

GALES-KINGSCLIFF

PTY LTD  
ABN: 75 093 540 080

# Annual Review

for the

## Cudgen Lakes Sand Quarry

1 July 2023 to 30 June 2024

*Compiled by:*



**RWC**orkery&co

September 2024



PTY LTD  
ABN: 75 093 540 080

# Annual Review

for the

## Cudgen Lakes Sand Quarry

### 1 July 2023 to 30 June 2024

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**Compiled for:**

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20 Ginahgulla Road  
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Ref No. 617/46

September 2024

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## Title Block

<b>Name of Operation</b>	Cudgen Lakes Sand Quarry
<b>Name of Operator</b>	Kingscliff Sands Pty Limited
<b>Development consent / project approval #</b>	Project Approval MP05_0103B
<b>Name of holder of development consent / project approval</b>	Gales-Kingscliff Pty Ltd
<b>Mining Lease #</b>	Not Applicable
<b>Name of holder of mining lease</b>	Not Applicable
<b>Water licence #</b>	WAL 40902
<b>Name of holder of water licence</b>	Gales-Kingscliff Pty Ltd
<b>MOP/RMP start date</b>	Not Applicable
<b>MOP/RMP end date</b>	Not Applicable
<b>Annual Review start date</b>	01/07/2023
<b>Annual Review end date</b>	30/06/2024
<p>I, Stephen Segal, certify that, to the best of my knowledge, this audit report is a true and accurate record of the compliance status of the Cudgen Lakes Sand Quarry for the period 1 July 2023 to 30 June 2024 and that I am authorised to make this statement of behalf of Gales-Kingscliff Pty Ltd.</p> <p><i>Note.</i></p> <p>a) <i>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.</i></p> <p>b) <i>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); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
<b>Name of authorised reporting officer</b>	Stephen Segal
<b>Title of authorised reporting officer</b>	Director
<b>Signature of authorised reporting officer</b>	
<b>Date</b>	30 September 2024

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# 1. Statement of Compliance

The compliance status of relevant approvals was reviewed for the reporting period and is summarised in **Table 1.1**. It was determined that, during the reporting period, there were a total of five non-compliances, two relating to EPL12385 and three relating to Project Approval MP05\_0103B. These non-compliances are further discussed in Section 11.

The non-compliances recorded during the reporting period have been ranked according to the risk matrix included in **Table 1.2**.

**Table 1.1**  
**Statement of Compliance**

Were all conditions of the relevant approval(s) complied with?	Yes / No
Project Approval MP05_0103B	No
Environment Protection Licence 12385	No

**Table 1.2**  
**Non-compliances**

Page 1 of 2

Relevant Approval	Condition	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
MP05_0103B	2(2)	Carry out the Project in accordance with the conditions of the approval.	Non-compliant	Non-compliances with the conditions of the approval were recorded.	Section 11
MP05_0103B	5(9)	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Proponent becomes aware of an incident	Non-compliant	The trigger action response plan (TARP) for water quality monitoring with the Soil and Water management Plan was exceed for a number of analytes during the reporting period. The TARP requires the reporting of these exceedances as an incident to DPHI.	Section 7.2, 7.3 and 11
MP05_0103B	5(10)	Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident.	Non-compliant		
EPL 12385	M2.1	Undertake monitoring in accordance with the locations, analytes, and frequency specified.	Non-compliant	Monitoring was unable to be undertaken at EPL Point 5 (MB10) due to the bore being damaged. A replacement bore is to be established / alternative site nominated.  This non-compliance was reported through the 2023/2024 Annual Return	Section 7.3 and 11

**Table 1.2 (Cont'd)**  
**Non-compliances**

Page 2 of 2

Relevant Approval	Condition	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
EPL 12385	E1.1	Bunding and spillways must be constructed in accordance with Mortons Urban Solutions Engineering Response submitted to the EPA on 11 December 2023, and maintained in accordance with the current Soil and Water Management Plan for the site.	Non-compliant	Bunding around the wider extent of the northern site has yet to be finalised. Notably the condition did not provide a timeframe for construction. Existing bunding around the pond remains in place.	Section 7.2

**Compliance Status Key**

Risk level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.
Medium	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>potential for serious environmental consequences, but is unlikely to occur; or</li> <li>potential for moderate environmental consequences, but is likely to occur.</li> </ul>
Low	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>potential for moderate environmental consequences, but is unlikely to occur; or</li> <li>potential for low environmental consequences, but is likely to occur.</li> </ul>
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).

## 2. Introduction

### 2.1 Overview of Operations

The Cudgen Lakes Sand Quarry (the Quarry) is located at Cudgen approximately 1km south of the Tweed River and 8km south of the New South Wales/Queensland Border (see **Figure 2.1**). Project Approval MP05\_0103B was granted 16 June 2009 and has since been modified as follows.

- a) Modification 1 (MOD 1) – 19 February 2016, including the addition of an initial processing area with operations planned to remain south of the existing alignment of Altona Road for a period of at least 5 years from commencement.
- b) Modification 2 (MOD 2) – 22 January 2019, including utilisation of the ‘Initial’ Processing Area as the long-term Processing Area, consolidation of the Northern and Southern Extraction Areas into a single lake and increase of the final lake batters to 1:3 (V:H).

The approved layout of the operations is shown in **Figure 2.2** whilst surrounding land ownership, residences and registered groundwater bores are shown in **Figure 2.3**.

Operations at the Quarry were physically commenced on 13 September 2016, site establishment activities commenced on 26 June 2017 and the first extraction campaign commenced 30 October 2017 and ceased on 8 February 2018. During April 2020 extraction operations recommenced and processing operations and road transportation of Quarry products commenced for the first time. Details on the activities undertaken during the reporting period are provided in Section 4.

The approval for the realignment of Altona Road (DA05/1450) was physically commenced in 2011 through the placement of sub-base material in the eastern section of the road realignment.

A further approval (DA 20/0965) was also determined by Tweed Shire Council on 12 May 2021 for the application of fill material to Lot 21 DP1082482 (the northern Quarry lot) to raise the level of land. The purpose of the fill in the short term will be to raise the level of the land to achieve improved pasture for existing grazing practices occurring on the land. In the medium to longer term the majority of the fill will be utilised to create future sports fields external to the lake area. With further filling to raise the land to the Q100 design flood level, and subject to development approval, some parts of the fill area may be used for alternative urban land use activities, as contemplated by Council’s Kingscliff Development Control Plan and Gales master planning.

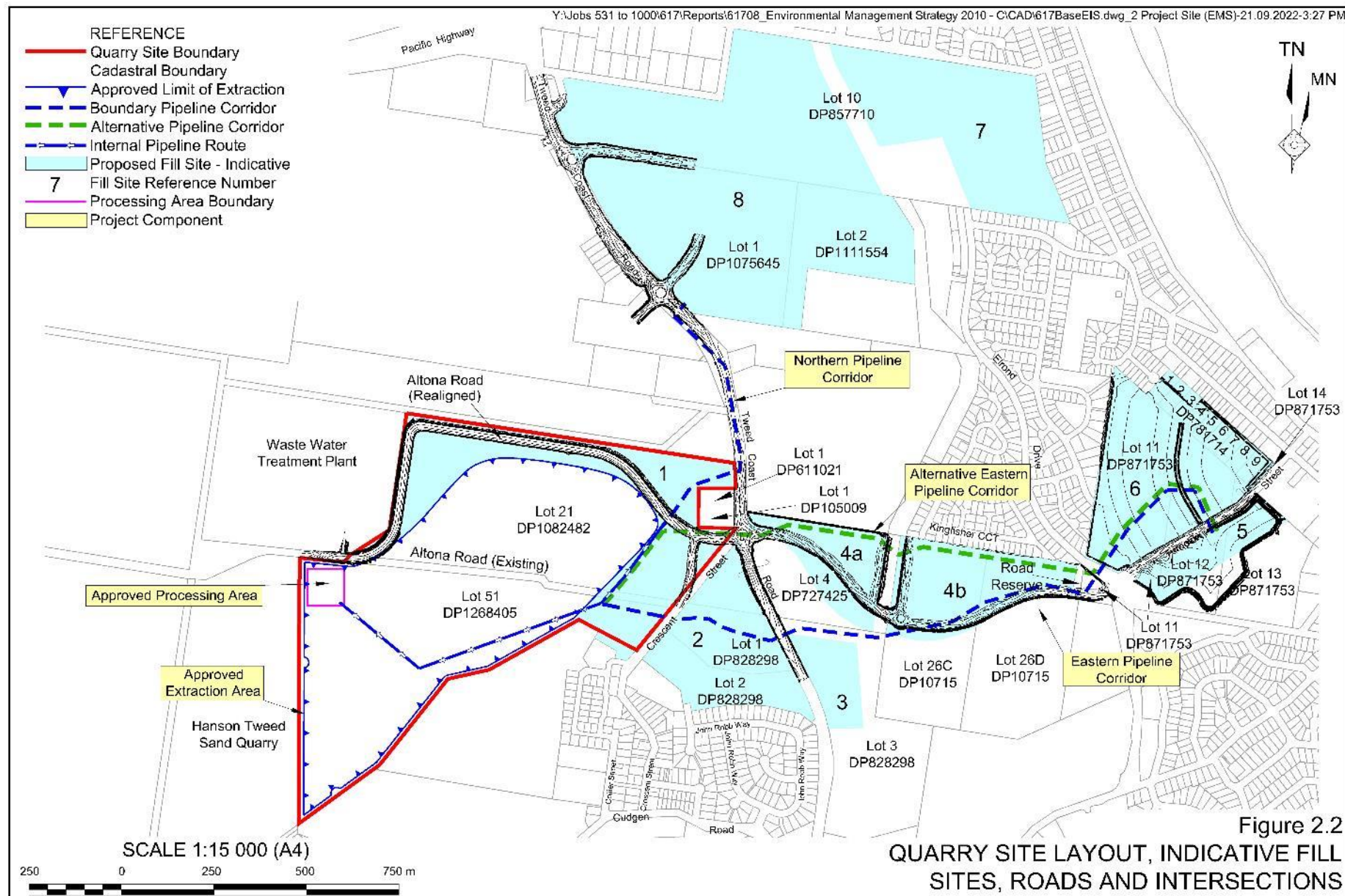
### 2.2 Scope and Format

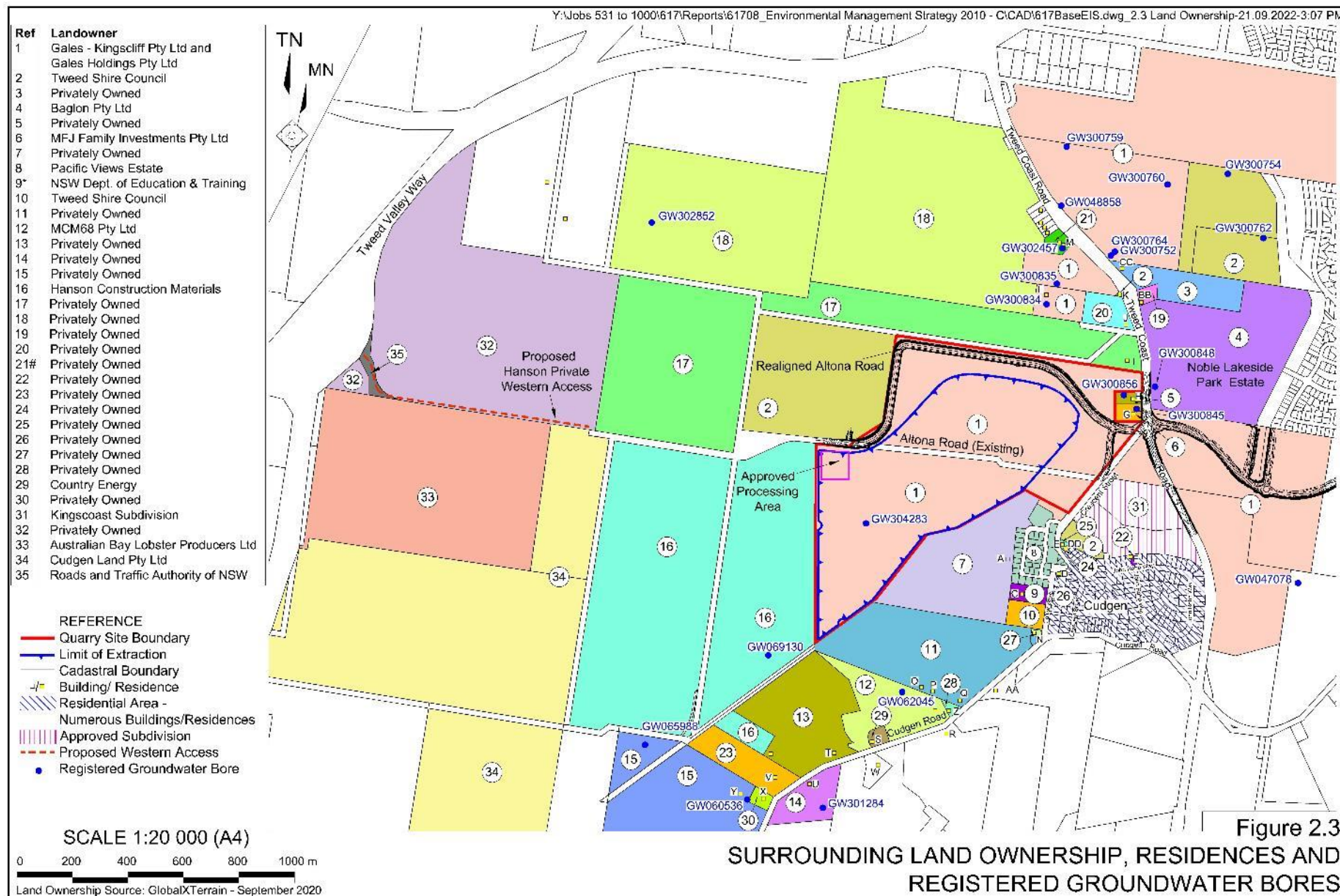
This is the fourteenth (14<sup>th</sup>) Annual Review submitted for the Quarry, following one Annual Environmental Management Report, and is applicable for the period 01 July 2023 to 30 June 2024 (“the reporting period”). The information presented within this Annual Review is based on information compiled by R.W. Corkery & Co. Pty. Limited and provided by Gales-Kingscliff Pty Limited (“the Company”), Kingscliff Sands Pty Limited, and HMC Environmental Consulting.











The report generally follows the format and content requirements identified in the *Annual Review Guideline* dated October 2015 and the approval and licencing requirements, as applicable for the reporting period.

## 2.3 Key Personnel Contact Details

The key personnel contact names, position and phone numbers during the reporting period are as follows.

Name	Company	Position	24 Hour Contact
Brad Holloway	Kingscliff Sands	Operations Manager	0449 965 772
Stephen Segal	Gales-Kingscliff	Director	0414 322 455



### 3. Approvals

The Quarry operates in accordance with the approvals listed in **Table 3.1**.

**Table 3.1**  
**Cudgen Lakes Sand Quarry – Consents, Leases and Licences**

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Project Approval MP05_0103B <sup>1</sup>	16/06/2009 MOD1 – 19/02/2016 MOD2 – 22/01/2019	31/12/2047	Issued by the (then) Department of Planning.
Environment Protection Licence 12385 <sup>1</sup>	18/11/2005 (licence version dated 09/02/2024)	Not Applicable	Issued by NSW Environment Protection Authority (EPA). Renewed annually.
Water Access Licence 40902	09/11/2016	Not Applicable	Issued by Water NSW. Includes 700ML water allocation. Nominated works 30CA321269.
Water Supply Works and Use Approval 30CA321269	01/07/2016	28/02/2031	Issued by Water NSW at commencement of <i>Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016</i> .
DA 05/1450	18/08/2006	Not Applicable	Issued by Tweed Shire Council for the realignment of Altona Road.
DA 20/0965 <sup>2</sup>	12/05/2021	Not Applicable	Issued by Tweed Shire Council for filling of land within Lot 21 DP1082482.
<sup>1</sup> A compliance review is included in <b>Appendix 1</b> reflecting the conditions relevant as at the end of this reporting period.			
<sup>2</sup> Activities associated with DA 20/0965 are not directly related to the Quarry and will be managed separately to activities undertaken under Project Approval MP05_0103B.			

A variation to EPL12385 was approved 9 February 2024 updating a number of water monitoring locations and requirements consistent with the approved Soil and Water Management Plan. There were no additional modifications or variations to any approvals or licences. A modification application for Project Approval MP05\_0103B is planned to be lodged during the next reporting period and is further discussed in Section 4.4.

It is noted that initial discussions with the Natural Resources Access Regulator (NRAR) in 2019 indicate that the Water Supply Works and Use Approval may have been issued in error. This is supported by the fact that, as the Quarry is a State Significant Development, Section 4.41 of the *Environmental Planning and Assessment Act 1979* states that a water use approval or water management work approval under the *Water Management Act 2000* is not required. Notwithstanding, the Water Access Licence and associated water allocation remain valid and are required for the ongoing operations.

## 4. Operations Summary

### 4.1 Extraction Operations

During the reporting period extraction activities focused upon sand recovery through dredging. Dredging was undertaken on a total of 209 days during the reporting period. A total of approximately<sup>1</sup> 176,773m<sup>3</sup> of sand was extracted during the reporting period. **Table 4.1** provides the production summary.

**Table 4.1**  
**Production Summary**

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Waste Rock / Overburden <sup>1</sup>	NA	0	0	0
ROM <sup>1</sup>	NA	0	0	0
Coarse Reject <sup>2#</sup>	NA	3,360m <sup>3</sup>	3,535m <sup>3</sup>	4,000m <sup>3</sup>
Fine Reject <sup>2^</sup>	NA	5,040m <sup>3</sup>	5,303m <sup>3</sup>	6,000m <sup>3</sup>
Saleable Product (transported by road)	300,000t [MP05_0103B Condition 2(9)]	248,966t	264,409t	300,000t
Total Extraction	650,000m <sup>3</sup> [MP05_0103B Condition 2(8)]	168,000m <sup>3</sup>	176,773m <sup>3</sup>	200,000m <sup>3</sup>
Imported VENM	45,000t [MP05_0103B Condition 2(10)]	0	0	0
<p>1. The Quarry does not generate waste rock / overburden or 'Run of Mine' material.</p> <p>2. Whilst some coarse materials and fines will be generated through sand washing, there are no approval limits applicable to these materials. It is also noted that the coarse reject comprises shells which are considered a raw material / product.</p> <p># Estimate based upon average of 2% of raw material comprising shells (stockpiled as a raw material).</p> <p>^ Estimate based upon average of 3% silt content washed and returned to the Silt Retention Pond.</p>				

### 4.2 Processing and Road Transportation

During the reporting period Gales-Kingscliff maintained the use of the previously installed CDE sand wash plant, EvoWash, and radial stacker. All dredged sand, i.e. a total of approximately 176,773m<sup>3</sup> of sand was processed through the wash plant during the reporting period.

During the reporting period a total of 264,409t of products were transported from the Quarry by road. The highest daily number of truck loads occurred on 19 July 2024 with 74 laden-trucks dispatched, however, truck transport was highly variable, with an average of 22 truck loads per day being dispatched during the reporting period.

<sup>1</sup> Bulk density testing indicates a loose density of 1.36t/m<sup>3</sup> and 'tight' (in-situ) density of 1.5t/m<sup>3</sup>. Extraction volumes are based upon conversion of measured tonnes to in-situ volume.

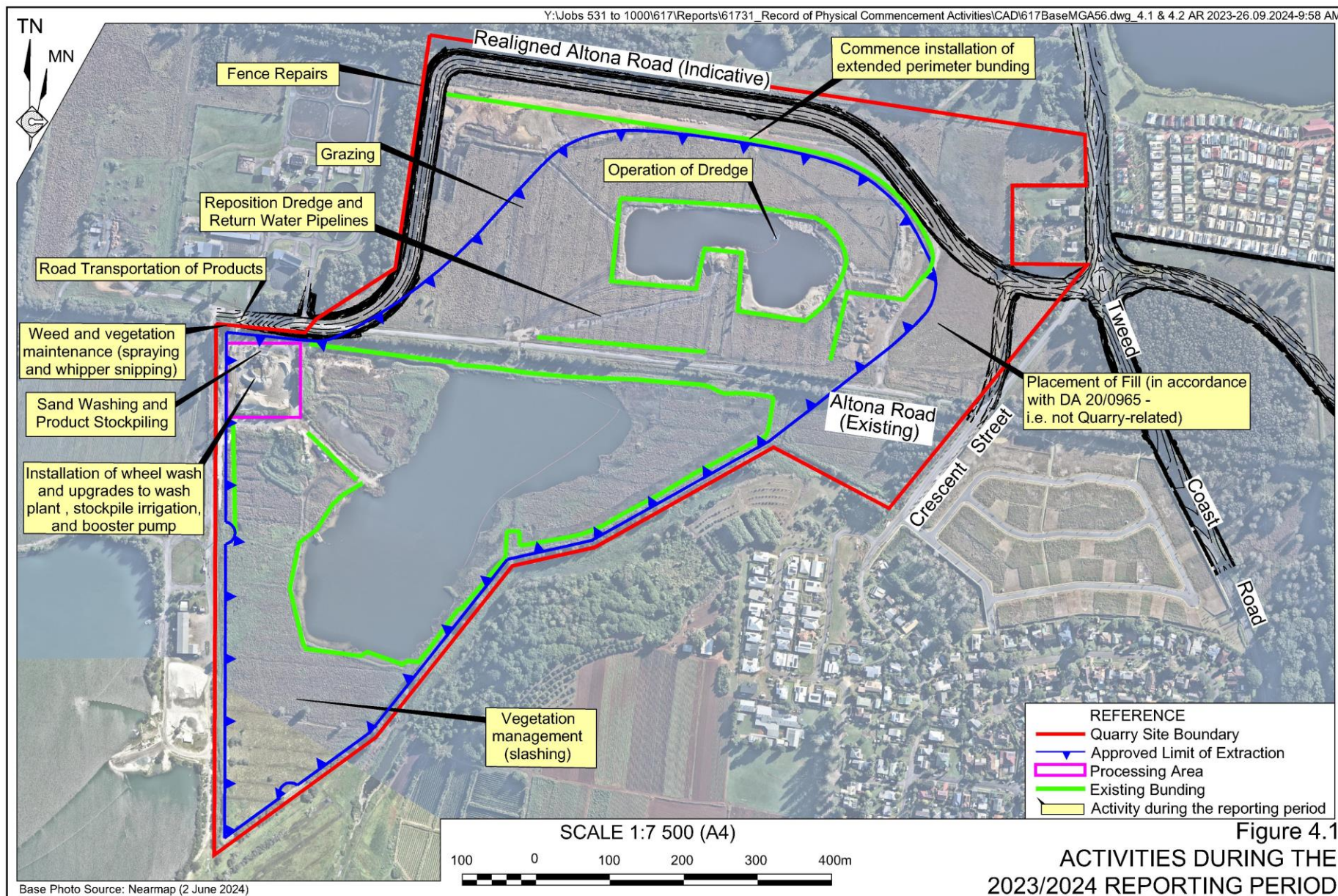
### 4.3 Other Operations During the Reporting Period

The status of the Quarry at the end of the reporting period is presented in **Figure 4.1** and a summary of other Quarry related activities during the reporting period provided as follows.

- The fixed wash plant was maintained, including regular checks of machinery, including the dredge and loader, and services, and maintenance of the electrical switch board.
- The fixed wash plant was upgraded in February 2024, including the addition of a booster pump, wheel wash, and stockpile irrigation for dust suppression.
- Continued maintenance of surface water control and drainage structures, including maintenance of the channel providing water from the dredge pond to the wash plant.
- Continued environmental monitoring, including noise, air quality, and water monitoring. Results of this monitoring are summarised in Sections 6 and 7.
- Repair and maintenance of fencing to the northern extraction area due to damage caused by grazing.
- Vegetation maintenance around the site office and entrance to the processing area including weed spraying and whipper snipping and slashing of the southern section of the Quarry Site.
- The Rehabilitation Management Plan (RMP) prepared for the Quarry was approved on 1 February 2024 and uploaded to the website.
- The Rehabilitation Cost Estimate (RCE) for the Quarry was reviewed and updated following approval of the RMP. Additional comments were received from DPHI in relation to the inclusion of revegetation of the lake perimeter, final landform creation, and various other aspects of Quarry rehabilitation. The RCE was subsequently updated and approved by DPHI on 18 June 2024. Consultation with DPHI and DCCEEW Water in relation to the Rehabilitation Bond held by DCCEEW for the Quarry remained ongoing at the time of this report.
- A Groundwater Assessment was prepared by Australasian Groundwater and Environmental Consultants Pty Ltd and submitted to address Project Approval MP05\_0103B Schedule 3 Condition 25 which requires an updated groundwater model to be prepared prior to extracting beyond the previously proposed realigned Altona Drive. Approval of the submitted report remains pending.
- An update to the Soil and Water Management Plan (SWMP) was prepared to reflect the status of water monitoring bores, water monitoring analytes, and other minor updates. The updated SWMP was submitted for consultation in December 2023. Consultation comments have been received and are to be addressed following resolution of the Schedule 3 Condition 25 Groundwater Assessment.

Non-Quarry related filling operations north of Altona Road also continued in accordance with the Council Development Consent DA20/0965.







## 4.4 Next Reporting Period

Activities planned to be undertaken during the next reporting period are summarised as follows and displayed on **Figure 4.2**.

### Extraction, Processing and Transportation

Extraction will continue during the next reporting period by both dredge and, if required, excavator/front-end loader for the production of saleable products within the processing area, including sand and soil products. These products will be transported via road. The volume of products will be dependent upon customer demand but has nominally been estimated at (but would not exceed) 300,000t (approximately 200,000m<sup>3</sup>). Based on the predicted volumes, extraction would extend further to the west of the dredge pond north of Altona Road and, subject to approval of the Schedule 3 Condition 25 Groundwater Assessment, further north towards the approved northern limit of extraction (see **Figure 4.2**).

Further dredging for hydraulic transfer of sand to fill sites is considered unlikely during the next reporting period.

### Monitoring

Noise, air quality, and water monitoring will continue to be undertaken as applicable and in accordance with the conditional requirements of Project Approval MP05\_0103B and the approved management plans. Acid sulfate soil testing will also be undertaken as required for any products which are not washed through the wash plant.

### Other Activities

Approval for the updated Soil and Water Management Plan (SWMP) will be sought following approval of the Groundwater Assessment submitted in accordance with Schedule 3 Condition 25 of the Project Approval. The updated SWMP will include additional groundwater monitoring bores as proposed within the Groundwater Assessment.

Further assessment of the rehabilitation status of the Quarry Site is intended to be undertaken. This will form the basis for rehabilitation planning and potential further review of the RMP. Planned rehabilitation activities are further discussed in Section 8.

A modification application, MOD4, will be submitted during the next reporting period seeking the following.

- Realignment of the northern section of the Extraction Area from east to west to permit the realisation of final land uses in the eastern section of the Quarry Site at an earlier date.
- Expansion of the existing 1ha processing area to approximately 3.3ha to provide sufficient space for a stockpile of washed sand. This would include extension / relocation of the existing amenity bunding to the extent of the expanded processing area.
- Construction and operation of a 2.25ha northern processing area to the north of Altona Road.



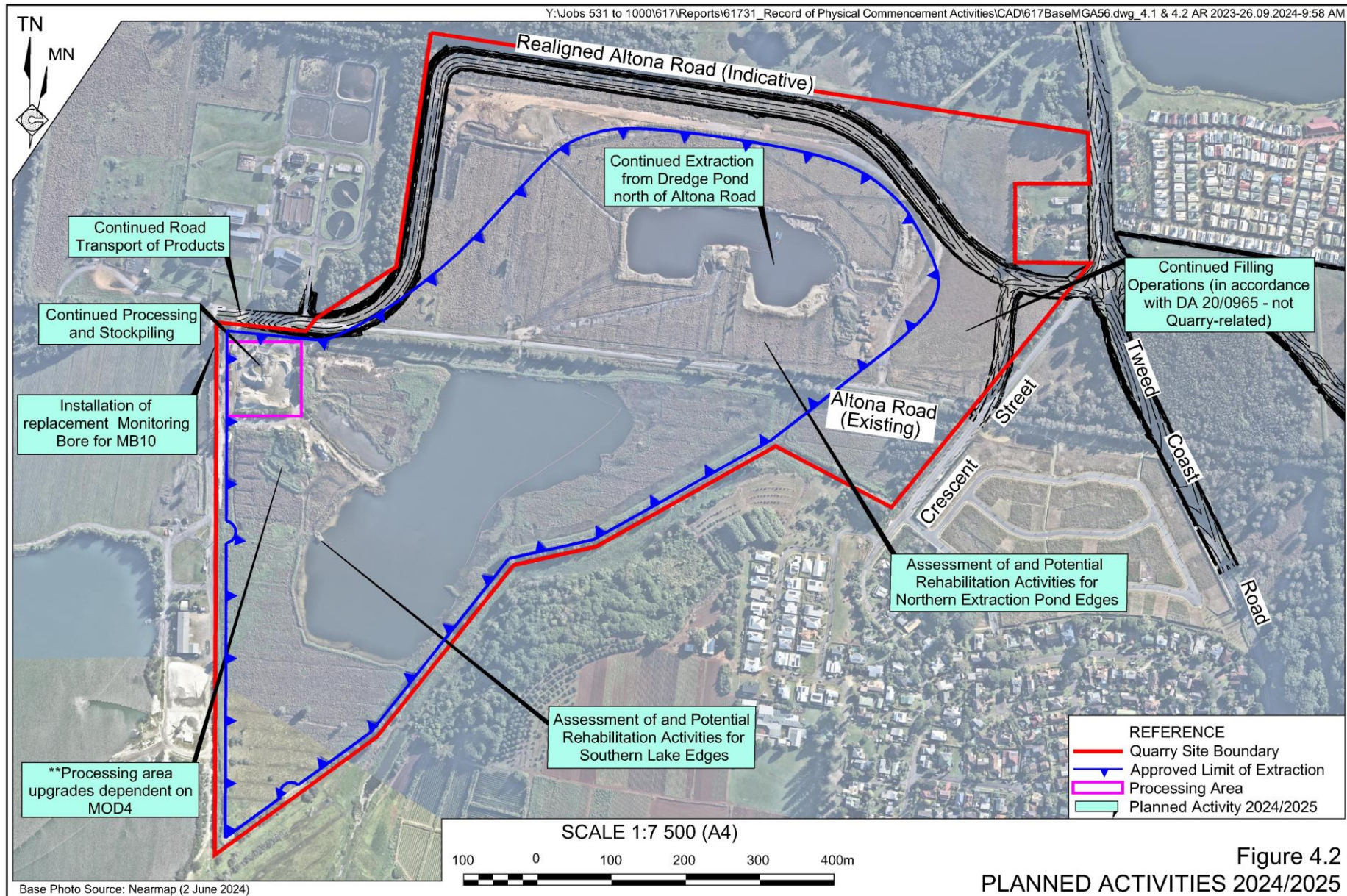


Figure 4.2  
PLANNED ACTIVITIES 2024/2025

- Increase the rate of road transportation from 300,000tpa to 500,000tpa.
- Increase the rate of material importation from 45,000tpa to 150,000tpa.
- Increase road transportation limits with an additional 30 laden trucks per hour via the eastern, widened access from Altona Road only.
- Various proposed updates to the Statement of Commitments.

Depending on the approval status of MOD4, components of the above may commence during the next reporting period.



## 5. Actions Required from Previous Annual Review

The 2022/2023 Annual Review was submitted to the (then) Department of Planning and Environment (DPE) via the Major Project Portal on 28 September 2023. A copy of the 2022/2023 Annual Review was also separately emailed to Tweed Shire Council, Water NSW, NRAR, and EPA. The 2022/2023 Annual Review was receipted by DPE on 28 September 2023 and accepted 24 October 2023. Specific follow up actions were provided and included the following.

1. *Schedule 5, Condition 13b: requires that the Annual Review includes a comprehensive review of the monitoring results and complaints records of the Project over the previous financial year. This includes a comparison of these results against the relevant statutory requirements, limits or performance measures/criteria, requirements of any plan or program required under the approval, monitoring results of years prior, and relevant predictions in the documents listed in condition 3 of Schedule 2. NSW Planning notes:*

- a) that a comparison of the monitoring results for noise and air quality against previous years has not been provided; and*
- b) that a comparison of the monitoring results against the relevant predictions in the documents listed in Schedule 2, Condition 3.*

*NSW Planning requests that in future, Annual Reviews adequately provide a comparison of the monitoring results against the monitoring results of previous years, and the relevant predictions in the documents listed in Schedule 2, Condition 3 of the Approval.*

2. *Schedule 5, Condition 13d: requires that Annual Reviews evaluate and report on the effectiveness of the noise and air quality management systems, and compliance with the performance measures, criteria and operating conditions in this Approval. NSW Planning notes that the 2022-2023 Annual Review does not provide an evaluation of the noise and air quality management systems. NSW Planning requests that in future, Annual Reviews adequately evaluate and report on the effectiveness of the noise and air quality management systems.*

The (then) DPE also requested the 2022/2023 Annual Review be published on the Company's website.

A comparison of the monitoring results against the monitoring results of previous years and against the predictions in previous assessments supporting MP05\_0103B has been included in Section 6. An evaluation of the effectiveness of noise and air quality management systems has also been reported on in Section 6 where applicable.



## 6. Environmental Performance

### 6.1 Summary of Environmental Performance

A summary of environmental performance for the principal environmental aspects is provided in **Table 6.1**. Further detail regarding specific environmental aspects is also provided in the following subsections. Environmental performance relating to water is discussed in Section 7.

**Table 6.1**  
**Environmental performance**

Aspect	Approval criteria / EIS prediction	Performance during the reporting period	Trend/key management implications	Implemented/proposed management actions
Noise	47dB(A) day & evening. 44dB(A) shoulder.	No complaints were received. Calculated noise contributions from the Quarry were below the project-specific noise criteria during operational periods.	No trends identifiable. Currently no management implications.	No other specific management measures were required during the reporting period.
Blasting	Blasting is not an approved activity.	No blasting undertaken.	Nil.	Nil.
Air Quality	PM <sub>10</sub> 24hr = 50ug/m <sup>3</sup> PM <sub>10</sub> Annual = 30ug/m <sup>3</sup> TSP Annual = 90ug/m <sup>3</sup> Dep Dust Annual = 4g/m <sup>2</sup> /month	No complaints were received. No elevated dust as a result of Quarry activities. Deposited dust remained within criteria.	No trends identifiable. Currently no management implications.	No other specific management measures currently proposed.
Biodiversity	Establish rehabilitation bond. No significant impacts predicted.	No native vegetation was disturbed.	No trends applicable. Currently no management implications.	The original rehabilitation bond for \$163,375 was lodged and accepted by DPE 12/04/17. An updated rehabilitation bond calculation was approved by DPHI on 18 June 2024 for \$340,263.
Heritage	Prepare Aboriginal Cultural Heritage Management Plan. No items of heritage have been located.	No heritage items were identified or disturbed.	No trends applicable. Currently no management implications.	No further specific management measures currently proposed.
Acid Sulfate Soils	Manage acid sulfate soils in accordance with an Acid Sulfate Soil Management Plan.	No acid sulfate soil issues were identified. No unwashed sand was produced during the reporting period.	No acid generation potential has been identified in topsoil (upper 250mm of soil). Topsoil is not considered an acid sulfate soil risk. Revised management measures outlined in updated management plan approved 20 July 2021.	Implementation of updated Acid Sulfate Soil Management Plan.

## 6.2 Meteorological Monitoring

Meteorological monitoring is undertaken utilising an on-site automatic rain gauge (installed 1 January 2017) and the Bureau of Meteorology's Coolangatta BOM 070717. A summary of the rainfall data during the reporting period is presented in **Table 6.2** whilst monthly wind roses are presented in **Figures 6.1a** and **6.1b**.

**Table 6.2**  
**Monthly Rainfall Records**

Period	Average Monthly Rainfall (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
2017	142.8	55.6	444.0	28.6	100.2	211.8	15.6	6.2	1.0	212.4	142.0	77.2	1437.4
2018	60.8	239.0	147.0	49.8	44.4	40.0	19.2	0.0	12.2	86.8	49.2	97.8	846.2
2019	10.4	71.2	227.8	66.0	55.4	145.4	22.2	6.8	9.6	42.8	12.8	72.0	742.4
2020	283.0	702.2	195.6	34.0	62.6	77.2	146.2	7.0	35.2	80.2	15.6	534.8	2173.6
2021	116.6	193.0	546.8	207.0	93.4	35.2	79.4	23.8	49.0	199.6	127.4	236.6	1907.8
2022	193.2	624.6	447.2	116.0	211.2	17.0	176.6	21.2	157.6	175.2	35.4	131.4	2306.6
2023	112.2	203.8	84.4	51.6	144.2	19.0	47.8	45.4	35.1	78.7	279.8	125.9	1227.9
2024	306.7	176.3	240.4	242	240.8	19.1	-	-	-	-	-	-	-
Bold italics = values relevant to this reporting period.													

Total rainfall during the 2023/2024 reporting year was 1838.0mm, 135.3mm above the long-term average rainfall of 1702.7mm recorded at the Tweed Heads Gold Club Station No. 58056. The month with the lowest recorded rainfall was June 2024 with 19.1mm, while the month with the highest was January 2024 with 306.7mm.

## 6.3 Noise

### Environmental Management

Noise management was undertaken in accordance with the approved Noise Management Plan as relevant. The principal noise management measures during the reporting period included the use of broadband reversing alarms, proper equipment maintenance, and adherence to operational hours. The impact assessment considered both the established impact assessment criteria and the cumulative noise criteria.

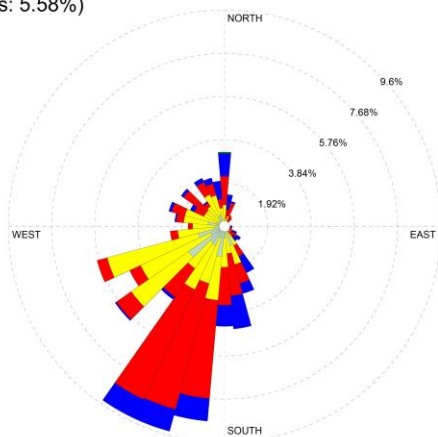
### Environmental Performance

During the reporting period noise monitoring was undertaken annually in accordance with the approved Noise Management Plan. Noise monitoring was undertaken 20 December 2023.

Y:\Jobs 531 to 1000\617\Reports\61746\_AR 2024\CAD\617 Wind Roses.dwg\_22-23-29.08.2024-5:03 PM

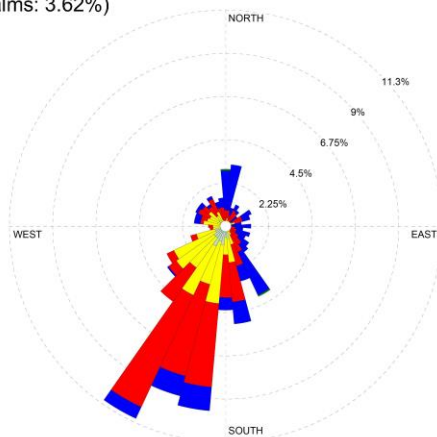
July 2023

(Calms: 5.58%)



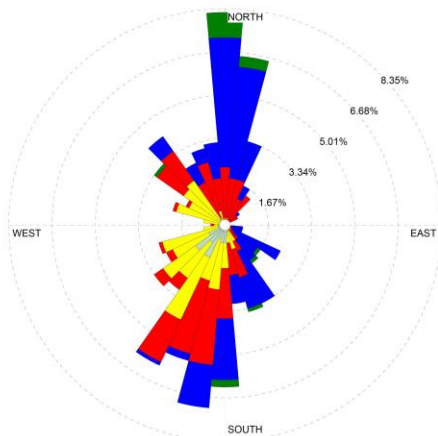
August 2023

(Calms: 3.62%)



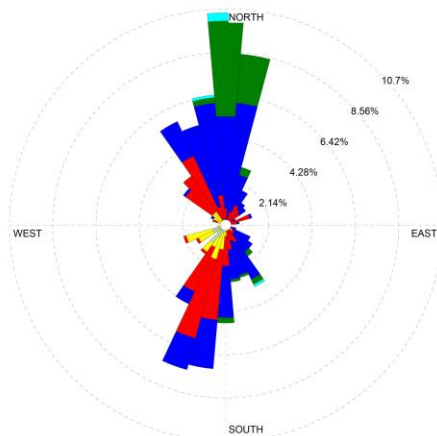
September 2023

(Calms: 1.67%)



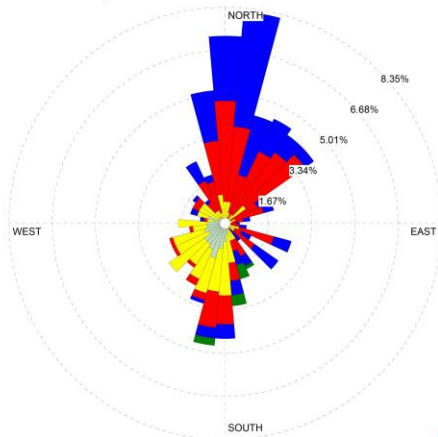
October 2023

(Calms: 1.61%)



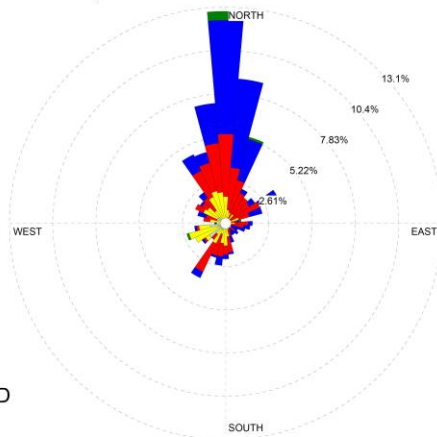
November 2023

(Calms: 3.61%)



December 2023

(Calms: 3.36%)

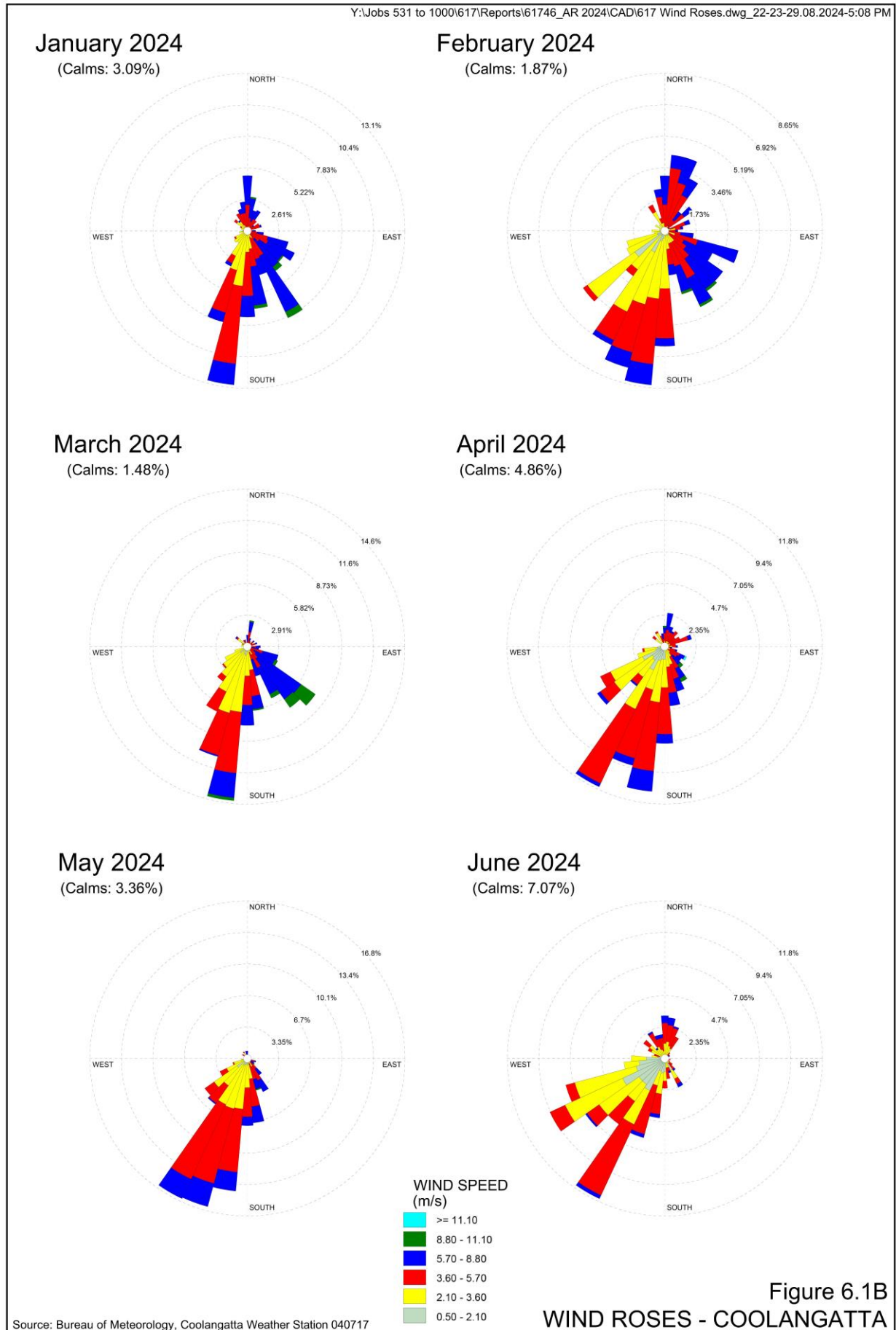


WIND SPEED  
(m/s)



Source: Bureau of Meteorology, Coolangatta Weather Station 040717

Figure 6.1A  
WIND ROSES - COOLANGATTA



A summary of the monitoring results for the reporting period is provided in **Table 6.3** and a copy of the monitoring report is provided as **Appendix 2**. In summary, total noise levels at all monitoring locations exceeded the project-specific criteria (47dB(A) LA<sub>eq(15 min)</sub>) during monitoring, except at location G, which recorded a value of 46dB(A) LA<sub>eq(15 min)</sub>. However, noise from the Cudgen Lakes Sand Quarry could not be isolated and, in most cases, was not distinguishable or measurable due to the continuous nature of the surrounding noise sources (e.g. traffic noise from Pacific Highway and Tweed Coast Road). As a result, Quarry specific noise levels could not be measured through direct monitoring at the specified monitoring locations.

**Table 6.3**  
**Summary of Attended Noise Monitoring Results (December 2023)**

Location <sup>1</sup>	Criteria	Attended Monitoring	Calculated Contribution <sup>2</sup>	Comments
	dB(A) LA <sub>eq(15 min)</sub>			
<b>G</b> 216 Tweed Coast Rd	47	46	42	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
<b>O</b> 607 Cudgen Rd	47	48	45	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible or measurable above background.
<b>Pacific Views Estate</b> Via Collier St	47	50	46 (46)	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible or measurable above background
<b>DD</b> 34A Crescent St	47	48	43 (33)	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
<b>F</b> 64 John Robb Way	47	48	42 (32)	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.
Note 1: See <b>Figure 7.1</b> .				
Note 2: Based on measurements of noise at 20m from operational equipment plus distance attenuation for receivers. Values in brackets ( ) include additional attenuation for the location not being in line of site of Quarry activities.				
Source: Craig Hill Acoustics.				

In order to assess compliance and in accordance with the approved NMP, near-field measurements of noise generated by equipment operating at the Quarry were undertaken. The contribution of each item was then calculated using attenuation associated with the distance of equipment from monitoring locations and then combined to provide a total calculated noise contribution from the Quarry.

The calculated contributions were all below the project-specific noise criteria, with the highest contribution calculated as 46dB(A) at the Pacific Views Estate monitoring location.

No Quarry-related noise complaints or enquiries were received during the reporting period. Calculations of the measured noise levels from the operating equipment on-site suggest that the operations would remain within the 47LA<sub>eq</sub> criteria and are unlikely to significantly contribute to the 50LA<sub>eq</sub> cumulative criteria. Additionally, an analysis of pre-project data reveals that the ambient LA<sub>eq</sub> levels during the day and evening rarely fall below the project's design thresholds, complicating the process of identifying compliance.

A summary of previous noise monitoring results is presented in **Table 8.1** of **Appendix 2**. In summary, noise monitoring within the reporting period was considered to be generally consistent with previous monitoring results. A review of the noise monitoring results during the reporting period against the predicted noise levels identified in the original 2008 Environmental Assessment for the Quarry indicates that the Quarry is currently operating under the predicted noise levels for the operational status.

As noise monitoring result indicate a pattern generally consistent with previous monitoring data and predicted levels, it is considered that the current noise management practices for the Quarry have remained effective.

### Reportable Incidents and Further Improvements

No exceedances of noise criteria were recorded and currently no further improvements are planned.

## 6.4 Air Quality

### Environmental Management

During the reporting period loading and transportation of products occurred regularly, however, extraction and processing activities occurred intermittently.

The principal dust management measure was ongoing visual monitoring and, if required, use of sprinklers to dampen the road surfaces within the processing area. Sand is principally extracted through dredging and is wet processed. Where soil and sand were extracted / recovered from stockpiles by excavator, the material was moist and only transported a short distance. Whilst no issues have previously occurred, stockpile sprinklers were installed during the reporting period to provide for efficient dust suppression during dry periods.

### Environmental Performance

The results of deposited dust monitoring at three locations (see **Figure 7.1**) during the reporting period are presented in **Table 6.4** whilst the results of all deposited dust monitoring undertaken to date are provided in **Appendix 3**.

At location DG3, the samples for July and November 2023, as well as January 2024, were contaminated with high levels of organic matter, affecting the measurements, and were excluded from the statistical summary as determined through consultation with the monitoring consultants HMC. Similarly, at location DG2, the samples from November 2023 were excluded due to contamination. Samples for all three monitoring locations during May 2024 were collected outside of the date range (due to inaccessibility flooding) and were considered invalidated due to overflows.

Throughout the reporting period the rolling average monthly deposited dust levels remained below the criteria of  $4\text{g/m}^2/\text{month}$ . This is consistent with the low intensity of activities and the significant rainfall throughout the reporting period.



The highest single monthly result of 13.70g/m<sup>2</sup> was recorded at location DG1 during the January 2024 monitoring period. DG1 was noted to contain fine organic matter, bugs, algae and twigs, however, the sample was not considered to be contaminated. Elevated levels may be attributable to filling activities associated with DA20/0965 which were occurring directly adjacent DG1.

**Table 6.4**  
**Summary of Deposited Dust Monitoring Results – 2023/2024**

Samples On	Samples Off	Month	Deposited Dust (g/m <sup>2</sup> /month)					
			DG1		DG2		DG3	
			Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average
23/06/2023	25/07/2023	Jul-23	0.62	1.25	1.59	2.22	*51.08	0.66
25/07/2023	23/08/2023	Aug-23	0.34	1.01	2.32	2.16	1.26	0.77
23/08/2023	19/09/2023	Sep-23	0.22	0.72	6.29	2.22	1.04	0.86
19/09/2023	25/10/2023	Oct-23	0.45	0.61	8.23	2.70	3.29	1.04
25/10/2023	22/11/2023	Nov-23	4.99	0.92	*23.89	2.70	*67.9	1.10
22/11/2023	20/12/2023	Dec-23	1.23	0.99	1.94	2.79	3.09	1.44
20/12/2023	19/01/2024	Jan-24	13.70	2.23	8.79	3.57	*65	1.59
19/01/2024	21/02/2024	Feb-24	0.13	2.19	0.05	3.53	NS	1.81
21/02/2024	22/03/2024	Mar-24	0.47	2.04	0.1	3.22	0.61	1.66
22/03/2024	22/04/2024	Apr-24	2.63	2.17	0.82	3.22	2.92	1.99
22/04/2024	31/05/2024	May-24	NS	2.31	NS	3.26	NS	1.84
31/05/2024	31/06/2024	Jun-24	3.70	2.59	1.9	3.20	3.1	2.19
<b>Monthly Minimum</b>			<b>0.13</b>	-	<b>0.05</b>	-	<b>0.61</b>	-
<b>Monthly Maximum</b>			<b>13.70</b>	-	<b>8.79</b>	-	<b>3.29</b>	-
<b>Average 2023/2024</b>			<b>2.59</b>	-	<b>3.20</b>	-	<b>2.19</b>	-
<i>ID – Insufficient data to calculate      NT – Not Tested (sample broken in transit)</i> <i>NS – No sample collected due to inaccessibility from flooding and resultant sample invalidation / overflow (May 2024) or due to courier breaking bottles in transit (February 2024).</i> <i>* Sample contaminated and not included in statistical summary</i>								

Wind direction for the reporting period was consistent with previous reporting period with winds predominantly originating from the southwest except for Spring to early Summer months, when winds predominately originated from the north. Calm periods vary slightly, with July 2023 and June 2024 being notable for their higher calm percentages and wider wind variability. Wind roses for the reporting period are presented as **Figure 6.1A** and **Figure 6.1B**.

No air quality complaints were received during the reporting period.

Historic air quality monitoring results are presented as **Appendix 3**. A review of the results for the reporting period against data for previous periods indicate that the results for the reporting period are consistent with previous data and the rolling annual average remains below the relevant criteria. Air quality monitoring results during the reporting period are also considered to be generally consistent with the predicted deposited dust levels identified in the original 2008 Environmental Assessment for the Quarry (which ranged from 1.6 to 2.8g/m<sup>2</sup>/month) with the exception of isolated spikes which have not been attributed to Quarry operations. It is therefore considered that the air quality management systems currently in place at the Quarry remain effective.

## Reportable Incidents and Further Improvements

No reportable air quality incidents occurred during the reporting period. In accordance with the AQMP, air quality monitoring will continue during the next reporting period whilst operational activities continue. Further discussions relating to the suitability of current air quality monitoring locations were held during the reporting period and may continue into the next reporting period. If appropriate, an amendment to the AQMP will be prepared during the next reporting period to reflect the any proposed updates to monitoring.

## 6.5 Biodiversity

The rehabilitation bond for \$163,375 was previously lodged and accepted by the (then) DPE on 12 April 2017. In accordance with *Condition 3(35)* of MP05\_0103B the rehabilitation bond was further reviewed and updated during the reporting period in response to feedback from DPHI. The updated RCE was subsequently approved by DPHI on 18 June 2024 with a bond amount of \$340,263. Notably, consultation with DPHI and DCCEEW Water remain ongoing in relation to an existing additional \$250,000 rehabilitation bond held by DCCEEW for the Quarry which may duplicate rehabilitation provisions.

No disturbance of native vegetation was required during the reporting period and no specific biodiversity management measures, or monitoring was deemed necessary. No incidents occurred during the reporting period and no further improvements are currently planned. However, further assessment of the rehabilitation status of the Quarry Site is intended to be undertaken. This will form the basis for rehabilitation planning and potential further review of the RMP and is further discussed in Section 8.

## 6.6 Heritage

### Environmental Management

The Quarry Manager and Operations Manager for Kingscliff Sands Pty Limited were previously inducted by the Tweed Local Aboriginal Land Council on 16 March 2020 in accordance with the approved Aboriginal Cultural Heritage Management Plan. No further management measures were required during the reporting period.

### Environmental Performance, Reportable Incidents, and Further Improvements

No Aboriginal heritage sites were identified during the reporting period no reportable incidents occurred. No further improvements are currently planned or deemed necessary.

## 6.7 Acid Sulfate Soils

### Environmental Management

During the reporting period no land-based extraction of sand was undertaken / raw sand products were produced. As such, no acid sulfate soil testing was required. It is noted that, based upon the updated Soil and Water Management Plan (SWMP) approved 20 July 2021, testing of soil material (the upper 250mm of profile) is no longer required.



## Environmental Performance, Reportable Incidents, and Further Improvements

No reportable acid sulfate soil incidents occurred during the reporting period. Currently no further improvements to acid sulfate soil management are planned. The results of ongoing testing will continue to be reviewed and, where appropriate, updates to the SWMP sought to rationalise testing.

## 6.8 Other Environmental Management Aspects

In accordance with MP05\_0103B *Condition 3(40)*, a summary of waste management is also provided. As discussed in Section 4.1, it is estimated that less than 2% of the washed material was oversize and consisted almost entirely of shells. The shells have been stockpiled and are considered a raw material and is being assessed for incorporation into products. It is also estimated that on, on average, less than 3% of washed material was fines material. All fines were returned to the Silt Retention Pond to settle at depths of at least 4m below water.

In relation to non-production wastes, Council domestic general waste and recycling services are available to the site. Non-production wastes volumes are minimal and include lunch, domestic style and consumable wastes which were managed through the 240L bins provided by Council. The site portaloo continued to be serviced on an as required basis by Kingscliff Hire, a licenced service provider.

## 7. Water Management

### 7.1 Water Take

Applicable water licencing held for the Quarry operations include Water Supply Works and Use Approval 30CA321269 and Water Access Licence (WAL) 40902, which has a water share component of 700ML. The Quarry Site is located within the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016*, which commenced on 1 July 2016.

Water take during the reporting period totalled approximately 141.9ML and is estimated to be comprised of the following components.

- Extraction of  $176,773\text{m}^3$  sand<sup>2</sup> = 123.7ML.
- A 10% water loss through incorporation into products = 17.7ML.
- Water utilised for dust suppression = 0.542ML.

As no sand was hydraulically transferred to fill sites, no tailwater losses occurred during the reporting period.

### 7.2 Surface Water

#### Environmental Management

The principal surface water management measure is bunding which has been installed around both the extraction ponds to prevent both external water from running into the extraction area and to prevent water from discharging from within the extraction area (excluding during flood events).

Further bunding around the outer perimeter of the northern dredge pond was also formed during the reporting period and will be completed during the next reporting period to provide for the maximum future extent of extraction north of the existing Altona Road. Stripped topsoil and disturbed areas not required for ongoing operations have previously been temporarily rehabilitated through the re-establishment of pasture grass.

Additionally, a Silt Return Pond and return channel between the processing area and pond with a pipe over 3m below the water surface has been created to provide for the effective return of fines.

No further surface water controls were required during the reporting period.

It is noted that surface water management for filling operations north of Altona Road are undertaken in accordance with Council DA 20/0965.

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<sup>2</sup> Conservatively assume that 100% of sand is extracted from below the water table. As per the approved *Soil and Water Management Plan*, the volume of groundwater inflow required to replace  $1\text{m}^3$  of sand extracted from below the water table is conservatively estimated to be  $0.7\text{m}^3$  (i.e. 700L).

## Environmental Performance

Water monitoring during the reporting period was undertaken within the extraction pond (north and south of existing Altona Road) and surrounding groundwater bores during both non-operational periods and operational periods. Dredging operations and processing of extracted material occurred over a total of 209 days during the reporting period, with a maximum continuous operating period of 6 days.

In reviewing and interpreting the monitoring results it should be noted that the extraction pond effectively represents a 'window' into the groundwater table and is therefore interconnected with the surrounding groundwater aquifer. Results of monitoring within the surrounding groundwater monitoring bores is provided in Section 7.3.

Monitoring was undertaken at three locations within the southern lake including two edge locations (DP2 and DP3) as well as one in the approximate centre of the pond (DP1), and one monitoring location on the edge of the northern dredge pond (DP4) (see **Figure 7.1**). Monitoring at 1m or 2m depth intervals to the bottom of the extraction pond also occurs at monitoring location DP1 at a 6-monthly frequency.

It is noted that no monitoring was undertaken in January 2024 due to high rainfall events and poor drainage resulting in all sites being deemed inaccessible to undertake sampling.

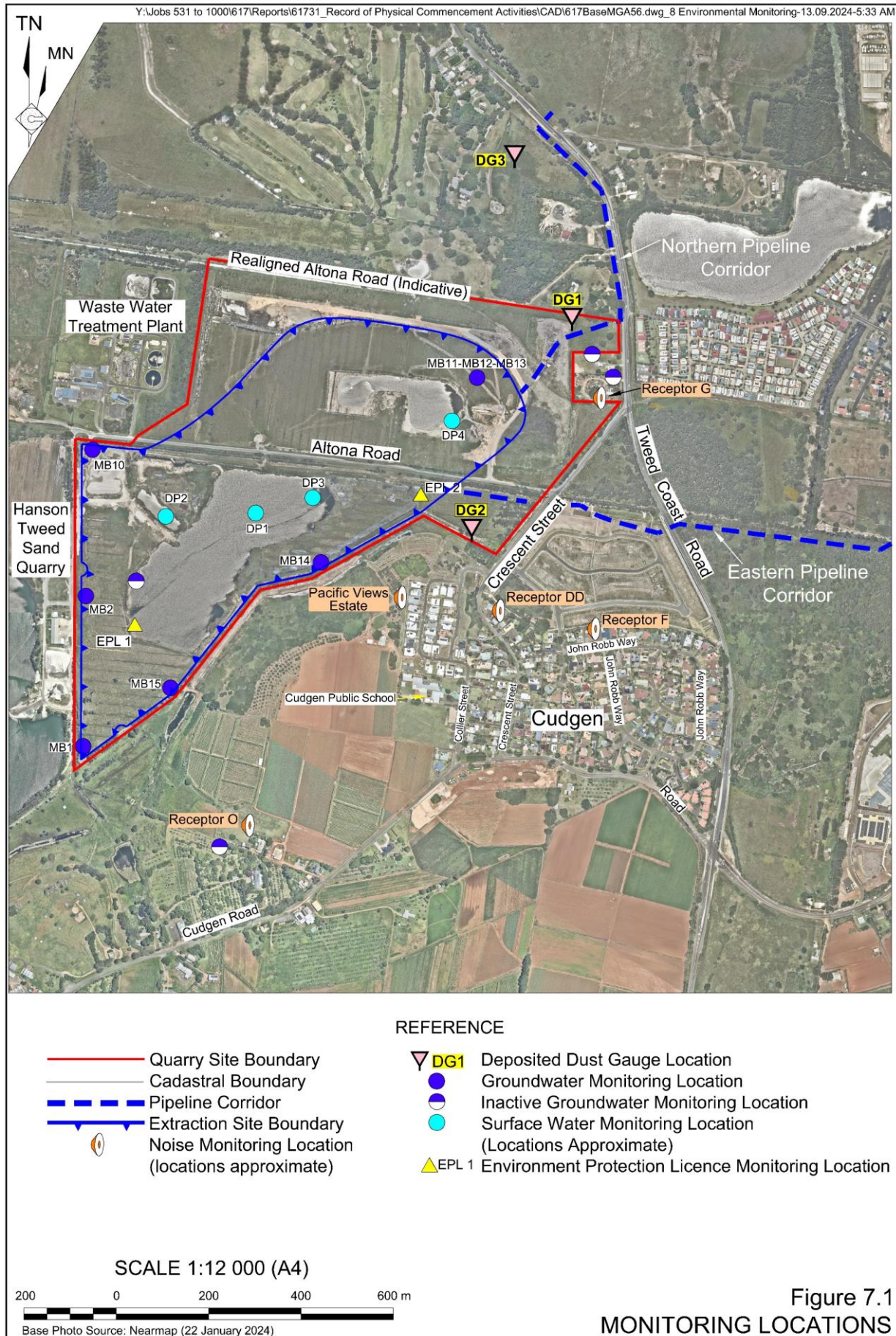
A summary of the surface water monitoring results is provided in **Table 7.1** and key analytes and historical trends are displayed graphically in **Figure 7.2**. A full copy of the raw data is presented in **Appendix 4**. As no discharges occurred during the reporting period, no monitoring was undertaken at the EPL monitoring locations positioned at the extraction pond spillways (see **Figure 7.1**).

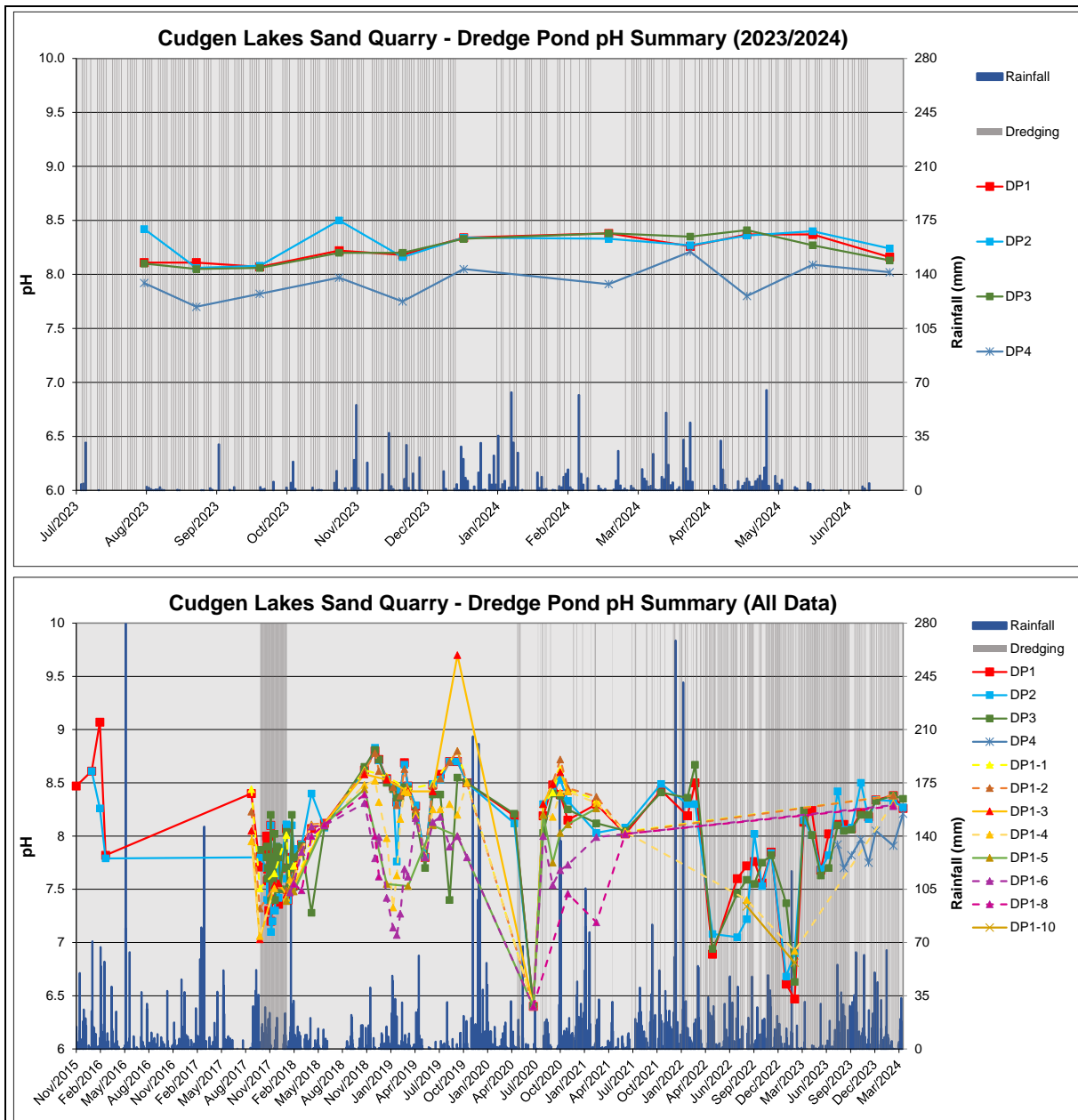
### **Physical Parameters and Major Cations and Anions**

During the reporting period, pH levels across the monitored sites, as shown in **Figure 7.2a**, have remained relatively stable ranging between 7.7 and 8.5. The small fluctuations observed are well within expected variability. Additionally, consistent with the majority of surrounding groundwater monitoring bores, the pH within the extraction pond has largely remained slightly alkaline. The lowest pH of 7.7 was recorded at DP4 during the August 2023 sampling round. The highest pH of 8.5 was recorded at DP2 during the October 2023 sampling period.

**Figure 7.2b** illustrates the Electrical Conductivity (EC) across the dredge ponds at the Quarry. The analysis reveals a general increase in EC at all sites, particularly from September 2023. This increase corresponds with the commencement of dredging north of Altona Road and is consistent with previous data recorded during commencement of dredging in the southern lake. As evidenced through baseline groundwater monitoring, EC increases further north away from the freshwater inputs from the Cudgen Plateau and with increasing depth. Given that the fines return water from processing is returned to the southern lake, this is considered to be the cause of the increase in EC across both ponds. The recorded EC levels are consistent with previous EC monitoring results and remains within the water quality objectives of the SWMP.







**Figure 7.2a**  
**Surface Water Quality Parameters – pH**

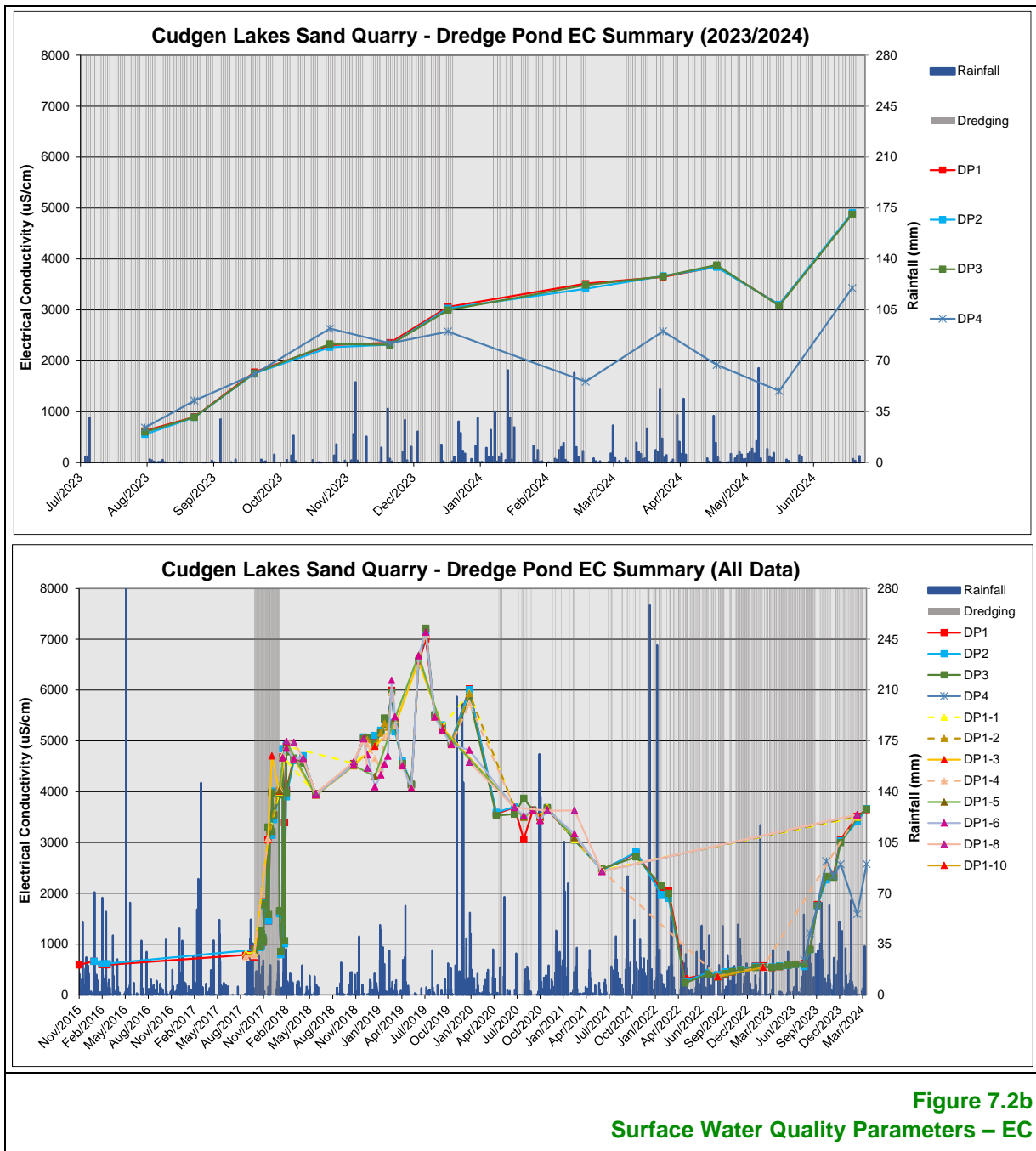




Table 7.1  
Surface Water Monitoring Data Summary

Page 1 of 5

		Physical Parameters							Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Potentially Toxic Cyanobacteria	Chlorophyll a	
Objectives		-	6.5-9.0	<6192	>6	-	5-20	10	<813	-	<119	<40	<1390	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	<50000	<10	
DP1																													
Pre-Extraction	Average	26.6	8.27	717	6.78	108.0	44.4	4	85	30	14	8	148	27	85	0.093	0.001	0.03	0.042	0.017	0.82	0.01	0.03	0.82	0.02	0.02	5	6	
	Maximum	28.3	9.07	901	9.24	192.0	156.0	5	132	46	21	8	236	57	130	0.190	0.002	0.07	0.090	0.020	1.10	0.01	0.03	1.10	0.02	0.03	5	10	
	Minimum	24.5	7.71	591	5.87	48.7	0.9	2	64	24	11	7	110	14	57	0.030	0.001	0.01	0.010	0.010	0.50	0.01	0.02	0.50	0.01	0.02	5	2	
Reporting Period (2023/2024)	Average	23.6	8.23	2730	6.73	-78.6	16.0	NV	463.8	132.8	75.5	18.8	871.8	323.0	162.0	0.0	0.0	0.1	0.0	0.0	0.7	0.0	0.2	0.6	0.1	0.2	200	7	
	Maximum	29.3	8.38	4884	9.22	-68.3	74.2	0.0	698.0	153.0	109.0	25.0	1280.0	407.0	188.0	0.0	0.0	0.1	0.1	0.0	1.0	0.1	0.4	0.7	0.2	0.6	1240	18	
	Minimum	17.8	8.07	624	4.07	-90.9	3.4	0.0	277.0	103.0	52.0	13.0	560.0	245.0	135.0	0.0	0.0	0.1	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	5	1	
All Results (2015-2024)	Average	23.5	7.99	2694	6.10	66.5	46.6	4.6	506.9	94.2	76.0	18.2	918.3	222.1	161.4	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.1	0.9	0.1	0.1	18760	9	
	Maximum	30.9	9.07	7007	10.67	224.0	593.0	5.0	833.0	153.0	125.0	28.0	1400.0	407.0	270.0	0.2	0.0	0.1	0.4	0.0	2.1	0.1	0.5	1.6	0.4	0.6	284000	51	
	80th Percentile	27.0	8.44	4659	8.18	157.8	70.4	5.0	728.4	127.0	110.0	24.0	1330.0	318.0	223.0	0.0	0.0	0.1	0.1	0.0	1.3	0.0	0.3	1.2	0.1	0.3	20340	13	
	Median	23.4	8.07	2465	5.90	74.7	8.4	5.0	591.5	110.0	89.0	22.0	1080.0	263.0	169.0	0.0	0.0	0.1	0.0	0.0	1.0	0.0	0.0	0.8	0.0	0.0	715	8	
	20th Percentile	20.5	7.66	786	4.15	-51.5	4.0	4.2	124.6	43.0	17.0	8.0	182.0	55.0	98.0	0.0	0.0	0.1	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0	5	2	
	Minimum	15.7	6.40	318	0.20	-115.7	-9.7	2.0	41.0	14.0	6.0	3.0	75.0	14.0	33.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	5	1	
DP2																													
Pre-Extraction	Average	26.3	8.12	695	4.87	114.7	39.1	3	65	26	12	8	117	15	95	0.073	0.002	0.03	0.04	0.020	0.89	-	-	0.9	0.02	0.02	5	9	
	Maximum	27.5	8.61	890	6.41	194.0	143.0	4	67	27	12	8	120	16	96	0.100	0.002	0.07	0.05	0.020	0.94	-	-	0.9	0.02	0.02	5	9	
	Minimum	23.7	7.79	613	3.43	58.8	3.5	2	64	25	12	7	110	14	94	0.050	0.001	0.01	0.04	0.020	0.82	-	-	0.8	0.02	0.02	5	9	
Reporting Period (2023/2024)	Average					-79.4		ND		134.3									0.0	0.0	0.7	0.0	0.2	0.5		0.2	200	6.818	
		23.7	8.29	2703.7	7.14		17.5		460.25		74.25	18.5	854.25	325.25	162.5	0.01	0.001	0.05							0.0				
	Maximum	29.5	8.50	4906	10.25	-70.5	71.8	ND	681	151.0	105	24	1280	406	189	0.01	0.001	0.05	0.3	0.0	1.0	0.1	0.4	0.7	0.1	0.6	1240	18	
	Minimum	17.2	8.06	557	4.11	-90.6	5.1	ND	274	104.0	51	13	560	246	135	0.01	0.001	0.05	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	5	1	
All Results (2015-2024)	Average			2730.1		85.3		4.7		97.8			960.91						0.1	0.0	1.1	0.0	0.1	1.0		0.1	23684.4	9.610	
		23.5	7.97		6.25		80.9		521.31		79.4	18.76		232.62	164.02	0.02	0.002	0.05							0.1				
	Maximum	32.0	8.83	7136	10.60	1322.0	1000.0	5.0	844	151.0	126	28	1420	406	270	0.10	0.005	0.07	1.0	0.0	5.8	0.1	0.5	5.4	0.4	0.6	409000	40	
	80th Percentile	27.0	8.43	4820.8	8.59	192.0	78.2	5.0	730.4	126.0	111.8	24	1336	317.8	219	0.03	0.002	0.05	0.1	0.0	1.2	0.0	0.3	1.2	0.1	0.3	22600	12	
	Median	23.1	8.05	2451	6.24	81.2	10.7	5.0	602	109.0	90	22	1080	292	168	0.01	0.002	0.05	0.0	0.0	1.0	0.0	0.0	0.9	0.0	0.0	946	8	
	20th Percentile	20.6	7.60	810.8	4.10	-52.1	4.9	4.6	284.2	65.0	48.6	12.2	574	144.6	123	0.01	0.001	0.05	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0	5	4	
	Minimum	16.3	6.40	271	0.19	-110.3	2.1	2.0	37.0	14.0	6	2	64	14	36	0.01	0.001	0.01	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	5	1	
Red and bold values exceed the objective value for that analyte.      IS - Insufficient data for statistical analysis.      NS = No Sample Required.      ND = No Data      NLM= No Longer Monitored																													

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Table 7.1 (Cont'd)  
Surface Water Monitoring Data Summary

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		Physical Parameters							Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Potentially Toxic Cyanobacteria	Chlorophyll a	
Objectives		-	6.5-9.0	<6192	>6	-	5-20	10	<813	-	<119	<40	<1390	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	<50000	<10	
DP3																													
Pre-Extraction	Average	27.3	7.87	898	7.17	63.4	139.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	7	
	Maximum	27.3	7.87	898	7.17	63.4	139.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	7	
	Minimum	27.3	7.87	898	7.17	63.4	139.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	7	
Reporting Period (2023/2024)	Average	23.6	8.22	2716.1	6.74	-78.66	14.2	ND	468.25	135.5	75.25	19	879.5	321.25	163	0.015	0.001	0.05	0.14	0.001	0.6	0.013	0.138	0.5	0.0836	0.20	200	6.8	
	Maximum	30.01	8.41	4877	9.81	-70.7	71.63	ND	702	155	109	25	1290	405	190	0.03	0.001	0.05	1.29	0.004	1	0.04	0.36	0.6	0.55	0.6	1240	18	
	Minimum	17.99	8.05	604	3.81	-90.3	3.7	ND	275	106	50	14	564	244	136	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	5	1	
All Results (2015-2024)	Average	23.37	7.95	2825.8	6.1575	65.137	48.01	5.0	550.69	102.74	83.57	19.42	1014	245.59	169.55	0.018	0.0016	0.051	0.063	0.003	0.97	0.0111	0.1	0.8627	0.0583	0.12	24529	9.4	
	Maximum	30.8	8.81	7215	10.5	225	627	5.0	846	155	126	28	1400	405	273	0.05	0.005	0.1	1.29	0.01	1.8	0.04	0.45	1.5	0.55	0.6	418000	48	
	80th Percentile	26.72	8.38	4689.2	8.222	172	72.34	5.0	733.4	127.4	110	24	1320	316.8	224	0.03	0.002	0.05	0.06	0.01	1.2	0.01	0.308	1.2	0.07	0.35	24920	13.4	
	Median	22.94	8.015	2996	6.08	85.8	10.2	5.0	610.5	110	94.5	22	1170	293.5	170	0.01	0.002	0.05	0.02	0.001	1	0.01	0.01	0.9	0.02	0.01	1040	8	
	20th Percentile	20.66	7.6	944.4	4.1	-70.58	3.602	5.0	412.8	75.4	63	15.2	770.6	185.4	133.6	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.6	0.01	0.01	5	2.6	
	Minimum	16.16	6.4	236	0.19	-180.1	-9.7	5.0	46	13	6	3	71	21	35	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	5	1	
DP1-1																													
Pre-Extraction	Average	22.8	7.98	822	5.76	87.7	76.5	ND	114	40	19	8	208	48	113	0.060	0.001	0.06	0.080	0.010	0.65	0.01	0.02	0.65	0.09	0.02	5	1	
	Maximum	24.0	8.44	824	7.01	121.0	149.0	ND	129	46	20	8	236	56	128	0.070	0.001	0.06	0.150	0.010	0.90	0.01	0.03	0.90	0.16	0.03	5	1	
	Minimum	21.5	7.51	819	4.51	54.4	3.9	ND	98	33	17	7	179	39	98	0.050	0.001	0.06	0.010	0.010	0.40	0.01	0.01	0.40	0.02	0.01	5	1	
Reporting Period (2023/2024)	Average	29.5	8.38	3499	5.49	-81.8	4.9	ND	492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	ND	ID	
	Maximum	29.5	8.38	3499	5.49	-81.8	4.9	ND	492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	ND	ID	
	Minimum	29.5	8.38	3499	5.49	-81.8	4.9	ND	492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	ND	ID	
All Results (2015-2024)	Average	23.9	8.04	3598	6.64	69.5	42.1	5	518	98	78	18	946	218	165	0.02	0.002	0.05	0.05	0.005	0.9	0.01	0.06	0.9	0.06	0.06	3611	5	
	Maximum	30.6	8.80	6553	10.71	212.4	428.0	5	838	153	121	28	1410	334	274	0.07	0.005	0.06	0.29	0.010	1.4	0.02	0.43	1.4	0.29	0.43	16800	10	
	80th Percentile	27.7	8.52	4976	9.18	101.7	58.1	5	731	129	111	24	1296	311	227	0.03	0.002	0.05	0.08	0.010	1.2	0.01	0.04	1.2	0.12	0.05	ID	ID	
	Median	24.6	8.32	3691	6.50	67.6	7.7	5	566	98	84	20	1045	234	161	0.01	0.002	0.05	0.02	0.003	1.0	0.01	0.01	0.9	0.04	0.01	5	5	
	20th Percentile	18.7	7.59	2130	4.77	20.3	3.9	5	292	62	43	12	555	122	127	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	ID	ID	
	Minimum	16.8	6.40	353	2.16	-81.8	2.4	5	49	24	7	3	84	30	50	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.01	0.01	5	1	
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM= No Longer Monitored																													

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Table 7.1 (Cont'd)  
Surface Water Monitoring Data Summary

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		Physical Parameters							Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Potentially Toxic Cyanobacteria	Chlorophyll a	
Objectives		-	6.5-9.0	<6192	>6	-	5-20	10	<813	-	<119	<40	<1390	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	<50000	<10	
DP1-2																													
Pre-Extraction	Average	21.6	7.78	793	5.09	94.9	84.0	ND	115	39.5	19	8	207	51	114	0.075	0.001	0.08	0.060	0.010	0.75	0.01	0.02	0.75	0.10	0.02	5	2	
	Maximum	23.0	8.23	798	6.86	126.0	166.0	ND	134	46	21	8	237	57	131	0.110	0.001	0.10	0.110	0.010	1.10	0.01	0.02	1.10	0.17	0.02	5	2	
	Minimum	20.1	7.32	787	3.32	63.8	1.9	ND	96	33	17	7	176	44	97	0.040	0.001	0.05	0.010	0.010	0.40	0.01	0.02	0.40	0.02	0.02	5	2	
Reporting Period (2023/2024)	Average	28.8	8.38	3520	4.04	-82.1	5.4	ND	454	140	67	19	910	318	162	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	1240	2	
	Maximum	28.8	8.38	3520	4.04	-82.1	5.4	ND	454	140	67	19	910	318	162	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	1240	2	
	Minimum	28.8	8.38	3520	4.04	-82.1	5.4	ND	454	140	67	19	910	318	162	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	1240	2	
All Results (2015-2024)	Average	23.6	8.15	4167	6.89	58.1	30.3	5	588	105	89	21	1078	250	175	0.02	0.002	0.05	0.03	0.005	1.0	0.01	0.04	1.0	0.08	0.05	35871	11	
	Maximum	29.0	8.80	7123	10.72	220.4	448.0	5	831	146	123	28	1410	345	270	0.11	0.005	0.10	0.15	0.010	1.4	0.02	0.45	1.4	0.36	0.45	299000	32	
	80th Percentile	27.4	8.60	5297	8.86	111.5	23.4	5	733	129	113	25	1340	315	224	0.03	0.002	0.05	0.05	0.010	1.2	0.01	0.04	1.2	0.14	0.05	39100	13	
	Median	24.4	8.37	4591	7.10	64.7	7.4	5	673	110	100	23	1240	287	175	0.01	0.002	0.05	0.02	0.002	1.0	0.01	0.01	1.0	0.03	0.01	13100	9	
	20th Percentile	18.9	7.55	3248	4.80	0.2	3.5	5	454	86	68	18	910	194	136	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.7	0.01	0.01	765	6	
	Minimum	16.8	6.40	367	2.17	-106.0	-9.8	5	50	24	7	3	86	31	49	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	5	2	
DP1-3																													
Pre-Extraction	Average	21.0	7.54	756	4.57	100.8	83.2	-	113	41	19	8	205	50	115	0.025	0.001	0.05	0.050	0.010	0.75	0.02	0.02	0.75	0.11	0.03	5	2	
	Maximum	22.8	8.05	769	6.02	125.0	163.0	-	130	48	21	8	236	57	134	0.040	0.001	0.05	0.090	0.010	1.00	0.02	0.02	1.00	0.19	0.03	5	2	
	Minimum	19.1	7.03	743	3.12	76.6	3.4	-	96	33	17	7	174	43	96	0.010	0.001	0.05	0.010	0.010	0.50	0.01	0.01	0.50	0.02	0.02	5	2	
Reporting Period (2023/2024)	Average	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Maximum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Minimum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
All Results (2015-2023)	Average	23.0	8.07	3920	6.18	66.7	29.2	5	568	102	86	20	1043	231	186	0.02	0.002	0.05	0.04	0.006	1.0	0.01	0.03	1.0	0.10	0.03	12753	5	
	Maximum	28.8	9.70	6577	10.78	125.0	163.0	5	765	133	115	25	1380	330	270	0.05	0.005	0.05	0.14	0.010	1.6	0.02	0.11	1.5	0.30	0.13	25500	8	
	80th Percentile	27.6	8.55	5054	9.15	92.7	37.1	5	712	130	108	24	1294	304	249	0.03	0.002	0.05	0.06	0.010	1.3	0.02	0.04	1.3	0.20	0.05	ID	ID	
	Median	23.2	8.30	3927	6.00	81.8	9.8	5	622	104	94	22	1105	244	180	0.02	0.002	0.05	0.02	0.008	1.0	0.01	0.01	1.0	0.05	0.02	12753	5	
	20th Percentile	18.7	7.50	3318	3.11	25.2	3.8	5	488	88	76	18	937	186	139	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.8	0.01	0.01	ID	ID	
	Minimum	16.7	6.40	743	1.07	-14.0	3.0	5	96	33	17	7	174	43	96	0.01	0.001	0.05	0.01	0.001	0.5	0.01	0.01	0.5	0.01	0.01	5	2	
Red and bold values exceed the objective value for that analyte.      IS - Insufficient data for statistical analysis.      NS = No Sample Required.      ND = No Data      NLM= No Longer Monitored																													

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Table 7.1 (Cont'd)  
Surface Water Monitoring Data Summary

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		Physical Parameters							Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Potentially Toxic Cyanobacteria	Chlorophyll a	
Objectives		-	6.5-9.0	<6192	>6	-	5-20	10	<813	-	<119	<40	<1390	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	<50000	<10	
DP1-4																													
Pre-Extraction	Average	20.3	7.51	762	3.68	103.1	85.4	-	111	40	19	7	204	50	116	0.030	0.001	0.06	0.055	0.010	0.70	0.02	0.02	0.70	0.12	0.03	5	2	
	Maximum	22.7	7.95	777	5.57	125.0	166.0	-	131	46	20	8	234	57	134	0.050	0.001	0.06	0.100	0.010	1.00	0.02	0.02	1.00	0.20	0.04	5	2	
	Minimum	17.9	7.06	746	1.79	81.1	4.8	-	90	33	17	6	173	43	97	0.010	0.001	0.05	0.010	0.010	0.40	0.01	0.02	0.40	0.04	0.02	5	2	
Reporting Period (2023/2024)	Average	23.7	7.54	1489	6.26	124.3	148.3	NS	194	71	28	9	363	132	94	0.01	0.001	0.05	0.06	0.002	0.8	0.01	0.29	0.5	0.02	0.29	417	5	
	Maximum	27.9	8.31	3541	6.92	243.9	371.0	NS	483	145	71	20	912	325	163	0.01	0.001	0.05	0.13	0.002	1.3	0.01	0.48	0.8	0.02	0.48	1240	10	
	Minimum	17.0	6.92	370	5.13	-77.2	8.3	NS	48	25	7	3	85	30	49	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	5	2	
All Results (2015-2024)	Average	22.7	7.96	4114	5.26	40.9	31.2	5	587	105	89	20	1073	249	187	0.02	0.002	0.05	0.08	0.005	1.1	0.01	0.05	1.1	0.09	0.05	31146	13	
	Maximum	28.1	8.52	7103	9.60	243.9	371.0	5	833	146	124	28	1410	333	264	0.05	0.005	0.19	1.81	0.010	7.3	0.02	0.48	7.3	0.37	0.48	387000	89	
	80th Percentile	26.5	8.39	5151	7.92	110.4	37.1	5	741	128	112	25	1326	310	231	0.03	0.002	0.05	0.04	0.010	1.2	0.01	0.04	1.2	0.19	0.05	32280	15	
	Median	23.2	8.16	4492	5.20	61.6	7.5	5	674	111	100	22	1250	286	188	0.01	0.002	0.05	0.02	0.004	1.0	0.01	0.01	0.9	0.05	0.01	6120	9	
	20th Percentile	18.0	7.52	3235	2.97	-28.4	3.4	5	457	87	71	18	911	192	149	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	211	6	
	Minimum	16.6	6.40	370	0.33	-219.7	-9.8	5	48	25	7	3	85	30	49	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	5	2	
DP1-5																													
Reporting Period (2023/2024)	Average	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Maximum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Minimum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
All Results (2015-2023)	Average	21.6	7.79	4320	4.09	33.6	20.7	5	640	113	96	22	1185	256	210	0.03	0.002	0.07	0.02	0.005	0.9	0.01	0.02	0.9	0.10	0.03	22300	8	
	Maximum	28.2	8.44	6687	9.50	120.0	112.0	5	764	146	117	26	1370	338	270	0.11	0.005	0.30	0.09	0.010	1.4	0.02	0.10	1.4	0.35	0.12	22300	8	
	80th Percentile	25.5	8.18	5173	7.16	89.0	25.8	5	731	133	110	24	1328	304	250	0.05	0.002	0.06	0.03	0.010	1.2	0.01	0.03	1.2	0.20	0.04	ID	ID	
	Median	20.5	8.00	4020	4.08	52.2	5.5	5	645	121	99	22	1240	257	214	0.01	0.002	0.05	0.02	0.001	0.8	0.01	0.01	0.8	0.05	0.01	22300	8	
	20th Percentile	17.9	7.48	3526	0.77	0.1	2.6	5	549	87	82	19	1028	195	172	0.01	0.002	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.02	0.01	ID	ID	
	Minimum	16.7	6.40	3095	0.36	-220.0	2.2	5	540	85	81	18	1020	185	159	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	22300	8	
DP1-6																													
Reporting Period (2023/2024)	Average	27.8	8.29	3543	4.74	-76.5	8.2	NS	460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	1240	3	
	Maximum	27.8	8.29	3543	4.74	-76.5	8.2	NS	460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	1240	3	
	Minimum	27.8	8.29	3543	4.74	-76.5	8.2	NS	460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	1240	3	
All Results (2015-2024)	Average	21.1	7.73	4288	3.39	-10.2	22.8	5	606	111	92	21	1123	249	211	0.01	0.002	0.07	0.03	0.005	1.1	0.01	0.05	1.0	0.20	0.05	14394	14	
	Maximum	27.8	8.31	7141	9.00	248.4	394.0	5	791	148	119	27	1360	344	342	0.05	0.005	0.22	0.15	0.025	2.6	0.03	0.46	2.6	1.43	0.46	276000	149	
	80th Percentile	24.6	8.10	5107	6.67	114.2	14.9	5	731	132	113	25	1318	303	263	0.02	0.002	0.12	0.04	0.010	1.3	0.01	0.04	1.3	0.31	0.06	15300	11	
	Median	20.4	7.80	4538	2.37	28.8	5.5	5	651	123	99	23	1255	277	219	0.01	0.002	0.05	0.02	0.002	1.0	0.01	0.01	1.0	0.13	0.01	1220	6	
	20th Percentile	17.6	7.41	3537	0.92	-140.0	2.3	5	529	87	80	19	1020	194	168	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.7	0.02	0.01	5	3	
	Minimum	16.7	6.40	363	0.11	-313.0	-9.7	5	47	24	7	3	86	31	50	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.01	0.01	5	1	
Red and bold values exceed the objective value for that analyte.      IS - Insufficient data for statistical analysis.      NS = No Sample Required.      ND = No Data      NLM= No Longer Monitored																													

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM= No Longer Monitored

Table 7.1 (Cont'd)  
Surface Water Monitoring Data Summary

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		Physical Parameters							Major Cations & Anions							Metals			Nutrients / Bacteria / Algae											
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Potentially Toxic Cyanobacteria	Chlorophyll a		
Objectives		-	6.5-9.0	<6192	>6	-	5-20	10	<813	-	<119	<40	<1390	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	<50000	<10		
DP1-7																														
Reporting Period (2023/2024)	Average	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS		
	Maximum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS		
	Minimum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS		
All Results (2015-2023)	Average	19.1	7.68	4311	3.58	-21.8	10.3	5	630	111	95	21	1175	248	225	0.02	0.002	0.08	0.02	0.006	1.1	0.01	0.02	1.1	2.13	0.03	16400	8		
	Maximum	22.2	8.40	6713	8.90	117.0	52.4	5	736	145	112	24	1360	342	326	0.05	0.005	0.17	0.02	0.017	2.7	0.04	0.11	2.7	20.00	0.13	16400	8		
	80th Percentile	21.3	8.20	5320	7.19	105.8	17.7	5	727	130	111	24	1300	304	276	0.02	0.002	0.14	0.02	0.011	1.2	0.02	0.04	1.1	1.18	0.05	ID	ID		
	Median	18.4	7.57	3971	2.70	55.0	3.1	5	630	127	96	22	1250	240	221	0.01	0.002	0.05	0.02	0.005	1.0	0.01	0.01	1.0	0.22	0.01	16400	8		
	20th Percentile	17.2	7.35	3471	1.12	-172.5	2.5	5	543	86	80	18.4	1030	194	177	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.8	0.08	0.01	ID	ID		
	Minimum	16.7	6.40	3025	0.31	-273.6	2.2	5	486	80	72	17	1020	190	173	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.03	0.01	16400	8		
DP1-8																														
Reporting Period (2023/2024)	Average	27.7	8.28	3552	4.37	-76.2	6.8	NS	466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01	1240	3		
	Maximum	27.7	8.28	3552	4.37	-76.2	6.8	NS	466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01	1240	3		
	Minimum	27.7	8.28	3552	4.37	-76.2	6.8	NS	466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01	1240	3		
All Results (2015-2024)	Average	21.8	7.54	3674	4.26	-10.2	51.4	5	506	99	76	18	961	212	199	0.02	0.002	0.07	0.03	0.006	1.2	0.01	0.08	1.1	0.29	0.08	6712	9		
	Maximum	27.7	8.39	5042	8.80	207.4	443.0	5	759	139	111	25	1330	333	294	0.05	0.005	0.13	0.17	0.015	2.4	0.02	0.44	2.4	1.30	0.44	34800	34		
	80th Percentile	25.6	8.04	4910	6.46	113.2	87.9	IS	647	132	99	22	1274	311	264	0.02	0.002	0.11	0.04	0.010	1.6	0.01	0.12	1.6	0.72	0.14	19100	16		
	Median	21.3	7.55	3968	4.64	18.0	6.8	5	608	116	91	20	1060	212	218	0.01	0.002	0.05	0.02	0.003	0.9	0.01	0.01	0.9	0.06	0.01	473	6		
	20th Percentile	17.4	7.08	2658	0.94	-180.7	3.3	IS	332	66	48	13	638	144	126	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.6	0.01	0.01	5	2		
	Minimum	16.7	6.40	371	0.64	-246.3	1.4	5	42	26	7	4	87	31	49	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.01	0.01	5	1		
DP1-10																														
Reporting Period (2023/2024)	Average	21.0	7.08	451	5.98	209.2	308.7	NS	52	36	8	4	88	36	62	0.01	0.001	0.05	0.13	0.004	1.2	0.01	0.44	0.8	0.01	0.44	5	6		
	Maximum	25.1	7.34	542	6.50	215.1	514.0	NS	54	44	8	4	90	41	73	0.01	0.001	0.05	0.18	0.004	1.3	0.01	0.44	0.9	0.01	0.44	5	10		
	Minimum	17.0	6.81	359	5.46	203.2	103.5	NS	49	27	8	4	85	31	50	0.01	0.001	0.05	0.08	0.003	1.0	0.01	0.43	0.6	0.01	0.43	5	2		
All Results (2015-2024)	Average	21.0	7.08	451	5.98	209.2	308.7	NS	52	36	8	4	88	36	62	0.01	0.001	0.05	0.13	0.004	1.2	0.01	0.44	0.8	0.01	0.44	5	6		
	Maximum	25.1	7.34	542	6.50	215.1	514.0	NS	54	44	8	4	90	41	73	0.01	0.001	0.05	0.18	0.004	1.3	0.01	0.44	0.9	0.01	0.44	5	10		
	80th Percentile	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS		
	Median	21.0	7.08	451	5.98	209.2	308.7	NS	52	36	8	4	88	36	62	0.01	0.001	0.05	0.13	0.004	1.2	0.01	0.44	0.8	0.01	0.44	5	6		
	20th Percentile	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS		
	Minimum	17.0	6.81	359	5.46	203.2	103.5	NS	49	27	8	4	85	31	50	0.01	0.001	0.05	0.08	0.003	1.0	0.01	0.43	0.6	0.01	0.43	5	2		
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM= No Longer Monitored																														

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM= No Longer Monitored

Cations and anions followed a similar trend to EC throughout the reporting period, with increases in all analytes. All cations and anions recorded were below the relevant SWMP objectives, however close monitoring of the cations and anions will be undertaken during the next reporting period as sodium and chloride analytes have trended towards their respective objectives.

As for EC, the increase in cations and anions are considered to be attributable to the deepening of the northern extraction pond, with expected further increases for a period of time as deeper groundwater is encountered and prior to further lateral expansion mixing this with the additional fresh upper layers.

During the reporting period turbidity ranged from 116 NTU to 3.4 NTU with an average of 21.5 NTU across all sites. Turbidity generally exceeded the objective range of 5-20 NTU, however turbidity during the reporting period was significantly less than the average turbidity for the previous reporting period of 285.5 NTU. Notably, the objective is only applicable during discharge. No discharges occurred during the reporting period. Turbidity during the reporting period trended downwards with results recorded at all sites exceeded the upper objective value of 20 NTU during the July and August 2023 sampling rounds. Turbidity recorded from October 2023 to June 2024 indicated a significant and consistent decrease in turbidity, likely attributable to the deepening of the northern dredge pond.

Turbidity value ranges are consistent with the operational status of the Quarry during the majority of the reporting period.

During the reporting period the dissolved oxygen objective as specified in the currently approved May 2021 SWMP was exceeded on three or more consecutive occasions at DP1 between May and August 2023, and December 2023 to April 2024, at DP2 between June and August 2023 and December 2023 to April 2024, and at DP3 between June and August 2023. These exceedances are consistent with previous monitoring results and reflects the mixing of the deeper deoxygenated water with the surface layers. In recognition of this, the dissolved oxygen objective has been updated in the SWMP which is currently awaiting approval.

No visible oil and grease was detected during the reporting period.

### **Metals**

The monitored metals filterable iron, aluminium, and arsenic all consistently remained well below the quality objectives with no discernible trends or variance from monitoring results during previous periods.

### **Nutrients and Bacteria**

Elevated nutrient levels have been recorded in pre-extraction baseline monitoring and in surrounding groundwater bores. This is reflective of past and current agricultural activities within and surrounding the Quarry both on the floodplain and the Cudgen Plateau.

Ammonia recorded remained below the objective value of 20mg/L at all sites for the entire reporting period.

### **Blue-Green Algae**

For all sites during the reporting period, potentially toxic cyanobacteria were below the limit of reporting, with values recorded as 5 cells/mL, significantly below the maximum cell count of 50,000 cells/mL. However, given the results recorded within the Cudgen Lakes Sand Quarry to



date and the ongoing presence of blue-green algae in the adjacent Hanson Tweed Sand Quarry, algal blooms are expected to regularly occur within the extraction pond, particularly during non-operational periods in summer.

### **Erosion and Sediment Control**

During the reporting period monthly inspections were undertaken of the Quarry site to ensure that all necessary erosion and sediment controls are in place and working effectively, particularly around the edges of the extraction pond, rehabilitation areas and access tracks. No issues were identified during the reporting period.

### **Comparison with Predictions**

In summary, the 2008 Environmental Assessment anticipated that the EC within the final lake would be in the order of 2,500µS/cm, similar to levels within the Hanson Tweed Sand Plant pond at that time. No other impacts of significance were predicted. To date the median EC for all surface monitoring results is generally consistent with the expected EC with continued variations expected as the dredging continues to expand both laterally and at depth. All other analytes have generally remained consistent with background or behaved as expected (i.e. increased turbidity and reduced dissolved oxygen at surface during operations).

### **Reportable Incidents**

During the reporting period a reportable incident occurred in relation to dissolved oxygen at monitoring locations DP1, DP2, and DP3 with three consecutive exceedances of the trigger value within the currently approved May 2021 SWMP. Notably, the updated SWMP which is awaiting approval subject to resolution of the Condition 25 Groundwater Assessment includes clarification that the DO object only applies to surface samples during periods of non-operation (when deeper deoxygenated water is not being mixed with the surface layers).

Notwithstanding, these exceedances will be formally reported to the DPHI.

### **Further Improvements**

Subject to the approval of the updated SWMP, no further improvements are currently planned. Review of water quality and the appropriateness of objectives will continue throughout the next reporting period. An internal system will also be implemented to flag the requirement to report any exceedance of TARPs.

## **7.3 Groundwater**

### **Environmental Management**

As outlined in Section 7.2, the extraction pond is effectively a 'window' into the groundwater table and is the principal location for potential interactions with the local groundwater environment. The key management measures for groundwater are therefore:

- ensuring that extractions rates do not cause drawdown beyond those predicted;
- monitoring of water quality to ensure that drawdown is not resulting in a reduction in pH (which would indicate oxidation of acid sulfate soils); and
- storage of all hydrocarbons in accordance with the relevant Australian Standards.

As no dredging occurred within the southern lake no specific measures were required to manage drawdown from the lake. However, within the northern extraction pond, due to the small volume of the initial pond, the previously established water transfer system was utilised to pump water from the existing southern lake to the new northern extraction pond to maintain water levels. This will be maintained during the next reporting period until the pond is of sufficient size to maintain acceptable water levels during dredging.

Monitoring did not indicate the need for any alteration to existing management measures relating to water quality. Limited volumes of hydrocarbons were stored within the Quarry Site during the reporting period and were appropriately stored within a service van.

## Environmental Performance

The groundwater resources within the local area are located within two aquifers, namely the Quaternary sands beneath the Tweed River floodplain and the Tertiary basalts of the Cudgen Plateau. It is expected that freshwater from the Tertiary basalts flows northwards into the Quaternary sands resulting in a wedge of freshwater that thins northwards towards the Tweed River. Beneath this, water quality is largely influenced by the degree of mixing between the freshwater from the Cudgen Plateau, as well as rainfall recharge directly to the Quaternary sands, and the deep saline waters originally derived from estuarine and marine infiltration.

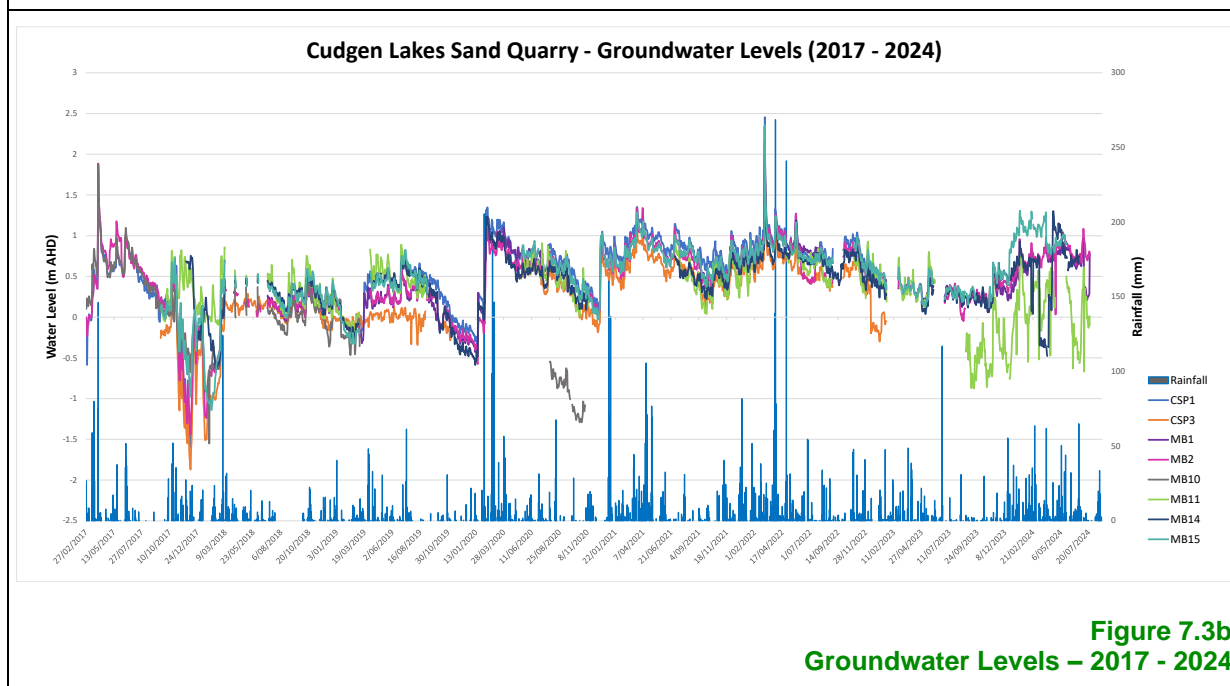
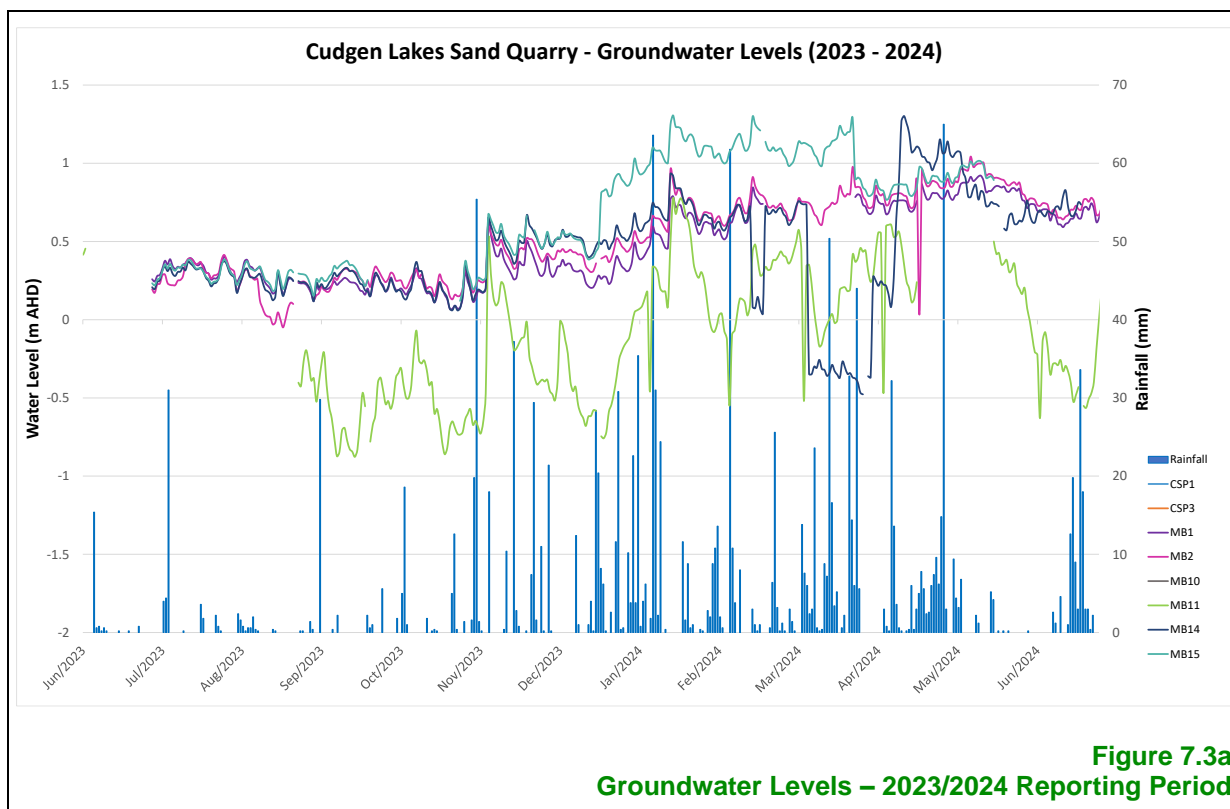
Groundwater levels and water quality were monitored in five dedicated monitoring bores, throughout the reporting period (see **Figure 7.1**). It is noted that monitoring bore MB10 was damaged could not be sampled during the reporting period. A replacement bore or utilisation of a suitable existing nearby bore is being investigated and will be implemented during the next reporting period. A number of the groundwater loggers required replacing during the reporting period and quotes have been sought to replace these loggers as well as for the remaining old loggers which have been encountering issues when downloading data.

### Groundwater Levels

During the reporting period, annual extraction rates ( $176,773\text{m}^3$ ) remained well below the approved maximum of  $650,000\text{m}^3$ . As such operations had no appreciable effects on water level and minimal volumes of water take (see Section 7.1). Therefore, groundwater levels recorded are generally a reflection of natural fluctuations and, to a lesser extent, surrounding activities.

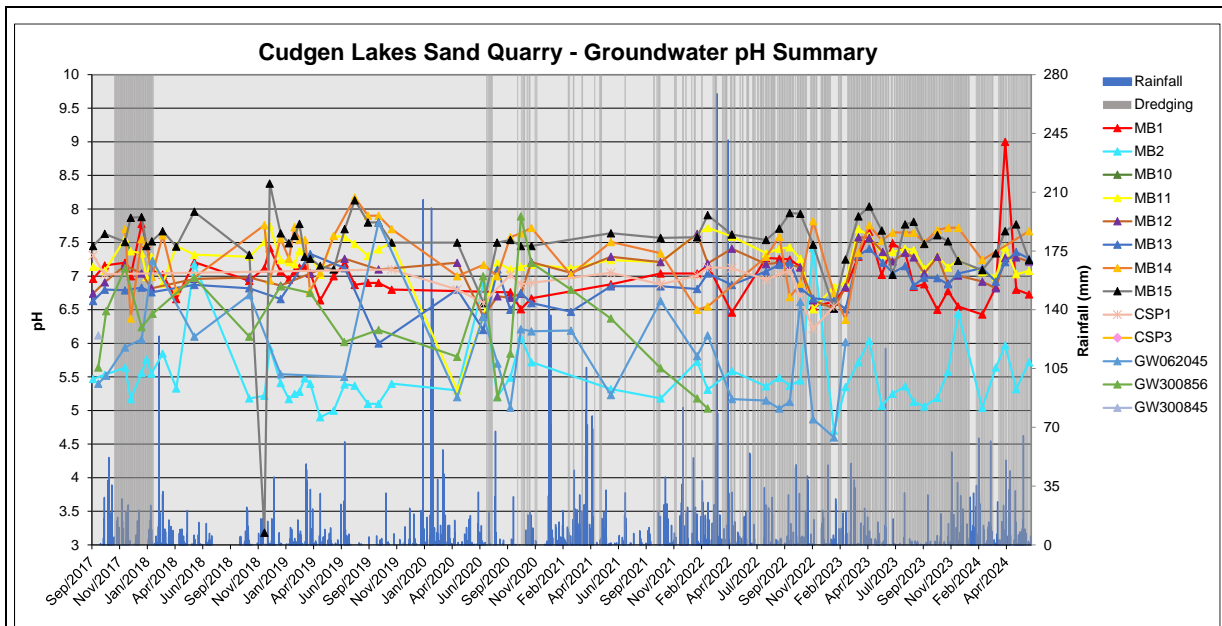
**Figure 7.3** presents the groundwater levels and rainfall recorded during the reporting period. The lowest water level recorded during the reporting period was  $-0.877\text{m AHD}$  at MB11 on 15 September 2023 and the highest water level was  $1.307\text{m AHD}$  at MB15 on 17 January 2024.

Increased rainfall during January 2024 and April 2024, resulted in temporary rises in groundwater levels across all monitoring sites. Overall, the data reflects a dynamic interaction between rainfall and groundwater levels, with periods of increased rainfall generally leading to short-term increases in groundwater levels. This is consistent with previous groundwater assessments and the conceptual groundwater model for this groundwater system.

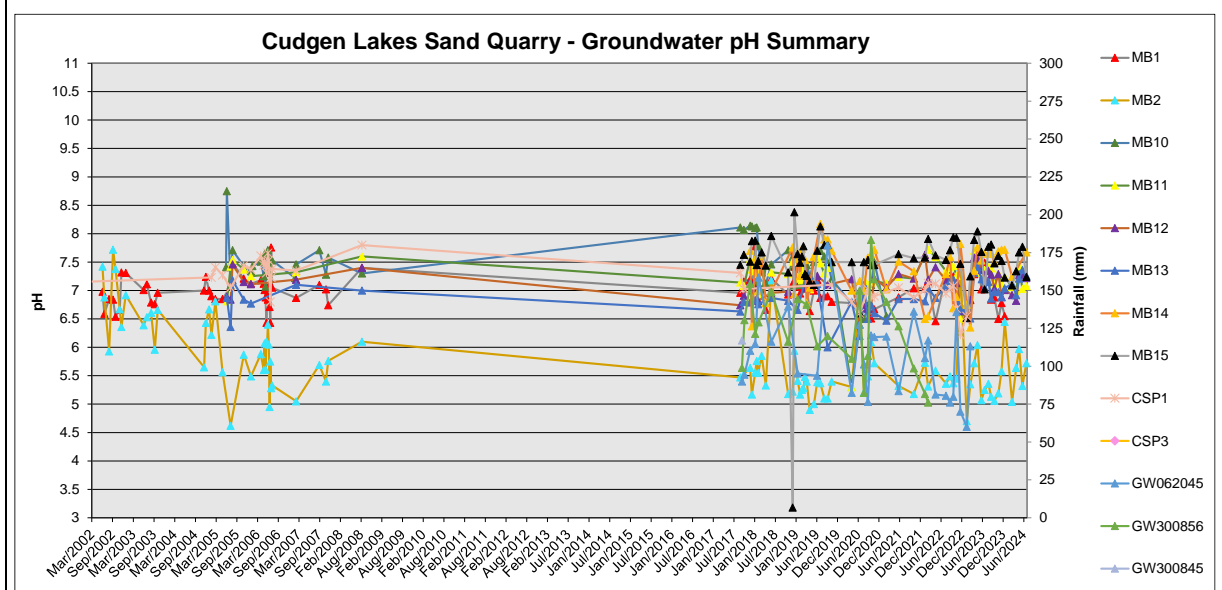


### Groundwater Quality

A summary of groundwater monitoring results is provided in **Table 7.2** and key analytes are displayed graphically in **Figure 7.4**. The full range of historical data is presented in **Figure 7.5** to assist with interpreting long-term trends. A full copy of the monitoring data is presented in **Appendix 5**.

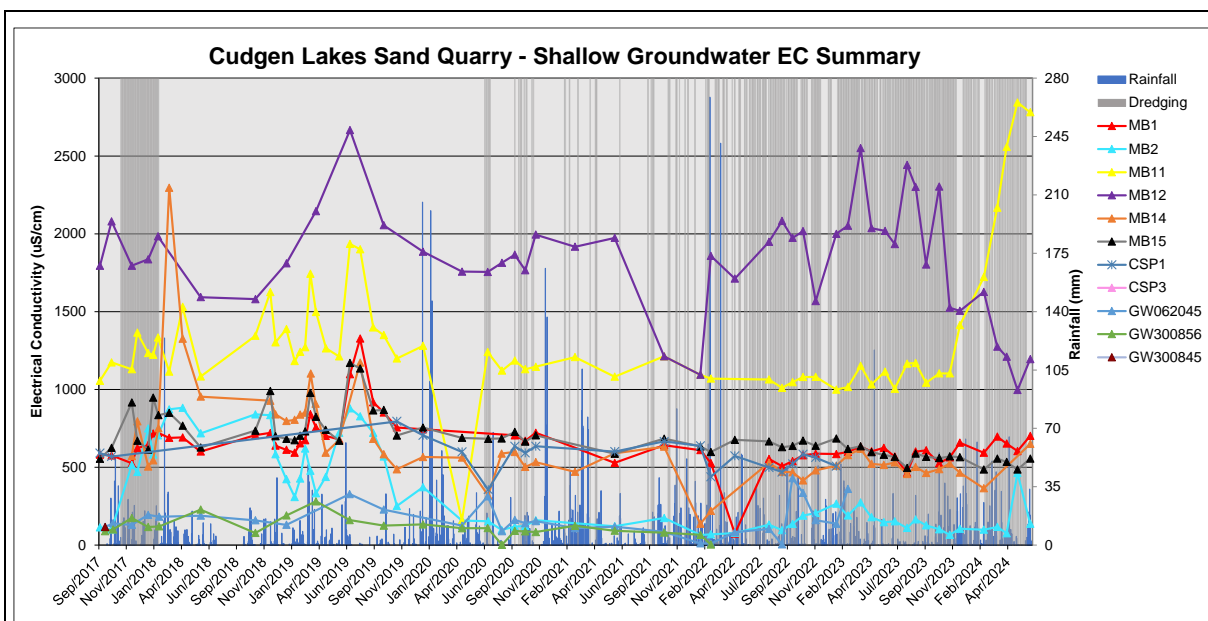


**Figure 7.4a**  
**Groundwater Quality Parameters – pH (All Bores)**

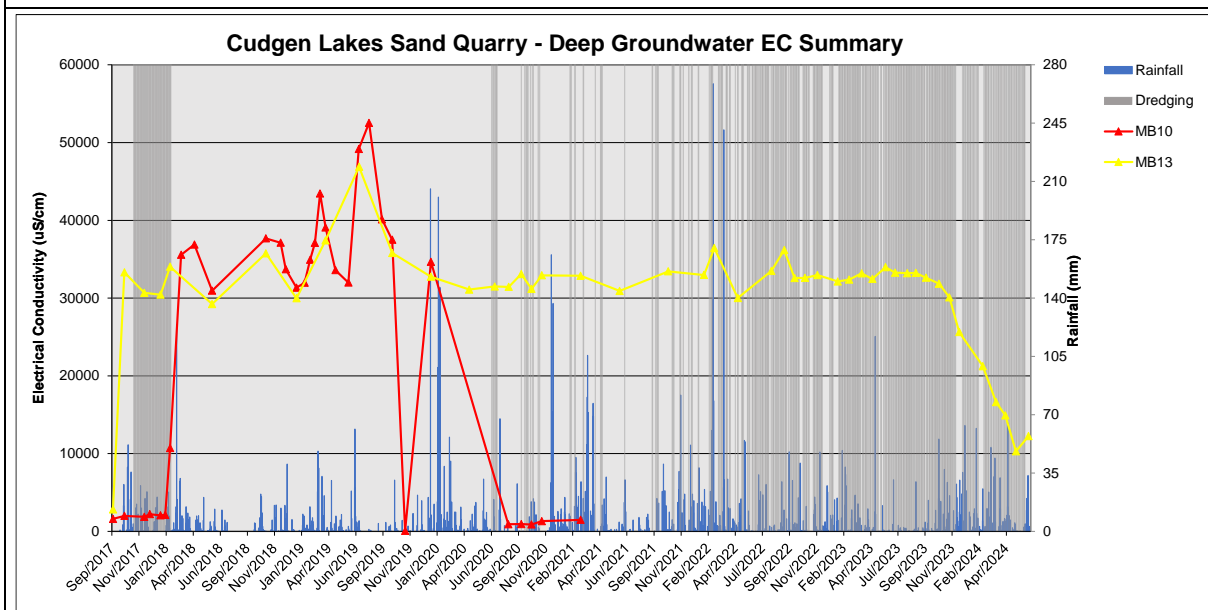


**Figure 7.5b**  
**Long Term Groundwater Quality Parameters – pH (All Bores)**

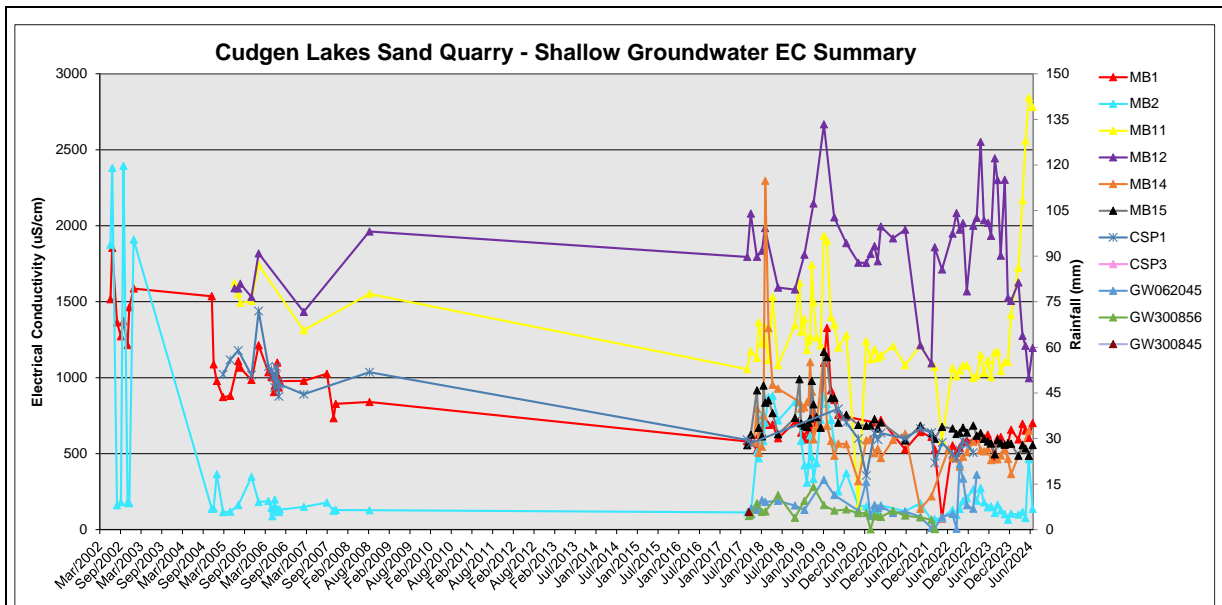




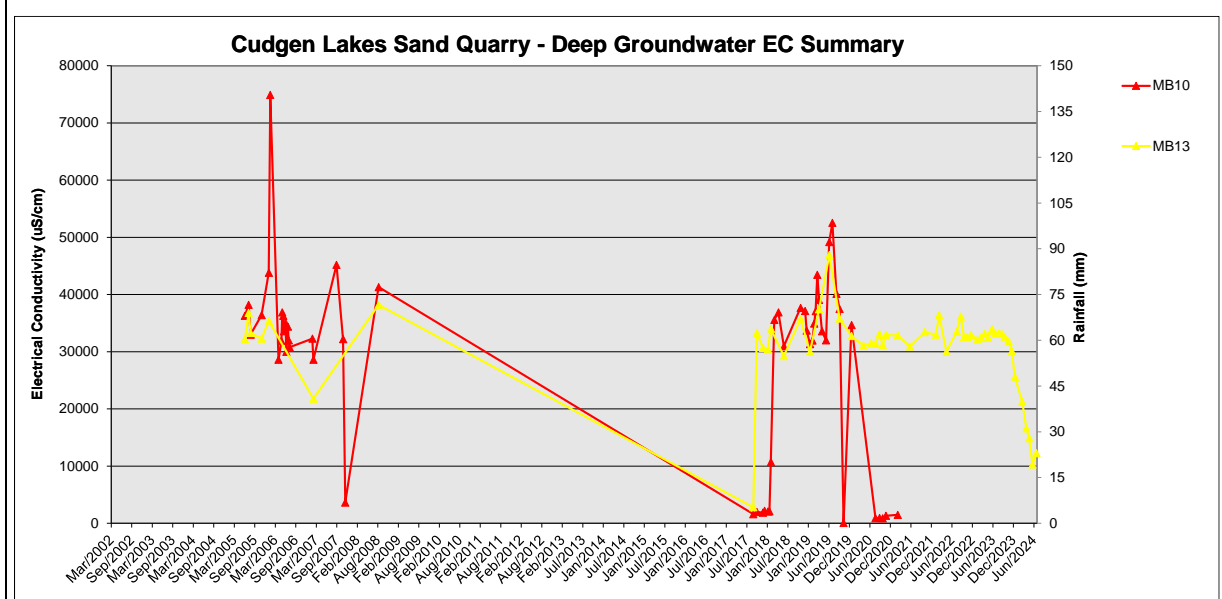
**Figure 7.4c**  
**Groundwater Quality Parameters – Electric Conductivity (Shallow Bores)**



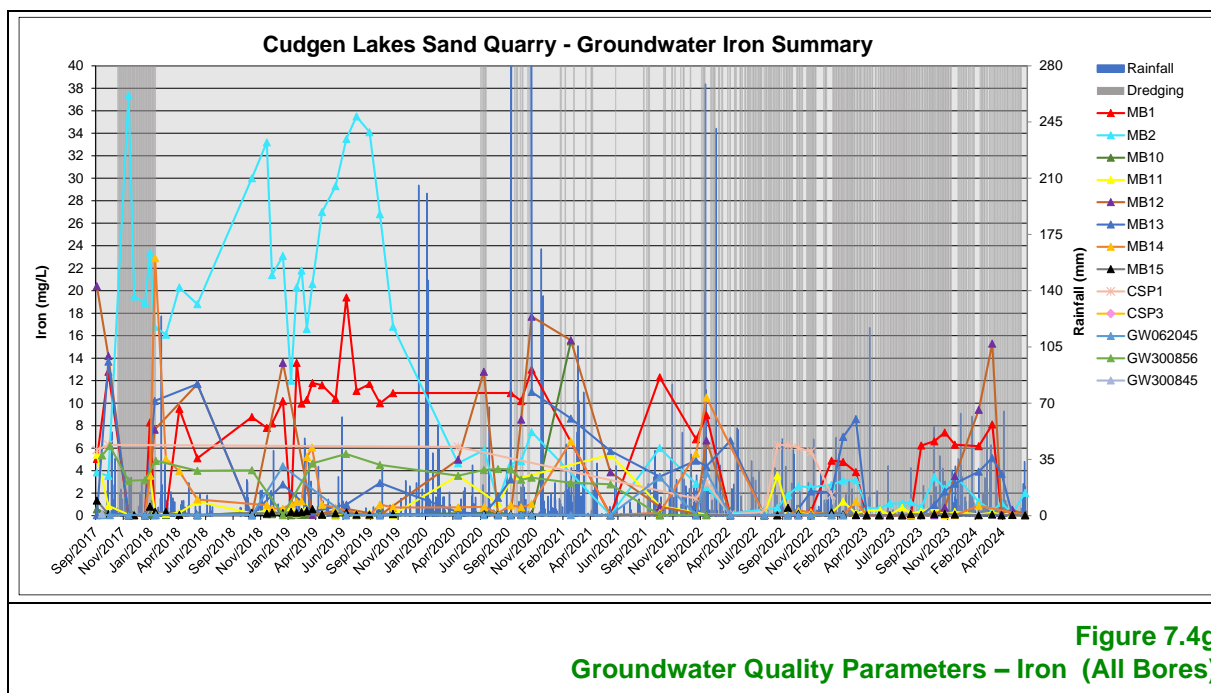
**Figure 7.4d**  
**Groundwater Quality Parameters – Electric Conductivity (Deep Bores)**



**Figure 7.5e**  
**Long Term Groundwater Quality Parameters – Electrical Conductivity (Shallow Bores)**



**Figure 7.5f**  
**Long Term Groundwater Quality Parameters – Electrical Conductivity (Deep Bores)**



### Physical Parameters and Major Cations and Anions

Groundwater monitoring data to date supports the expected hydrogeological environment, with water within the Quaternary sand aquifer essentially fresh in the upper 5m to 10m with increasing salinity with increased depth and towards the Tweed River. Iron levels at the Quarry have also been identified as consistent with the presence of iron in the sediments, specifically the iron rich ferrosols, and surface waters of the region.

**Figures 7.4a and 7.4b** summarise groundwater pH levels at the Cudgen Lakes Sand Quarry. The pH levels recorded across all years to date generally range between 6 and 8, reflecting slightly acidic to neutral conditions, with some fluctuations including occasional drops below 6 and spikes above 8. Monitoring data for the reporting period indicates that pH levels have stabilized within a narrower range, suggesting more consistent groundwater conditions, with pH generally remaining near neutral to slightly acidic for all sites except MB2. Whilst pH levels at MB2 fell below the SWMP objective the lowest recorded pH of 5.04 remained above the minimum pre-extraction pH of 4.62. No discernible trend in pH at MB2 was recorded with the average pH remaining generally consistent with the long-term average for all data.

**Figures 7.4c to 7.4f** illustrates the EC trends in both shallow and deep groundwater bores at the Cudgen Lakes Sand Quarry. Throughout the reporting period, EC levels at all shallow groundwater bore sites remained below the water quality objective of 3,000  $\mu\text{S}/\text{cm}$ . The average EC for these sites was generally consistent with the long-term average, with a slight increasing trend toward the end of the reporting period. Deep groundwater bore MB13 recorded a steady trend of decreasing EC levels, with a slight increase in EC toward the end of the reporting period. The increase in EC at both shallow and deep groundwater bores during June 2024 is likely due to a decrease in rainfall received at the Quarry. Despite this, EC levels at all bores remain within expected values.

**Table 7.2**  
**Groundwater Monitoring Data Summary**

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		Physical							Major Cations & Anions								Metals			Nutrients									
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L			
MB1																													
Pre-Extraction	Average	20.80	6.98	1080	0.96	-233.01	18.20	5.00	39.23	130.54	20.77	4.83	64.11	220.05	185.86	0.05	0.00	9.18	0.29	0.01	0.65	0.01	0.01	0.65	0.34	0.01			
	Maximum	21.80	7.76	1854	7.66	23.00	35.00	5.00	58.00	193.00	36.00	5.00	124.00	492.00	292.00	0.14	0.00	22.00	0.46	0.01	0.70	0.01	0.01	0.70	0.39	0.01			
	Minimum	19.80	6.43	576	0.05	-1398	1.40	5.00	31.00	77.00	13.00	4.00	35.00	10.00	110.00	0.01	0.00	0.24	0.11	0.01	0.60	0.01	0.01	0.60	0.28	0.01			
Reporting Period (2023/2024)	Average	21.34	6.97	606.27	3.51	-4.11	27.74	IS	28.36	94.73	10.09	4.36	32.64	1.90	282.64	0.01	0.00	3.74	0.27	IS	1.25	0.01	0.09	1.18	0.50	0.15			
	Maximum	25.47	9.00	702.00	6.26	16.40	87.10	IS	35.00	117.00	12.00	6.00	39.00	4.00	338.00	0.01	0.00	8.11	0.51	IS	2.10	0.01	0.26	2.10	1.20	0.26			
	Minimum	18.17	6.43	464.00	1.13	-27.90	1.30	IS	11.00	78.00	8.00	3.00	28.00	1.00	246.00	0.01	0.00	0.05	0.14	IS	0.60	0.01	0.01	0.60	0.03	0.03			
All Results (2002-2024)	Average	21.84	7.00	823.20	1.49	-75.28	65.16	5.00	31.03	102.24	11.90	4.04	40.88	60.71	275.94	0.02	0.00	6.59	0.20	0.02	1.06	0.01	0.05	1.08	0.58	0.06			
	Maximum	26.00	9.00	1854.00	7.66	194.90	2546.77	5.00	58.00	193.00	36.00	9.00	124.00	492.00	596.00	0.14	0.01	22.00	1.28	0.11	6.60	0.01	0.34	6.60	4.99	0.34			
	80th Percentile	23.99	7.21	1027.80	2.55	-1.79	46.04	5.00	36.20	117.20	13.00	5.00	50.00	114.60	329.00	0.01	0.00	11.62	0.23	0.02	1.40	0.01	0.05	1.40	0.72	0.04			
	Median (50th Percentile)	21.80	7.00	717.00	0.91	-67.90	7.75	5.00	31.00	100.00	10.00	4.00	33.50	5.00	284.00	0.01	0.00	6.51	0.17	0.01	0.80	0.01	0.01	0.80	0.43	0.01			
	20th Percentile	19.85	6.76	595.40	0.31	-122.30	1.56	5.00	26.00	83.00	9.00	3.00	27.00	1.00	235.00	0.01	0.00	0.05	0.11	0.01	0.60	0.01	0.01	0.54	0.28	0.01			
	Minimum	17.60	6.43	74.00	0.05	-1398.00	-8.60	5.00	11.00	6.00	3.00	3.00	20.00	1.00	24.00	0.01	0.00	0.05	0.04	0.00	0.01	0.01	0.01	0.09	0.01	0.01			
MB2																													
Pre-Extraction	Average	21.25	6.07	3833	0.74	5.13	10.85	5.00	16.46	0.76	0.69	14.92	25.85	15.40	16.16	2.03	0.01	6.60	0.08	0.05	0.70	0.01	0.01	0.70	0.24	0.01			
	Maximum	21.70	7.72	2394	5.09	216.00	14.40	5.00	23.00	1.80	2.00	20.00	45.00	27.00	60.00	6.37	0.01	9.50	0.08	0.07	0.80	0.01	0.01	0.80	0.29	0.01			
	Minimum	20.80	4.62	88	0.16	-130.00	7.30	5.00	12.00	0.20	0.20	4.00	10.00	0.90	7.00	0.43	0.01	3.12	0.07	0.03	0.60	0.01	0.01	0.60	0.19	0.01			
Reporting Period (2023/2024)	Average	22.38	5.48	143.33	3.66	73.54	46.24	ND	17.00	2.25	1.92	8.33	24.42	9.08	18.33	0.23	0.03	1.54	0.12	IS	1.28	0.01	0.03	0.95	0.22	0.03			
	Maximum	27.53	6.45	463.00	5.84	100.10	76.50	0.00	35.00	3.00	3.00	10.00	36.00	16.00	40.00	0.49	0.08	3.57	0.19	IS	1.70	0.01	0.07	1.60	0.38	0.05			
	Minimum	19.50	5.04	66.00	0.13	43.70	20.20	0.00	2.00	2.00	1.00	6.00	18.00	3.00	8.00	0.04	0.00	0.17	0.05	IS	0.50	0.01	0.01	0.07	0.15	0.01			
All Results (2002-2024)	Average	22.43	5.74	358.89	1.39	26.32	123.44	5.00	37.77	4.65	3.04	10.66	58.46	35.28	14.53	0.69	0.04	10.16	0.09	0.02	0.98	0.01	0.03	1.04	0.30	0.03			
	Maximum	27.53	7.72	2394.00	5.84	216.00	4009.23	5.00	119.00	25.00	15.00	26.00	189.00	159.00	60.00	6.37	0.19	37.40	0.26	0.22	2.00	0.01	0.28	2.00	0.77	0.28			
	80th Percentile	24.40	6.25	571.60	2.33	77.50	64.10	5.00	71.20	8.60	5.60	14.80	125.60	80.00	22.00	0.90	0.07	20.30	0.13	0.03	1.50	0.01	0.01	1.50	0.39	0.01			
	Median (50th Percentile)	22.25	5.57	165.00	0.67	38.75	18.40	5.00	22.00	2.00	2.00	10.00	31.00	14.00	12.50	0.21	0.03	6.01	0.07	0.01	0.90	0.01	0.01	0.90	0.29	0.01			
	20th Percentile	20.46	5.24	118.32	0.27	-28.08	6.70	5.00	15.00	1.88	1.00	6.00	21.00	8.00	7.00	0.13	0.01	1.61	0.05	0.01	0.60	0.01	0.01	0.70	0.19	0.01			
	Minimum	18.60	4.62	65.00	0.11	-130.00	0.00	5.00	2.00	0.20	0.20	3.00	6.00	0.90	1.00	0.04	0.00	0.05	0.02	0.00	0.01	0.01	0.01	0.07	0.01	0.01			
Red and bold values exceed the objective value for that analyte.      IS - Insufficient data for statistical analysis.      NS = No Sample Required.      ND = No Data      NLM - No Longer Monitored      **=Monitoring has ceased																													

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored \*\*=Monitoring has ceased



Table 7.2 (Cont'd)  
Groundwater Monitoring Data Summary

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		Physical						Major Cations & Anions							Metals			Nutrients								
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L
MB10 (broken)																										
Pre-Extraction	Average	21.80	7.53	32513	2.15	-72.81	9.49	5.00	4552.80	150.70	617.20	201.78	8229.80	1282.00	609.75	0.09	0.00	0.62	3.02	2.89	157.00	3.80	0.69	153.00	147.00	4.49
	Maximum	23.70	8.75	74900	4.11	107.00	13.00	5.00	7500.00	233.00	1150.00	292.00	14750.00	2490.00	852.00	0.34	0.00	1.96	3.32	3.22	162.00	4.39	1.20	157.00	158.00	5.59
	Minimum	19.90	7.07	1605	0.38	-187.00	5.97	5.00	94.00	30.00	17.00	24.00	194.00	77.00	247.00	0.01	0.00	0.01	2.71	2.56	152.00	3.20	0.18	149.00	136.00	3.38
Reporting Period (2023/2024)	Average	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Maximum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Minimum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
All Results (2002-2023)	Average	22.80	7.47	28124	1.76	-83.12	18.36	5.00	4624.65	181.50	701.48	167.85	8162.03	1244.25	844.59	0.05	0.00	0.64	1.35	1.30	50.93	0.45	0.16	47.81	43.55	0.60
	Maximum	26.30	8.75	74900	5.40	149.00	268.00	5.00	7610.00	293.00	1170.00	292.00	14750.00	2490.00	1170.00	0.34	0.01	15.50	3.35	3.86	186.00	4.39	1.20	184.00	174.00	5.59
	80th Percentile	24.48	7.71	37644	2.73	46.96	24.00	5.00	7104.00	234.60	1100.00	241.00	12280.00	1797.80	1124.00	0.05	0.01	0.27	2.71	2.08	104.92	0.75	0.29	68.82	44.52	0.99
	Median (50th Percentile)	23.15	7.45	33600	1.81	-94.65	4.55	5.00	6515.00	208.50	999.00	213.00	11800.00	1675.00	955.00	0.05	0.01	0.09	1.03	1.01	30.20	0.02	0.02	30.20	27.20	0.05
	20th Percentile	20.89	7.20	2136	0.48	-205.00	0.86	5.00	105.00	140.80	18.20	26.00	200.00	77.20	510.00	0.01	0.00	0.05	0.90	0.90	3.28	0.01	0.01	16.36	13.79	0.01
	Minimum	19.50	6.50	73	0.00	-273.00	-11.10	5.00	27.00	30.00	16.00	6.00	39.00	64.00	247.00	0.01	0.00	0.01	0.01	0.00	0.34	0.01	0.01	0.50	0.13	0.01
MB11																										
Pre-Extraction	Average	19.95	7.28	1446	1.02	-107.33	27.20	5.00	103.33	209.00	58.00	12.67	146.00	415.67	333.00	0.75	0.00	4.18	0.53	0.14	3.70	0.01	0.01	3.70	1.64	0.01
	Maximum	20.80	7.60	1743	2.11	-74.00	43.10	5.00	220.00	289.00	72.00	19.00	311.00	520.00	432.00	3.13	0.00	11.00	0.64	0.27	4.60	0.01	0.01	4.60	1.80	0.01
	Minimum	19.10	6.81	1056	0.37	-144.00	11.30	5.00	34.00	168.00	45.00	9.00	47.00	328.00	235.00	0.01	0.00	0.87	0.42	0.01	2.80	0.01	0.01	2.80	1.48	0.01
Reporting Period (2023/2024)	Average	20.55	7.20	1733.82	4.06	-21.90	NLM	92.54	NLM	43.45	278.27	79.36	11.45	45.91	785.27	291.18	0.01	0.00	11.03	0.25	NLM	0.93	0.03	0.06	0.70	0.26
	Maximum	23.43	7.43	2844.00	6.75	-7.40	NLM	392.00	NLM	103.00	592.00	173.00	17.00	52.00	2240.00	360.00	0.01	0.00	56.80	0.41	NLM	1.20	0.06	0.12	1.10	0.33
	Minimum	17.16	6.99	1043.00	0.34	-37.90	NLM	1.60	NLM	28.00	139.00	37.00	9.00	39.00	146.00	102.00	0.01	0.00	0.10	0.16	NLM	0.70	0.01	0.01	0.01	0.22
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored **=Monitoring has ceased																										

Table 7.2 (Cont'd)  
Groundwater Monitoring Data Summary

		Physical								Major Cations & Anions								Metals			Nutrients									
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L			
MB11 (Cont'd)																														
All Results (2002-2024)	Average	21.86	7.25	1324.54	2.00	-84.48	23.70	39.48	5.00	42.52	182.91	49.38	10.20	57.03	342.09	329.53	0.09	0.00	2.65	0.37	0.35	2.25	0.02	0.11	2.30	1.54	0.13			
	Maximum	27.10	7.75	2844.00	7.67	297.10	140.00	452.50	5.00	220.00	592.00	173.00	19.00	311.00	2240.00	500.00	3.13	0.06	56.80	1.37	1.75	11.80	0.33	1.30	11.70	9.71	1.30			
	80th Percentile	24.50	7.49	1535.20	3.22	-15.54	33.20	39.44	5.00	43.60	192.00	52.00	11.00	52.00	344.40	360.00	0.02	0.00	2.09	0.62	0.56	3.06	0.02	0.20	3.38	2.06	0.25			
	Median (50th Percentile)	21.58	7.30	1212.50	1.66	-70.00	11.00	8.45	5.00	35.00	169.00	45.00	10.00	47.00	263.00	342.00	0.01	0.00	0.30	0.29	0.26	1.60	0.01	0.01	1.60	1.15	0.01			
	20th Percentile	19.77	7.08	1080.80	0.39	-200.08	5.00	1.66	5.00	29.00	149.40	38.00	9.00	42.00	169.60	318.00	0.01	0.00	0.09	0.19	0.10	1.00	0.01	0.01	1.10	0.24	0.01			
	Minimum	17.16	5.30	157.80	0.10	-354.00	5.00	-5.50	5.00	17.00	2.00	1.00	2.00	17.00	11.00	3.00	0.01	0.00	0.05	0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
MB12																														
Pre-Extraction	Average	21.30	7.08	1713	0.72	-74.97	15.00	13.60	5.00	49.17	328.67	53.83	11.67	100.50	608.83	267.40	0.20	0.00	6.99	0.11	0.02	0.60	0.01	0.01	0.60	0.34	0.01			
	Maximum	21.90	7.46	2080	1.65	-54.00	15.00	20.10	5.00	66.00	433.00	59.00	13.00	147.00	720.00	329.00	0.74	0.00	20.40	0.11	0.02	0.60	0.01	0.01	0.60	0.34	0.01			
	Minimum	20.70	6.74	1433	0.09	-98.00	15.00	7.10	5.00	39.00	219.00	46.00	10.00	54.00	410.00	223.00	0.01	0.00	1.31	0.11	0.01	0.60	0.01	0.01	0.60	0.33	0.01			
Reporting Period (2023/2024)	Average	20.44	7.12	1653.00	3.62	-18.38	NLM	44.42	NLM	67.00	225.82	26.45	9.82	135.36	338.36	312.18	0.01	0.00	2.72	0.04	NLM	1.00	0.01	0.23	0.80	0.13	0.41			
	Maximum	24.76	7.35	2443.00	6.95	1.50	NLM	216.00	NLM	107.00	302.00	38.00	12.00	259.00	572.00	357.00	0.01	0.00	15.30	0.06	NLM	1.40	0.02	0.50	1.00	0.30	0.50			
	Minimum	17.47	6.82	996.00	0.26	-29.50	NLM	2.60	NLM	21.00	154.00	18.00	8.00	99.00	118.00	274.00	0.01	0.00	0.05	0.03	NLM	0.50	0.01	0.03	0.31	0.01	0.31			
All Results (2002-2024)	Average	21.06	7.08	1808.49	2.63	-6.26	29.44	36.46	5.00	67.54	290.58	39.28	10.78	152.68	547.06	288.49	0.03	0.00	3.62	0.06	0.01	0.66	0.01	0.18	0.53	0.21	0.19			
	Maximum	26.50	7.63	2667.00	7.95	192.80	155.00	216.00	5.00	108.00	433.00	59.00	13.00	474.00	814.00	378.00	0.74	0.01	20.40	0.32	0.03	1.50	0.02	0.50	1.20	0.67	0.50			
	80th Percentile	23.94	7.28	2039.20	4.03	75.60	38.00	58.78	5.00	88.80	335.60	46.00	12.00	259.80	716.40	324.00	0.01	0.00	8.55	0.10	0.01	0.88	0.01	0.38	0.78	0.37	0.38			
	Median (50th Percentile)	20.70	7.14	1818.00	1.82	-20.55	24.50	21.80	5.00	69.50	302.00	40.00	11.00	113.50	558.00	294.00	0.01	0.00	0.19	0.03	0.01	0.60	0.01	0.09	0.50	0.27	0.14			
	20th Percentile	19.43	6.84	1560.60	0.79	-71.74	5.00	6.22	5.00	44.20	235.80	34.00	10.00	72.00	414.00	246.00	0.01	0.00	0.05	0.01	0.00	0.50	0.01	0.02	0.22	0.02	0.02			
	Minimum	7.48	6.40	996.00	0.09	-177.90	5.00	0.30	5.00	21.00	154.00	18.00	8.00	35.00	118.00	193.00	0.01	0.00	0.05	0.01	0.00	0.01	0.01	0.01	0.10	0.01	0.01			
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored **=Monitoring has ceased																														

Table 7.2 (Cont'd)  
Groundwater Monitoring Data Summary

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		Physical								Major Cations & Anions								Metals			Nutrients									
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L			
MB13																														
Pre-Extraction	Average	22.35	6.84	29572	0.86	-112.10	26.00	3.75	5.00	6500.00	960.00	1227.17	192.67	10701.67	2490.00	385.80	0.23	0.00	8.44	0.42	0.02	1.85	0.01	0.16	1.70	1.37	0.16			
	Maximum	24.00	7.18	38200	2.97	-34.00	26.00	5.90	5.00	6940.00	2350.00	2040.00	240.00	15198.00	4000.00	534.00	0.75	0.01	19.00	0.56	0.02	2.90	0.01	0.30	2.90	2.59	0.30			
	Minimum	20.70	6.36	2826	0.05	-250.00	26.00	1.60	5.00	5700.00	533.00	888.00	127.00	247.00	2110.00	194.00	0.01	0.00	0.05	0.27	0.01	0.80	0.01	0.02	0.50	0.14	0.02			
Reporting Period (2023/2024)	Average	20.67	7.07	23816	3.24	-15.46	NLM	43.93	NLM	3835.27	434.45	660	116	7689	1605	455.82	0.03	0.00	1.7	0.20	NLM	1.13	0.02	0.03	0.90	0.80	0.04			
	Maximum	24.46	7.36	33240	4.83	-6.70	NLM	169.00	NLM	6080.00	614.00	963	157	10800	2010	491.00	0.05	0.01	5.1	0.60	NLM	1.70	0.04	0.07	1.70	1.49	0.07			
	Minimum	18.04	6.86	10290	1.76	-26.30	NLM	4.70	NLM	458.00	276.00	340	69	3550	1130	411.00	0.01	0.00	0.1	0.02	NLM	0.50	0.01	0.01	0.01	0.02	0.01			
All Results (2002-2024)	Average	21.33	6.89	30646	1.95	-35.40	14.50	34.39	5.00	5655.36	582.58	915	159	10306	1978	485.84	0.06	0.00	20.9	0.34	0.22	3.28	0.04	0.21	3.38	2.83	0.26			
	Maximum	25.42	7.41	46890	9.15	195.80	33.00	169.00	5.00	7080.00	2350.00	2040	240	15198	4000	597.00	0.75	0.01	855.0	1.20	0.85	11.50	0.35	2.00	11.50	9.21	2.05			
	80th Percentile	23.46	7.16	33983	2.93	-5.44	22.00	74.72	5.00	6528.00	608.60	1020	179	11500	2168	544.00	0.05	0.01	7.0	0.58	0.50	5.04	0.03	0.32	5.04	4.66	0.45			
	Median (50th Percentile)	21.03	6.87	32593	1.44	-25.55	13.50	18.20	5.00	6045.00	557.00	935	163	11000	1995	490.00	0.05	0.01	2.2	0.25	0.05	2.90	0.01	0.01	3.10	2.50	0.02			
	20th Percentile	19.24	6.67	30004	0.74	-71.92	5.40	4.22	5.00	5244.00	492.60	827	147	10400	1820	463.00	0.01	0.00	0.1	0.08	0.01	0.92	0.01	0.01	1.42	1.04	0.01			
	Minimum	17.45	6.00	2826	0.05	-267.00	5.00	0.40	5.00	458.00	276.00	340	69	247	1130	194.00	0.01	0.00	0.1	0.02	0.00	0.01	0.01	0.01	0.01	0.02	0.01			
	MB14																													
Reporting Period (2023/2024)	Average	21.66	7.61	489.25	4.50	-41.08	NLM	12.13	NLM	26.25	64.50	13.25	5.88	38.63	26.75	182.88	0.03	0.00	0.18	0.18	NLM	0.85	0.01	0.16	0.74	0.19	0.19			
	Maximum	25.33	7.72	650.00	6.62	-11.30	NLM	33.40	NLM	33.00	80.00	15.00	7.00	62.00	31.00	204.00	0.16	0.00	0.88	0.36	NLM	2.20	0.02	0.34	2.10	0.66	0.34			
	Minimum	19.26	7.24	365.00	2.21	-51.30	NLM	1.50	NLM	23.00	49.00	9.00	5.00	31.00	22.00	146.00	0.01	0.00	0.05	0.05	NLM	0.30	0.01	0.03	0.10	0.01	0.03			
All Results (2002-2024)	Average	21.99	7.35	646.70	2.41	-36.34	24.54	29.19	5.00	52.30	62.70	16.68	5.47	79.62	42.23	181.77	0.02	0.00	1.71	0.16	0.04	0.46	0.01	0.05	0.44	0.15	0.04			
	Maximum	28.30	8.17	2296.00	10.30	210.70	195.00	217.40	5.00	182.00	154.00	39.00	10.00	491.00	181.00	321.00	0.16	0.02	22.90	0.43	0.47	3.20	0.10	0.37	3.20	3.29	0.37			
	80th Percentile	23.50	7.71	811.60	3.83	49.24	30.00	34.36	5.00	83.40	69.20	20.20	6.00	115.20	47.40	197.40	0.01	0.00	1.35	0.25	0.05	0.50	0.01	0.03	0.40	0.10	0.02			
	Median (50th Percentile)	21.90	7.54	566.00	1.70	-42.00	14.50	15.80	5.00	38.00	59.00	15.00	5.00	48.00	31.00	185.00	0.01	0.00	0.63	0.12	0.01	0.30	0.01	0.01	0.30	0.06	0.01			
	20th Percentile	20.63	6.96	471.00	0.71	-118.26	6.00	3.72	5.00	25.00	49.00	12.80	5.00	36.00	25.80	165.00	0.01	0.00	0.05	0.10	0.01	0.20	0.01	0.01	0.20	0.02	0.01			
	Minimum	18.18	6.35	137.00	-0.30	-244.00	5.00	0.55	5.00	20.00	22.00	6.00	2.00	17.00	7.00	71.00	0.01	0.00	0.05	0.05	0.00	0.01	0.01	0.01	0.10	0.01	0.01			
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored **=Monitoring has ceased																														

Table 7.2 (Cont'd)  
Groundwater Monitoring Data Summary

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		Physical								Major Cations & Anions							Metals			Nutrients							
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L
MB15																											
Pre-Extraction	Average	21.10	7.54	590.00	0.33	-119.80	14.00	36.45	5.00	101.00	32.50	12.00	7.00	78.50	42.50	212.50	0.28	0.00	0.74	0.28	0.22	0.45	0.01	0.01	0.45	0.19	0.01
	Maximum	21.60	7.63	625.00	0.65	-87.00	14.00	62.00	5.00	116.00	40.00	14.00	8.00	83.00	48.00	217.00	0.52	0.00	1.35	0.33	0.22	0.60	0.01	0.01	0.60	0.26	0.01
	Minimum	20.60	7.45	555.00	0.01	-152.60	14.00	10.90	5.00	86.00	25.00	10.00	6.00	74.00	37.00	208.00	0.03	0.00	0.13	0.22	0.21	0.30	0.01	0.01	0.30	0.12	0.01
Reporting Period (2023/2024)	Average	21.86	7.50	542.00	2.94	-38.06	NLM	6.80	NLM	64.64	38.91	10.27	7.27	44.09	13.55	209.09	0.01	0.00	0.09	0.41	NLM	1.10	0.05	0.28	0.70	0.34	0.02
	Maximum	26.09	7.81	588.00	5.83	-6.40	NLM	26.40	NLM	76.00	43.00	12.00	9.00	49.00	19.00	226.00	0.01	0.00	0.16	0.78	NLM	2.60	0.18	1.07	1.40	0.46	0.02
	Minimum	18.74	7.09	485.00	0.35	-60.40	NLM	3.10	NLM	10.00	32.00	8.00	6.00	23.00	6.00	177.00	0.01	0.00	0.05	0.23	NLM	0.30	0.01	0.01	0.01	0.21	0.01
All Results (2002-2024)	Average	22.09	7.48	692.47	1.76	-69.28	9.58	9.95	5.00	77.27	45.78	13.87	8.65	76.92	39.12	198.08	0.02	0.00	0.18	0.23	0.15	0.69	0.02	0.07	0.67	0.28	0.05
	Maximum	26.09	8.38	1170.00	6.45	203.70	24.00	69.94	5.00	144.00	83.00	23.00	14.00	121.00	138.00	228.00	0.52	0.01	1.35	0.78	0.22	4.80	0.18	1.07	4.80	0.66	0.46
	80th Percentile	24.06	7.80	764.60	2.47	-25.40	15.20	18.70	5.00	87.00	56.80	17.00	10.00	97.00	53.00	216.80	0.01	0.00	0.28	0.28	0.17	0.80	0.01	0.03	0.80	0.42	0.03
	Median (50th Percentile)	22.05	7.54	670.50	1.32	-72.00	7.00	4.00	5.00	73.50	42.00	15.00	8.00	83.50	35.00	198.00	0.01	0.00	0.11	0.20	0.14	0.40	0.01	0.01	0.40	0.26	0.01
	20th Percentile	20.18	7.29	572.00	0.53	-150.30	5.00	1.40	5.00	66.20	36.20	10.00	7.00	49.60	16.20	186.20	0.01	0.00	0.05	0.17	0.11	0.30	0.01	0.01	0.30	0.16	0.01
	Minimum	17.50	3.18	485.00	0.01	-224.40	5.00	-7.10	5.00	10.00	25.00	8.00	6.00	23.00	4.00	128.00	0.01	0.00	0.05	0.05	0.08	0.01	0.01	0.01	0.01	0.01	0.01
CSP1**																											
Pre-Extraction	Average	20.90	7.13	607.66	0.40	-118.49	5.00	4.55	5.00	24.94	89.24	8.29	8.58	53.19	31.71	196.33	0.08	0.00	4.12	0.26	0.08	1.30	0.01	1.56	1.30	0.44	0.01
	Maximum	21.30	8.09	1007.00	2.61	27.70	5.00	7.40	5.00	83.00	148.00	19.00	28.00	123.00	182.00	271.00	0.26	0.00	9.82	0.28	0.10	2.00	0.01	3.10	2.00	0.60	0.01
	Minimum	20.50	6.34	300.00	0.04	-160.10	5.00	1.70	5.00	9.00	50.00	5.00	5.00	8.00	4.50	135.00	0.01	0.00	0.59	0.24	0.06	0.60	0.01	0.01	0.60	0.28	0.01
Reporting Period (2022/2023)	Average	21.1	7.54	629	2.29	-1.4	NLM	4.2	NLM	81	36	10	7	68	30	180	0.01	0.001	0.15	0.23	NLM	0.3	0.01	0.05	0.3	0.09	0.05
	Maximum	24.0	8.04	685	5.65	197.4	NLM	23.4	NLM	92	42	11	8	117	36	219	0.02	0.002	0.70	0.42	NLM	0.4	0.01	0.11	0.4	0.18	0.11
	Minimum	17.5	6.52	566	0.38	-117.8	NLM	-1.9	NLM	68	28	9	6	45	15	128	0.01	0.001	0.05	0.05	NLM	0.1	0.01	0.01	0.1	0.01	0.01
All Results (2002-2023)	Average	22.1	7.48	722	1.47	-75.1	10	10.6	5	80	47	15	9	84	44	196	0.02	0.001	0.20	0.21	0.146	0.7	0.01	0.05	0.7	0.27	0.05
	Maximum	25.1	8.38	1170	6.45	203.7	24	69.9	5	144	83	23	14	121	138	228	0.52	0.005	1.35	0.42	0.220	4.8	0.10	0.46	4.8	0.66	0.46
	80th Percentile	24.0	7.87	833	2.21	-26.3	15	20.0	5	92	60	17	10	98	58	212	0.01	0.001	0.30	0.27	0.173	0.8	0.01	0.03	0.8	0.39	0.04
	Median (50th Percentile)	22.1	7.57	684	1.10	-88.9	7	3.9	5	76	46	16	9	86	38	197	0.01	0.001	0.11	0.20	0.143	0.4	0.01	0.01	0.4	0.25	0.01
	20th Percentile	20.5	7.32	625	0.52	-152.6	5	0.9	5	67	36	11	7	67	28	184	0.01	0.001	0.05	0.16	0.113	0.3	0.01	0.01	0.3	0.16	0.01
	Minimum	17.5	3.18	496	0.01	-224.4	5	-7.1	5	44	25	9	6	45	4	128	0.01	0.001	0.05	0.05	0.077	0.0	0.01	0.01	0.1	0.01	0.01

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored \*\*=Monitoring has ceased



Table 7.2 (Cont'd)  
Groundwater Monitoring Data Summary

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		Physical								Major Cations & Anions								Metals			Nutrients							
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	
CSP3**																												
Pre-Extraction	Average	20.90	7.13	607.66	0.40	-118.49	5.00	4.55	5.00	24.94	89.24	8.29	8.58	53.19	31.71	196.33	0.08	0.00	4.12	0.26	0.08	1.30	0.01	1.56	1.30	0.44	0.01	
	Maximum	21.30	8.09	1007.00	2.61	27.70	5.00	7.40	5.00	83.00	148.00	19.00	28.00	123.00	182.00	271.00	0.26	0.00	9.82	0.28	0.10	2.00	0.01	3.10	2.00	0.60	0.01	
	Minimum	20.50	6.34	300.00	0.04	-160.10	5.00	1.70	5.00	9.00	50.00	5.00	5.00	8.00	4.50	135.00	0.01	0.00	0.59	0.24	0.06	0.60	0.01	0.01	0.60	0.28	0.01	
Reporting Period (2022/2023)	Average	19.1	7.33	875	1.34	-24.5	NLM	5.3	NLM	20	142	18	13	26	110	331	0.01	0.001	0.20	0.23	NLM	1.2	0.02	0.13	1.1	0.38	0.14	
	Maximum	20.5	7.48	913	3.24	184.1	NLM	12.8	NLM	21	152	20	13	28	115	349	0.01	0.001	0.44	0.24	NLM	1.2	0.02	0.20	1.2	0.43	0.20	
	Minimum	17.9	7.11	834	0.19	-165.4	NLM	1.9	NLM	19	134	16	13	23	104	315	0.01	0.001	0.05	0.22	NLM	1.1	0.01	0.06	1.0	0.33	0.08	
All Results (2002-2023)	Average	21.4	7.20	805	0.95	-93.6	6	12.2	5	26	138	17	13	44	114	306	0.04	0.001	1.68	0.38	0.290	1.9	0.01	0.20	2.0	1.45	0.04	
	Maximum	24.3	8.09	1643	7.17	184.1	20	80.0	5	83	211	27	28	123	294	555	0.26	0.010	9.82	0.96	0.810	5.0	0.02	3.10	5.0	5.44	0.37	
	80th Percentile	23.2	7.48	1039	1.51	1.0	6	15.6	5	25	187	24	15	63	225	364	0.05	0.001	3.00	0.65	0.525	3.8	0.01	0.05	3.8	3.04	0.02	
	Median (50th Percentile)	21.3	7.22	799	0.43	-125.0	5	2.9	5	22	142	19	14	31	109	312	0.01	0.001	0.13	0.27	0.164	1.2	0.01	0.01	1.6	0.53	0.01	
	20th Percentile	19.7	6.91	567	0.16	-182.7	5	0.9	5	19	93	7	5	23	9	199	0.01	0.001	0.05	0.21	0.100	0.3	0.01	0.01	0.6	0.24	0.01	
	Minimum	17.9	6.34	300	0.04	-290.0	5	-3.3	5	5	50	5	5	8	5	135	0.01	0.001	0.05	0.11	0.060	0.0	0.01	0.01	0.0	0.01	0.01	
GW062045**																												
Pre-Extraction	Average	22.55	5.46	128.50	1.31	146.00	0.00	2.10	5.00	15.50	2.50	4.50	1.00	22.50	4.50	8.00	0.11	0.00	0.05	0.03	0.01	5.65	0.01	5.22	0.45	0.04	5.22	
	Maximum	23.50	5.52	140.00	1.34	150.00	0.00	2.40	5.00	16.00	3.00	5.00	1.00	23.00	5.00	10.00	0.21	0.00	0.05	0.03	0.01	5.90	0.01	5.41	0.50	0.06	5.41	
	Minimum	21.60	5.40	117.00	1.27	142.00	0.00	1.80	5.00	15.00	2.00	4.00	1.00	22.00	4.00	6.00	0.01	0.00	0.05	0.02	0.01	5.40	0.01	5.02	0.40	0.01	5.02	
Reporting Period (2022/2023)	Average	21.7	5.35	219	5.45	178.2	NLM	4.8	NLM	16	5	5	1	21	5	4	0.02	0.001	0.05	0.04	NLM	4.8	0.01	4.26	2.7	0.02	4.26	
	Maximum	22.6	6.62	430	6.65	233.7	NLM	19.0	NLM	20	11	7	1	24	6	7	0.03	0.001	0.05	0.06	NLM	5.1	0.01	4.33	5.1	0.02	4.33	
	Minimum	20.3	4.60	5	1.62	57.3	NLM	1.1	NLM	14	2	4	1	18	5	1	0.01	0.001	0.05	0.01	NLM	4.5	0.01	4.18	0.3	0.01	4.18	
All Results (2002-2023)	Average	22.1	5.83	163	5.79	105.6	5	8.8	5.00	14	3	4	1	20	5	8	0.07	0.002	0.46	0.04	0.036	4.5	0.01	4.20	0.9	0.04	4.16	
	Maximum	25.5	7.80	430	8.43	251.8	6	44.0	5.00	20	11	7	2	24	6	34	0.56	0.015	4.40	0.27	0.316	6.0	0.07	5.60	5.1	0.19	5.60	
	80th Percentile	23.1	6.40	228	7.60	178.0	6	14.4	5	16	3	5	1	23	5	10	0.03	0.001	0.05	0.05	0.010	5.4	0.01	5.31	0.7	0.05	5.31	
	Median (50th Percentile)	22.5	5.81	140	6.25	133.4	5	2.5	5	15	2	4	1	20	5	7	0.02	0.001	0.05	0.02	0.010	4.7	0.01	4.35	0.5	0.01	4.35	
	20th Percentile	21.3	5.15	89	4.31	18.0	5	1.3	5	10	2	4	1	18	4	5	0.01	0.001	0.05	0.01	0.005	4.1	0.01	3.63	0.4	0.01	3.63	
	Minimum	17.6	4.60	5	1.27	-165.9	5	0.0	5.00	1	2	1	1	9	3	1	0.01	0.001	0.05	0.01	0.003	0.7	0.01	0.87	0.2	0.01	0.02	
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored **=Monitoring has ceased																												

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored \*\*=Monitoring has ceased

Table 7.2 (Cont'd)  
Groundwater Monitoring Data Summary

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		Physical								Major Cations & Anions								Metals			Nutrients							
Parameters		Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	
GW300856**																												
Pre-Extraction	Average	21.80	6.06	94.50	3.34	36.00		16.65	5.00	8.00	4.00	2.00	2.00	17.00	5.00	8.50	2.00	0.02	5.78	0.36	0.29	0.95	0.01	0.01	0.95	0.18	0.01	
	Maximum	22.90	6.48	100.00	4.36	41.00	0.00	17.30	5.00	8.00	4.00	2.00	2.00	17.00	6.00	10.00	3.27	0.02	6.19	0.41	0.32	1.10	0.01	0.01	1.10	0.20	0.01	
	Minimum	20.70	5.64	89.00	2.31	31.00	0.00	16.00	5.00	8.00	4.00	2.00	2.00	17.00	4.00	7.00	0.72	0.02	5.36	0.31	0.25	0.80	0.01	0.01	0.80	0.16	0.01	
Reporting Period (2022/2023)	Average	22.5	5.28	50	5.60	81.7	NLM	16.3	NLM	15	2	5	1	22	6	7	0.02	0.001	0.05	NLM	NLM	NLM	NLM	NLM	NLM	NLM	NLM	
	Maximum	23.2	5.63	80	6.82	88.4	NLM	19.0	NLM	16	2	5	1	23	6	10	0.02	0.001	0.05	NLM	NLM	NLM	NLM	NLM	NLM	NLM	NLM	
	Minimum	21.2	5.03	3	4.52	73.8	NLM	13.0	NLM	14	1	4	1	20	5	3	0.01	0.001	0.05	NLM	NLM	NLM	NLM	NLM	NLM	NLM	NLM	
All Results (2002-2023)	Average	22.1	6.31	115	5.52	26.2	6	36.2	5.00	10	4	2	2	17	6	8	0.51	0.012	3.51	0.27	0.104	0.8	0.01	0.02	0.8	0.16	0.07	
	Maximum	25.9	7.89	281	7.86	253.2	15	391.6	5.00	16	5	5	2	23	12	15	3.27	0.020	6.19	0.41	0.320	1.4	0.02	0.10	1.1	0.28	0.95	
	80th Percentile	24.6	6.99	164	7.08	84.0	7	25.8	5	13	4	2	2	20	7	10	0.57	0.019	4.78	0.32	0.228	1.1	0.01	0.02	1.0	0.20	0.02	
	Median (50th Percentile)	22.7	6.31	109	5.26	4.4	5	17.3	5	9	4	2	2	18	6	8	0.36	0.012	3.99	0.29	0.038	0.8	0.01	0.01	0.8	0.17	0.01	
	20th Percentile	21.1	5.64	80	4.05	-35.1	5	9.0	5	8	4	2	1	14	5	5	0.31	0.009	2.85	0.23	0.012	0.4	0.01	0.01	0.7	0.12	0.01	
	Minimum	5.8	5.03	2	2.31	-99.0	5	0.1	5.00	1	1	1	1	10	4	3	0.01	0.001	0.05	0.01	0.006	0.0	0.01	0.01	0.4	0.06	0.01	
Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data NLM - No Longer Monitored **=Monitoring has ceased																												

At all groundwater monitoring locations, all major cations and anions sampled during the reporting period were generally below the relevant SWMP objective. However, MB11 recorded exceedances of the upper limit of the magnesium objective of 100mg/L, from March 2024 to June 2024, and also the sulfate objective of 800mg/L from March 2024 to June 2024. These increased levels are consistent with the increased EC levels, although a corresponding increase in sodium and chloride levels did not occur over the same time period. Whilst pH levels remained near neutral, as elevated iron levels were also recorded during May and June 2024 it is expected that this has resulted from local oxidation of acid sulfate soils with pH buffered by the existing buffering capacity within the sand profile.

No visible oil and grease was reported during the reporting period.

### **Metals**

**Figure 7.4g** shows the iron concentrations at the Cudgen Lakes Sand Quarry. Metal values recorded at all bores during the reporting period generally remained within the relevant objective values with the exception of iron levels at MB11. This is consistent with the near neutral to slightly acidic pH recorded at these locations. At MB11 high iron concentrations were recorded during May and June 2024. Whilst pH remained neutral leading up to and during these months, as discussed above, it is expected that the elevated levels of iron are associated with the local oxidation of acid sulfate soils which was subsequently neutralised by the existing buffering capacity within the sand profile.

### **Nutrients**

Nutrient levels across both extraction ponds remained slightly elevated throughout the reporting period, consistent with previous reporting periods.

Elevated nutrient levels have consistently been recorded in pre-extraction baseline monitoring and in surrounding groundwater bores. This is reflective of past and current agricultural activities within and surrounding the Quarry both on the floodplain and the Cudgen Plateau. Given that the approved Quarry activities themselves do not influence nutrient levels within the surrounding groundwater bores, groundwater quality objectives are not specified in the approved *Soil and Water Management Plan* for the Quarry and ongoing monitoring of nutrients within groundwater is undertaken only to improve the understanding of potential impacts from surrounding activities on water quality within the dredge pond.

### **Comparison with Predictions**

In summary, the 2008 Environmental Assessment anticipated that “water quality at surrounding bores would not be significantly affected as a result of the Project”. However, the 2008 Environmental Assessment also anticipate that the Project “may lead to the generation of acidic water. It is expected that the buffering capacity of the sand and sediments below -5.0m AHD would be sufficient to maintain the extraction pond water at a neutral pH.

The monitoring results to date support these predictions with water levels remaining within predicted levels. Notwithstanding, the reduction in groundwater levels at MB11 during the reporting period (following the commencement of dredging within the northern extraction pond immediately adjacent MB11), pH levels remained near neutral. This indicates that the existing buffering capacity was sufficient to neutralise any acidification of acid sulfate soils in the vicinity of MB11. The elevated magnesium, sulfate and iron during this period are therefore consistent

with this process and are expected to represent a short term / transient change in water quality as dredging progresses within this area. This is supported by the July and August 2024 monitoring data (beyond this current reporting period) which record a continuing decline in these analytes.

### **Reportable Incidents**

During the reporting period the lower limit of the pH objective criteria of 5.2 for MB2 was exceeded from August 2023 to October 2023. MB11 also recorded exceedances of the upper limit of magnesium and sulfate objectives from March 2024 to June 2024.

In accordance with the SWMP these are reportable incidents and will be reported to the DPHI.

### **Further Improvements**

During the next reporting period a replacement bore will be resolved for MB10. Groundwater level logger replacements for multiple monitoring sites will also be undertaken. Subject to approval of the updated SWMP, no further improvements to the SWMP are currently planned. However, an internal system will be implemented to flag the requirement to report any exceedance of TARPs.



## 8. Rehabilitation

### 8.1 Rehabilitation Performance During the Reporting Period

**Figure 8.1** shows the status of disturbance and rehabilitation at the end of the reporting period whilst **Table 8.1** provides a summary of the disturbance and rehabilitation areas.

**Table 8.1**  
**Rehabilitation Summary**

	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
Quarry Area Type	Year 14 (ha)	Year 15 (ha)	Year 16(ha)
Total Quarry footprint <sup>1</sup>	19.3	21.7	21.7
Total active disturbance <sup>1</sup>	19.3	21.7	21.7
Land being prepared for rehabilitation	0	0	0
Land under active rehabilitation	0	0	0
Completed rehabilitation	0	0	0
Note: 1. Includes areas of temporary rehabilitation.			

The total active disturbance area increased during the reporting period with extraction activities continuing in the northern dredge pond to the west. A small area to the northwest of the northern dredge pond was disturbed for the installation of a drain to return water ponded against the fill area associated with DA 20/0965 to the northern dredge pond.

The current active disturbance area of 21.7ha includes an approximately 11ha pond area (~8.7ha southern lake and ~2.3ha northern pond), 0.6ha silt return pond area, and approximately 1.0ha processing area. The majority of the remaining areas are considered to have been previously temporarily rehabilitated with re-established pasture.

An approximately 9ha area of disturbance is also present in relation filling works associated with DA 20/0965. As these works are managed under separate approval and not directly related to Quarry operations, these areas are not included in **Table 8.1**.

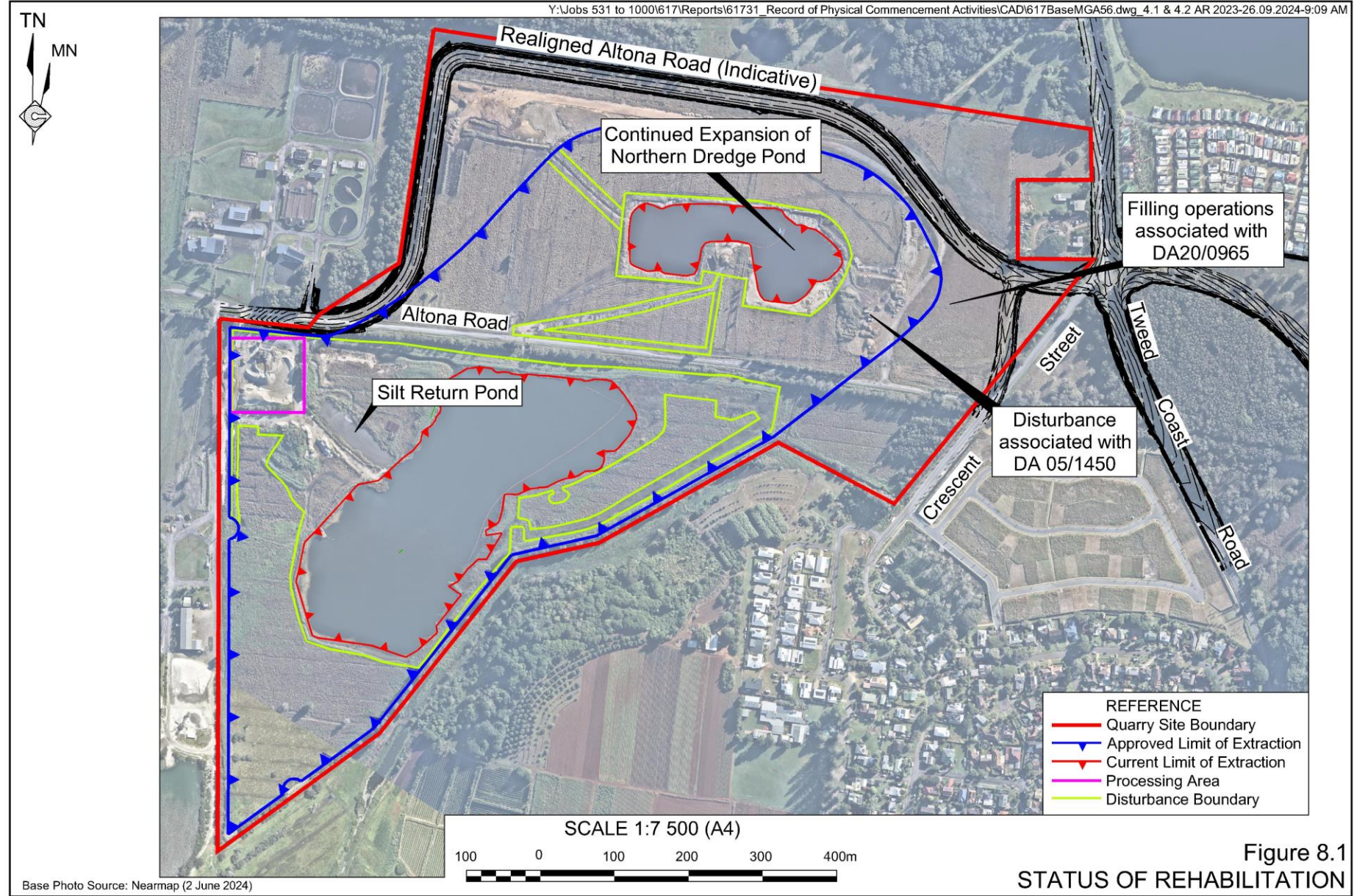
Maintenance activities mainly consisted of slashing the southern section of the Quarry, spot spraying of grass, whipper snipping around the office and entrance, and fencing repairs to the northern section of the Quarry following grazing.

Monthly visual monitoring of the site was undertaken to ensure no noxious weeds, such as Amazonian Frogbit and Kidney Mud Plantain were present on site following identification of the weeds near the Kingscliff Waste Water Treatment Plant and east of Tweed Coast Road. No aquatic weeds have been observed to date within the extraction ponds and Rous County Council treated the off-site areas identified with the weeds and have been monitoring to ensure the treatment has been effective.

## 8.2 Actions for the Next Reporting Period

Rehabilitation activities during the next reporting period are expected to include temporary rehabilitation of the extended bunding. Pending the construction of an extended processing area (development application to be lodged), planting of tubestock may also occur on visual barriers constructed for the extended area.

Australian Wetland Consultants (AWC) have also been engaged to complete an initial assessment of the rehabilitation status of the southern lake edges and southern sections of the northern dredge pond. Following this initial assessment AWC will undertake a review of the Rehabilitation Management Plan and recommend any updates. A program of on-site works may also be recommended in the event that additional actions are identified for enhancing the existing rehabilitation status.





## 9. Community

### 9.1 Community Complaints

No complaints were received during the current reporting period.

### 9.2 Community Liaison

The principal form of formal community consultation relating to the Quarry during the reporting period was via the Community Consultative Committee (CCC). During the reporting period, the CCC consisted of following representatives.

- The CCC Chairperson – Mr Michael Ulph who was appointed by (then) DPE to the role of chairperson in May 2022.
- Community members – Ms Felicia Cecil and Mr Barry Green who were approved by (then) DPE on 14 November 2016. Mr Lloyd Goddard (as a potential community representative) and Mr Lachlan McIntosh (representing the Kingscliff Chamber of Commerce) were also present at the February 2024 meeting.
- Company representatives – Dr Stephen Segal of Gales-Kingscliff and Mr Matt and Mr Brad Holloway and Nick Gould of Kingscliff Sands Pty Limited/JBM Developments.
- Tweed Shire Council representatives – Ms Colleen Forbes, Team Leader Development Assessment.

During the reporting period, the CCC meeting was convened on 9 February 2024. During the February 2024 meeting matters or issues discussed included the new electric dredge, the Drainage Management Plan approved by Rous Country Council, the proposed MOD4, advertisement of new CCC meeting members and other membership/attendance concerns, various plans for the Quarry that were shelved including 6am starts, and floating solar panels, and a pause on seeking updated EPA licencing for receipt of Potential Acid Sulfate Soils.

The report / minutes provided an overview of activities during the current reporting period.

Continued CCC meetings will be undertaken at times set by the CCC. Minutes from these meetings/reports will also continue to be placed on the Company website and reported through the respective Annual Review.



## 10. Independent Audit

In accordance with *Condition 5(14)* of PA 05\_0103, an independent audit was undertaken by James Hart Consulting on 9 November 2022 and finalised 20 December 2022. The final audit and response was submitted to the Department on 24 January 2023. This is the second independent audit for the Quarry.

A review of the status of the response plan as at the end of this reporting period is provided in **Table 10.1**.

The next Independent Environmental Audit is due and will be undertaken in 2025.

**Table 10.1**  
**2022 Independent Audit – Action Response Plan Status**

Page 1 of 2

No.	Audit Recommendation	Action / Response	Proposed Timing	Status Update
NC-01	It is recommended that all non-compliances identified are addressed and closed out. Consider implementing a process to track compliance requirements and status.	Compliance requirements and status to continue to be tracked internally and reported through the Annual Review process.	Annually as part of the Annual Review.	Actions have been generally implemented as planned. Further closing out of non-compliances will be reported in future Annual Reviews.
NC-02	A copy of the DRG Extractive Materials Return form should be included in the Annual Review.	It is noted that the Extractive Materials Return for each financial year is due after the respective Annual Review and is submitted directly to the Resources Regulator. A copy of the previous year's Extractive Materials Return will be included as an appendix to future Annual Reviews.	Annually as part of the Annual Review.	The Extractive Materials Return form has been included in this Annual Review as <b>Appendix 6</b> . <b>Complete.</b>
NC-03	Noise monitoring should be scheduled and completed as required by the approved Noise Management Plan.	An incident report was lodged in 2021 with action responses. These actions have been implemented with subsequent noise monitoring completed in accordance with the approved Noise Management Plan and reported through the Annual Review process.	Annually as part of the Annual Review.	Noise Monitoring has been completed for the 2023-2024 reporting period as required by the approved Noise Management Plan. Future noise monitoring will be scheduled to ensure it is undertaken as required by the NMP. <b>Complete.</b>
NC-04	Inspections required by Section 4.4 of the SWMP should be completed and records retained.	Review inspection checklist / form for recording the required information and ensure addresses all requirements.	By 31 January 2023.	The workplace inspection checklist was updated to include inspection of erosion and sediment controls. <b>Complete</b>
		Ongoing inspections to be undertaken and recorded utilising the template and reported through the Annual Review.	Ongoing and annually as part of the Annual Review.	The updated workplace inspection checklist has been implemented since February 2023 and commentary is provided in Section 7.2. <b>Complete</b>
NC-05	Surface water monitoring should be conducted in accordance with Section 7.5 of the SWMP and records retained.	Review template form / spread sheet for recording the weekly monitoring information and ensure addresses all requirements.	By 31 January 2023.	Template reviewed. Monitoring undertaken by external consultant on monthly basis. The SWMP has been revised to remove weekly monitoring given the consistency of water quality within the pond over a long period of operations and is awaiting approval.
		Ongoing weekly monitoring to be undertaken (in accordance with the SWMP) and recorded utilising the template and reported through the Annual Review.	Ongoing and annually as part of the Annual Review.	

**Table 10.1 (Cont'd)**  
**2022 Independent Audit – Action Response Plan Status**

Page 2 of 2

No.	Audit Recommendation	Action / Response	Proposed Timing	Status Update
NC-06	The draft Rehabilitation Management Plan should be updated and resubmitted to DPE for acceptance.	The draft Rehabilitation Management Plan will be updated to address agency comments and resubmitted to DPE with a request for approval.	Submission prior to 31 March 2023.	The updated Rehabilitation Management Plan was approved on 1 February 2024. <b>Complete</b>
NC-07	Update the website to include all required information.	The Gales-Kingscliff website was previously upgraded to a new site with some documentation not migrated. A review of the website will be undertaken to identify any additional documentation gaps and all documentation required uploaded.	Documentation to be uploaded prior to 28 February 2023.	A review of the website was undertaken and all documents required by the PA have been uploaded. Up to date versions of these documents will also be uploaded as they are approved/required. <b>Complete.</b>
NC-08	Annual Returns should be submitted within the required timeframe.	Internal reporting checklists have previously been updated to reflect the updated Annual Return date. The 2022 Annual Return was submitted within the required reporting date.	No further action required.	Noted. No further action. <b>Complete</b>
NC-09	Instal a height gauge within the extraction pond to enable monitoring of water levels	A new height gauge has been installed to replace the previous gauge removed due to dredging. Elevations to be added using laser level.	By 31 January 2023	<b>Complete.</b>
		During a future modification application, it will be proposed to update Statement of Commitment 5.2 to be consistent with the approved Soil and Water Management Plan which provides for multiple measurement options. <i>"Levels will be measured either via the calibrated height gauge, water level sensor, or calibrated water level monitor on the dredge"</i>	During future modification of Project Approval.	To be completed during future modification of Project Approval.

## 11. Incidents and Non-compliances During the Reporting Period

During the reporting period there were no official cautions, warning letters, penalty notices or prosecution proceedings.

As part of the compliance review undertaken for the Annual Review, a total of five non-compliances were recorded (see Section 1 and **Appendix 1**). All non-compliances are considered either administrative non-compliances with no environmental or community impacts or of low risk without environmental impacts. A summary of these non-compliances and completed or proposed actions is provided as follows.

### Monitoring Parameters and Frequency

EPL 12385 *Condition M2.1* requires monitoring to be undertaken in accordance with the locations, analytes, and frequency specified within the table within EPL 12385. Monitoring was unable to be undertaken at EPL Point 5 (MB10) due to damage of the bore caused by earthworks for placement of transformer. A replacement bore is to be established / alternative site nominated.

### Construction of Bunding and Spillways

EPL 12385 requires the construction of bunding and spillways in accordance with Mortons Urban Solutions Engineering Response submitted to the EPA and maintained in accordance with the current SWMP for the site.

Bunding and spillways around the southern lake and processing area have been finalised in accordance with the conditions of consent for the Quarry. Whilst bunding is present around the northern extraction pond, the additional bunding and spillway construction has not yet been finalised for the northern portion of the site per the Mortons Urban Solutions plan. Given the existing bunding this is considered to be an administrative non-compliance as the EPL condition does not specify a timeframe in which the bunding was to be completed. The additional bunding will be completed during the next reporting period.

### Reportable Incidents

During the reporting period it is also considered that a reportable incident occurred as per the Trigger Action Response Plan within the approved May 2021 SWMP. As outlined in Sections 7.2 and 7.3 there were instances during the reporting period in which dissolved oxygen reduced below the SWMP surface water objective on three or more consecutive occasions and in which pH, magnesium, and sulfate objectives were exceeded for groundwater. These are defined by the SWMP as reportable incidents and will be reported to the Department of Planning and Environment. An internal system will also be implemented to flag the requirement to report any future exceedance of TARPs in accordance with the SWMP and conditions of consent.



## **12. Activities to be Completed in the Next Reporting Period**

Activities planned to be completed during the next reporting period are outlined in Section 4.3 and planned improvements in environmental management practices in Sections 6 and 7. In summary, the key activities planned for the next reporting period are as follows.

- A potential extension of the processing area (subject to modification of MP 05\_0103B).
- Continued extraction of sand and soil by dredge and excavator and sale of products by road.
- Creation of property access tracks to improve access to key locations for monitoring and site inspections.
- Continued environmental monitoring, including re-instatement of monitoring bore MB10 and replacement of groundwater loggers.
- Implementation of an internal system will also be implemented to flag the requirement to report any future exceedance of TARPs in accordance with the SWMP and conditions of consent.
- Continued community consultation to inform the community about Quarry activities and development on the Quarry site.

Key environmental improvements planned during the next reporting period include further review and update of the Soil and Water Management Plan to include additional groundwater monitoring (subject to approval of the Condition 25 Groundwater Assessment), and potentially the Rehabilitation Management Plan following review by Australian Wetland Consultants.

# Appendices

## Appendix 1 Compliance Review

Table A: Project Approval MP05\_0103B

Table B: Statement of Commitments

Table C: Environment Protection Licence 12385

## Appendix 2 Noise Monitoring Results

## Appendix 3 Air Quality Monitoring Results

## Appendix 4 Surface Water Monitoring Results

## Appendix 5 Groundwater Monitoring Results

## Appendix 6 Extractive Materials Return

# Appendix 1

## Compliance Review

Table A: Project Approval MP 05\_0103B

Table B: Statement of Commitments

Table C: Environment Protection Licence 12385

(No. of pages including blank pages = 54)

**Table A**  
**Compliance Review – Project Approval 05\_0103B**

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 2 ADMINISTRATIVE CONDITIONS</b>				
<b>OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT</b>				
1.	In addition to meeting the specific performance measures and criteria established under this approval, the Proponent must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise any material harm to the environment that may result from the construction and operation of the project, and any rehabilitation required under this approval.	Compliant	All reasonable and feasible measures to minimise potential for harm were implemented during the reporting period.	A, D
<b>TERMS OF APPROVAL</b>				
2.	The Proponent, in acting on this approval, must carry out the project in accordance with: (a) the conditions of this approval; and (b) all written directions of the Secretary.	<b>Non-Compliant</b>	The Company has generally undertaken operations in accordance with the conditions of this approval. However, non-compliance with some conditions have been recorded for this reporting period.  No written directions have been received during the reporting period.	D
3.	The Proponent, in acting on this approval, must carry out the project generally in accordance with the EA, EA MOD 1, EA MOD2 and project layout.	Compliant	The works completed during the reporting period are considered to be generally consistent these documents.	A, D
4.	The conditions of this approval and directions of the Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document referenced in condition 3 of this Schedule. In the event of an inconsistency, ambiguity or conflict between any of the documents referenced in condition 3 of this Schedule, the most recent document prevails.	Noted	-	-
5.	Consistent with the requirements of this approval, the Secretary may make written directions to the Proponent in relation to: a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this approval, including those that are required to be, and have been, approved by the Secretary; and b) the implementation of any actions or measures contained in any such document referred to in (a) above.  <i>Note: For the purposes of this condition, there will be an inconsistency between documents if it is not possible to comply with both documents, or in the case of a condition of approval or direction of the Secretary, and a document, if it is not possible to comply with both the condition or direction, and the document.</i>	Not Applicable	No directions from the Secretary arose during the reporting period.	A
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				



**Table A (Cont'd)**  
**Compliance Review – Project Approval 05\_0103B**

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)</b>				
<b>LIMITS ON APPROVAL</b>				
<b>Quarrying Operations</b>				
6.	The Proponent may carry out quarrying operations on the site until 31 December 2047.  <i>Note: Under this approval, the Proponent is required to rehabilitate the site and carry out additional requirements and undertakings to the satisfaction of the Secretary. Consequently, this approval will continue to apply in all respects other than the right to conduct quarrying operations until the rehabilitation of the site and those requirements and undertakings have been carried out to the standard required by the applicable conditions.</i>	Noted	-	-
7.	The Proponent must not undertake extraction of extractive materials to a depth greater than 20 metres AHD.	Compliant	To date extraction has reached a maximum depth of approximately 14m AHD.	D, A
8.	The Proponent must not extract more than 650,000 cubic metres of quarry products from the site in any financial year.	Compliant	A total of approximately 176,773m <sup>3</sup> of sand was extracted during the reporting period.	A, D
<b>Quarry Product Transport</b>				
9.	The Proponent must not transport more than 300,000 tonnes of quarry products from the site by road in any financial year.	Compliant	A total of 264,409t of product was transported by road during the reporting period.	A, D
10.	The Proponent must not import more than 45,000 tonnes of VENM (or material that otherwise meets the classification of VENM as approved by the EPA) to the site in any financial year. The Proponent must ensure that all VENM imported to the site does not contain waste.	Compliant	No VENM was imported during the reporting period under Project Approval MP05_05_0103B.	A
11.	Prior to the upgrade of Altona Road and the Tweed Coast Road / Crescent Street intersection, as required under conditions 27 and 29 of Schedule 3, the Proponent may dispatch up to:  (a) 4 laden trucks per hour; and (b) 10 laden trucks per day between the hours of 9.00 am and 3.00 pm.	No Longer Applicable	During the 2020/2021 reporting period road upgrade works were completed by Hanson Construction Materials, including upgrade works to Altona Road and the Tweed Coast Road / Crescent Street intersection. These works also satisfy the requirements of Schedule 3 Conditions 27 and 29. Council confirmed their satisfaction of the works through the issue of a Works as Executed Compliance Certificate dated 7 May 2020.	A, D
12.	Following the completion of road upgrades required under conditions 27 and 29 of Schedule 3, the Proponent must not dispatch more than 12 laden trucks from the site in any hour, during the hours specified in Table 1.	Compliant	Trucking records confirm that hourly laden trucks did not exceed 12 per hour.	A, D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table A (Cont'd)**  
**Compliance Review – Project Approval 05\_0103B**

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)				
LIMITS ON APPROVAL (Cont'd)				
Hours of Operation				
13.	The Proponent shall comply with the operating hours in <i>Table 1</i> . <i>Table 1: Operating Hours</i>	Compliant	Site records confirm activities undertaken within approved hours of operation.	A, D
	<b>Activity</b>	<b>Permissible Hours</b>		
	Site establishment, dry processing, product transport by road, VENM receipts, other quarrying operations not specified in this table	<ul style="list-style-type: none"><li>7.00 am to 6.00 pm Monday to Friday</li><li>7.00 am to 1.00 pm Saturday</li><li>At no time on Sundays or public holidays</li></ul>		
	Sand extraction by dredging and pumping to the processing plant, wet processing.	<ul style="list-style-type: none"><li>7.00 am to 10.00 pm Monday to Friday</li><li>7.00 am to 4.00 pm Saturday</li><li>At no time on Sundays or public holidays</li></ul>		
	Sand extraction by dredging and pumping to fill sites.	<ul style="list-style-type: none"><li>7.00 am to 6.30 pm Monday to Friday</li><li>7.00 am to 1.00 pm Saturday</li><li>At no time on Sundays or public holidays</li></ul>		
	Operation of dredge to fill pipeline with water or pipeline flushing	<ul style="list-style-type: none"><li>6.30 am to 7.00 pm Monday to Friday</li><li>6.30 am to 1.30 pm Saturday</li><li>At no time on Sundays or public holidays</li></ul>		
	Maintenance (if inaudible at neighbouring residences)	Any day		
14.	The following activities may be carried out outside the hours specified in condition 13. above:  (a) delivery or dispatch of materials as requested by Police or other public authorities; and  (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.  In such circumstances, the Proponent must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.	Not Applicable	No such requests or emergency works have been received / required to date.	A
STRUCTURAL ADEQUACY				
15.	The Proponent must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.  <i>Notes:</i> <ul style="list-style-type: none"><li>Under Part 4A of the EP&amp;A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works; and</li><li>Part 8 of the EP&amp;A Regulation sets out the requirements for the certification of the project.</li></ul>	Compliant	No buildings or structures on site require certification or assessment against the Building Code of Australia.	A, D

\* D = Documentation sightedA = Advised by CompanyO = On-site Observation

**Table A (Cont'd)**  
**Compliance Review – Project Approval 05\_0103B**

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)</b>				
<b>DEMOLITION</b>				
16.	The Proponent shall ensure that all demolition work is carried out in accordance with AS 2601-2001: <i>The Demolition of Structures</i> , or its latest version.	Not Yet Applicable	No demolition work has been required to date.	A
<b>PROTECTION OF PUBLIC INFRASTRUCTURE</b>				
17.	The Proponent shall: a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the project; and b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project. <i>Note: This condition does not apply to damage to roads caused as a result of general road usage or as otherwise addressed by contributions required by condition 19 of Schedule 2.</i>	Compliant	No repair works or relocation of public infrastructure was required during the reporting period.	A, D
<b>OPERATION OF PLANT AND EQUIPMENT</b>				
18.	The Proponent must ensure that all plant and equipment used at the site, or to monitor the performance of the project is: a) maintained in a proper and efficient condition; and b) operated in a proper and efficient manner.	Compliant	Equipment repair and servicing was undertaken during the reporting period to ensure proper and efficient equipment condition. No issues with equipment operation arose during the reporting period.	A
<b>CONTRIBUTIONS</b>				
19.	The Proponent must pay to Council a financial contribution toward the upgrade and construction of distributor roads (other than Altona Road and the upgrade of the Tweed Coast Road / Crescent Street intersection). The contribution must be: a) determined in accordance with the Tweed Road Contributions Plan September 2016 (as indexed); b) paid prior to the dispatch of any laden trucks from the site, unless otherwise agreed by Council; c) reported in the Annual Review. <i>Note: The upgrade and maintenance of Altona Road is subject to conditions 25 and 26 of Schedule 3. The upgrade of the Tweed Coast Road / Crescent Street intersection is subject to condition 27 of Schedule 3.</i>	Compliant	Correspondence from Council dated 7 September 2016 confirms Council's acceptance that the contribution be paid prior to receipt of VENM to the site. The contribution amount was confirmed with Tweed Shire Council on 13 October 2020 and subsequently paid (i.e. prior to receipt of VENM).	A
<b>COMPLIANCE</b>				
20.	The Proponent must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this approval relevant to activities they carry out in respect of the project.	Compliant	Kingscliff Sands induct all employees and contractors with all works under the direct supervision of the Operations Manager. The Operations Manager maintains copies of all approvals on site which are accessible to all employees / contractors.	A
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)</b>				
<b>PRODUCTION DATA</b>				
21.	<p>The Proponent must:</p> <p>a) from the commencement of quarrying operations provide annual quarry production data to DRG using the standard form for that purpose; and</p> <p>b) include a copy of this data in the Annual Review.</p>	<p>Compliant</p> <p>Compliant</p>	<p>It is advised that the 2023/24 Extractive Material Return form was submitted and accepted by Department of Primary Industries and Regional Development.</p> <p>Production data is presented in Section 4.1 and as <b>Appendix 6</b> of this Annual Review.</p>	A, D
<b>LIMITS OF EXTRACTION</b>				
22.	<p>The Proponent must ensure that the surveyed boundaries of the approved limits of extraction are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.</p> <p><i>Note: The limit of extraction includes the area described in the documents listed in condition 3 of Schedule 2, and shown conceptually on the project layout plan in Appendix 1.</i></p>	Compliant	<p>The modified extraction boundary (per MOD2) has been surveyed by registered surveyors (B&amp;P Surveys) and star pickets placed with ~2m high orange electrical conduit to enhance the visibility of the markers.</p>	A, D
<b>PIPELINE CORRIDOR</b>				
23.	<p>Prior to commencing work to install pipeline corridors (shown conceptually in Appendix 1), the Proponent must submit for the approval of the Secretary:</p> <p>a) a survey plan of the route of the pipeline;</p> <p>b) evidence that this route does not require native vegetation clearing;</p> <p>c) evidence that the fill sites have approval for filling; and</p> <p>d) in relation to the eastern pipeline:</p> <p>(i) evidence that any vegetation cleared from the eastern pipeline corridor following the date of this approval has been lawfully carried out in accordance with another approval;</p> <p>(ii) details of proposed measures to protect vegetation during pipeline installation, operation and removal; and</p> <p>(iii) details of measures, developed in consultation with OEH, to provide opportunities for the Wallum Froglet to cross the eastern pipeline.</p>	Compliant	<p>Neumann Contractors emailed DPE the required information for the section of pipeline between the Quarry Site and the Cudgen Heights fill site 5 and 19 July 2017. DPE approved installation of the pipeline by letter dated 31 July 2017.</p> <p>No additional sections of pipeline were placed during the reporting period.</p>	A, D
24.	<p>The Proponent must maintain the pipelines, ensuring that any leak or maintenance issues are detected and repaired to the satisfaction of the Secretary.</p>	Not Applicable	<p>The pipelines during the 2017/2018 reporting period were maintained and inspected by Neumann Contractors. However, following the completion of filling of the Cudgen Heights area the pipelines were removed. Therefore, no inspections or maintenance were applicable to this reporting period.</p>	A, D
<p>* D = Documentation sighted      A = Advised by Company      O = On-site Observation</p>				



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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*						
SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)										
PROCESSING AREA										
25.	The Proponent must ensure that the office facilities for the processing area: a) are designed with ventilation emanating from the side facing away from the Kingscliff Waste Water Treatment Plant; and b) have air conditioning facilities installed prior to occupation.	Compliant	The office facilities placed within the Processing Area include appropriate ventilation away from the WWTP and air conditioning facilities.	A						
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS										
NOISE										
Operational Noise Criteria										
1.	<p>The Proponent must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land.</p> <p>Table 2: Noise criteria dB(A)</p> <table><tr><th>Receiver Location</th><th>Day &amp; Evening LAeq(15 min) dB(A)</th><th>Shoulder LAeq(15 min) dB(A)</th></tr><tr><td>Residences on privately owned land</td><td>47</td><td>44</td></tr></table> <p>Noise generated by the project is to be measured in accordance with the relevant requirements of the <i>NSW Industrial Noise Policy</i>. Appendix 3 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.</p> <p>However, the noise limits in Table 2 do not apply if the Proponent has an agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the department in writing of the terms of the agreement.</p>	Receiver Location	Day & Evening LAeq(15 min) dB(A)	Shoulder LAeq(15 min) dB(A)	Residences on privately owned land	47	44	Compliant	Noise monitoring during the reporting period confirmed noise contributions from the Quarry remained below the criteria.	D
Receiver Location	Day & Evening LAeq(15 min) dB(A)	Shoulder LAeq(15 min) dB(A)								
Residences on privately owned land	47	44								
Cumulative Noise Criteria										
2.	<p>The Proponent shall take all reasonable and feasible measures to ensure that noise generated by the project combined with the noise generated by other industrial development does not exceed the following amenity criteria on any privately-owned land, to the satisfaction of the Secretary:</p> <ul style="list-style-type: none"><li>• LAeq (11 hour) 50 dB(A) – Day;</li><li>• LAeq (4 hour) 45 dB(A) – Evening; and</li><li>• LAeq(9 hour) 40 dB(A) – Night.</li></ul>	Compliant	Whilst the cumulative amenity criterion was exceeded, noise monitoring confirms this was the result of surrounding noise sources. Operations were limited using appropriately sized and maintained equipment with the noise contributions from Quarry activities well below the relevant criteria. Therefore, it is considered all reasonable and feasible measure were taken.	A, D						
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation										

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>NOISE (Cont'd)</b>				
<b>Operating Conditions</b>				
3.	<p>The Proponent must:</p> <ul style="list-style-type: none"> <li>a) implement best practice management to minimise the construction, operational and road transportation noise of the project;</li> <li>b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this approval do not apply (see Appendix 3);</li> <li>c) carry out attended noise monitoring (at least every 3 months or as otherwise agreed by the Secretary) to determine whether the project is complying with the operational noise criteria in Table 2 (see Appendix 3); and</li> <li>d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this approval,</li> </ul> <p>to the satisfaction of the Secretary.</p> <p><i>Note: Monitoring under this approval is not required at all residences and the use of representative monitoring locations can be used to demonstrate compliance with criteria, if agreed to by the Secretary.</i></p>	Compliant	<p>All equipment utilised in operations was appropriately sized and maintained to ensure efficient operations with the lowest noise generation. Use of broadband reversing alarms were also utilised to minimise tonal noise. Operations were also restricted to the approved hours of operation.</p> <p>Noise monitoring was undertaken during the reporting period.</p> <p>No modification to operations has been deemed necessary to date.</p> <p>Noise monitoring and management is further discussed in Section 6.3.</p>	A, D
<b>Noise Management Plan</b>				
4.	<p>The Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:</p> <ul style="list-style-type: none"> <li>a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;</li> <li>b) be submitted to the Secretary for approval within three months of the determination of Modification 2;</li> <li>c) be prepared in consultation with the EPA;</li> <li>d) describe the measures to be implemented to ensure: <ul style="list-style-type: none"> <li>- compliance with the noise criteria and operating conditions of this approval;</li> <li>- best practice management is being employed; and</li> <li>- the noise impacts of the project are minimised during meteorological conditions under which the noise criteria in this approval do not apply (see Appendix 3);</li> </ul> </li> <li>e) describe the proposed noise management system; and</li> </ul>	Compliant	<p>No amendments to the Noise Management Plan were required during the reporting period.</p> <p>The Department confirmed by letter 18 April 2019 that RWC was suitably qualified to prepare the noise management plan.</p> <p>The updated management plan was submitted to the Department on 22 April 2019, resubmitted 30 April 2020 and approved 22 June 2020.</p> <p>EPA confirmed via email on 18 April 2019 that they would not be providing comments on the updated plan.</p> <p>Section 3 of the 2020 Noise Management Plan outlines the noise management measures.</p> <p>Section 5 of the 2020 Noise Management Plan outlines the noise management system.</p>	<p>D</p> <p>D</p> <p>D</p> <p>D</p> <p>D</p>

\* D = Documentation sighted

A = Advised by Company

O = On-site Observation

Table A (Cont'd)  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*																			
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)																							
NOISE (Cont'd)																							
Noise Management Plan (Cont'd)																							
4. (Cont'd)	<p>f) include a monitoring program to be implemented to measure noise from the project against the noise criteria in Table 2, and which evaluates and reports on the effectiveness of the noise management system on site.</p> <p>The Proponent must implement the Noise Management Plan as approved from time to time by the Secretary.</p>		<p>Section 5 of the 2020 Noise Management Plan outlines the noise monitoring program.</p> <p>The Noise Management Plan was appropriated implemented during the reporting period.</p>	<p>D</p> <p>A, D</p>																			
AIR QUALITY																							
Air Quality Impact Assessment Criteria																							
8.	<p>The Proponent must ensure that particulate matter generated by the project do not cause exceedances of the criteria listed in Table 3 at any privately-owned land.</p> <p>Table 3</p> <table><tr><th>Pollutant</th><th>Averaging period</th><th>Criterion</th></tr><tr><td rowspan="2">Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td><td>Annual</td><td><sup>a,c</sup> 25 µg/m<sup>3</sup></td></tr><tr><td>24-hour</td><td><sup>b</sup> 50 µg/m<sup>3</sup></td></tr><tr><td rowspan="2">Particulate matter &lt; 2.5 (PM<sub>2.5</sub>)</td><td>Annual</td><td><sup>a, c</sup> 8 µg/m<sup>3</sup></td></tr><tr><td>24-hour</td><td><sup>b</sup> 25 µg/m<sup>3</sup></td></tr><tr><td>Total suspended particulate (TSP)</td><td>Annual</td><td><sup>a,c</sup> 90 µg/m<sup>3</sup></td></tr><tr><td><sup>d</sup> Deposited dust</td><td>Annual</td><td><sup>b</sup> 2 g/m<sup>2</sup>/month <sup>a</sup> 4 g/m<sup>2</sup>/month</td></tr></table> <p>Notes:</p> <p>a Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources).</p> <p>b Incremental impact (i.e. incremental increase in concentrations due to the project on its own).</p> <p>c Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.</p> <p>d Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.</p>	Pollutant	Averaging period	Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a,c</sup> 25 µg/m <sup>3</sup>	24-hour	<sup>b</sup> 50 µg/m <sup>3</sup>	Particulate matter < 2.5 (PM <sub>2.5</sub> )	Annual	<sup>a, c</sup> 8 µg/m <sup>3</sup>	24-hour	<sup>b</sup> 25 µg/m <sup>3</sup>	Total suspended particulate (TSP)	Annual	<sup>a,c</sup> 90 µg/m <sup>3</sup>	<sup>d</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month <sup>a</sup> 4 g/m <sup>2</sup> /month	Compliant	<p>Air quality monitoring was undertaken in accordance with the approved Air Quality Management Plan. Deposited dust levels remained below the criteria for the reporting period.</p>	<p>A, D</p>
Pollutant	Averaging period	Criterion																					
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a,c</sup> 25 µg/m <sup>3</sup>																					
	24-hour	<sup>b</sup> 50 µg/m <sup>3</sup>																					
Particulate matter < 2.5 (PM <sub>2.5</sub> )	Annual	<sup>a, c</sup> 8 µg/m <sup>3</sup>																					
	24-hour	<sup>b</sup> 25 µg/m <sup>3</sup>																					
Total suspended particulate (TSP)	Annual	<sup>a,c</sup> 90 µg/m <sup>3</sup>																					
<sup>d</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month <sup>a</sup> 4 g/m <sup>2</sup> /month																					
Operating Conditions																							
6.	<p>The Proponent must:</p> <p>a) implement best management practice to minimise the dust emissions of the project, including routinely watering haul roads being used by heavy vehicles and equipment;</p>	Compliant	<p>Previously disturbed areas have been stabilised through re-establishment of pasture. Visual monitoring of dust generation indicated that no additional controls were required beyond the natural moisture content of the materials.</p>	<p>A, D</p>																			
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation																							

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
AIR QUALITY (Cont'd)				
Operating Conditions (Cont'd)				
6 (Cont'd)	b) regularly assess meteorological and air quality monitoring data to guide the day-to-day planning of operations and implementation of air quality mitigation measures to ensure compliance with the relevant conditions of this approval;	Compliant	The Operations Manager advises that meteorological conditions and visible dust generation routinely observed through operational days to determine if any further actions were required.	A
	c) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events (see Note c to Table 3 above);	Not Applicable	The Operations Manager confirmed that no extraordinary events effecting air quality occurred during the reporting period.	A
	d) monitor and report on compliance with the relevant air quality conditions in this approval; and	Compliant	Operational deposited dust monitoring is reported in Section 6.4 of this report.	A, D
	e) minimise surface disturbance of the site, other than as permitted under this approval,	Compliant	All areas of disturbance not required for immediate operation and which can feasibly be revegetated have been stabilised with pasture cover.	A, D
	to the satisfaction of the Secretary.			
Air Quality Management Plan				
7.	The Proponent must prepare an Air Quality Management Plan for the project to the satisfaction of the Secretary. This plan must:  a) be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;  b) be prepared in consultation with the EPA;  c) be submitted to the Secretary within three months of the determination of Modification 2;  d) describe the measures to be implemented to ensure: - compliance with the air quality criteria and operating conditions of this approval; - best practice management is being employed; and - the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events;  e) describe the air quality management system in detail; and	Compliant	No amendments to the Air Quality Management Plan were required during the reporting period.  The Department confirmed by letter 18 April 2019 that R.W. Corkery & Co Pty Limited was suitably qualified to prepare the Air Quality Management Plan.  EPA confirmed via email on 18 April 2019 that they would not be providing comments on the updated Air Quality Management Plan  The updated management plan was submitted to the Department on 22 April 2019, resubmitted 30 April 2020 and approved 22 June 2020.  Section 3 of the 2020 Air Quality Management Plan outlines the air quality management measures.          Section 7 of the approved Air Quality Management Plan outlines the air quality management system.	   <

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>AIR QUALITY (Cont'd)</b>				
<b>Air Quality Management Plan (Cont'd)</b>				
7. (Cont'd)	f) include an air quality monitoring program that: <ul style="list-style-type: none"> <li>- is capable of evaluating the performance of the project against the air quality criteria;</li> <li>- adequately supports the air quality management system; and</li> <li>- includes a protocol for determining any exceedances of the air quality criteria.</li> </ul> The Proponent must implement the Air Quality Management Plan as approved from time to time by the Secretary.		Section 6 of the 2020 Air Quality Management Plan outlines the air quality monitoring program.  The 2020 Air Quality Management Plan was implemented during the reporting period.	D
<b>Meteorological Monitoring</b>				
8.	For the life of the project, the Proponent must ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the <i>Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales</i> guideline.	Compliant	Reliance is placed upon an on-site rain gauge, the BOM Coolangatta Station No. 040717 and BOM Tweed Heads Golf Course Station No. 058056. Rain and wind data is presented in Section 6.2 of this Annual Review.	A, D
<b>Greenhouse Gas Emissions</b>				
9.	The Proponent must implement all reasonable measures to minimise the release of greenhouse gas emissions from the site.	Compliant	Given the limited scale of activities, appropriate maintenance, operation and sizing of equipment for tasks are considered reasonable measures and were implemented.	A,D
<b>SOIL AND WATER</b>				
<b>Water Supply</b>				
10.	The Proponent must ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations under this approval to match its available water supply. <i>Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Proponent is required to obtain all necessary water licences for the project.</i>	Compliant	Gales holds Water Access Licence 40902 which provides for 'take' of up to 700ML per year. Water take remained below the licence limits (see Section 7.1).	D
<b>Water Discharges</b>				
11.	The Proponent must comply with the discharge limits in any EPL for the site, or with section 120 of the POEO Act.	Compliant	No discharge occurred during the reporting period.	A
<b>Fines Management</b>				
12.	The Proponent must ensure that: <ul style="list-style-type: none"> <li>a) no potential acid sulfate soil is removed from the site, unless adequately neutralised in accordance with methods approved under the Soil and Water Management Plan (see condition 18 below);</li> </ul>	Compliant	Unwashed materials were not transported from the Quarry during the reporting period.	A, D

\* D = Documentation sighted      A = Advised by Company      O = On-site Observation



**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>SOIL AND WATER (Cont'd)</b>				
<b>Fines Management (Cont'd)</b>				
12. (Cont'd)	b) all excavated potential acid sulfate soil fines material is discharged into the dredge pond at a depth greater than 3 metres below the water surface as soon as possible to prevent oxidisation; and	Compliant	All fines have been returned to the pond a least 3m below the water.	AD
	c) all fines are deposited to a final depth of at least 8 metres below the water surface, unless an alternative method(s) is approved by the EPA and the Secretary. <i>Note: Acid sulfate soils are as defined in the NSW Acid Sulfate Soils Manual.</i>	Compliant	Fines deposited during the reporting period will also ultimately settle at the base of the dredge pond.	A, D
<b>Flood Management</b>				
13.	All earthworks, including drainage and bunding works, must be contained wholly within the site.	Compliant	The processing area, extraction pond and associated bunding is contained wholly within the site.	D
14.	The Proponent must cease dredging and processing activities not less than 24 hours prior to the commencement of overflow from any dredge pond. No dredging or processing may occur when the dredge ponds are overflowing.	Not Yet Applicable	No overflows of the dredge pond bunding occurred during the reporting period. Notwithstanding, dredging and processing did not occur during periods of localised flooding.	A, D
15.	The Proponent must ensure that the flood storage capacity of the site throughout all stages of the project is not less than the pre-project flood storage capacity, unless otherwise agreed by the Secretary. Details of the available flood storage capacity must be reported in each Annual Review. <i>Note: The Secretary may agree to a reduction in the pre-existing flood storage capacity of the site in the event that separate development consent is granted for development on the site.</i>	Compliant	Based on previous survey of the extraction pond and the volume of material imported to create the transformer pad, net flood storage capacity has increased by at least ~4 000m <sup>3</sup> (4ML). Agreement of the Secretary will be sought for the reduction in flood storage capacity as approved under separate DA20/0695.	D
16.	The Proponent must ensure that the top of the earth bunding around the extraction ponds does not exceed 1.8 m AHD. Spillways shall be provided at the eastern and western extents of each bund and must be a minimum of 50 m wide and not exceed 1.3 m AHD. Bunds and spillways must be suitably surfaced (for example grassed or rock lined) to avoid scour and erosion during storm and flood events.	Compliant	All bunding surrounding the southern extraction area has been constructed in accordance with these requirements. The existing bunding around the northern extraction pond also includes spillways in accordance with these requirements. Additional bunding and replacement spillways will be completed during the next reporting period in accordance with discussions with EPA.	A, D
17.	The Proponent must ensure the pad of the processing area does not exceed a height of 1.8 m AHD.	Compliant	The construction of the Processing Area was completed during the previous reporting period. Levels at the processing area pad have been retained to 1.8m AHD. The transformer pad has been formed to 3.8m AHD per Essential Energy requirements – it is noted that the transformer is owned and controlled by Essential Energy.	A
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>SOIL AND WATER (Cont'd)</b>				
<b>Soil and Water Management Plan</b>				
18.	<p>Within three months of the determination of Modification 2, unless otherwise agreed by the Secretary, the Proponent must prepare a Soil and Water Management Plan for the project in consultation with EPA, Water NSW, DoI and Council, to the satisfaction of the Secretary. This plan must be prepared by a suitably qualified expert whose appointment has been approved by the Secretary, and include:</p> <ul style="list-style-type: none"> <li>a) a Site Water Balance;</li> <li>b) an Erosion and Sediment Control Plan;</li> <li>c) a Surface Water Monitoring Program</li> <li>d) a Groundwater Monitoring Program;</li> <li>e) a Blue-Green Algae Management Plan;</li> </ul> <p>The Proponent must implement the approved plan as approved from time to time by the Secretary</p>	Compliant	<p>Extensions were granted by the Department on 18 April and 31 May 2019 for the submission of the updated Soil and Water Management Plan (SWMP) by 8 July 2019. The updated SWMP was submitted to the Department on 8 July 2019. A copy of the SWMP was also provided to the required agencies for comment on 24 June 2019. The Department approved of RWC, AGECC and HMC as being suitably qualified to prepare the SWMP on 31 May 2019.</p> <p>Section 3 of the SWMP. Section 4 of the SWMP. Section 7 of the SWMP. Section 6 of the SWMP. Section 8 of the SWMP. The updated SWMP was approved 20 July 2021.</p>	A, D
19.	<p>The Site Water Balance must include details of:</p> <ul style="list-style-type: none"> <li>a) sources and security of water supply;</li> <li>b) water use and management on site;</li> <li>c) any off-site water transfers;</li> <li>d) reporting procedures; and</li> <li>e) measures to be implemented to minimise clean water use on site.</li> </ul>	Compliant	<p>Section 3.2 of the SWMP. Section 3.3 of the SWMP. Section 3.3 of the SWMP. Section 9 of the SWMP. Section 3.5 of the SWMP.</p>	D
20.	<p>The Erosion and Sediment Control Plan must:</p> <ul style="list-style-type: none"> <li>a) be consistent with the relevant requirements of Department of Housing's <i>Managing Urban Stormwater: Soil and Construction</i>, the NSW Acid Sulfate Soil Advisory Committee's <i>Acid Sulfate Soil Manual</i>, and relevant Council codes, or most recent versions of these documents;</li> <li>b) describe construction and operational activities that could cause soil erosion, sedimentation or generation of acid sulfate soils;</li> </ul>	Compliant	<p>Sections 4.1 and 5.1 of SWMP.</p> <p>Sections 4.2 and 5.2 of the SWMP.</p>	D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>SOIL AND WATER (Cont'd)</b>				
<b>Soil and Water Management Plan (Cont'd)</b>				
20 (Cont'd)	<ul style="list-style-type: none"> <li>c) describe the location, function, and capacity of soil and water management and control structures during construction, stabilisation and operational stages;</li> <li>d) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;</li> <li>e) define procedures for managing the potential acid sulfate soils on the site;</li> <li>f) define procedures for managing water releases from the site; and</li> <li>g) define procedures for the maintenance of soil and water management structures on the site during the life of the project.</li> </ul>		<p>Section 4.3 of the SWMP.</p> <p>Section 4.3 of the SWMP.</p> <p>Sections 5.3 and 5.4 of the SWMP.</p> <p>Section 7.8 of the SWMP.</p> <p>Section 4.4 of the SWMP.</p>	
21.	<p>The Surface Water Monitoring Program must include:</p> <ul style="list-style-type: none"> <li>a) a detailed description of the surface water management system;</li> <li>b) surface water impact assessment criteria;</li> <li>c) a program to monitor bank and bed stability; and</li> <li>d) a program to monitor and manage pH in the dredge pond;</li> <li>e) a program to monitor and report on adverse impacts of the project on surface water flows and quality, including any surface water discharges; and</li> <li>f) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water impact assessment criteria.</li> </ul>	Compliant	<p>Section 7.2 of the SWMP.</p> <p>Section 7.4 of the SWMP.</p> <p>Section 4.4 of the SWMP.</p> <p>Section 7.5 of the SWMP.</p> <p>Sections 7.7 and 7.8 of the SWMP.</p> <p>Section 7.7 of the SWMP.</p>	D
22.	<p>The Groundwater Monitoring Program must include:</p> <ul style="list-style-type: none"> <li>a) detailed baseline data on groundwater levels and quality, based on statistical analysis;</li> <li>b) groundwater impact assessment criteria;</li> <li>c) a program to monitor and report on adverse impacts of the project on groundwater flows and quality;</li> <li>d) a program to monitor groundwater level effects on vegetation, and on groundwater supply to adjoining properties; and</li> <li>e) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.</li> </ul>	Compliant	<p>Section 6.2 of the SWMP.</p> <p>Section 6.3 of the SWMP.</p> <p>Sections 6.4 and 6.5 of the SWMP.</p> <p>Section 6.4 of the SWMP.</p> <p>Section 6.5 of the SWMP.</p>	D
<p>* D = Documentation sighted      A = Advised by Company      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>SOIL AND WATER (Cont'd)</b>				
<b>Soil and Water Management Plan (Cont'd)</b>				
23.	<p>The Blue-Green Algae Management Plan must:</p> <ul style="list-style-type: none"> <li>a) be consistent with extant guidelines for blue-green algae management including the National Health and Medical Research Council's Guidelines for Managing Risks in Recreational Water;</li> <li>b) describe the measures that would be implemented to prevent and control the sources of algal blooms over the short, medium and long term;</li> <li>c) include a detailed recovery plan that aims to reduce algae levels to meet the water quality completion criteria in the Rehabilitation Management Plan;</li> <li>d) include reasonable and feasible measures to reduce nutrient levels in the pond/s over the short, medium and long term, and include interim water quality targets for nutrients based on continual improvement and established water quality objectives for the Tweed River catchment; and</li> <li>e) define procedures for the management and notification of identified algal blooms.</li> </ul>	Compliant	<p>Section 8.2 of the SWMP.</p> <p>Section 8.5 of the SWMP.</p> <p>Section 8.5 of the SWMP.</p> <p>Sections 8.5 and 8.6 of the SWMP.</p> <p>Section 8.8 of the SWMP.</p>	D
<b>Additional Groundwater Requirements</b>				
24.	<p>Within six months of the determination of Modification 2, the Proponent must:</p> <ul style="list-style-type: none"> <li>a) review the site's existing groundwater monitoring data (including water quality data) and groundwater management and mitigation measures;</li> <li>b) identify any additional monitoring, management or mitigation measures required to achieve the site's groundwater impact assessment criteria, as required under condition 22(c) of this Schedule; and</li> <li>c) prepare an amended Groundwater Monitoring Program to reflect any additional measures, to the satisfaction of the Secretary.</li> </ul>	No Longer Applicable	As part of the updated SWMP an extensive review was completed of the existing water monitoring data and management measures. These details are included as part of the updated SWMP. The completion of this review was advised within the correspondence to the Department with the submission of the SWMP on 8 July 2019.	D
25.	Prior to extracting beyond the previously-proposed realigned Altona Road (as shown in Figure 2 of the Department's Assessment Report for Modification 2), the Proponent, following consultation with DoI, must:	Not Yet Applicable	Extraction has not extended beyond the previously proposed Altona Road. The area prepared to commence dredging north of the existing Altona Road remains south of the previously proposed Altona Road limit.	A, D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>SOIL AND WATER (Cont'd)</b>				
<b>Additional Groundwater Requirements (Cont'd)</b>				
25. (Cont'd)	a) update the existing groundwater model for the project to address the consolidated extraction area as approved under Modification 2; b) re-assess the potential groundwater impacts of the project; and c) review and if necessary revise the Groundwater Monitoring Program and the groundwater management and mitigation measures for the project in response to the updated groundwater modelling; to the satisfaction of the Secretary.		A Groundwater Assessment was prepared by AGE and submitted during the reporting period to address the requirements Condition 25. Approval of the submitted report remains pending.	
<b>TRANSPORT</b>				
<b>Site Access</b>				
26.	The Proponent must ensure that all heavy vehicle access to and from the site is via the Tweed Coast Road/Crescent Street/Altona Road route. Heavy vehicles must not travel via Crescent Street through Cudgen Village, except for local deliveries to Cudgen Village.	Compliant	The Transport Management Plan and associated Truck Drivers Code of Conduct details explicitly the approve transportation route and excluded roads.	D
<b>Upgrade and Maintenance of Altona Road</b>				
27.	The Proponent must upgrade Altona Road between the site entrance and intersection with Crescent Street. This upgrade must: a) include two additional passing bays along the current alignment of Altona Road, each having sufficient length to readily accommodate a laden truck and dog trailer combination, to the satisfaction of the Council; and b) be funded by the Proponent, or by a cost sharing agreement between the Proponent and the owner of the Tweed Sand Quarry, in consultation with Council.	Compliant	Hanson, operator of the Tweed Sand Quarry sought and received approval for the construction of a single longer passing bay.  Upgrade works were completed by Hanson during the reporting period with Council confirming satisfaction with the works through the issue of a Works as Executed Compliance Certificate dated 7 May 2020.	A, D
28.	By 20 August 2019, the Proponent must enter into a cost sharing agreement with the owner of the Tweed Sand Quarry, in consultation with Council, for the maintenance of Altona Road between the site entrance and intersection with Crescent Street. This agreement must: c) provide for ongoing repairs and maintenance of the road; d) apply to the existing or any future approved alignment of Altona Road; and	Compliant	Previously a draft agreement was prepared between Gales and Hanson, in consultation with Council, a number of matters remained in dispute. A request for an extension was requested from DPIE on 21 August 2019. A response to the time extension was not received from the Department with the draft agreement ultimately referred to the Secretary for resolution on 25/09/19. Whilst a response was not received, during the reporting period Gales, Hanson and Council have operated in accordance with the agreement without dispute.	D, A
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				



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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>TRANSPORT (Cont'd)</b>				
<b>Upgrade and Maintenance of Altona Road (Cont'd)</b>				
28. (Cont'd)	<p>c) provide for proportionate and equitable contributions between the Proponent and the owner of the Tweed Sand Quarry (based on actual annual product road transport or other measure/s agreed by the parties).</p> <p>If a cost sharing agreement cannot be reached or if there is any dispute regarding the finalisation of the terms of the cost sharing agreement, or its implementation, then either party may refer the matter to the Secretary for resolution.</p>			
29	<p>The Proponent must upgrade the intersection of Crescent Street and Tweed Coast Road. This upgrade must:</p> <p>a) provide for the construction of an acceleration lane of not less than 200 metres in length on Tweed Coast Road, northbound from the intersection, to the satisfaction of Council (as roads authority);</p> <p>b) provide for channelised right turn treatment (line marking only) on Tweed Coast Road for vehicles turning right into Crescent Street;</p> <p>c) be designed and constructed in accordance with Austroads Guidelines, Australian Standards and RMS Supplements; and</p> <p>d) be funded by the Proponent, or by a cost sharing agreement between the Proponent and the owner of the Tweed Sand Quarry, in consultation with Council;</p> <p>If a cost sharing agreement cannot be reached or if there is any dispute regarding the finalisation of the terms of the cost sharing agreement, or its implementation, then either party may refer the matter to the Secretary for resolution.</p> <p><i>Note: The proposed road works on Tweed Coast Road (MR450) will be captured by Section 138 of the Roads Act 1993. Concept Design is to be submitted to Tweed Shire Council for referral to Roads and Maritime for concurrence under Section 138 of the Roads Act 1993.</i></p>	Compliant	Upgrade works were completed by Hanson during the reporting period with Council confirming satisfaction with the works through the issue of a Works as Executed Compliance Certificate dated 7 May 2020.	A, D
<b>Operating Conditions</b>				
30.	<p>The Proponent must:</p> <p>a) provide sufficient parking on-site for all project-related traffic and visitors, in accordance with Council parking code and ensure that no on street parking is undertaken.</p>	Compliant	No on-street parking occurred during the reporting period. On-site parking is available within the Processing Area.	A
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>TRANSPORT (Cont'd)</b>				
<b>Operating Conditions (Cont'd)</b>				
30. (Cont'd)	b) ensure that trucks do not enter the site prior to 7.00 am on any day;	Compliant	Records of operational hours confirms no transportation activities commenced prior to 7:00am.	A, D
	c) ensure that on-site parking and pedestrian facilities are adequately signposted;	Compliant	Signage has been placed.	A
	d) ensure that all laden trucks entering or exiting the site have their loads covered;	Compliant	The Operations Manager advises that the loader operator checks all trucks.	A
	e) ensure that all laden trucks exiting the site are cleaned of material that may fall from vehicles, before leaving the site;	Compliant	The Operations Manager advises that the loader operator checks all trucks.	A
	f) use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport quarry products from the project so they can be easily identified by road users; and	Compliant	The need for appropriate signage is specified in the Drivers Code of Conduct.	A
	g) keep accurate records of all laden truck movements to and from the site and publish a summary of these records on its website every month.	Compliant	Records of laden trucks are provided on the Company website.	A, D
<b>Transport Management Plan</b>				
31.	The Proponent must prepare a Traffic Management Plan for the project to the satisfaction of the Secretary. This plan must:  a) be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;  b) be prepared in consultation with RMS, Transport for NSW and Council, and in accordance with the RTA – Traffic Control at Worksites Manual;  c) describe the processes in place for the management of truck movements entering and exiting the site;  d) prohibit trucks departing the site from turning right from Crescent Street to Tweed Coast Road;  e) include a Drivers' Code of Conduct that includes: - details of the safe and quiet driving practices that must be used by drivers travelling to and from the quarry;	Compliant	Approval for the staged submission of the Traffic Safety Plan was issued by DPE 9 September 2016.  The 'Stage 1' Traffic Management Plan, for physical commencement activities, was prepared in consultation with Council and RMS and approved by DPE 12/09/16.  The 'Stage 2' Traffic Management Plan for works to enable commencement of dredging was prepared in consultation with Council and RMS and approved by DPE 25/05/17.  The Operational Transport Management Plan was prepared in consultation with Council and RMS/TfNSW and approved by DPIE 21/05/20. The approved TMP address all requirements.  Dispatch of product trucks commenced 22 May 2020.	

\* D = Documentation sighted

A = Advised by Company

O = On-site Observation

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>TRANSPORT (Cont'd)</b>				
<b>Transport Management Plan (Cont'd)</b>				
31. (Cont'd)	<ul style="list-style-type: none"> <li>- a map of the primary haulage route;</li> <li>- safety initiatives for haulage through residential areas, school zones and along school bus routes;</li> <li>- an induction process for vehicle operators and regular toolbox meetings;</li> <li>- complaints resolution and disciplinary procedures; and</li> <li>- details of community consultation</li> <li>- measures for peak haulage periods.</li> </ul> <p>f) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct;</p> <p>g) include details of the measures to be implemented to minimise traffic safety issues and disruption to local road users during road upgrade works; and</p> <p>(h) propose measures to minimise the transmission of dust and tracking of material onto the surface of public roads from vehicles leaving the quarry.</p> <p>The Proponent must not dispatch any trucks from the site until the Traffic Management Plan is approved by the Secretary.</p> <p>The Proponent must implement the approved Traffic Management Plan as approved from time to time by the Secretary.</p>			
<b>REHABILITATION</b>				
<b>Rehabilitation Objectives</b>				
32.	The Proponent must rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the proposed rehabilitation activities described in the documents listed in condition 3 of Schedule 2, and comply with the objectives in Table 4.	Not Yet Applicable	No areas have yet become available for final rehabilitation. Notwithstanding, it is noted that 'temporary' rehabilitation of soil stockpiles and bunding has been completed.	A, D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
REHABILITATION (Cont'd)				
Rehabilitation Objectives (Cont'd)				
32. (Cont'd)	Table 4: Rehabilitation Objectives			
	Feature	Objective		
	All areas of the site affected by the project	<ul style="list-style-type: none"><li>• Safe</li><li>• Hydraulically and geotechnically stable, including the dredge pond margins (particularly where subject to regular wind and wave action)</li><li>• Non-polluting</li><li>• Fit for the intended post-extraction land use(s)</li><li>• Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land</li></ul>		
	Surface Infrastructure	<ul style="list-style-type: none"><li>• Decommissioned and removed, unless otherwise agreed by the Secretary</li></ul>		
	Dredge Pond	<ul style="list-style-type: none"><li>• Perimeter of dredge pond landscaped and vegetated using native tree and understorey species and, where necessary, non-invasive groundcover suitable for the final land use</li><li>• Natural looking bank design with curved lake boundaries, with a variety of bank treatments (e.g. beaches, wetlands) providing a variety of habitats.</li><li>• Minimise the extent and persistence of algae blooms</li><li>• Water quality fit for the intended post-extraction land use(s)</li></ul>		
Progressive Rehabilitation				
33.	The Proponent must rehabilitate the site progressively as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated.	Compliant	No areas have yet become available for final rehabilitation. Notwithstanding, it is noted that 'temporary' rehabilitation of soil stockpiles and bunding has been completed therefore achieving a minimum practical exposed area.	A, O
Rehabilitation Management Plan				
34.	The Proponent must prepare a Rehabilitation Management Plan for the project to the satisfaction of the Secretary. This plan must:	Compliant		
	a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;		RWC was approved as being suitably qualified to prepare the Rehabilitation Management Plan (RMP) on 31 May 2019.	D
	b) be prepared in consultation with Council, Water NSW, DoI and OEH;		The RMP was supplied to these agencies for review on 1 July 2019.	D
	c) be submitted to the Secretary within three months of the determination of Modification 2, unless the Secretary agrees otherwise;		Extensions were granted by the Department on 18 April and 31 May 2019 for the submission of the updated RMP by 8 July 2019. The updated RMP was approved on 1 February 2024.	
	d) describe how the rehabilitation of the site and pipeline corridors would achieve the objectives identified in Table 4;		Sections 3.2 and 3.3 of the RMP.	D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>REHABILITATION (Cont'd)</b>				
<b>Rehabilitation Management Plan (Cont'd)</b>				
34. (Cont'd)	<p>l) detail who is responsible for monitoring, reviewing, and implementing the plan.</p> <p>The Proponent must implement the approved Rehabilitation Management Plan as approved from time to time by the Secretary.</p>		<p>Section 3.7 of the RMP.</p> <p>The RMP was approved on 1 February 2024 and has been implemented.</p>	D
<b>Rehabilitation Bond</b>				
35.	<p>Within 6 months of the approval of the Rehabilitation Management Plan, the Proponent must lodge a Rehabilitation Bond with the Department to ensure that the rehabilitation of the site is undertaken in accordance with the performance and completion criteria set out in the plan and the relevant conditions of approval. The sum of the bond must be an amount agreed to by the Secretary and determined by:</p> <p>a) calculating the cost of rehabilitating all disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and</p> <p>b) employing a suitably, independent and experienced person to verify the calculated costs.</p> <p>The calculation of the Rehabilitation Bond must be submitted to the Department for approval at least 1 month prior to the lodgement of the bond</p>	Not Yet Applicable	<p>A rehabilitation bond was previously established (correspondence from DPE dated 12/04/17 confirms receipt of bank guarantee for the agreed rehabilitation bond of \$163,375).</p> <p>A review of the bond was completed within 3 months of the RMP approval. A revised bond calculation of \$340,263 was approved by DPHI 18 June 2024.</p>	A, D
36.	<p>The Rehabilitation Bond must be reviewed and if required, an updated bond must be lodged with the Department within 3 months following:</p> <p>a) any update or revision to the Rehabilitation Management Plan;</p> <p>b) the completion of an Independent Environmental Audit; or</p> <p>c) in response to a request by the Secretary.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>If the rehabilitation of the site area is completed (or partially completed) to the satisfaction of the Secretary, then the Secretary will release the bond (or relevant part of the bond). If the rehabilitation of the site is not completed to the satisfaction of the Secretary, then the Secretary will call in all or part of the bond, and arrange for the completion of the relevant works.</li> <li>If capital and other expenditure required by the Rehabilitation Management Plan is largely complete, the Secretary may waive the requirement for lodgement of a bond in respect of the remaining expenditure.</li> </ul>	Compliant	<p>The RMP was approved on 1 February 2024. Within 3 months of the approval of the RMP, the rehabilitation bond was reviewed and submitted to the Department for approval. A revised bond calculation of \$340,263 was approved by DPHI 18 June 2024.</p> <p>No request has been received from the Secretary.</p>	A, D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>ABORIGINAL CULTURAL HERITAGE</b>				
<b>Aboriginal Cultural Heritage Management Plan</b>				
37.	<p>The Proponent must prepare an Aboriginal Cultural Heritage Management Plan to the satisfaction of the Secretary. This plan must:</p> <ul style="list-style-type: none"> <li>a) be prepared in consultation with the relevant Aboriginal communities;</li> <li>b) be submitted to the Secretary for approval prior to carrying out any development; and</li> <li>c) include a description of the: <ul style="list-style-type: none"> <li>• Aboriginal cultural heritage induction protocol for employees;</li> <li>• process for Aboriginal inspection of excavations for the northern pipeline corridor;</li> <li>• measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project either within or beyond the area of disturbance; and</li> <li>• process for identifying a long-term storage location should Aboriginal relics be discovered within the project site requiring salvage.</li> </ul> </li> </ul> <p>The Proponent must implement the approved Aboriginal Cultural Heritage Management Plan as approved from time to time by the Secretary.</p>	Compliant	<p>The Aboriginal Cultural Heritage Management Plan (ACHMP) was implemented as applicable during the reporting period.</p> <p>Prepared in consultation with Tweed-Byron LALC (correspondence dated 01/03/11)</p> <p>The ACHMP was submitted to the then DoP 09/02/11 and approved 14/05/14. An updated version was approved 05/07/17.</p> <p>Section 7 of the ACHMP.</p> <p>Section 8 of the ACHMP.</p> <p>Section 10 and Appendix 1 of the ACHMP.</p> <p>Section 12 of the ACHMP.</p> <p>As confirmed to the Department on 16 April 2019, as a result of the MOD2 approval, only administrative updates were required to the existing plan.</p>	A, D
<b>VISUAL</b>				
38.	<p>The Proponent must establish and subsequently maintain the vegetation screen around the extraction area within 12 months of the date of this approval.</p> <p><i>Note: The vegetation screen must be detailed in the Rehabilitation Management Plan required under Schedule 3.</i></p>	Compliant	<p>Vegetation screening was previously planted adjacent to Tweed Coast Road and Crescent Street, fencing installed to exclude cattle and slashing of grass undertaken within the fenced off area to assist tree growth. Supplemental planting was also completed during September 2017 with maintenance (principally weed spraying and fence repair) occurring as required – See Section 8 of this report.</p>	A, D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</b>				
<b>VISUAL (Cont'd)</b>				
39.	The Proponent must implement all reasonable measures to minimise the visual and off-site lighting impacts of the project to the satisfaction of the Secretary.	Compliant	The use of topsoil on the bund walls containing the existing pasture species ensured that the bund wall's groundcover was rapidly established. Planting of shrubs on the eastern and southern boundary of the Initial Processing Area was also completed during October 2017.	A, D
<b>WASTE</b>				
40.	The Proponent must: a) manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council; b) minimise the waste generated by the project; c) ensure that the waste generated by the project is appropriately stored, handled, and disposed of; and d) report on waste management and minimisation in the Annual Review, to the satisfaction of the Secretary.	Compliant	During the reporting period all sewage wastes were collected in a portaloo system and removed from site by a licenced waste contractor.  Minimal wastes were generated and were appropriately removed by licenced contractors or Council for disposal at a licenced facility.  A summary of waste management is presented in Section 6.8.	A
41.	Except as expressly permitted in an EPL, the Proponent must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.	Compliant	No wastes were received to the site.	A
<b>LIQUID STORAGE</b>				
42.	The Proponent must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.	Compliant	No hydrocarbon tanks were retained on site during the reporting period. A mobile road-registered fuel tanker service was used to refuel the mobile equipment.	A
<b>Dangerous Goods</b>				
43.	The Proponent must ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant <i>Australian Standards</i> , particularly AS1940 and AS1596, and the <i>Dangerous Goods Code</i> .	Compliant	Only minor volumes of hydrocarbons (20L and 5L oil and grease containers) were stored on-site within a service van. No spills or other issues occurred during the reporting period.	A
<b>SCHEDULE 4 ADDITIONAL PROCEDURES</b>				
<b>Notification of Landowners</b>				
1.	As soon as practicable and no longer than 7 days after obtaining monitoring results showing an exceedance of any criteria in Schedule 3 the Proponent must:	Not Yet Applicable	Criteria specified within Schedule 3 include air quality and noise. No exceedance with these criteria is considered to have occurred. Therefore no 'notification' events have occurred.	A, D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 4 ADDITIONAL PROCEDURES (Cont'd)</b>				
<b>Notification of Landowners (Cont'd)</b>				
1. (Cont'd)	<p>a) notify the affected landowners and tenants in writing of the exceedance, and provide quarterly monitoring results, to each affected party until the project is again complying with the relevant criteria; and</p> <p>b) publish on its website the full details of the exceedance.</p> <p>Any exceedance of any criteria in Schedule 3 is an incident that must be notified to the Department in accordance with conditions 9 to 12 of Schedule 5.</p> <p>For any exceedance of the air quality criteria or air quality measures in Schedule 3, the Proponent must also provide to any affected land owners and tenants a copy of the fact sheet entitled "Mine Dust and You" (NSW Minerals Council, 2011).</p>			
<b>Independent Review</b>				
2.	<p>If a landowner considers the project to be exceeding the relevant criteria in Schedule 3, they may ask the Secretary in writing for an independent review of the impacts of the project on their land.</p> <p>If the Secretary is not satisfied that an independent review is warranted, the Secretary will notify the landowner in writing of that decision, and the reasons for that decision, within 21 days of the request for a review.</p> <p>If the Secretary is satisfied that an independent review is warranted, within 3 months, or as otherwise agreed by the Secretary and the landowner, the Proponent must:</p> <p>a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:</p> <ul style="list-style-type: none"> <li>- consult with the landowner to determine their concerns;</li> <li>- conduct monitoring to determine whether the project is complying with the relevant criteria in Schedule 3; and</li> <li>- if the project is not complying with that criteria, identify measures that could be implemented to ensure compliance with the relevant criteria;</li> </ul> <p>b) give the Secretary and landowner a copy of the independent review.</p> <p>c) comply with any written requests made by the Secretary to implement any findings of the review.</p>	Not Yet Applicable	Request for independent review has not been received to date.	A
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS</b>				
<b>Environmental Management Strategy</b>				
1.	<p>The Proponent must prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must:</p> <ul style="list-style-type: none"> <li>a) be submitted to the Secretary for approval within three months of the determination of Modification 2;</li> <li>b) provide the strategic framework for environmental management of the project;</li> <li>c) identify the statutory requirements that apply to the project;</li> <li>d) describe the role, responsibility, authority, and accountability of the key personnel involved in the environmental management of the project.</li> <li>e) describe the procedures that would be implemented to: <ul style="list-style-type: none"> <li>• keep the local community and relevant agencies informed about the construction, operation and environmental performance of the project;</li> <li>• receive, record, handle and respond to complaints;</li> <li>• resolve any disputes that may arise during the life of the project;</li> <li>• respond to any non-compliance;</li> <li>• respond to emergencies; and</li> </ul> </li> <li>d) include: <ul style="list-style-type: none"> <li>• reference to any strategies, plans and programs approved under the conditions of this approval; and</li> <li>• a clear plan depicting all the monitoring to be carried out under the conditions of this approval.</li> </ul> </li> </ul> <p>The Proponent must implement the Environmental Management Strategy as approved from time to time by the Secretary.</p>	Compliant	<p>The updated EMS was submitted to the Department on 22 April 2019.</p> <p>Section 1.2 of the EMS.</p> <p>Section 3.0 of the EMS.</p> <p>Section 4.0 of the EMS.</p> <p>Section 6.1 of the EMS.</p> <p>Section 6.2 of the EMS.</p> <p>Section 6.3 of the EMS.</p> <p>Section 7 of the EMS.</p> <p>Section 9 of the EMS.</p> <p>Section 5 of the EMS.</p> <p>Section 5 of the EMS.</p> <p>Approval of the updated EMS remains pending.</p>	A, D
<b>Management Plan Requirements</b>				
2.	<p>The Proponent must ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:</p> <ul style="list-style-type: none"> <li>a) a summary of relevant background or baseline data;</li> </ul>	Compliant	Each management plan includes these components as relevant to each plan.	D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				



Table A (Cont'd)  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>Management Plan Requirements (Cont'd)</b>				
2. (Cont'd)	<p>a) a summary of relevant background or baseline data;</p> <p>b) a description of:</p> <ul style="list-style-type: none"> <li>- the relevant statutory requirements (including any relevant approval, licence or lease conditions);</li> <li>- any relevant limits or performance measures/criteria; and</li> <li>- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;</li> </ul> <p>c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</p> <p>d) a program to monitor and report on the:</p> <ul style="list-style-type: none"> <li>- impacts and environmental performance of the project; and</li> <li>- effectiveness of any management measures (see (c) above);</li> </ul> <p>e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;</p> <p>f) a program to investigate and implement ways to improve the environmental performance of the project over time;</p> <p>(g) a protocol for managing and reporting any:</p> <ul style="list-style-type: none"> <li>- incidents;</li> <li>- complaints; and</li> <li>- non-compliances with statutory requirements;</li> </ul> <p>h) a protocol for periodic review of the plan; and</p> <p>i) a document control table that includes version numbers, dates when the management plan was prepared and reviewed, names and positions of the person/s who prepared and reviewed the management plan, a description of any revisions made and the date of the Secretary's approval.</p> <p><i>Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</i></p>			
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>Application of Existing Management Plans</b>				
3.	The Proponent must continue to apply existing approved management plans, strategies or monitoring programs that have most recently been approved under this approval, until the approval of a similar plan, strategy or program following a modification to this approval.	Compliant	Previous management plans were applied to the extent applicable and/or superseded by approved updated management plans.	D
<b>COMMUNITY CONSULTATIVE COMMITTEE</b>				
8.	<p>The Proponent must operate a Community Consultative Committee (CCC) for the project to the satisfaction of the Secretary. This CCC must be operated in general accordance with the Department's <i>Community Consultative Committee Guidelines: State Significant Projects (2016)</i>, for the duration of quarrying operations and for at least 6 months following the completion of quarrying operations.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>The CCC is an advisory committee.</li> <li>In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Proponent, Council and the local community.</li> </ul>	Compliant	<p>The CCC was established in July 2017 with the approval of the Independent Chairperson by DPE 8 July 2017 and new chairperson in May 2022. Community and Council members of the CCC were approved by DPE 14 November 2016.</p> <p>The inaugural CCC meeting was held 07/04/17. The CCC continued to operate during the reporting period (see Section 9.2).</p>	A, D
<b>Revision of Strategies, Plans &amp; Programs</b>				
4.	<p>Within 3 months of:</p> <ul style="list-style-type: none"> <li>a) the submission of an incident report under condition 10 of this Schedule;</li> <li>b) the submission of an Annual Review under condition 13 of this Schedule;</li> <li>c) the submission of an Independent Environmental Audit under condition 14 of this Schedule; or</li> <li>d) the approval of any modification to the conditions of this approval.</li> </ul> <p>the Proponent must review the suitability of all strategies, plans and programs required under this approval. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary.</p> <p>Notes:</p> <p><i>This is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve the environmental performance of the project.</i></p>	Compliant	<p>All management plans have continued to be reviewed.</p> <p>Following a review of the suitability of the SWMP, a review and update of the plan was completed during the reporting period. The SWMP was submitted to the Department for consultation in December 2023.</p>	A, D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>COMMUNITY CONSULTATIVE COMMITTEE (Cont'd)</b>				
<b>Staging, Combining and Updating Strategies, Plans or Programs</b>				
5.	With the approval of the Secretary, the Proponent may:  a) prepare and submit any strategy, plan or program required by this approval on a staged basis (if a clear description is provided as to the specific stage and scope of the project to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);  b) combine any strategy, plan or program required by this approval (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); and  c) update any strategy, plan or program required by this approval (to ensure the strategies, plans and programs required under this approval are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the project).	Not Applicable	No requests to stage or combine plans, strategies or programs were made during the reporting period. Updated management plans were submitted in accordance with the relevant conditional requirements.	A, D
<b>Evidence of Consultation</b>				
6.	Where the conditions of this approval require consultation with an identified party, the Proponent must:  a) consult with the relevant party prior to submitting the subject document; and  b) provide details of the consultation undertaken, including: - the outcome of that consultation, matters resolved and unresolved; and - details of any disagreement remaining between the party consulted and the Proponent and how the Proponent has addressed any unresolved matters.	Compliant	A summary of consultation (to date) for the updated SWMP was included as an appendix to the respective plan.  Further consultation correspondence will continue to be provided to the Department as received / required.	D
7.	However, if the Secretary agrees, a strategy, plan or program may be prepared without consultation being undertaken with an identified party required under a condition of this approval.	Not Applicable	No formal requests have been made to the Department not to undertake consultation.	A

\* D = Documentation sighted

A = Advised by Company

O = On-site Observation

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>REPORTING</b>				
<b>Incident Notification, Reporting and Response</b>				
9.	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Proponent becomes aware of an incident.	<b>Non-Compliant</b>	Exceedances of water quality objectives were recorded during the reporting period but were not reported as incidents.	A, D
10	Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested. This report must include the time and date of the incident, details of the incident, measures implemented to prevent re- occurrence and must identify any non-compliance with this approval.	<b>Non-Compliant</b>	Exceedances of water quality objectives were recorded during the reporting period, however, a written report was not prepared within 7 days of the incident.	A, D
11.	Any written requirements of the Secretary or relevant public authority (as determined by the Secretary) which may be given at any point in time, to address the cause or impact of an incident must be complied with and within any timeframe specified by the Secretary or relevant public authority.	Not Applicable	No incidents occurred during the reporting period.	A, D
12.	If statutory notification is provided to EPA as required under the POEO Act in relation to the project, such notification must also be provided to the Secretary within 24 hours after the notification was provided to EPA.	Not Applicable	No statutory notification was required to be provided to EPA during the reporting period.	A, D
<b>Annual Review</b>				
13.	By the end of September each year, or other timing as may be agreed by the Secretary, the Proponent must submit a report to the Department reviewing the environmental performance of the project, to the satisfaction of the Secretary. This review must:  a) describe the project (including any rehabilitation) that was carried out in the previous financial year, and the project that is proposed to be carried out over the current financial year;	Compliant	The 2022/2023 Annual Review (this report) was submitted to DPE on 28/09/23  Sections 4 and 8 describe the activities, including rehabilitation, undertaken during the reporting period.	D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>REPORTING (Cont'd)</b>				
<b>Annual Review (Cont'd)</b>				
13.	<p>b) include a comprehensive review of the monitoring results and complaints records of the project over the previous financial year, which includes a comparison of these results against the:</p> <ul style="list-style-type: none"> <li>- relevant statutory requirements, limits or performance measures/criteria;</li> <li>- requirements of any plan or program required under this approval;</li> <li>- monitoring results of years prior; and</li> <li>- relevant predictions in the documents listed in condition 3 of Schedule 2;</li> </ul> <p>c) detail any non-compliance over the past financial year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence;</p> <p>d) evaluate and report on:</p> <ul style="list-style-type: none"> <li>- the effectiveness of the noise and air quality management systems; and</li> <li>- compliance with the performance measures, criteria and operating conditions in this approval;</li> </ul> <p>e) identify any trends in the monitoring data over the life of the project;</p> <p>f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and</p> <p>(g) describe what measures will be implemented over the current financial year to improve the environmental performance of the project.</p> <p>The Proponent must ensure that copies of the Annual Review are submitted to Council and are available to the CCC and any interested person upon request.</p>		<p>Section 6 and 7 provide a review of the results against the relevant limits, requirements and previous / baseline monitoring results.</p> <p>Sections 1 and 11 and Appendix 1 provide details of non-compliances.</p> <p>Section 6 and Table 6.1 provide an evaluation.</p> <p>Section 6 provides a summary of any discernible trends.</p> <p>Section 6 would provide discuss any discrepancies. However, none have been identified to date.</p> <p>Section 6 outlines planned / further improvements to environmental management.</p> <p>Copies of the Annual Review has also been provided to Council, CCC and other relevant agencies and was made publicly available on the Gales website.</p>	
<b>Independent Environmental Audit</b>				
6.	<p>Within 2 years of the commencement of quarrying operations and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. The primary purposes of the audit are to ascertain information in relation to the environmental performance of the project and the adequacy of strategies, plans and programs. Audits must:</p>	Compliant	<p>Site establishment activities commenced 26 June 2017 with extraction operations commencing 30 October 2017. James Hart Consulting was formally commissioned 6 September 2022 to undertake the second Independent Environmental Audit.</p> <p>The independent audit team held suitable certifications and were endorsed by the Department on 16 September 2022 and the audit inspection completed 6 November 2022. The next independent audit must be commissioned prior to 30 October 2025.</p>	A, D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				



**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>REPORTING (Cont'd)</b>				
<b>Independent Environmental Audit (Cont'd)</b>				
6. (Cont'd)	<p>a) be led and conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Secretary;</p> <p>b) include consultation with the relevant agencies and the CCC;</p> <p>c) assess the environmental performance of the project and whether it is complying with the relevant requirements in this approval and any relevant EPL or water licences for the project (including any assessment, strategy, plan or program required under these approvals);</p> <p>d) review the adequacy of any strategies, plan or programs required under the abovementioned approvals;</p> <p>e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval; and</p> <p>f) be conducted and reported to the satisfaction of the Secretary.</p> <p><i>Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Secretary.</i></p>		The 2022 audit addressed all required components and was confirmed by the Department as being satisfactory on 24 January 2023.	
<b>Independent Environmental Audit</b>				
15.	Within 12 weeks of commencing each audit, unless otherwise agreed by the Secretary, the Proponent must submit a copy of the audit report to the Secretary and other agencies that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The Proponent must implement these recommendations, to the satisfaction of the Secretary.	Compliant	The final audit and its response were submitted to DPE within 12 weeks of commencement of the audit.	A, D
<b>Access to Information</b>				
10.	<p>Within 1 month of the approval of Modification 2, and for the life of the project, the Proponent must:</p> <p>a) make the following information and documents (as they are obtained or approved) publicly available on its website:</p> <ul style="list-style-type: none"> <li>- the documents listed in conditions 2 and 3 of Schedule 2;</li> <li>- current statutory approvals for the project;</li> </ul>	Compliant	Copies of all required documents have been made available on the Gales website.	D
<p>* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation</p>				

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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>REPORTING (Cont'd)</b>				
<b>Access to Information (Cont'd)</b>				
10. (Cont'd)	<ul style="list-style-type: none"> <li>- all approved strategies, plans and programs required under the conditions of this approval;</li> <li>- regular reporting on the environmental performance of the project in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval;</li> <li>- a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs;</li> <li>- a summary of the current stage and progress of the project;</li> <li>- contact details to enquire about the project or to make a complaint;</li> <li>- a complaints register, updated monthly;</li> <li>- the Annual Reviews of the project;</li> <li>- any Independent Environmental Audit as described in condition 14 above, and the Proponent's response to the recommendations in any audit; and</li> <li>- any other matter required by the Secretary; and</li> </ul> <p>b) keep this information up-to-date, to the satisfaction of the Secretary.</p>			
<b>APPENDIX 3 - NOISE COMPLIANCE ASSESSMENT</b>				
<b>Applicable Meteorological Conditions</b>				
1.	<p>The noise criteria in Table 2 are to apply under all meteorological conditions except the following:</p> <ul style="list-style-type: none"> <li>a) wind speeds greater than 3 m/s at 10 m above ground level; or</li> <li>b) temperature inversion conditions between 1.5°C and 3°C/100 m and wind speed greater than 2 m/s at 10 m above ground level; or</li> <li>c) temperature inversion conditions greater than 3°C/100 m.</li> </ul>	Noted	There were no instances during the reporting period where these meteorological conditions needed to be taken into account for noise compliance.	A, D

\* D = Documentation sighted      A = Advised by Company      O = On-site Observation

**Table A (Cont'd)**  
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Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
<b>SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)</b>				
<b>APPENDIX 3 - NOISE COMPLIANCE ASSESSMENT (Cont'd)</b>				
<b>Compliance Monitoring</b>				
2.	Within three months of the determination of Modification 2, unless otherwise agreed by the Secretary, the Applicant must undertake a noise compliance assessment. The assessment must be conducted by a suitably qualified and experienced acoustical practitioner and must assess compliance with noise criteria presented above. A report must be provided to the Department and EPA within 1 month of the assessment.	No Longer Applicable	A request was lodged with the Department on 16 April 2019 for the compliance assessment to be completed within 3 months of the recommencement of extraction operations. Approval was received from the Department on 18 April 2019.  Noise monitoring addressing this was undertake at recommencement of extraction operations in 2020 (i.e. prior to this reporting period).	D
3.	Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:  a) monitoring locations for the collection of representative noise data;  b) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment;  c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration; and  d) the use of an appropriate modifying factor for low frequency noise to be applied during compliance testing at any individual residence if low frequency noise is present (in accordance with the NSW Noise Policy for Industry (2017, or its latest version) Fact Sheet C) and before comparison with the specified noise levels in the approval.	No Longer Applicable	The monitoring was carried out in accordance with the relevant requirements.	D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

**Table B**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>1. Sand Extraction and Processing</b>				
1.1	Ensure terminal extraction batters are formed no steeper than 1:3 (V:H) (excludes stabilised backfilled final landform batters).	Not Yet Applicable	Terminal extraction batters have not yet been formed.	A, D
<b>2. Waste Management</b>				
2.1	Dispose all recyclables and general waste in appropriate waste receptacles.	Compliant	Any waste generated during the reporting period was removed by the service contractor or Council for disposal at a licenced facility.	A
2.2	Use non-saleable oversize materials for final landform creation / return to the extraction area.	Compliant	Oversize material not suitable as a product was returned to the extraction pond.	A, D
2.3	Intern any oversize materials suspected of being acid generating so they settle beneath at least 8m of water.	Not Yet Applicable	Oversize material consisted of vegetative material (grass), shells and rocks and was not considered to be potentially acid generating (given the shell content).	A, D
<b>3. Rehabilitation</b>				
3.1	Progressively backfill selected finalised sections of the southern extraction pond to create wetland areas.	Not Yet Applicable	Terminal extraction batters have not yet been formed to enable backfilling.	A, D
3.2	Stabilise all earthworks and disturbed areas no longer required for Quarry-related activities in order to minimise erosion and sedimentation, dust lift-off and to reduce visual intrusion.	Compliant	Pasture has been established on the surface of the bund walls, topsoil stockpiles.	A, D
3.3	Cross-rip all unsealed roads and remove all buildings and structures not required for the final land use.	Not Yet Applicable	No areas have become available for final rehabilitation.	A, D
<b>4. Flooding and Drainage</b>				
4.1	Construct and maintain shallow spillways (approximate elevation 1.3m AHD) within the bunds surrounding the extraction pond at the eastern and western extent of the bunding.	Compliant	Spillways have been constructed to the required height.	A
4.2	Remove sections of bunding once floodwaters have peaked to allow floodwaters trapped behind the bunds to drain freely to the western drainage channel as the flood recedes.	Not Yet Applicable	No flood water was required to be released from the dredge pond during the reporting period.	A, D
4.3	Maintain drainage paths outside of the bunded and filled areas to allow floodwaters to drain freely.	Not Yet Applicable	No obstructions or works that would alter drainage paths outside of the approved extraction areas occurred during the reporting period.	A, D
4.4	Prepare a flood evacuation plan to ensure that personnel respond appropriately to a warning of an imminent Tweed River overbank flood.	Compliant	The Quarry operator has prepared a flood evacuation plan.	A, D
4.5	Realign the western drainage channel within the Altona Road reserve to provide an equivalent or more efficient drain.	Not Yet Applicable	Altona Road has not yet been realigned.	A, D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>5. Groundwater</b>				
5.1	Adjust sand extraction rates to ensure that groundwater drawdown levels remain within the predicted limits.	Not Applicable	Extraction rates were not required to be adjusted during the reporting period.	A, D
5.2	Install a height gauge within the extraction pond so that water levels can be monitored daily to m AHD.	Compliant	A survey gauge was previously installed but was temporarily removed due to the expansion of the dredge pond. The gauge was reinstated during 2022/2023 reporting period.	A
5.3	Continue groundwater monitoring following the cessation of extraction and placement of VENM.	Not Yet Applicable	Extraction operations and VENM placement has not permanently ceased.	A, D
5.4	Compile an annual summary of all monitoring results and forward to Water NSW as part of the Annual Review for the site.	Compliant	A detailed monitoring summary has been included as part of this Annual Review which has been provided to Water NSW.	A, D
5.5	Consult with each likely affected landowner and investigate complaints of poor water quality in neighbouring dams/bores.	Not Yet Applicable	Potentially affected landholders have previously been consulted. No issues or complaints arose during the reporting period.	A, D
5.6	Negotiate an agreement with each affected landholder in the event water quality or quantity is adversely affected to either: <ul style="list-style-type: none"> <li>• deepen the existing bore or install a replacement bore;</li> <li>• pay a cash compensation equal to the assessed cost of deepening the bore;</li> <li>• provide an alternative water supply, such as from the extraction ponds or groundwater bore registered to the Proponent; or</li> <li>• provide an appropriately sized rainwater storage tank to enhance property water storage.</li> </ul>	Not Yet Applicable	No landholders have been adversely affected.	A, D
5.7	Implement the provision of an alternative water supply or other agreed compensation.	Not Applicable	The R. Julius water supplies have not been adversely effected.	A, D
5.8	Provide copies of any negotiated agreements to the Department of Planning and Department of Water and Energy for their records.	Compliant	The signed agreement with R.W. Julius has been provided to the then DPE and Water NSW.	A, D
<b>6. Surface Water</b>				
6.1	Reduce sand extraction and temporarily cease VENM placement if a significant deterioration in extraction pond water quality occurs, until the source is identified and appropriate amelioration measures are implemented.	Not Applicable	No significant deterioration of extraction pond water occurred during the reporting period.	A, D
6.2	Regularly monitor surface water to provide an accurate assessment of the adequacy of practices implemented as part of the operation.	Compliant	Monitoring data reviewed and critically analysed annually.	A, D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				



**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>7. Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability</b>				
7.1	Convey return water (from both the wash plant and fill sites) in a manner which ensures fines / silts remain in suspension and do not settle in the return pipelines. If a pipeline is not used, undertake sluicing in a manner that ensures turbulent flow and sufficient velocity to prevent the deposition of fines material within the drainage line.	Compliant	A silt return channel has been constructed in order to provide sufficient head pressure for return water to discharge via a pipe 3m below the pond surface.	A
7.2	Do not extract residual clay material from the base of the sand resource.	Compliant	Extraction operations to date have remained well above the expected residual marine clays.	A, D
7.3	Ensure a suitably qualified or trained person assesses imported material (VENM) in accordance with the ASSMAC guidelines and confirms its classification as VENM prior to acceptance at the Quarry Site.	Compliant	Imported VENM was classified and VENM certificates retained. No VENM imported during the reporting period.	A, D
7.4	Place VENM(b) received at the premises which is intended to be dredged or interned at the base of the extraction pond within the nominated period.	Not Yet Applicable	VENM(b) (PASS) has not yet been imported to the Quarry.	A, D
7.5	Retain records of monitoring together with the application rates of the alkaline amendment used as neutralising agents. Provide these records to statutory authorities upon request.	Compliant	These monitoring records have been retained and reported in the respective Annual Reviews. No requests for supply of additional records has been received to date.	A, D
7.6	Obtain documentation for each truck load of VENM(b) received at the Quarry Site that demonstrates that the excavation of VENM(b) and its transport and handling has been conducted in accordance with the NSW ASS Manual to prevent the generation of acid.	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.7	Retain documentation for each truck load of VENM(b) received at the site which indicates: <ul style="list-style-type: none"> <li>the details of the originating site (name, address, owner and developer, contact details);</li> <li>the details of the transportee (name, address, contact details, vehicle registration);</li> <li>date and time of the extraction of the VENM(b);</li> <li>pH of the VENM(b) at the time of its extraction, and at the time immediately prior to its placement underwater; and</li> <li>the name of the person (certified practicing soil scientist) who assessed the material and classified it as VENM(b).</li> </ul>	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.8	Ensure verification of neutralising agent application volumes and verification results are available.	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.9	Treat any acid sulfate material excavated on site at determined rates prior to use in earthen bunds or for rehabilitation.	Not Applicable	No acid sulfate material was excavated during the reporting period for use in earthen bunds or for rehabilitation.	A, D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>7. Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability (Cont'd)</b>				
7.10	Collect and analyse samples of acid sulfate soil material that is to be recovered through excavation (i.e. not dredged) and is not to be washed using a hydrocyclone (or similar).	Not Applicable	All extracted material during the reporting period was washed.	A
7.11	Incorporate an alkaline amendment into the excavated acid sulfate material at the calculated rate (based on the results of sampling).	Not Applicable	All extracted material during the reporting period was washed.	A
7.12	Complete the validation sampling of treated material in accordance with the approved Acid Sulfate Soil Management Plan.	Not Applicable	All extracted material during the reporting period was washed.	A
7.13	Construct bunding around the extraction and processing areas to control drainage.	Compliant	Bunding has been constructed around the southern dredge pond and northern dredge pond to control drainage.	A, D
7.14	Ensure all surface water and runoff from the extraction and processing areas drains or is pumped into the extraction ponds.	Compliant	All water within the active extraction area is internally draining. The processing area also drains back into the bunded extraction area.	A, D
7.15	Audit the effectiveness of the operational safeguards and monitoring by an external environmental consultant.	Compliant	HMC previously completed an audit of the acid sulfate soil monitoring and management.	D
7.16	Test the pH of the water into which the VENM(b) is placed to ensure it is not less than 6.5 at any time.	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.17 & 7.18	Undertake monitoring in accordance with the approved Acid Sulfate Soil Management Plan in relation to VENM(b) receipt and processing / internment.	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.19	Test the pH of the VENM(b) immediately prior to under-water disposal / backfilling to ensure the pH is not less than 5.5.	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.20	Undertake internal environmental audits of VENM(b) receipt and treatment during the initial stages of the operation to ensure appropriate treatment is being conducted and records are up to date.	Not Yet Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.21	Complete the following in the event that validation or monitoring criteria are exceeded for any extracted materials. <ul style="list-style-type: none"> <li>• Test the acid neutralising capacity of the material.</li> <li>• Incorporate alkaline amendments at the appropriate rate if the measured acid neutralising capacity is insufficient to neutralise the existing and potential acidity.</li> <li>• Undertake validation testing following treatment and apply additional alkaline amendments as required. Repeat process until compliance with action criteria is met.</li> </ul>	Not Applicable	Previous validation testing results did not exceed criteria.	A, D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>7. Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability (Cont'd)</b>				
7.22	Terminate VENM(b) receipt at the premises if the pH of the water falls below accepted levels, until approval to continue is received in writing from the DECC(EPA).	Not Applicable	Importation of VENM(b) has not yet commenced.	A, D
7.23	Complete the following in the event monitoring criteria are exceeded for imported VENM(b). <ul style="list-style-type: none"> <li>Test the acid neutralising capacity of the material.</li> <li>Incorporate alkaline amendments at the appropriate rate if the measured acid neutralising capacity is insufficient to neutralise the existing and potential acidity.</li> <li>Undertake validation testing following treatment and apply additional alkaline amendments as required. Repeat process until compliance with action criteria is met.</li> </ul>	Not Applicable	Note: Repeated commitment. See SoC 7.21	A, D
7.24	Undertake the following as soon as possible after becoming aware that any waste/material accepted at the premises is not VENM. <ul style="list-style-type: none"> <li>Notify the EPA in writing.</li> <li>Remove the material/waste from the premises and dispose of it at a facility licensed to take such waste.</li> </ul>	Not Applicable	Unauthorised waste material has not been accepted to the premises.	A, D
7.25	Implement a procedure to audit all further incoming loads from that waste origin site prior to accepting any further waste, until such time as the results of such audits demonstrate that the waste origin site's screening and assessment procedures have been corrected to prevent further miss-classification of waste.	Not Applicable	Unauthorised waste material has not been accepted to the premises.	A, D
7.26	Introduce hydrated lime at the appropriate rate if the extraction pond water quality fails accepted levels and ensure target pH level of 6.5 is not "overshot" leading to severely alkaline conditions (pH>9.0).	Not Applicable	Monitoring did not record pH levels below the trigger action levels and therefore no treatment was required.	A, D
<b>8. Flora and Fauna</b>				
8.1	Progressively rehabilitate completed works within the Quarry Site to maximise cover of native vegetation in appropriate areas and minimise opportunities for erosion and weed invasion.	Not Yet Applicable	No final areas have become available for rehabilitation. Temporary rehabilitation has been completed on the bund walls and topsoil stockpile using pasture species thereby minimising potential erosion and weed invasion.	A, D
8.2	Define and clearly mark vegetation for retention prior to the commencement of site establishment to ensure that native vegetation clearing is confined only to those areas required.	Not Yet Applicable	Commitment relates to the pipeline corridors, principally the section of the eastern corridor east of Tweed Coast Road – the pipelines have not yet been installed in that location.	A, D
8.3	Control noxious weeds on the Quarry Site.	Compliant	Weed control is undertaken as part of the current cattle agistment.	A

\* D = Documentation sighted

A = Advised by Company

O = On-site Observation

**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>8. Flora and Fauna (Cont'd)</b>				
8.4	Place pipelines within pipeline corridors so as to avoid the need to clear trees or shrubs, wherever possible.	Compliant	The pipelines installed to the Cudgen Heights fill site minimised disturbance to vegetation and did not disturb any native vegetation.	A, D
8.5	Utilise local native plant species recommended by Idyll Spaces (2008) for rehabilitation and landscaping within and adjacent the final lake (Note: vegetation set back from the final lake would reflect the specific land use – e.g. sporting fields, gardens, etc).	Not Yet Applicable	No final areas have become available for rehabilitation.	A, D
8.6	Undertake replacement planting of the same tree species within the same area in the unlikely event that a small number of trees are required to be removed for the laying of the pipelines.	Not Yet Applicable	No native tree species were disturbed as a result of the pipeline to the Cudgen Heights fill site.	A, D
<b>9. Aquatic Ecology</b>				
9.1	During the realignment of the western drainage channel as part of the realignment of Altona Road. <ul style="list-style-type: none"> <li>maintain the original connection to other upstream and downstream drainage channels;</li> <li>avoid stranding native fish and, where possible, relocate them to similar habitat;</li> <li>ensure fish free passage through the channel is made available where permanent crossings are to be constructed (e.g. access road crossings); and</li> <li>consult with DPI – Fisheries officers during the realignment process.</li> </ul>	Not Yet Applicable	Altona Road has not yet been realigned.	A, D
9.2	Create wetlands along finalised sections of the extraction pond in accordance with the approved Landscape Management Plan.	Not Yet Applicable	No final batters have yet been formed.	D
9.3	Undertake frequent and regular monitoring of temperature, dissolved oxygen, nutrients, colour and concentrations of blue-green algae.	Compliant	Regular water quality monitoring was undertaken (see Section 7).	A, D
9.4	Obtain samples and readings from the dredge pond in accordance with the approved Blue Green Algae Management Plan.	Compliant	Monitoring was undertaken in accordance with the approved Blue-Green Algal Management Plan during the reporting period.	A, D
<b>10. Traffic and Transport</b>				
10.1	No vehicles permitted to turn right from Crescent Street to Tweed Coast Road. (Note: Light vehicles travelling south from the Quarry Site would be directed to travel on Crescent Street/Cudgen Road.	Compliant	Drivers were instructed not to turn right through the Drivers Code of Conduct.	A, D
10.2	No heavy vehicles to turn right from Altona Road to Crescent Street.	Compliant	Drivers were instructed not to turn right through the Drivers Code of Conduct.	A, D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>10. Traffic and Transport (Cont'd)</b>				
10.3	Weigh all product trucks using the on-site weighbridge or other suitable weigh system and ensure all RMS weight restrictions are adhered to.	Compliant	All product trucks were loaded using a front-end loader with calibrated weigh cells.	A, D
10.4	Inform all truck drivers and staff of road rules, speed restrictions and considerate driving practices.	Compliant	Drivers instructed of rules and restrictions through the Drivers Code of Conduct.	A, D
10.5	Ensure all drivers are aware of all relevant operational hours.	Compliant	Drivers instructed of operational hours through the Drivers Code of Conduct.	A, D
10.6	Undertake mechanical road sweeping of Altona Road and site access roads.	Compliant	During the reporting period manual sweeping of Altona Road was undertaken as required	A
10.7	Cover all product loads to reduce dust lift off.	Compliant	The loader operator instructs all product truck drivers to cover their loads prior to leaving site.	A
10.8	Realign Altona Road in accordance with DA 05/1450 (or other applicable development consent).	Not Yet Applicable	Operations will not reach a point that requires the realignment of Altona Road for some time.	A, D
10.9	Implement appropriate management controls including the use of warning signs and manual traffic control during the laying of pipelines adjacent to Tweed Coast Road and during the underboring of the road crossings.	Not Yet Applicable	The pipelines have not yet been installed.	A, D
10.10	Establish a telephone complaints line to enable any traffic-related incidents, unsafe operation or general concern to be reported. Investigate all complaints and act decisively on substantiated incidents.	Compliant	A telephone complaints line is advertised on the Company website.	A, D
10.11	Implement a truck driver's code of conduct required to be signed by all Company employed or contracted truck drivers. The code will outline each truck driver's responsibility and the process to be undertaken in the event of a complaint.	Compliant	The Drivers Code of Conduct is included within the approved Transportation Management Plan.	A, D
<b>11. Noise</b>				
11.1	Fit all mobile vehicles on the site with broadband type reversing beepers or alternative safety devices such as strobe lights and / or cameras.	Compliant	All mobile equipment that required reversing alarms were fitted with broadband type alarms.	A
11.2	Regularly service all equipment on site.	Compliant	Repairs and maintenance were undertaken during the reporting period as required.	A, D
11.3	Maintain the internal road network to an acceptable standard to limit body noise from empty trucks.	Compliant	The internal road to the extraction area has been appropriately surfaced.	A,O
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				



**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>11. Noise (Cont'd)</b>				
11.4	Undertake a monitoring program to demonstrate that noise emissions from the Quarry Site are within the Quarry specific noise limits at the surrounding assessment locations.	Compliant	Compliance noise monitoring confirmed compliance with applicable noise limits.	D
11.5	Regularly review the extent of noise monitoring throughout the life of the Project to ensure meaningful data is being collected.	Compliant	Noise monitoring reviewed as part of the updated Noise Management Plan approved 22 June 2020 and as part of each Annual Review. No further adjustments are currently planned.	D
<b>12. Air Quality</b>				
12.1	Install water sprays or other suitable controls to minimise dusts generated during screening and dry processing.	Compliant	All processing during the reporting period was undertaken as a wet process.	A, D
12.2	Undertake progressive rehabilitation / stabilisation of available areas of disturbance (e.g. finalised sections or backfilled areas of the extraction ponds).	Not Yet Applicable	No final rehabilitation areas have become available. Notwithstanding, disturbed areas are temporarily rehabilitated to pasture where possible.	A, D
12.3	Clean accumulated tracked road mud, dry dusts, sand or spillages on Altona Road using a street sweeper.	Compliant	Tracked sand was manually swept from Altona Road during the reporting period.	A
12.4	Cover product trucks loads to prevent wind-borne losses and spillages.	Compliant	The loader operator instructs all product truck drivers to cover their loads prior to leaving site.	A
12.5	Undertake monitoring in accordance with the Air Quality Monitoring Program.	Compliant	Monitoring during the reporting period was undertaken in accordance with the updated AQMP approved 22 June 2020.	A, D
12.6	Annually review the dust monitoring program to ensure that the data being collected is meaningful.	Compliant	The AQMP was revised and updated 22 April 2019 and resubmitted 30 April 2020 and approved 22 June 2020. Need for further updates are planned to be assessed during the next reporting period.	A, D
12.7	Ensure the screening and blending plant does not exceed a daily <u>average</u> processing rate greater than 100tph.	Not Yet Applicable	Dry processing operations have not yet commenced.	A, D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

**Table B (Cont'd)**  
**Compliance Review – Statement of Commitments (SoC)**

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SoC No.	Commitment	Compliance	Comments	Basis*
<b>13. Aboriginal Heritage</b>				
13.1	Invite Aboriginal stakeholders to observe during the burying of the pipelines within the northern pipeline corridor.	Not Yet Applicable	The pipelines have not yet been installed within the northern pipeline corridor.	A, D
13.2	Stop works at and adjacent to any Aboriginal sites or relics, if found.	Not Applicable	No Aboriginal sites have been identified.	A
13.3	Contact the regional archaeologist of the Coffs Harbour OEH and relevant Aboriginal Stakeholders if any Aboriginal sites or relics, if found.	Not Applicable	No Aboriginal sites have been identified.	A
13.5	Complete inductions and training in accordance with the approved Aboriginal Cultural Heritage Management Plan.	Compliant	The Quarry Operator has been 'inducted' by the Tweed LALC.	A
13.6	Undertake consultation with Aboriginal representatives in relation to the ongoing management of identified items of Aboriginal heritage.	Not Applicable	No Aboriginal sites have been identified.	A
<b>14. Visibility</b>				
14.1	Construct a 2m high bund on the eastern and southern perimeter of the processing area and plant with native shrub species.	Compliant	These bunds have previously been established and planted with native shrub species.	A, D
14.2	Progressively rehabilitate the Quarry Site such that non-vegetated areas would be minimised.	Compliant	No final rehabilitation areas have become available. Notwithstanding, disturbed are temporarily rehabilitated to pasture where possible.	A, D
14.3	Maintain the Quarry Site in a clean and tidy condition at all times.	Compliant	The Quarry Site is maintained in a clean and tidy condition.	A
14.4	Position and direct floodlights or other lighting to minimise light emissions, with lighting not required at any given time not used.	Compliant	Floodlights directing light onto the plant have been utilised for security purposes as advised by security consultants.	A
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table C**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*							
1. Administrative Controls											
A1 What the licence authorises and regulates											
A1.1	<p>This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.</p> <p>Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.</p> <table><tr><th>Scheduled Activity</th><th>Fee Based Activity</th><th>Scale</th></tr><tr><td>Extractive Activities</td><td>Land-based extractive activity</td><td>&gt; 100000 - 500000 T annual capacity to extract, process or store</td></tr></table>	Scheduled Activity	Fee Based Activity	Scale	Extractive Activities	Land-based extractive activity	> 100000 - 500000 T annual capacity to extract, process or store	Compliant	Approximately 265,160t (176,773m³) of sand was extracted during the reporting period.	A, D	
Scheduled Activity	Fee Based Activity	Scale									
Extractive Activities	Land-based extractive activity	> 100000 - 500000 T annual capacity to extract, process or store									
A1.2	The licensee must not carry on any scheduled activities until the scheduled development works are completed, except as elsewhere provided in this licence.	Compliant	Scheduled development works related to creation of the initial dredge pond. These works were completed in 2006.	D							
A2 Premises or plant to which this licence applies											
A2.1	<p>The licence applies to the following premises:</p> <table><tr><th>Premises Details</th></tr><tr><td>CUDGEN LAKES</td></tr><tr><td>ALTONA DRIVE</td></tr><tr><td>CUDGEN</td></tr><tr><td>NSW 2487</td></tr><tr><td>LOT 21 DP 1082482, LOT 51 DP 1268405</td></tr><tr><td>ALSO INCLUDES ROAD EASEMENTS FOR CRESCENT STREET AND ALTONA ROAD.</td></tr></table>	Premises Details	CUDGEN LAKES	ALTONA DRIVE	CUDGEN	NSW 2487	LOT 21 DP 1082482, LOT 51 DP 1268405	ALSO INCLUDES ROAD EASEMENTS FOR CRESCENT STREET AND ALTONA ROAD.	Noted	-	-
Premises Details											
CUDGEN LAKES											
ALTONA DRIVE											
CUDGEN											
NSW 2487											
LOT 21 DP 1082482, LOT 51 DP 1268405											
ALSO INCLUDES ROAD EASEMENTS FOR CRESCENT STREET AND ALTONA ROAD.											
A3 Other Activities											
A3.1	<p>This licence applies to all other activities carried on at the premises, including:</p> <table><tr><th>Ancillary Activity</th></tr><tr><td>Crushing, grinding or separating</td></tr><tr><td>Water-based extractive activity</td></tr></table>	Ancillary Activity	Crushing, grinding or separating	Water-based extractive activity	Compliant	Water based extraction and separating (through washing) occurred during the reporting period.	-				
Ancillary Activity											
Crushing, grinding or separating											
Water-based extractive activity											
A4 Information supplied to the EPA											
A4.1	<p>Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.</p> <p>In this condition the reference to "the licence application" includes a reference to:</p> <p>a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and</p> <p>the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.</p>	Compliant	Activities during the reporting period were consistent with all relevant application information.	A, D							

\* D = Documentation sightedA = Advised by CompanyO = On-site Observation

**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*																																
2 Discharges to Air and Water and Applications to Land																																				
P1 Location of monitoring/discharge points and areas																																				
P1.1	The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.	Noted	-	-																																
P1.2	The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.	Noted	Monitoring undertaken at these monitoring points as applicable.	D																																
<table><tr><th>EPA Identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>1</td><td>Water Quality Monitoring Point</td><td>Water Quality Monitoring Point</td><td>Dredge Pond South Spillway West - Identified as EPL 1 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)</td></tr><tr><td>2</td><td>Water Quality Monitoring Point</td><td>Water Quality Monitoring Point</td><td>Dredge Pond South Spillway East - Identified as EPL 2 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)</td></tr><tr><td>4</td><td>Groundwater Monitoring - MB15</td><td></td><td>Groundwater monitoring bore. Defined as MB15 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, December 2023 (GKSWMP). Location described in Section 6.4.2 and Figure 6.3.</td></tr><tr><td>5</td><td>Groundwater Monitoring - MB10</td><td></td><td>Groundwater monitoring bore. Defined as MB10 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, December 2023 (GKSWMP). Location described in Section 6.4.2 and Figure 6.3.</td></tr><tr><td>6</td><td>Groundwater Monitoring - MB11</td><td></td><td>Groundwater monitoring bore. Defined as MB11 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, December 2023 (GKSWMP). Location described in Section 6.4.2 and Figure 6.3.</td></tr><tr><td>7</td><td>Water Quality Monitoring Point</td><td>Water Quality Monitoring Point</td><td>Dredge Pond North Spillway West - Identified as EPL 7 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)</td></tr><tr><td>8</td><td>Water Quality Monitoring Point</td><td>Water Quality Monitoring Point</td><td>Dredge Pond North Spillway East - Identified as EPL 8 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)</td></tr></table>					EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description	1	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond South Spillway West - Identified as EPL 1 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)	2	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond South Spillway East - Identified as EPL 2 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)	4	Groundwater Monitoring - MB15		Groundwater monitoring bore. Defined as MB15 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, December 2023 (GKSWMP). Location described in Section 6.4.2 and Figure 6.3.	5	Groundwater Monitoring - MB10		Groundwater monitoring bore. Defined as MB10 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, December 2023 (GKSWMP). Location described in Section 6.4.2 and Figure 6.3.	6	Groundwater Monitoring - MB11		Groundwater monitoring bore. Defined as MB11 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, December 2023 (GKSWMP). Location described in Section 6.4.2 and Figure 6.3.	7	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond North Spillway West - Identified as EPL 7 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)	8	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond North Spillway East - Identified as EPL 8 in the site map submitted to the EPA on 31 October 2023 (DOC23/1005480)
EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description																																	
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* D = Documentation sighted A = Advised by Company O = On-site Observation																																				

**Table C (Cont'd)**  
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Cond. No.	Commitment	Compliance	Comments	Basis*																								
3 Limit Conditions																												
L1 Pollution of waters																												
L1.1	Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.	Compliant	No pollution of waters is deemed to have occurred during the reporting period.	A, D																								
L1.2	Exceedance of the quality limits specified in this licence for the discharge of TSS, pH and Oil and Grease from Points 1, 2, 7, or 8, or exceedance of a volume limit for discharges from Points 1, 2, 7, or 8, are permitted if the discharge occurs solely as a result of rainfall at the premises exceeding a total of 82.5 millimetres over any consecutive five day period.	Not Applicable	No discharges occurred during the reporting period.	A, D																								
L1.3	The licensee must take all practical measures to avoid or minimise TSS, pH etc. contained in wet weather discharges.	Not Applicable	No discharges occurred during the reporting period.	A, D																								
L2 Concentration Limits																												
L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.	Not Applicable	No discharges occurred during the reporting period.	A, D																								
L2.2	Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.	Not Applicable	No discharges occurred during the reporting period.	A, D																								
L2.3	To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.	Noted	-	-																								
L2.4	Water and/or Land Concentration Limits <b>POINT 1,2,7,8</b>	-	-	-																								
		<table><tr><th>Pollutant</th><th>Units of Measure</th><th>50 Percentile concentration limit</th><th>90 Percentile concentration limit</th><th>3DGM concentration limit</th><th>100 percentile concentration limit</th></tr><tr><td>Oil and Grease</td><td>Visible</td><td></td><td></td><td></td><td>nil</td></tr><tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5 - 8.5</td></tr><tr><td>TSS</td><td>milligrams per litre</td><td></td><td></td><td></td><td>50</td></tr></table>			Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit	Oil and Grease	Visible				nil	pH	pH				6.5 - 8.5	TSS	milligrams per litre				50
Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit																							
Oil and Grease	Visible				nil																							
pH	pH				6.5 - 8.5																							
TSS	milligrams per litre				50																							
L3 Waste																												
L3.1	The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.	Compliant	No wastes were received to the Quarry during the reporting period.	A, D																								
L3.2	Virgin Excavated Natural Material (VENM) may be received at the premises for the purpose of land application.	Noted	No VENM was imported during the reporting period as part of the approved Quarry operations.	A, D																								

\* D = Documentation sighted

A = Advised by Company

O = On-site Observation

\* D = Documentation sighted

A = Advised by Company

O = On-site Observation



**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>3 Limit Conditions (Cont'd)</b>				
<b>L4 Noise limits</b>				
L4.1	Noise from the premises where extraction is occurring (being Lot 51 DP 1268405 and Lot 21 DP 1082482) must not exceed an LAeq (15 minute) noise emission criterion of 47 dB(A) between the hours of 7am to 10pm, and 44dB(A) between the hours of 630am to 7am, except as expressly provided by this licence.	Compliant	Noise monitoring undertaken during the reporting period confirms compliance with the noise criteria.	D
L4.2	Noise from the premises where extraction is occurring (being Lot 51 DP 1268405 and Lot 21 DP 1082482) is to be measured at: residences on privately owned land; and, locations specified in Section 7 (b) of Schedule 3 of Project Approval 75J Project Application 05_0103, or the current modification, to determine compliance with this condition.	Compliant	As above.	D
L4.3	The noise limits set out in L4.1 apply under all meteorological conditions except for the following: a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or b) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or c) Temperature inversion conditions greater than 3°C/100m.	Compliant	There were no instances during the reporting period where these meteorological conditions needed to be taken into account for noise compliance.	A
<b>L5 Hours of operation</b>				
L5.1	This licence only allows activities to be carried out from the premises where extraction is occurring (being Lot 51 DP1268405 and Lot 21 DP 1082482) within the following times as follows: site establishment, sand or soil extraction by excavator, dry processing, product transport by road, other quarry related activities, maintenance (if audible at neighbouring residences)[Monday to Friday - 7am to 6pm, Saturday - 7am to 1pm, Sunday and Public Holidays - nil]; sand extraction by dredging and pumping to the processing plant, wet processing [Monday to Friday - 7am to 10pm, Saturday - 7am to 4pm, Sunday and Public Holidays - nil]; Sand extraction by dredging and pumping to fill sites [Monday to Friday - 7am to 6.30pm, Saturday - 7am to 1pm, Sunday and Public Holidays - nil]; operation of dredge to fill pipeline with water or pipeline flushing [Monday to Friday - 6.30am to 7pm, Saturday - 6.30am to 1.30pm, Sunday and Public Holidays - nil]; maintenance (if inaudible at neighbouring residences)[any day, any time].	Compliant	All activities occurred within the approved hours.	D
<b>4 Operating Conditions</b>				
<b>O1 Activities must be carried out in a competent manner</b>				
O1.1	Licensed activities must be carried out in a competent manner. This includes: a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	Compliant	All processing and transportation activities were undertaken in a competent manner and wastes appropriately disposed of.	A, D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>4 Operating Conditions (Cont'd)</b>				
<b>O2 Maintenance of plant and equipment</b>				
O2.1	All plant and equipment installed at the premises or used in connection with the licensed activity: a) must be maintained in a proper and efficient condition; and b) must be operated in a proper and efficient manner.	Compliant	All equipment was appropriately maintained and operated during the reporting period. Where required, repairs were undertaken to ensure proper operation.	A
<b>O3 Dust</b>				
O3.1	The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	Compliant	Temporary stabilisation of soil bunding and topsoil stockpile has been achieved through re-establishment of pasture grass. No complaints or issues have arisen.	A, D
<b>O4 Processes and management</b>				
O4.1	Any pond subject to dredging, or containing turbid water due to recent dredging must be maintained and operated to prevent discharges of any water from these ponds. A vegetated barrier must be used at all times to ensure that the active dredge and fines placement area / pond are isolated from stormwater drainage channels.	Compliant	The grassed bunding surrounding the dredge pond prevents discharge of water from the pond.	A, D
O4.2	The licensee must maximise the diversion of run-on waters from lands upslope and around the site whilst land disturbance activities are being undertaken.	Compliant	The grassed bunding surrounding the dredge pond prevents the inflow of surface water (except in flood events).	D
O4.3	The licensee must ensure that sampling point(s) for water discharged from the Dredge Pond(s) and Sediment Dam are provided and maintained in an appropriate condition to permit: a) the clear identification of each Dredge Pond and Sediment Dam and discharge point(s); b) the collection of representative samples of the water discharged from the Dredge Pond(s) and Sediment Dam; and c) access to the sampling point(s) at all times by an authorised officer of the EPA.	Compliant	Access to the dredge pond was maintained throughout the reporting period except where local flooding as a result of significant rainfall events prevented safe access.	A, D
O4.4	All liquid chemicals, fuels and oils must be stored in tanks or containers inside suitable bund(s). Bunds are to be designed, constructed and maintained in accordance with all relevant Australian Standards.	Compliant	No diesel was stored on site with a mobile refuelling tanker service utilised for refuelling. Minor quantities of oil and grease (20L and 5L) were appropriately stored within a service van.	A
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*																																									
O5 Other operating conditions																																													
O5.1	The licensee must assess and manage any acid sulfate soil (ASS) and potential acid sulfate soil PASS) in accordance with the current <i>Acid Sulfate Soils Manual</i> published by the NSW Acid Sulfate Soil Management Advisory Committee (ASSMAC).	Compliant	Activities to date have been undertaken in accordance with the Acid Sulfate Soil Management Plan.	A, D																																									
5. Monitoring and Recording Conditions																																													
M1 Monitoring records																																													
M1.1	The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.	Compliant	The monitoring records have been retained as required.	D																																									
M1.2	All records required to be kept by this licence must be: a) in a legible form, or in a form that can readily be reduced to a legible form; b) kept for at least 4 years after the monitoring or event to which they relate took place; and c) produced in a legible form to any authorised officer of the EPA who asks to see them.	Compliant	Monitoring has been retained in a legible form for more than 4 years. No requests from an EPA officer were received.	A, D																																									
M1.3	The following records must be kept in respect of any samples required to be collected for the purposes of this licence: a) the date(s) on which the sample was taken; b) the time(s) at which the sample was collected; c) the point at which the sample was taken; and d) the name of the person who collected the sample.	Compliant	Monitoring records contain all required information.	D																																									
M2 Requirement to monitor concentration of pollutants discharged																																													
M2.1	For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:	Non-Compliant	Monitoring was unable to be undertaken at EPL Point 5 (MB10) due to the bore being damaged. A replacement bore is to be established / alternative site nominated.  This non-compliance was reported through the 2023/2024 Annual Return.	D																																									
M2.2	Water and/ or Land Monitoring Requirements. <b>POINT 1,2,7,8</b> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Oil and Grease</td><td>Visible</td><td>Special Frequency 1</td><td>Visual Inspection</td></tr><tr><td>pH</td><td>pH</td><td>Special Frequency 1</td><td>Probe</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Special Frequency 1</td><td>Grab sample</td></tr></table> <b>POINT 4,5,6</b> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Ammonia</td><td>milligrams per litre</td><td>Yearly</td><td>Grab sample</td></tr><tr><td>Chloride</td><td>milligrams per litre</td><td>Yearly</td><td>Grab sample</td></tr><tr><td>Electrical conductivity</td><td>microsiemens per centimetre</td><td>Yearly</td><td>Grab sample</td></tr><tr><td>pH</td><td>pH</td><td>Yearly</td><td>Grab sample</td></tr><tr><td>Standing Water Level</td><td>metres (Australian Height Datum)</td><td>Yearly</td><td>No method specified</td></tr><tr><td>Sulfate</td><td>milligrams per litre</td><td>Yearly</td><td>Grab sample</td></tr></table>				Pollutant	Units of measure	Frequency	Sampling Method	Oil and Grease	Visible	Special Frequency 1	Visual Inspection	pH	pH	Special Frequency 1	Probe	Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample	Pollutant	Units of measure	Frequency	Sampling Method	Ammonia	milligrams per litre	Yearly	Grab sample	Chloride	milligrams per litre	Yearly	Grab sample	Electrical conductivity	microsiemens per centimetre	Yearly	Grab sample	pH	pH	Yearly	Grab sample	Standing Water Level	metres (Australian Height Datum)	Yearly	No method specified	Sulfate
Pollutant	Units of measure	Frequency	Sampling Method																																										
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\* D = Documentation sighted

A = Advised by Company

O = On-site Observation

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**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>M2 Requirement to monitor concentration of pollutants discharged (Cont'd)</b>				
M2.3	Special Frequency 1 means: sampling once <24 hours prior to; and, sampling the discharge daily during, each discharge event arising from rainfall of less than 82.5mm falling in total over a period of up to five days duration.	Noted	No wet weather discharge occurred during the reporting period.	-
<b>M3 Testing methods - concentration limits</b>				
M3.1	Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.	Noted	-	A
<b>M4 Environmental Monitoring</b>				
M4.1	The licensee is required to install and maintain a rainfall depth measuring device.	Compliant	An new automatic rain gauge was previously installed on site in addition to a manual rain gauge.	A, D
M4.2	Rainfall at the premises must be measured and recorded in millimetres per 24 hour period, at the same time each day. Note: The rainfall monitoring data collected in compliance with Condition M4.2 can be used to determine compliance with L1.2.	Compliant	As above.	A, D
<b>M5 Recording of pollution complaints</b>				
M5.1	The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.	Compliant	No complaints were received during the reporting period.	A, D
M5.2	The record must include details of the following: a) the date and time of the complaint; b) the method by which the complaint was made; c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; d) the nature of the complaint; e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and f) if no action was taken by the licensee, the reasons why no action was taken.	Compliant	No complaints were received during the reporting period.	A, D
M5.3	The record of a complaint must be kept for at least 4 years after the complaint was made.	Compliant	The complaint record has been retained (with one complaint having been previously recorded in the past 4 years).	A, D
M5.4	The record must be produced to any authorised officer of the EPA who asks to see them.	Not Applicable	No requests received during the reporting period.	A
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>M6 Telephone complaints line</b>				
M6.1	The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.	Compliant	The mobile phone contact for the Quarry Operator, 0449 965 772, was the relevant complaints contact during the reporting period.	A, D
M6.2	The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	Compliant	The complaints number is included on the Company website.	A, D
M6.3	The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.	No Longer Applicable	The licence was issued 18/11/2005 (i.e. more than 3 months prior).	D
<b>M7 Other monitoring and recording conditions</b>				
M7.1	For the purposes of monitoring for compliance with the noise limit conditions of this licence (condition L4) noise emitted from the premises must be measured or computed at 30 metres from the nearest residential dwelling/s over a period of 15 minutes using the "FAST" response on the sound level meter. A modifying factor correction must be applied for tonal, impulsive, or intermittent noise in accordance with the current NSW Noise Policy for Industry by NSW EPA.	Compliant	Noise monitoring was undertaken in accordance with these requirements.	D
<b>6 Reporting Conditions</b>				
<b>R1 Annual return documents</b>				
R1.1	The licensee must complete and supply to the EPA an Annual Return in the approved form comprising: 1. a Statement of Compliance; and 2. a Monitoring and Complaints Summary. 3. Statement of Compliance - Licence Conditions, 4. a Statement of Compliance - Load based Fee, 5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan, 6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and 7. a Statement of Compliance - Environmental Management Systems and Practices. At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.	Compliant	The completed annual return for the period 1 July 2023 to 30 June 2024 was submitted on 28 August 2024.	D
R1.2	An Annual Return must be prepared in respect of each reporting period, except as provided below.	Compliant	The completed annual return for the period 1 July 2023 to 30 June 2024 was submitted on 28 August 2024.	D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				



**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>6 Reporting Conditions (Cont'd)</b>				
<b>R1 Annual return documents (Cont'd)</b>				
R1.3	Where this licence is transferred from the licensee to a new licensee: a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.	Not Applicable	The licence has not been transferred.	D
R1.4	Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on: a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.	Not Applicable	The licence has not been surrendered.	D
R1.5	The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').	Compliant	The completed annual return for the period 1 July 2023 to 30 June 2024 was submitted on 28 August 2024.	D
R1.6	The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.	Compliant	Copies of annual returns retained for more than 4 years.	A
R1.7	Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by: a) the licence holder; or b) by a person approved in writing by the EPA to sign on behalf of the licence holder.  Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.  Note: An application to transfer a licence must be made in the approved form for this purpose.	Compliant	The Annual Return was signed by the licence holder.	D
<b>R2 Notification of environmental harm</b>				
R2.1	Notifications must be made by telephoning the Environment Line service on 131 555.	Noted	-	-
R2.2	The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.  Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.	Not Applicable	No environmental harm occurred during the reporting period.	A, D
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>6 Reporting Conditions (Cont'd)</b>				
<b>R3 Written report</b>				
R3.1	Where an authorised officer of the EPA suspects on reasonable grounds that: a) where this licence applies to premises, an event has occurred at the premises; or b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.	Not Applicable	No requests received.	A
R3.2	The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.	Not Applicable	No requests received.	A
R3.3	The request may require a report which includes any or all of the following information: a) the cause, time and duration of the event; b) the type, volume and concentration of every pollutant discharged as a result of the event; c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event; d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort; e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants; f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and g) any other relevant matters.	Not Applicable	No requests received.	A
R3.4	The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.	Not Applicable	No requests received.	A
<b>7 General Conditions</b>				
<b>G1 Copy of licence kept at the premises or plant</b>				
G1.1	A copy of this licence must be kept at the premises to which the licence applies.	Compliant	A copy is retained on-site.	A
G1.2	The licence must be produced to any authorised officer of the EPA who asks to see it.	Not Applicable	No requests received.	A
G1.3	The licence must be available for inspection by any employee or agent of the licensee working at the premises.	Compliant	A copy is retained on-site and is available upon request.	A
* D = Documentation sighted      A = Advised by Company      O = On-site Observation				

**Table C (Cont'd)**  
**Compliance Review – Environmental Protection Licence 12385**

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Cond. No.	Commitment	Compliance	Comments	Basis*
<b>8 Special Conditions</b>				
<b>E1 Engineer Report</b>				
E1.1	Bunding and spillways must be constructed in accordance with Mortons Urban Solutions Engineering Response submitted to the EPA on 11 December 2023, and maintained in accordance with the current Soil and Water Management Plan for the site.	<b>Non-Compliant</b>	Construction of the extended bunding around the extent of the northern site has commenced but has yet to be finalised.	A, D
* D = Documentation sighted                      A = Advised by Company                      O = On-site Observation				

# Appendix 2

## Noise Monitoring Results

(Total No. of pages including blank pages = 30)



**CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS**

# **CRAIG HILL ACOUSTICS**

**Acoustic Consultants**

**QLD & NSW**

## **Cudgen Lakes Sand Quarry**

**Compliance Noise Monitoring**

Thursday, 21 December 2023

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**DOCUMENT CONTROL PAGE**



## Cudgen Lakes Sand Quarry

Reference:211223/1

Report prepared for Gales-Kingscliff Pty Limited

Date Thursday, 21 December 2023

Site Cudgen Lakes Sand Quarry

Authorised by Scott Hollanby

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Signed Craig Hill (manager) author

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## 1.0 INTRODUCTION

The purpose of this report is to examine noise levels from quarry operations for compliance.

Attended monitoring was conducted on the 20th December 2023 at noise sensitive receivers identified in the conditions of approval to establish the compliance status.

Activities on the day were related to dredging and loading product to road registered trucks.

**Table 1.1 Equipment being used at the time of the test**

CDE (Wash Plant)
Loader (Hyundai HL-770)
Excavator (SHM225)
Road Trucks
Dragflow Electric Dredge EI180

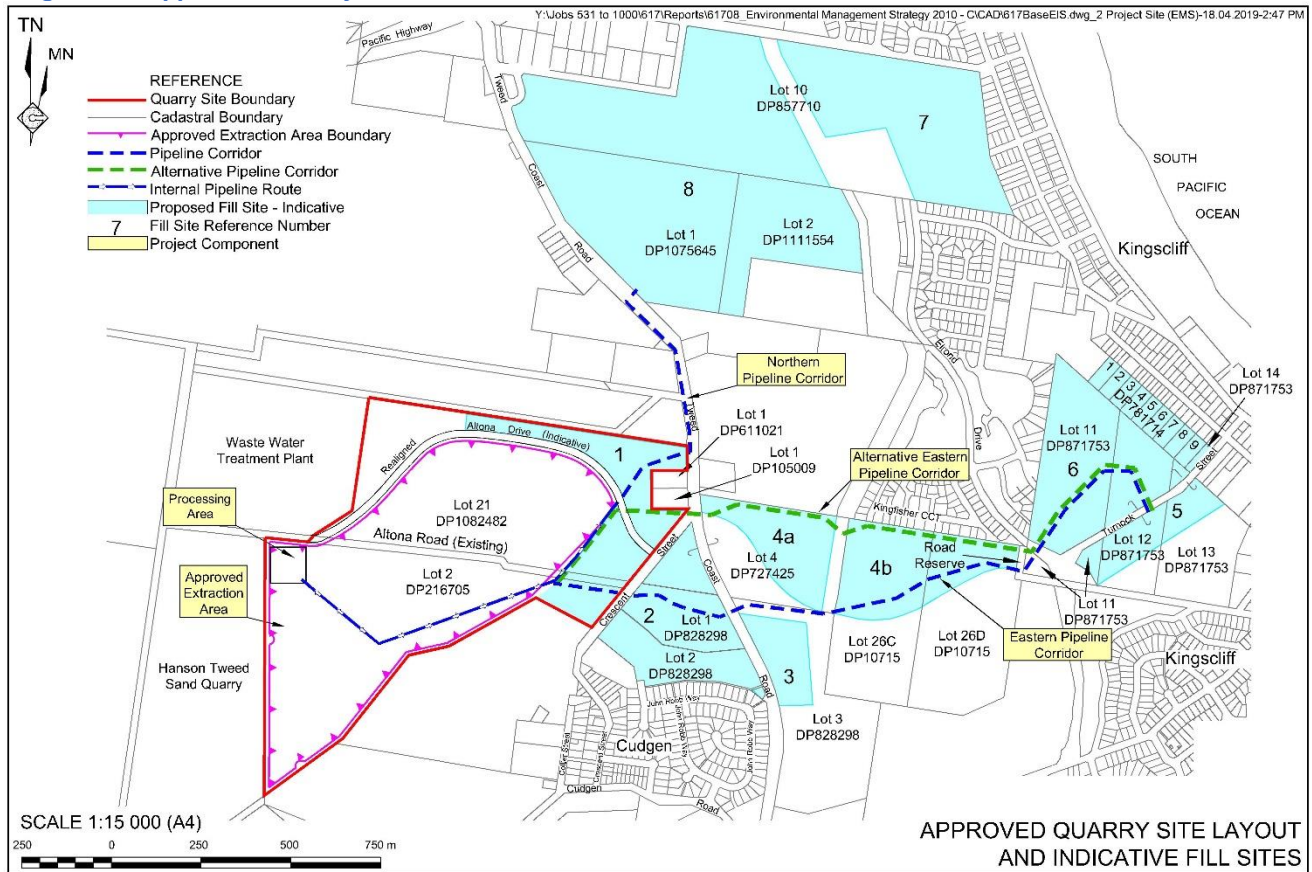
**Table 1.3 Hours of operation**

Activity	Permissible Hours
Site establishment, dry processing, product transport by road, VENM receipts, other quarrying operations not specified in this table	<ul style="list-style-type: none"> <li>7.00 am to 6.00 pm Monday to Friday</li> <li>7.00 am to 1.00 pm Saturday</li> <li>At no time on Sundays or public holidays</li> </ul>
Sand extraction by dredging and pumping to the processing plant, wet processing.	<ul style="list-style-type: none"> <li>7.00 am to 10.00 pm Monday to Friday</li> <li>7.00 am to 4.00 pm Saturday</li> <li>At no time on Sundays or public holidays</li> </ul>
Sand extraction by dredging and pumping to fill sites.	<ul style="list-style-type: none"> <li>7.00 am to 6.30 pm Monday to Friday</li> <li>7.00 am to 1.00 pm Saturday</li> <li>At no time on Sundays or public holidays</li> </ul>
Operation of dredge to fill pipeline with water or pipeline flushing	<ul style="list-style-type: none"> <li>6.30 am to 7.00 pm Monday to Friday</li> <li>6.30 am to 1.30 pm Saturday</li> <li>At no time on Sundays or public holidays</li> </ul>
Maintenance (if inaudible at neighbouring residences)	Any day

**Table 1.4 Operational Activities**

Activity	Day	Time
Site establishment, sand or soil extraction by excavator, dry processing, product transport by road, VENM receipts, other quarry related activities, maintenance (if audible at neighbouring residences)	Monday – Friday	7:00am to 6:00pm
	Saturday	7:00am to 1:00pm
	Sunday and Public Holidays	Nil

Diagram 1.1 Approved Site Layout





## 2.0 LOCATION OF MONITORING

- *Receptor G – Residence - 216 Tweed Coast Road. (line of sight to operations)*
- *Receptor O – Residence - 607 Cudgen Road.(line of sight to operations)*
- *Receptor Pacific Views Estate – Residences – via Collier Street (located to rear of new residences). (line of sight to operations)*
- *Receptor DD – Residence - 34A Crescent Street.(no line of sight)*
- *Receptor F – Residence - 64 John Robb Way. (no line of sight)*

Diagram 2.1 Monitoring locations

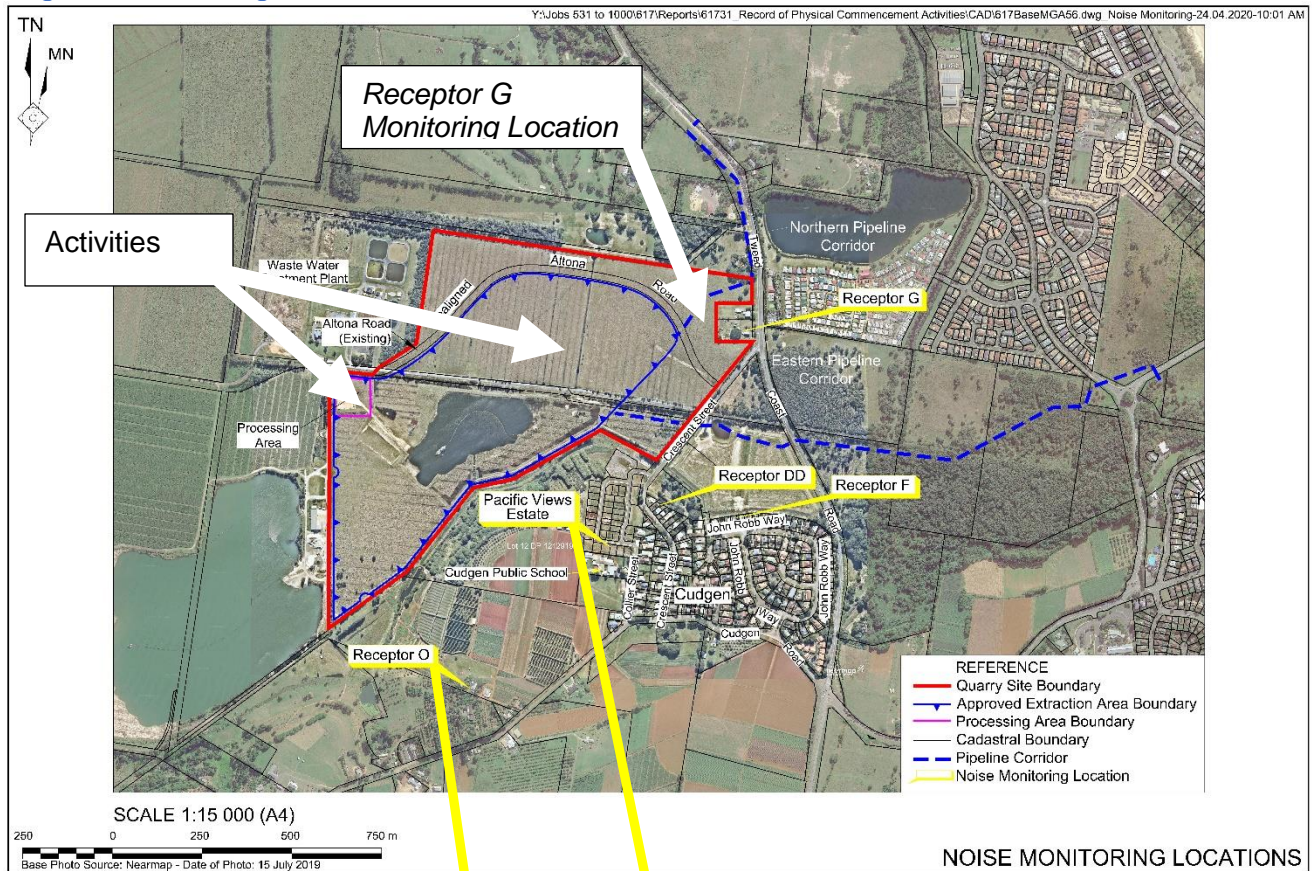
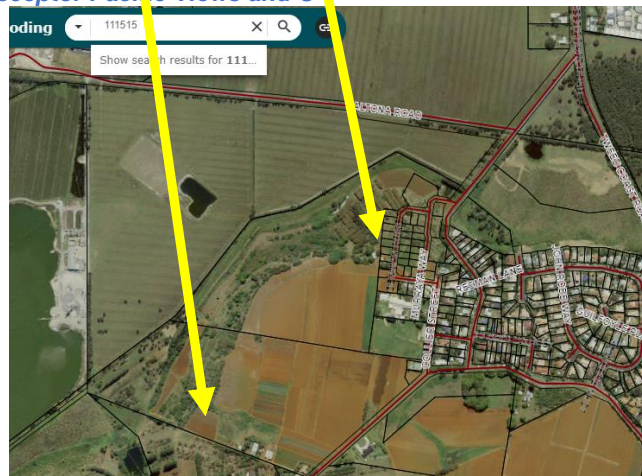


Diagram 2.2 Relocation of Receptor Pacific Views and O





*Pic 2.1 View of site from Pacific views monitoring location*



*Pic 2.2 Zoomed in above pic*





*Pic 2.3 View of site from Receptor O monitoring location*



*Pic 2.2 Zoomed in above pic*



### 3.0 CRITERIA

The relevant impact assessment and cumulative noise criteria as specified in Schedule 3 Conditions 3 and 4 of Project Approval 05\_0103B are as follows.

#### 3.1 Impact Assessment Criteria

*Table 3.1 Impact Assessment Criteria*

Receiver Location	Day and Evening LAeq (15 min) dB(A)
Residences on privately owned land	47

#### 3.2 Cumulative Noise Criteria

The project combined with the noise generated by other industrial development does not exceed the following amenity criteria on any privately owned land.

LAeq (11 hour) 50 dB(A) – Day;

LAeq (4 hour) 45 dB(A) - Evening and

LAeq(9 hour) 40 dB(A) - Night

---

LA90 corresponds to the A-weighted sound pressure level which is exceeded for 90% of the time. This parameter is used to measure the background noise level.

LAeq corresponds to the equivalent or energy-averaged level

## 4.0 SOUND MEASUREMENTS

### 4.1 Equipment

The following equipment was utilised during the test assessments:

Svantec Type 1, Sound and Vibration Analyser Model 977C Serial N0 98824, calibrated March 2022.

Svantec SV-33B Sound Level Calibrator Serial No 127992, calibrated August 2023.

The above equipment complies with the requirements of Australian Standards 1259.2 1990, Sound Level Meters, Part 2 Integrating – Averaging, as required by the Australian Standards.

Equipment was calibrated before the tests and checked after and found to be within the acceptable drift.

The above equipment complies with the requirements in **IEC 61672**.

### 4.2 Atmospheric Conditions

The atmospheric conditions during the period of monitoring are provided in Table 4.1.

**Table 4.1 Atmospheric Conditions**

Humidity	60%
Wind Speed	5kts
Wind Direction	NNW
Atmospheric Pressure	1010 hpa
Cloud Cover	0%
Temp	28C

## 5.0 TESTING

The following tests were carried out at locations G, O, B, DD and F within 30m of affected dwellings where practical as indicated on the attached site plan.

Tests conducted on 20 December 2023 between 0900 and 11100 hrs DST

- *Receptor G – Residence - 216 Tweed Coast Road. (rear boundary)*
- *Receptor O – Residence – 607 Cudgen Road. (rear boundary)*
- *Receptor Pacific Views Estate – Residences – via Collier Street. (opposite rear boundary of new residences)*
- *Receptor DD – Residence - 34A Crescent Street. (rear boundary)*
- *Receptor F – Residence - 64 John Robb Way. (rear boundary)*

### 5.1 On site equipment 20 December 2023

**Table 5.1 Equipment on site at the time of the test 20/12/2023**

<b>On site equipment</b>	<b>LAeq 15 min at 20 metres</b>
CDE Wash Plant	76
Loader (Hyundai HL-770)	71
Excavator	66
Road Trucks	66
Dredge (new electric)	48



## 5.2 Equipment used during previous tests

**Table 5.2 Equipment being used previous tests**

<b>Date:08 march 2022</b>	
Operating equipment	Previous tests LAeq 15 min at 20 metres
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Dredge	63
<b>Date 01/10/2021</b>	
Operating equipment	LAeq 15 min
CDE Wash Plant (nil product)	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
<b>Date 05/08/2021</b>	
CDE Wash Plant (nil product)	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
<b>Date 18/06/2021</b>	
CDE Wash Plant (nil product)	-
Loader (Hyundai HL-770	71
Road Trucks	66
<b>Date 10/12/2021</b>	
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Roller compactor CA302	68
Screener Sanvik(QA331)	70
<b>Date 10/07/2020</b>	
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
<b>Date April 2020</b>	
Operating equipment	LAeq
Screener (QA331)	70
Loader (Cat 926H)	67
Excavator (Cat 329D)	68
End loader and screener	72

## 6.0 Attended monitoring results and criteria compliance

The results of attended monitoring and criteria compliance are presented in Table 6.1 below.

**Table 6.1 Attended monitoring 20/12/2023**

Receptor & Time hrs	Attended Testing LAeq 15 minutes	> Project Criteria (47 LAeq 15min)	> Cumulative Criteria (50 LAeq 11 hrs)	Comments
G 0900-0915	46	-1	-4	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0930-0945	48	1	-2	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible or measurable above background.
Pacific Views 0955-1005	50	3	0	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible or measurable above background
DD 1010-1035	48	1	-2	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1045-1100	48	1	-2	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

## 7.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the monitoring sites.

Measurements were undertaken at approximately 20m from equipment during operations and distance attenuation applied to establish possible levels at monitoring locations.

Table 7.1 shows predicted compliance to the criteria for nominated equipment operations.

**Table 7.1 Predicted levels of on site equipment based on measurements at 20m**

Receptor	Distance metres	Dredge Electric 48 LAeq @ 20m	CDE wash plant 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m	Road Trucks 66 LAeq @ 20 m	Combined	Combined with line of sight attenuation	> Project Day Criteria (47 LAeq 15 min)	> Cumulative Day Criteria (50 LAeq 11 hrs)
		Predicted Levels with Distance attenuation								
G	880m	15.1	37	38	33	33	42	42	-5	-8
O	600m	18.5	40	41	36	36	45	45	-2	-5
Pacific Views	555m	19.1	41	42	37	37	46	46	-1	-4
DD	780m	16.2	38	39	34	34	43	33	-14	-17
F	900m	14.9	37	38	33	33	42	32	-15	-18

NA: Not audible

(not in use): Equipment not in use on the day but included in prediction to demonstrate compliance

$$L_p(R2) = L_p(R1) - 20 \cdot \log_{10}(R2/R1)$$

Where:

$L_p(R1)$  = Sound Pressure Level at Initial location.

$L_p(R2)$  = Sound Pressure Level at the new location.

R1 = Distance from the noise source to initial location.

R2 = Distance from noise source to the new location.

$$\text{Logarithmic addition} = 10 \cdot \log_{10}(\sum(10^{(\text{user range}/10)}))$$

## 8.0 DISCUSSION AND CONCLUSIONS

Noise from operations were not audible or measurable at locations G,F,O, DD, and Pacific Views Estate.

Distance calculations of measured noise levels from operating plant on site indicate that operations would be within the criteria of 47LAeq and not likely to be a major contributor the 50 LAeq cumulative criteria.

Monitoring for accumulative levels was only conducted over 15 minutes. This measurement would be relative for continuous operations over an 11 hour period. For shorter duration operations this figure would be reduced by 2 to 5 dB with breaks for lunch and working an 8 hour day.

**Table 8.1**

Receptor	Pre-project / Baseline Levels	Compliance Monitoring LAeq 15 min											Project Criteria and Latest Test		
		Previous attended testing											Latest tests	LAeq 15 min	LAeq 11 hr
	Unattended logger original report	23/08/05	10/07/17	30/08/18	20/04/20	20/04/20	10/12/20	18/06/21	05/08/21	01/10/21	08/04/22	08/08/22	20/12/23	>Impact Criteria day and evening 47LAeq	>Cumulative Criteria Day >50LAeq
G	62	63	62	57	55	56	57	55	50	49	47	47	46	-1	-4
O	NM	NM	64	46	48	52	53	52	49	51	50	48	48	1	-2
Pacific Views	55	51	57	48	55	53	52	51	51	50	51	48	50	3	0
DD	55	53	58	56	56	53	52	50	49	51	52	50	48	1	-2
F	58	54	43	57	59	55	47	50	48	50	49	49	48	1	-2

Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

To better demonstrate this, Appendix A shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From Appendix A it can be seen that the LAeq levels generally do not fall below the project criteria until the night time period, at which time the Quarry is not approved to operate. This issue will be further considered during future monitoring events.

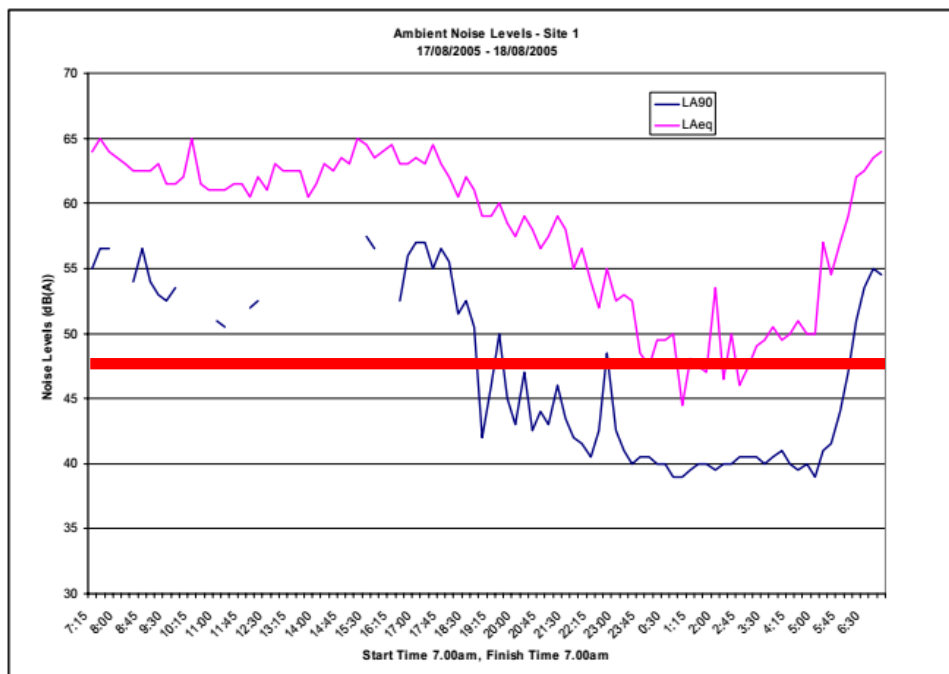
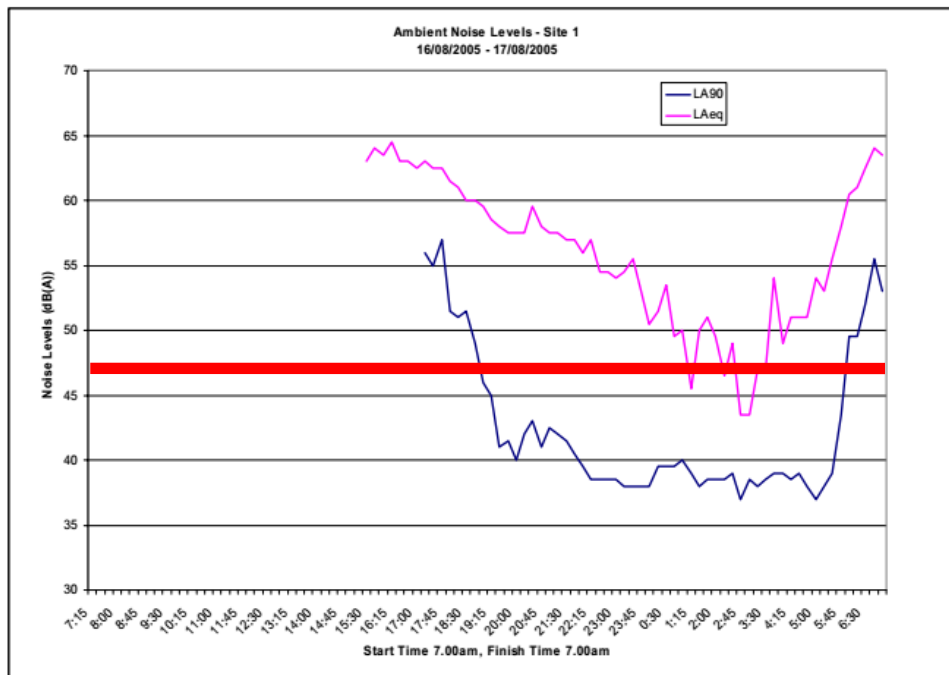
## APPENDIX A PRE CONSTRUCTION TESTING

Measurements taken by Ron Rumble Pty Ltd and originally presented in Ron Rumble, (2008). Noise Assessment Report 61704- Part B.

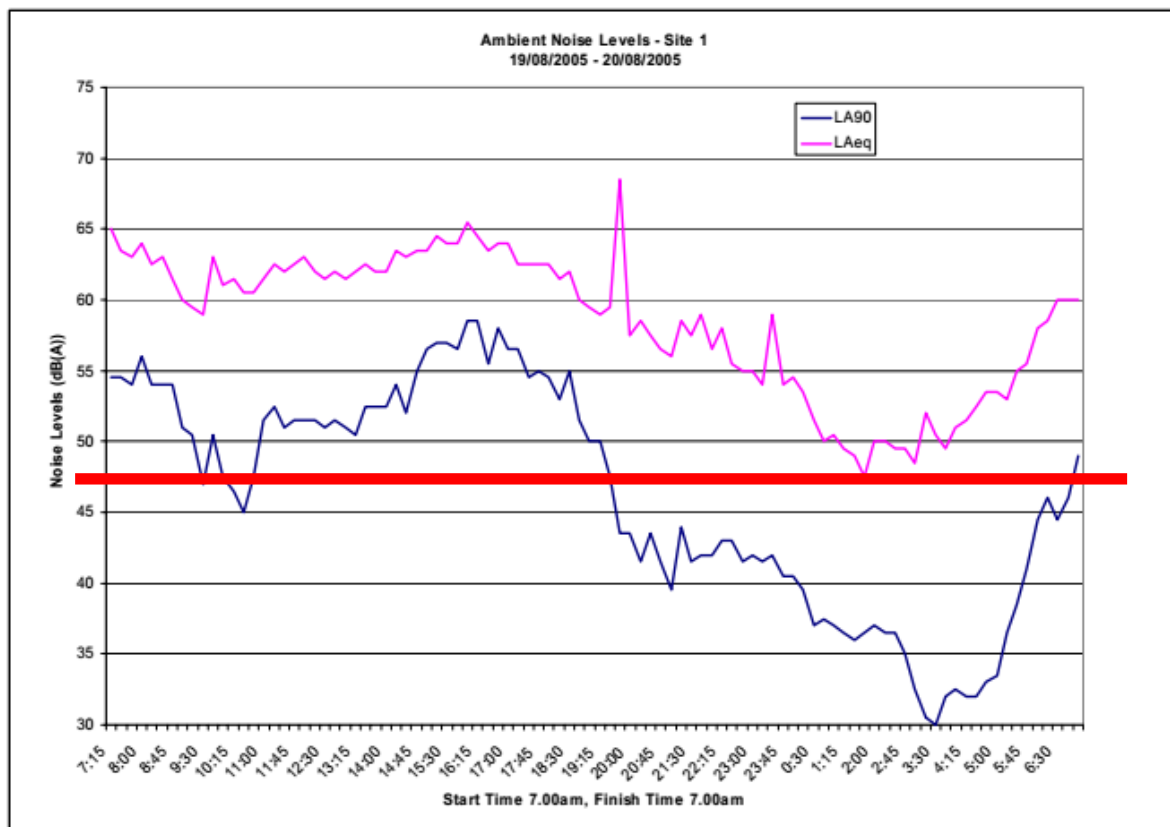
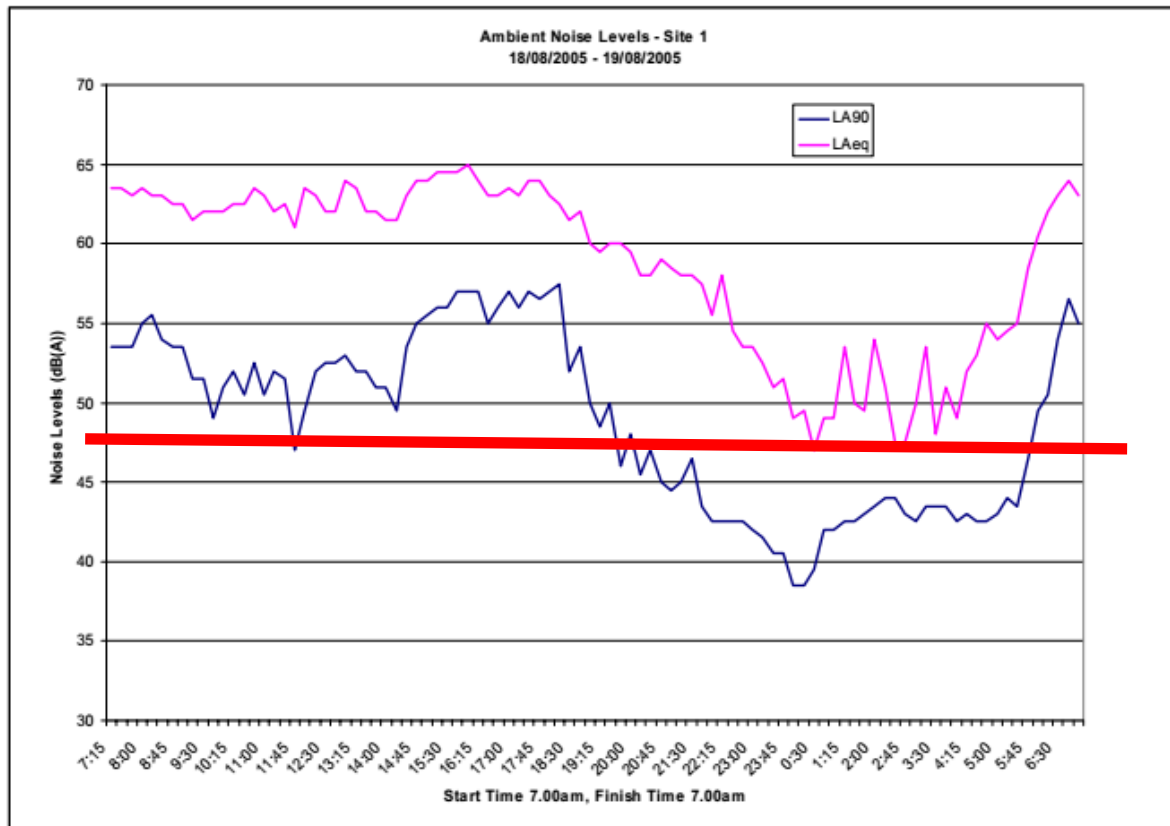
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Part 8 – Noise Assessment

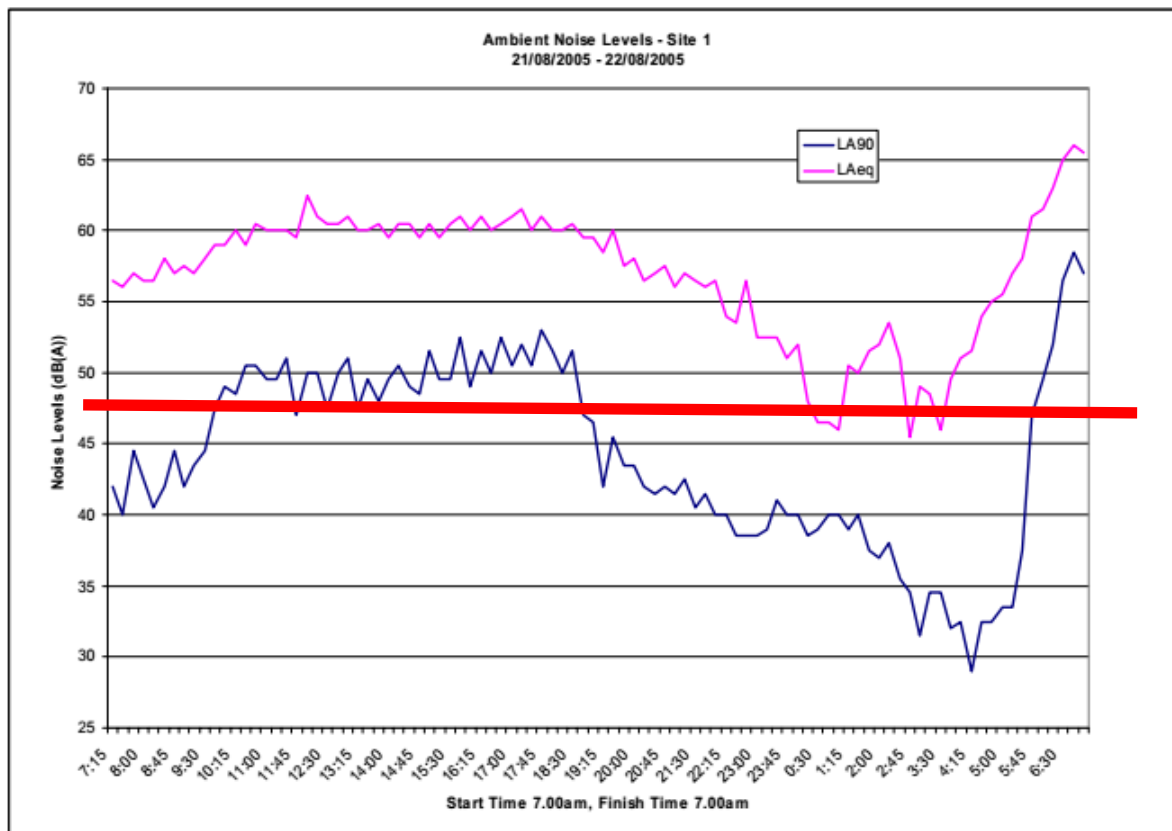
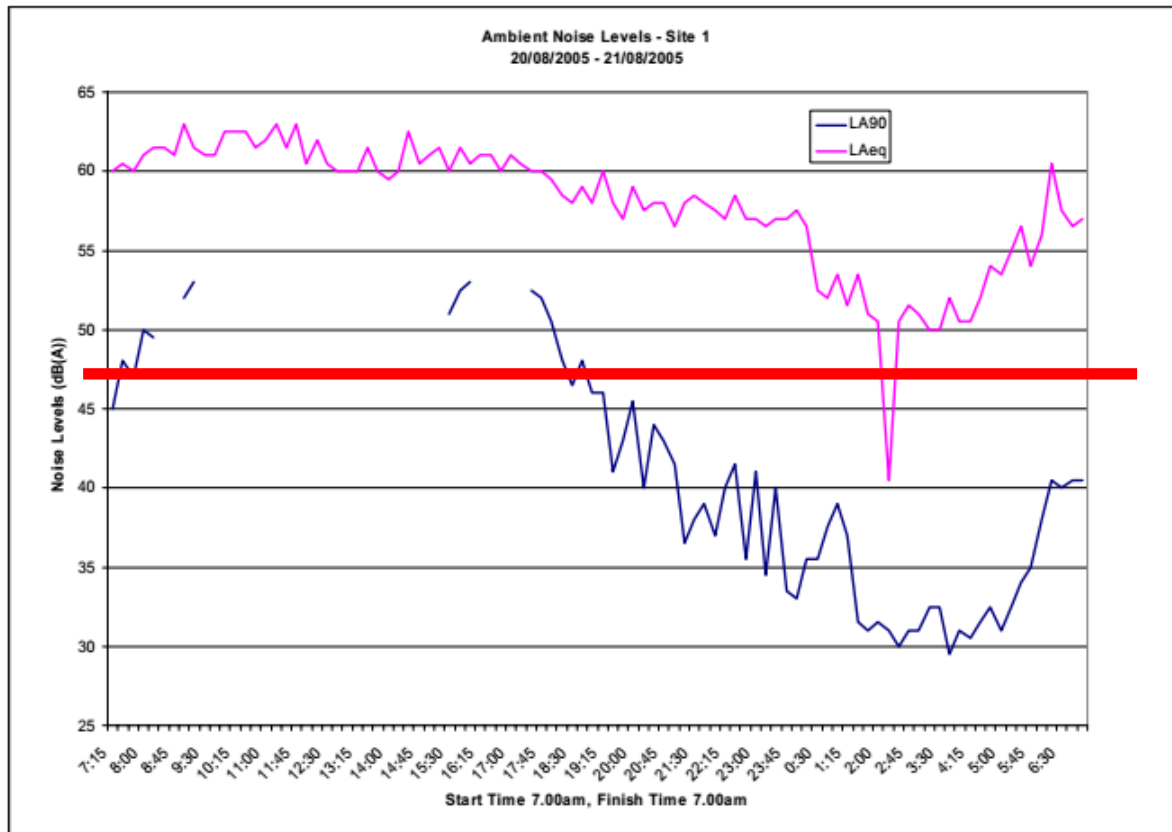
8 - 87

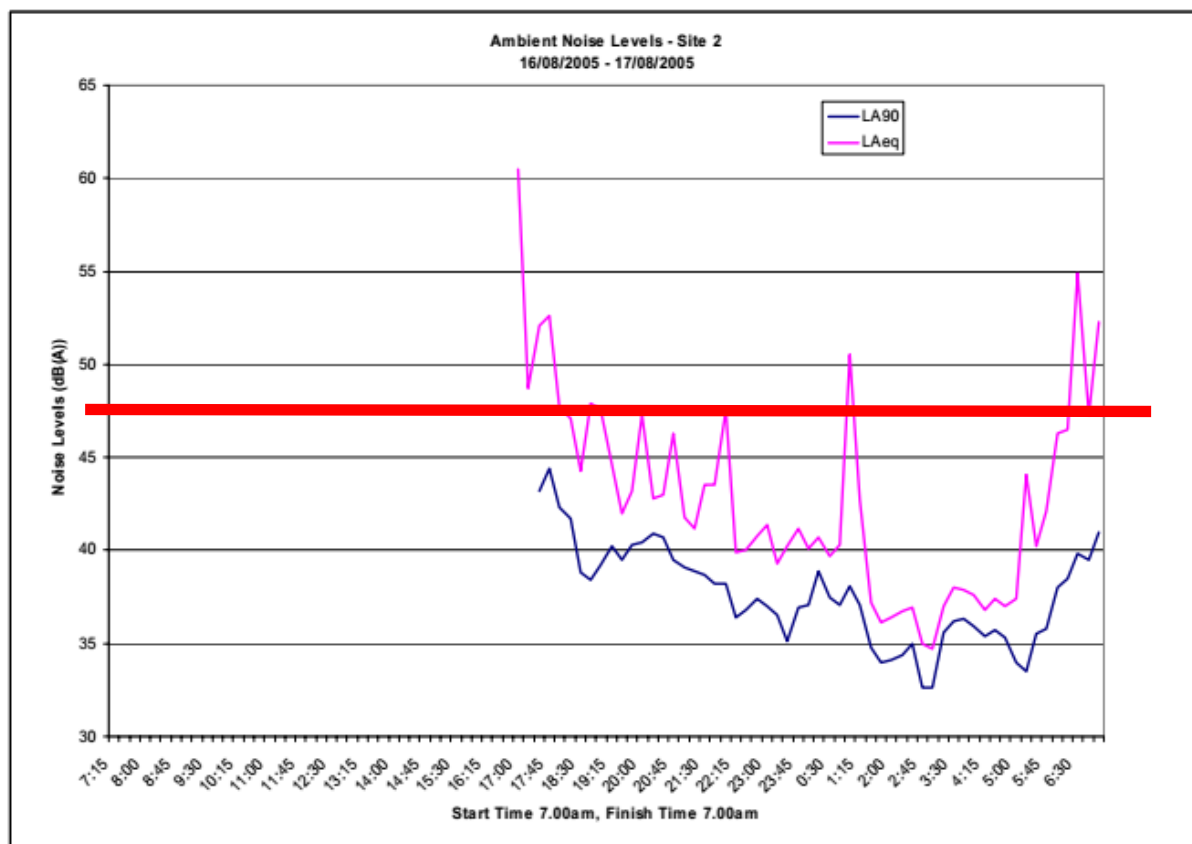
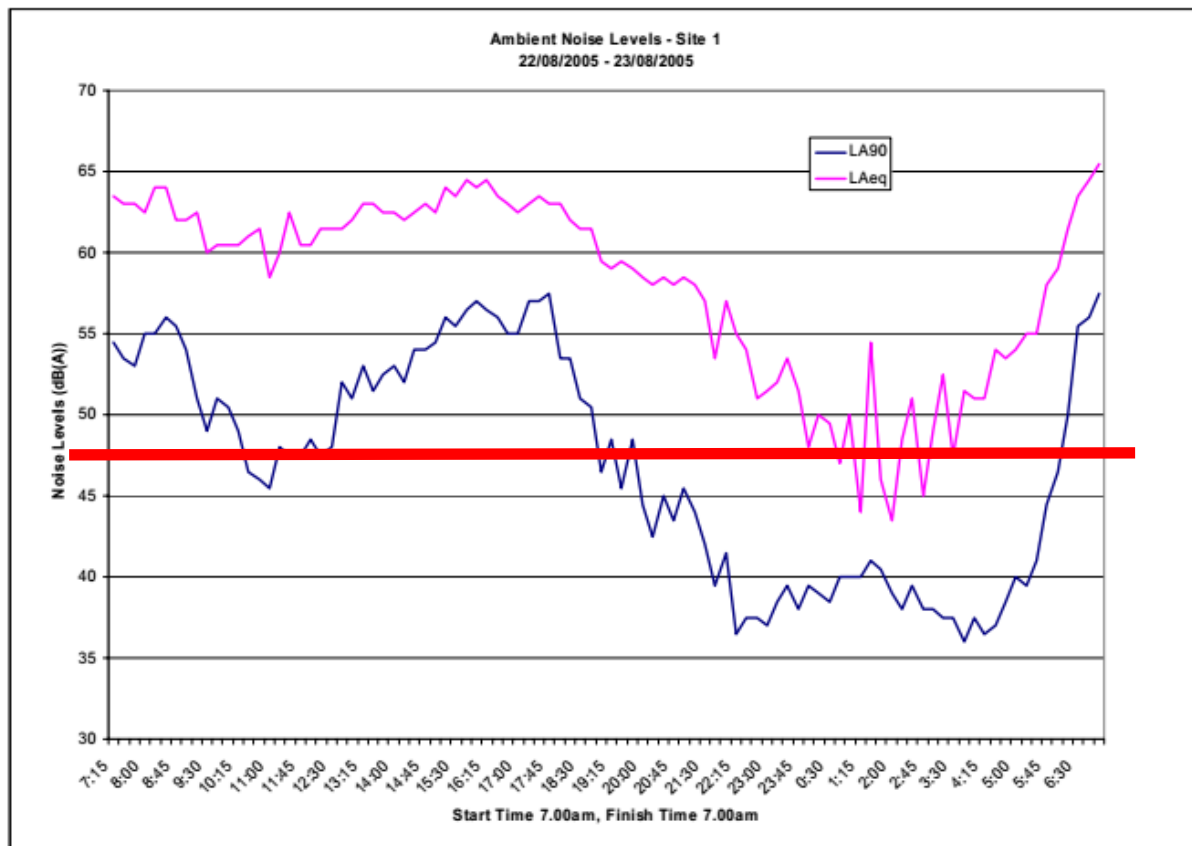
**GALES-KINGSLIFF PTY LTD**  
Cudgen Lakes Sand Extraction Project  
Report No. 617/04

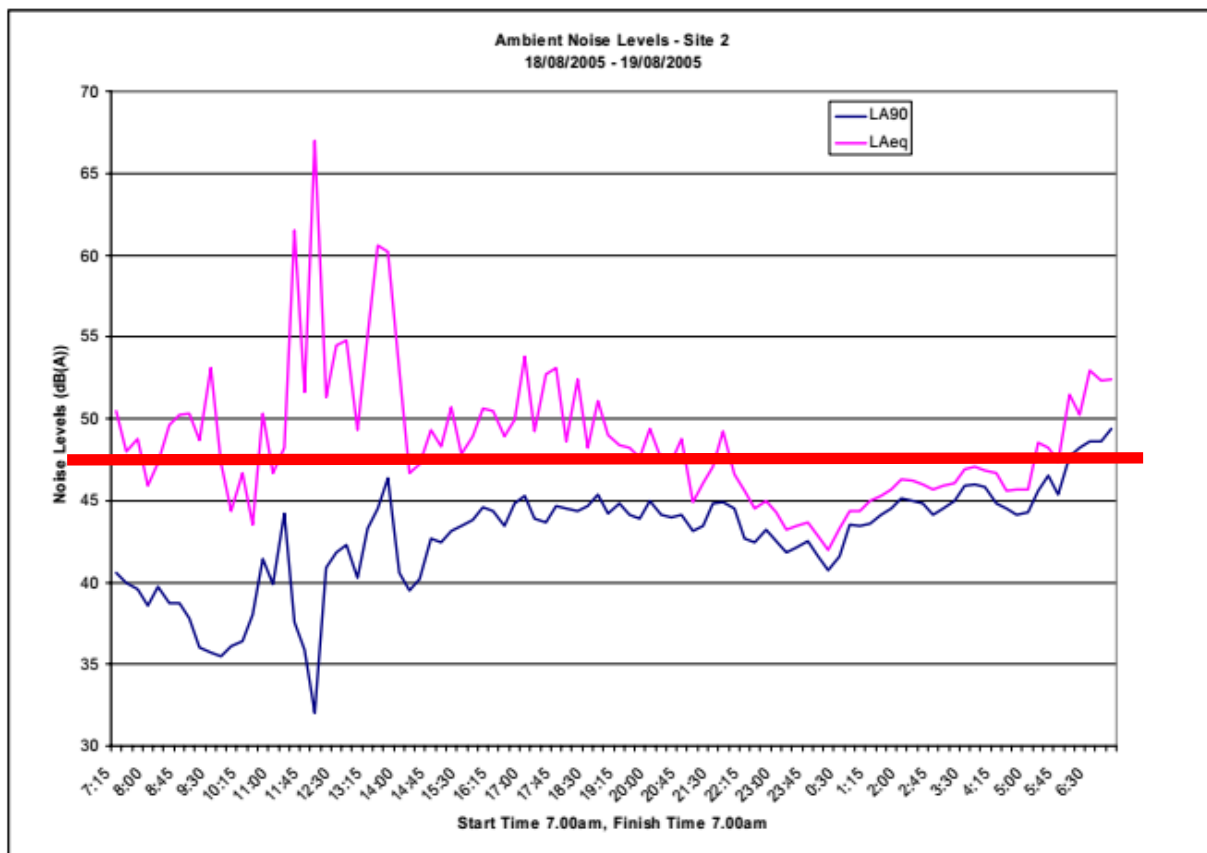
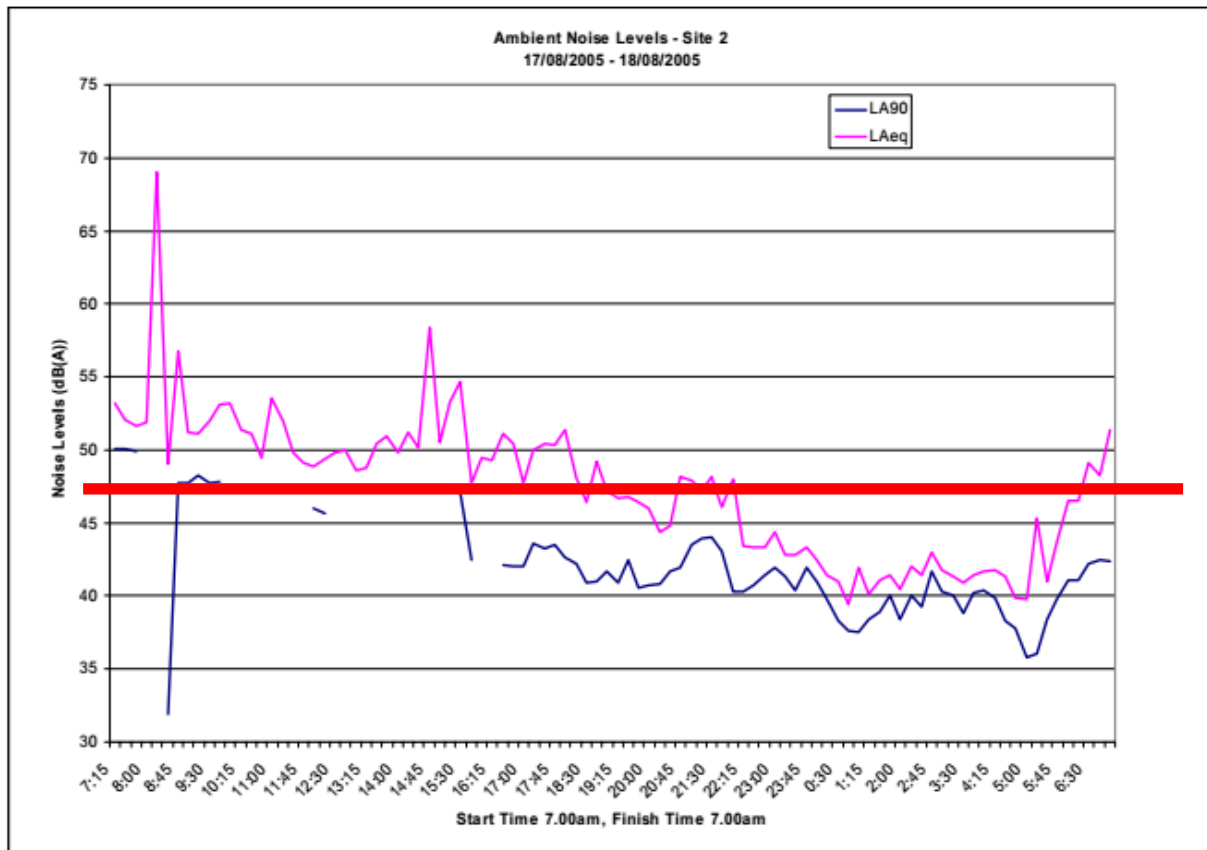


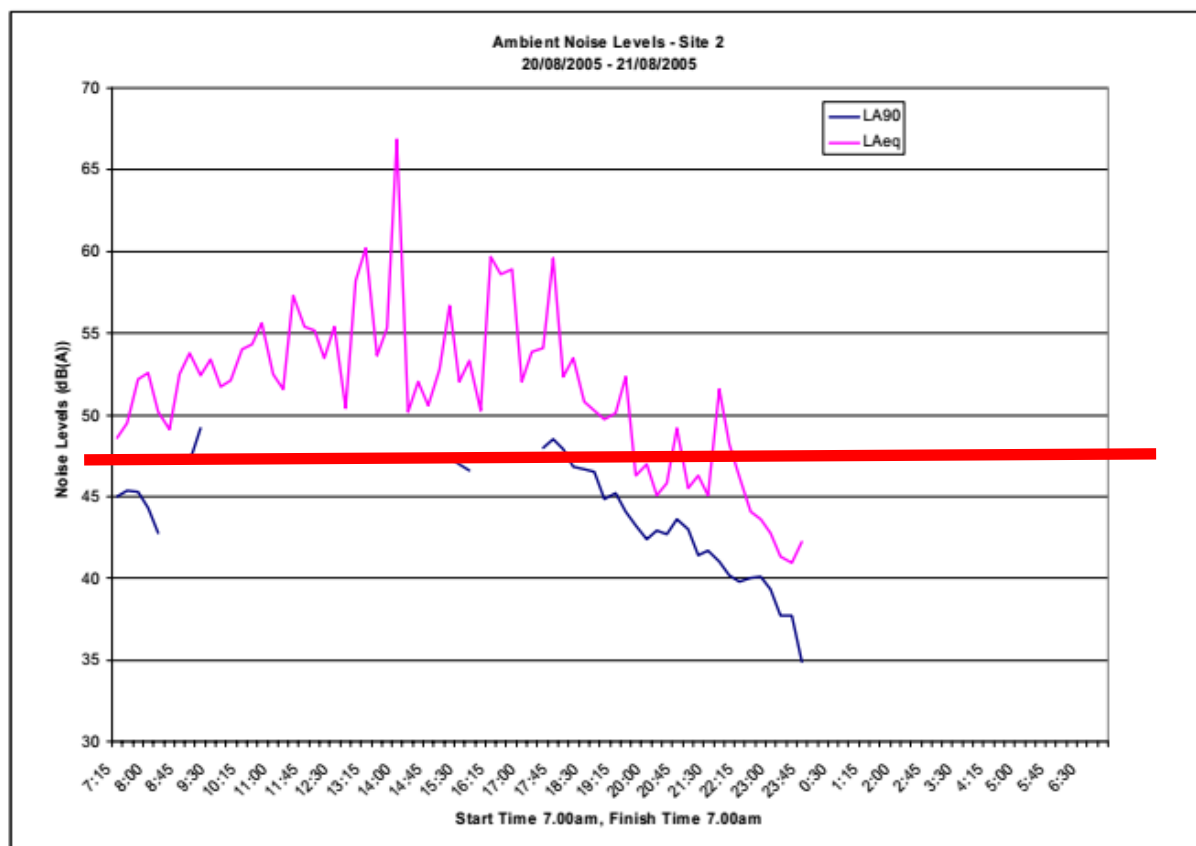
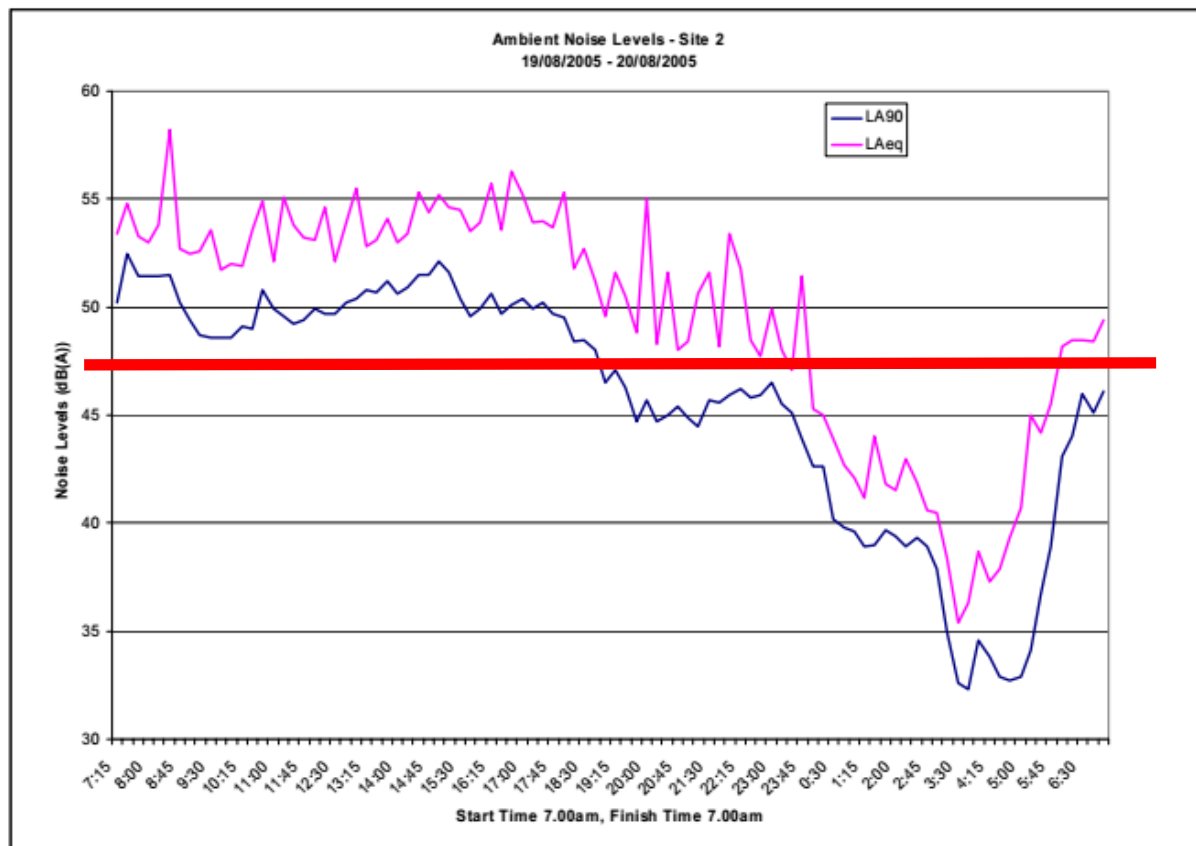




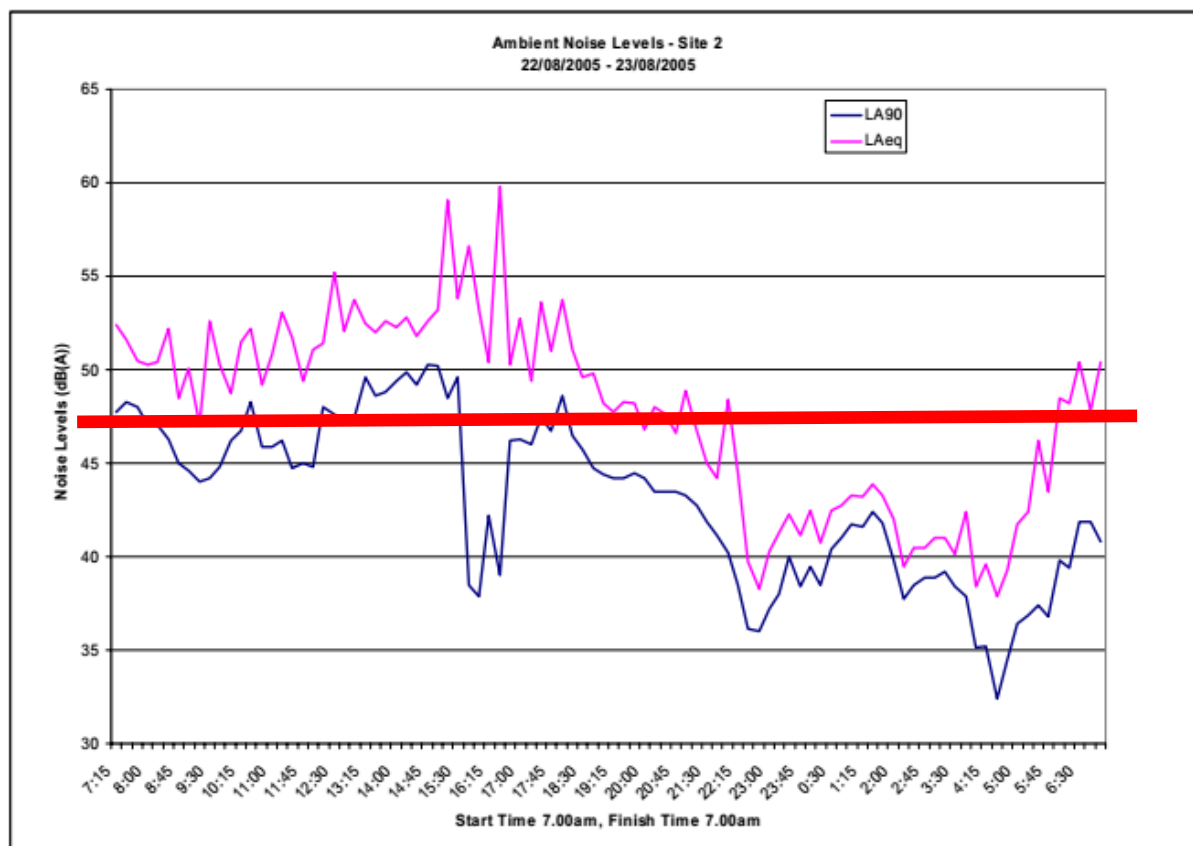
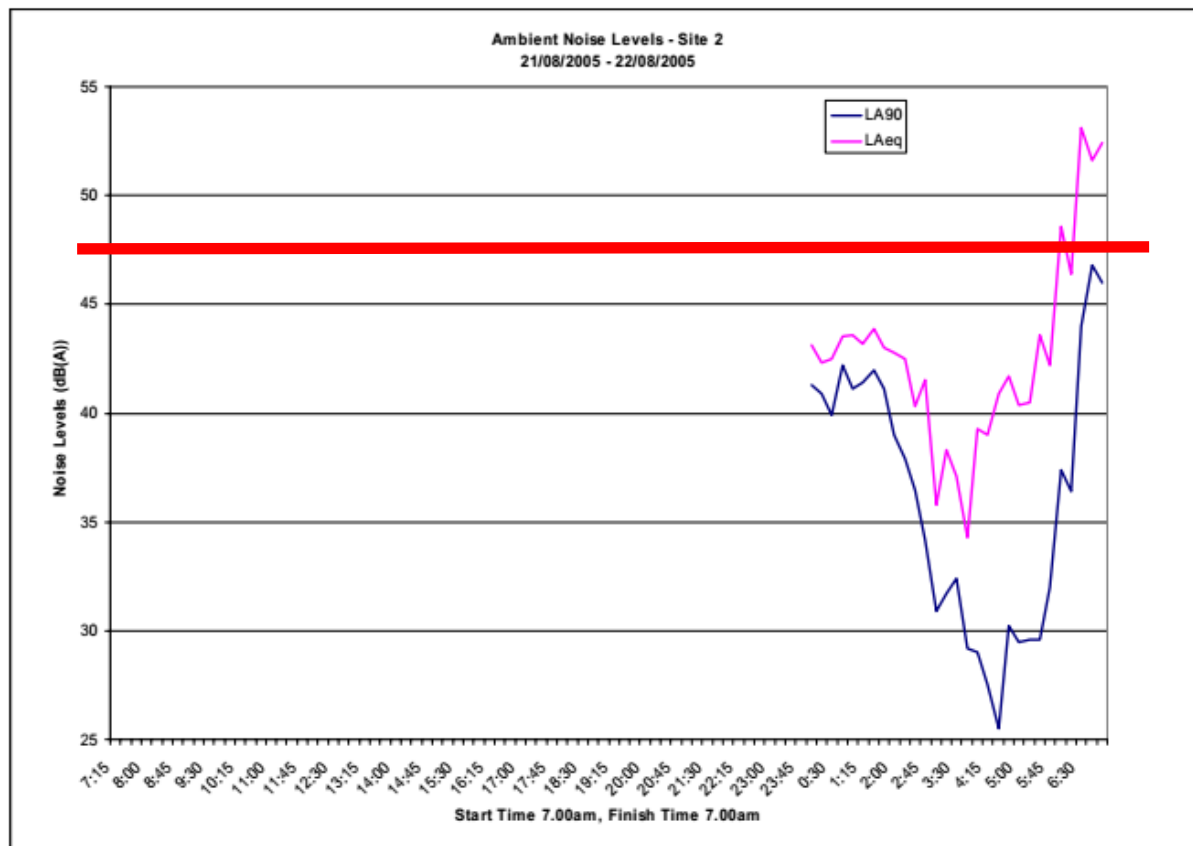


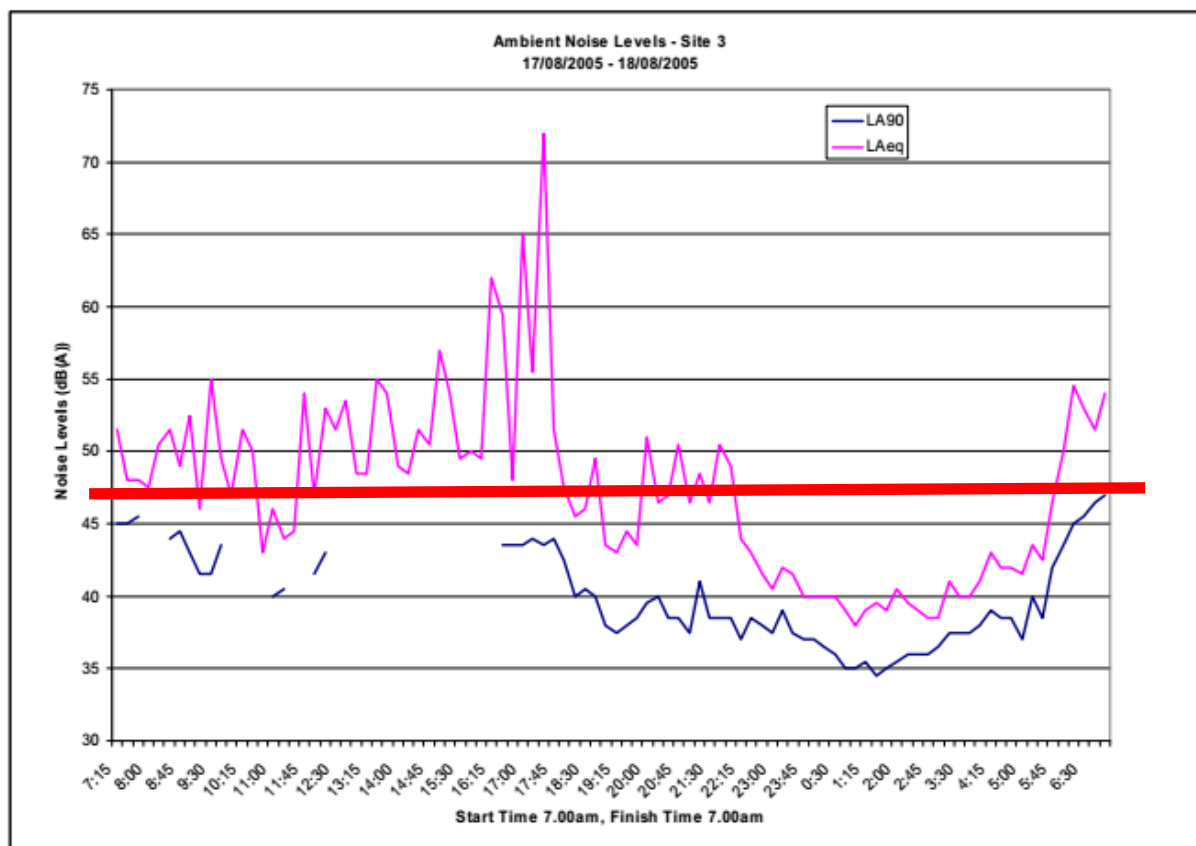
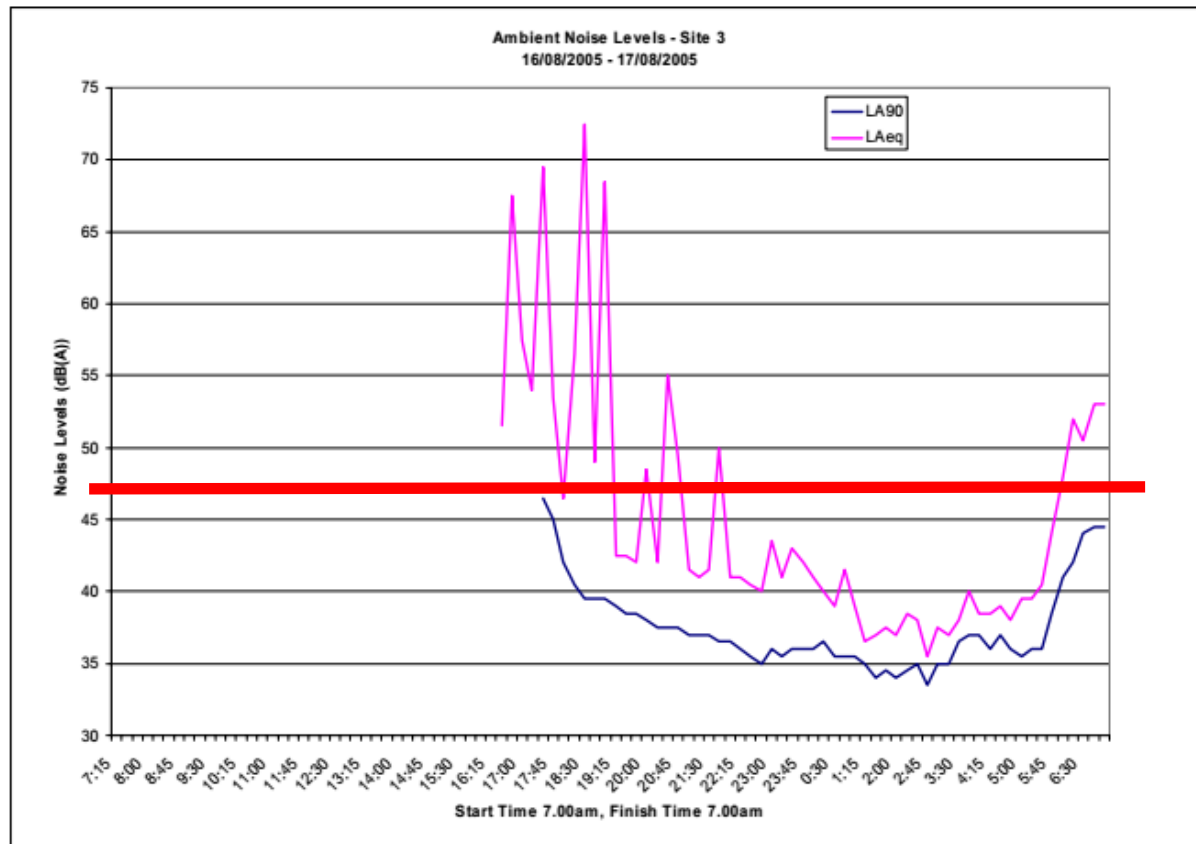


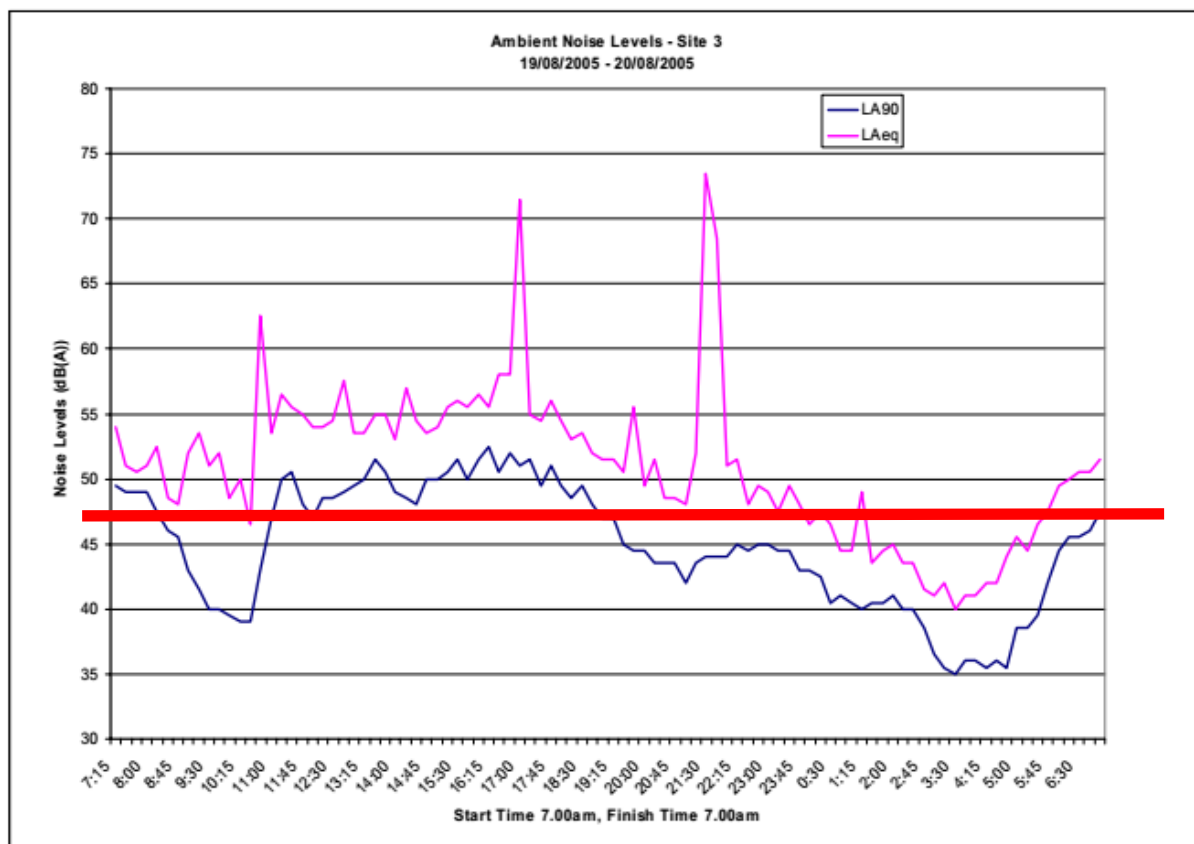
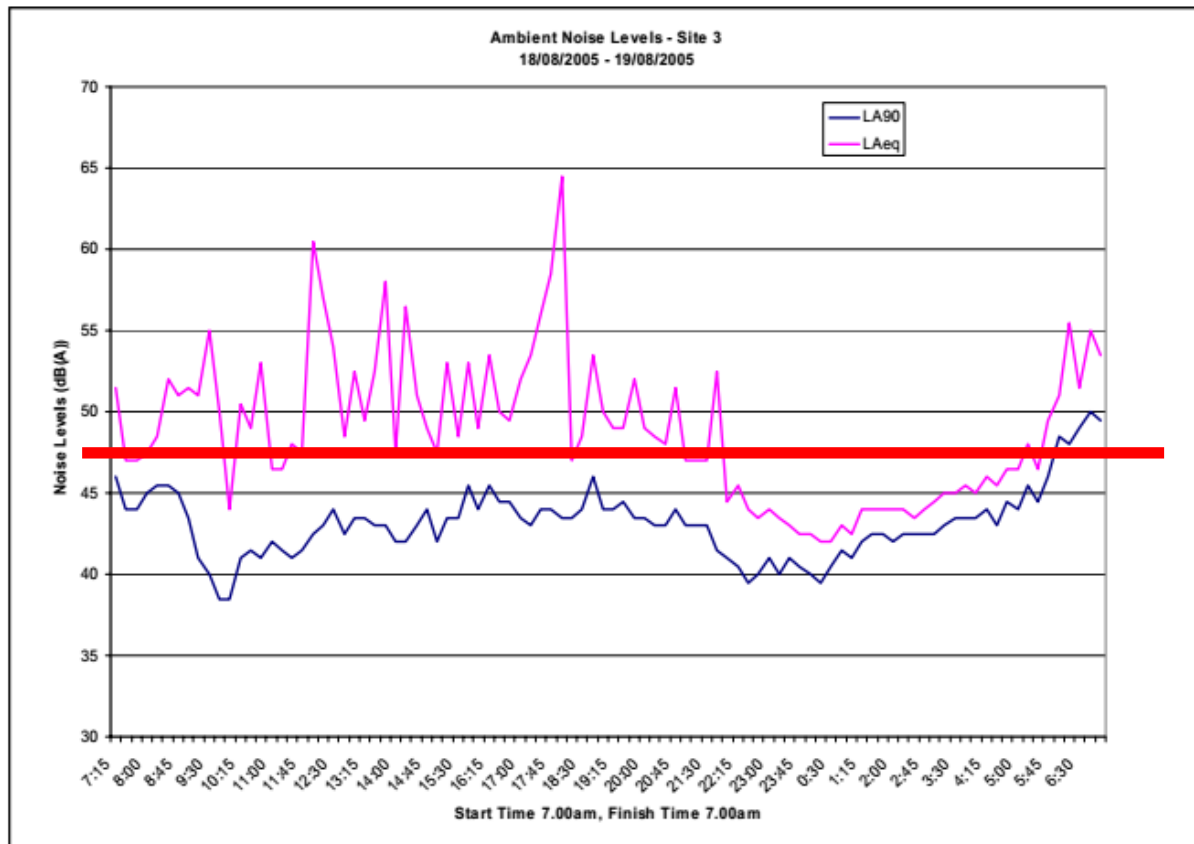


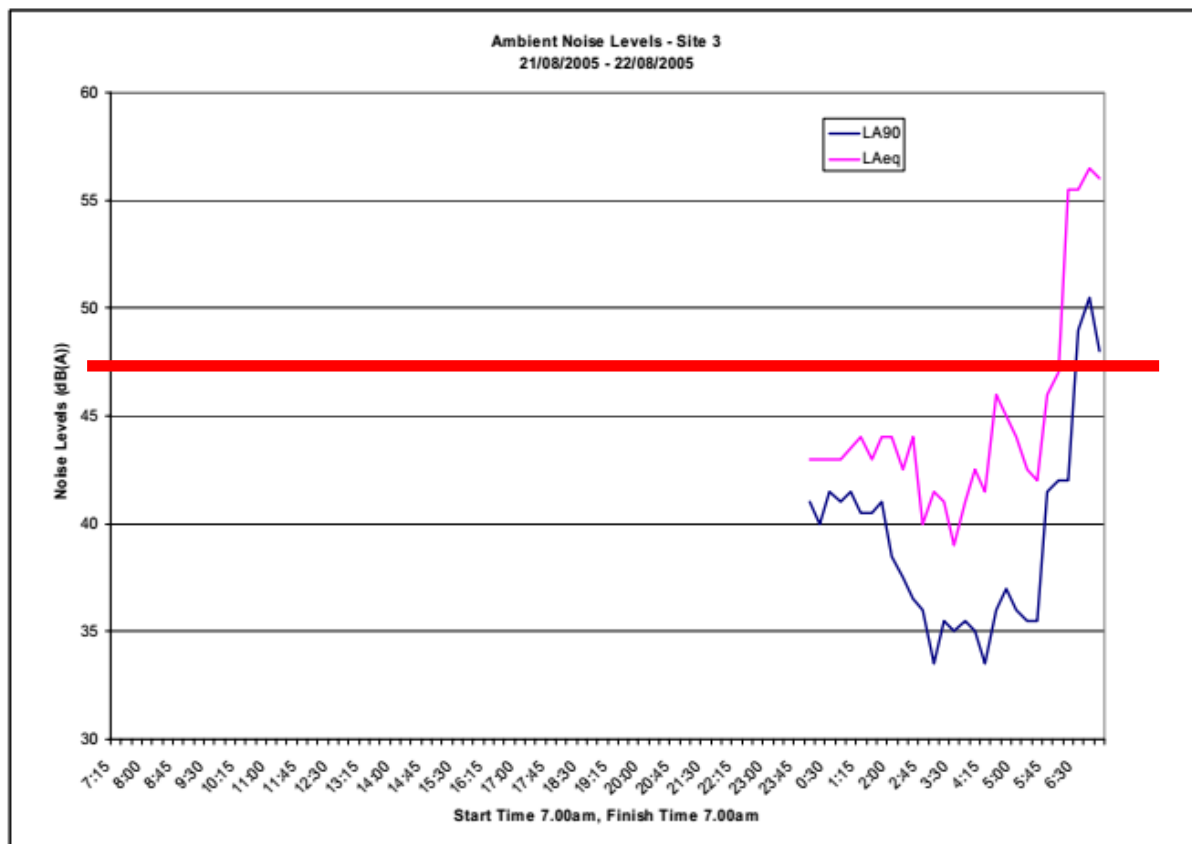
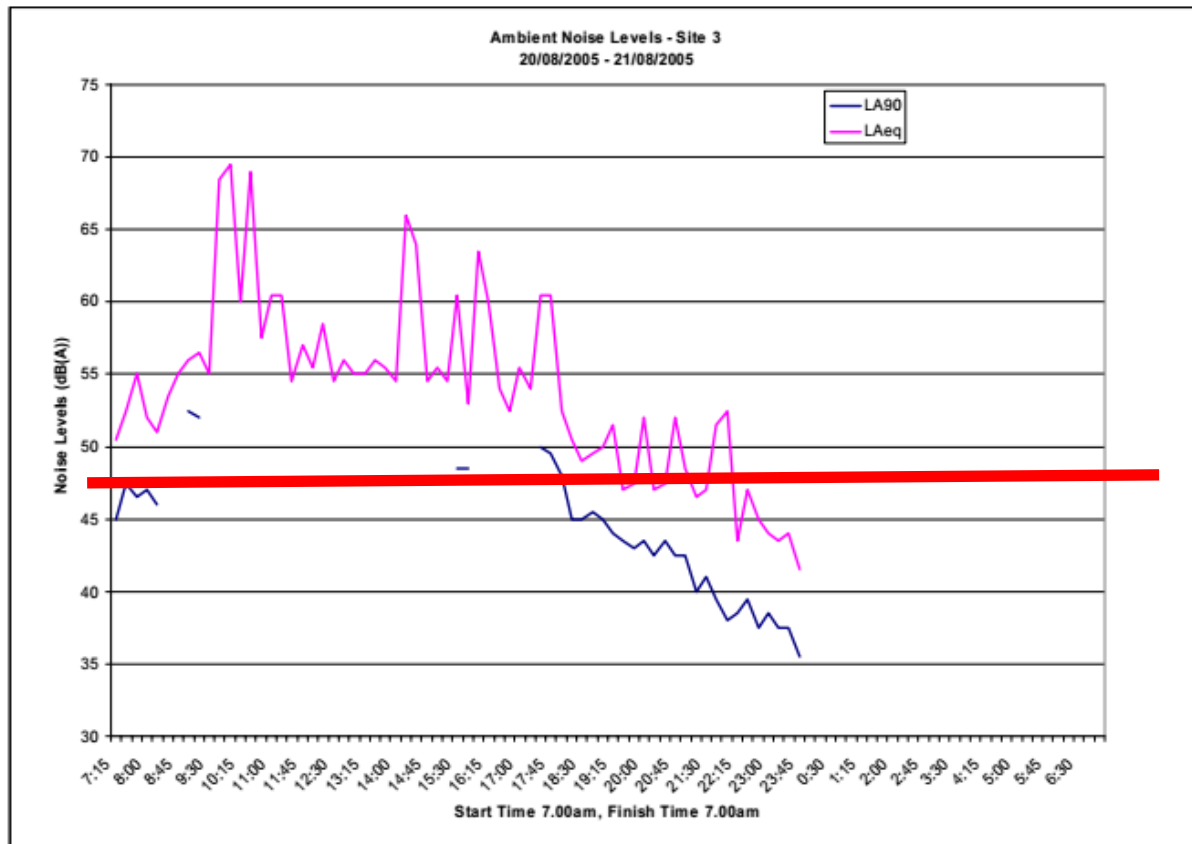


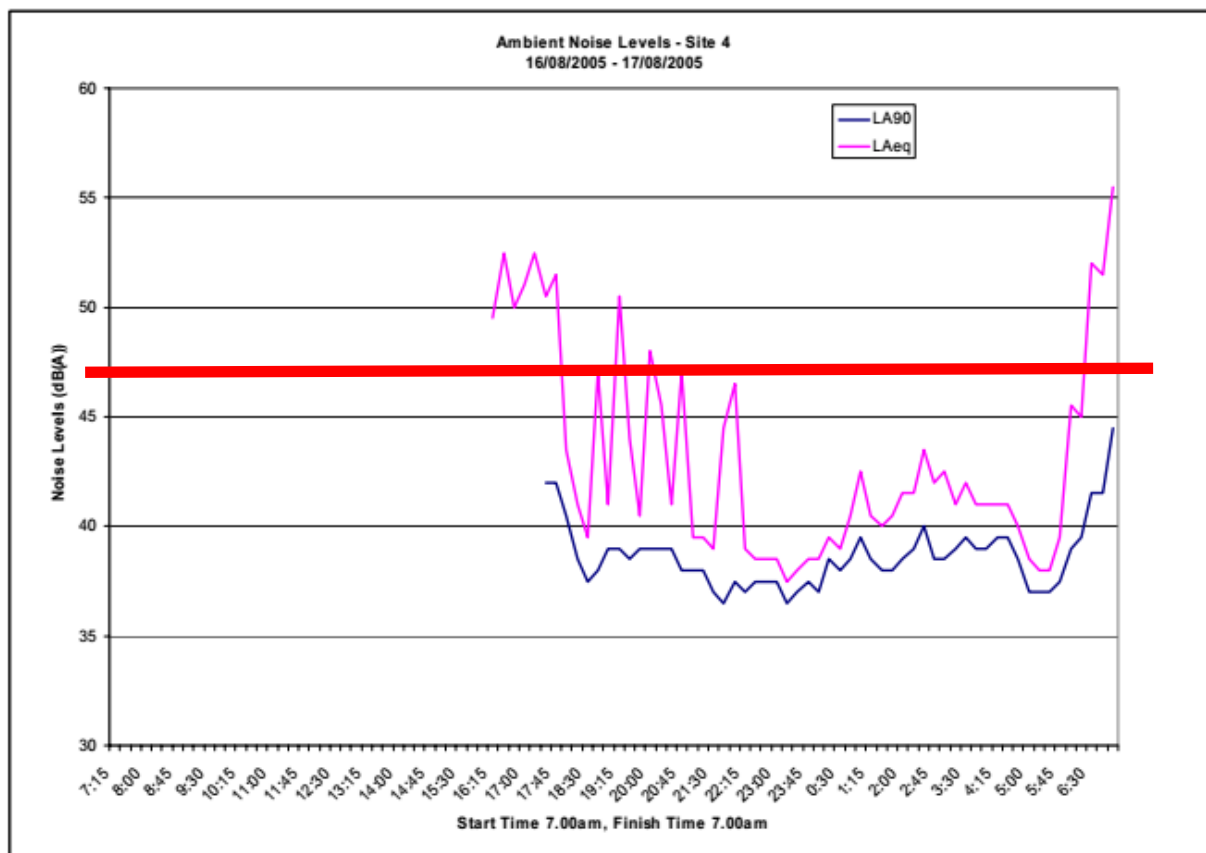
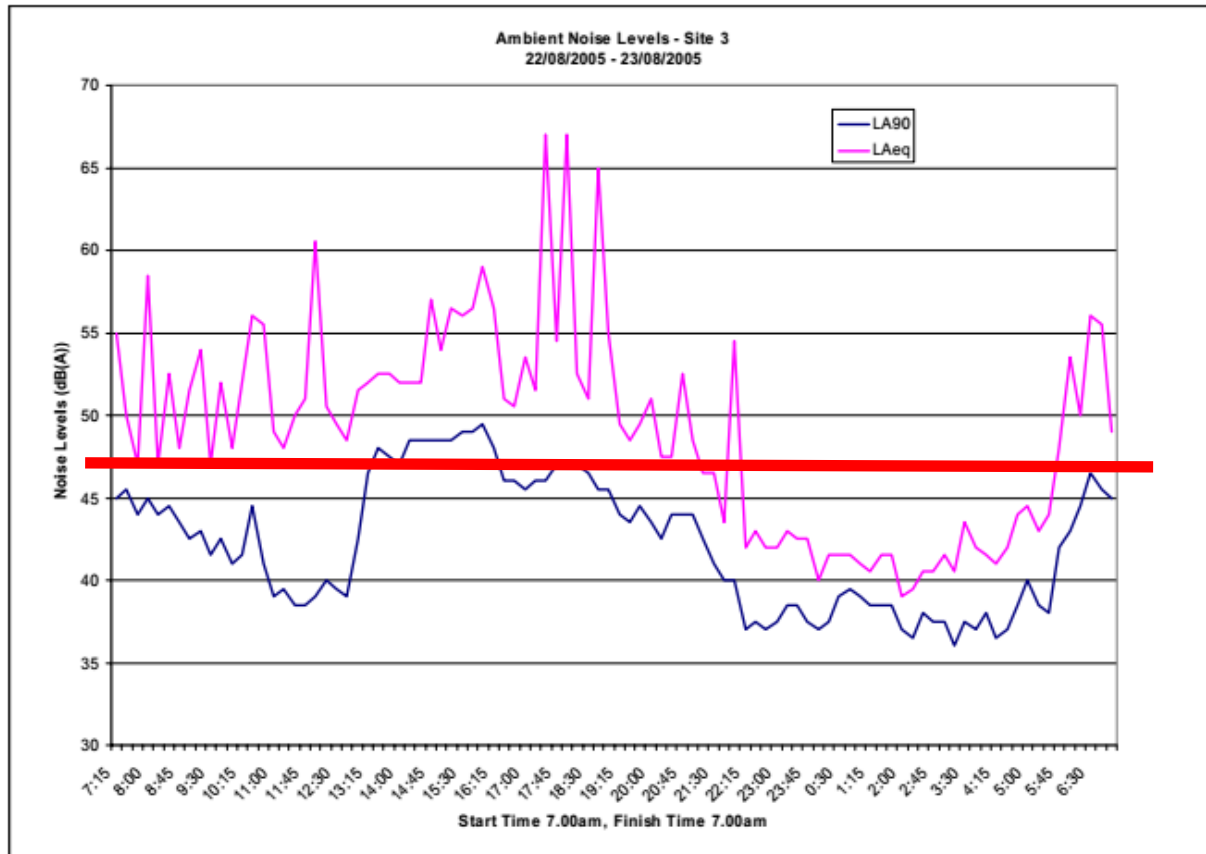




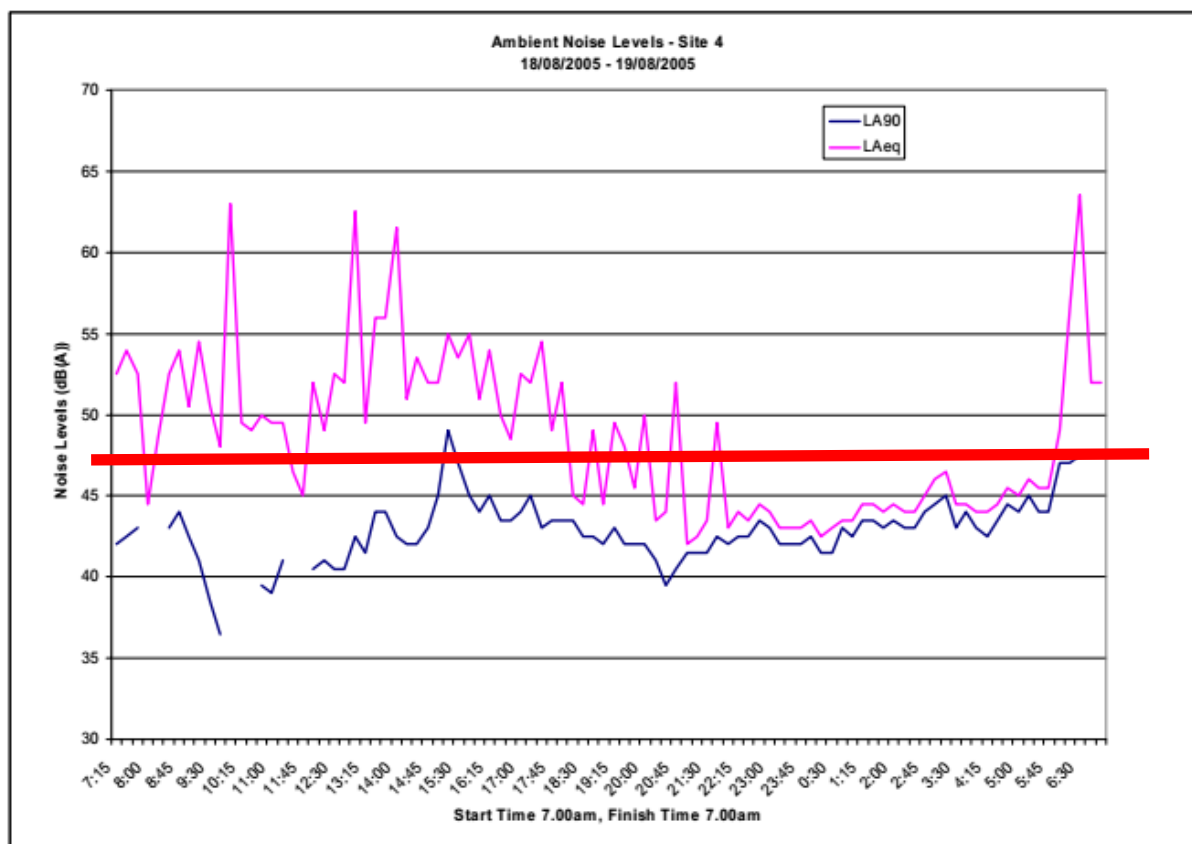
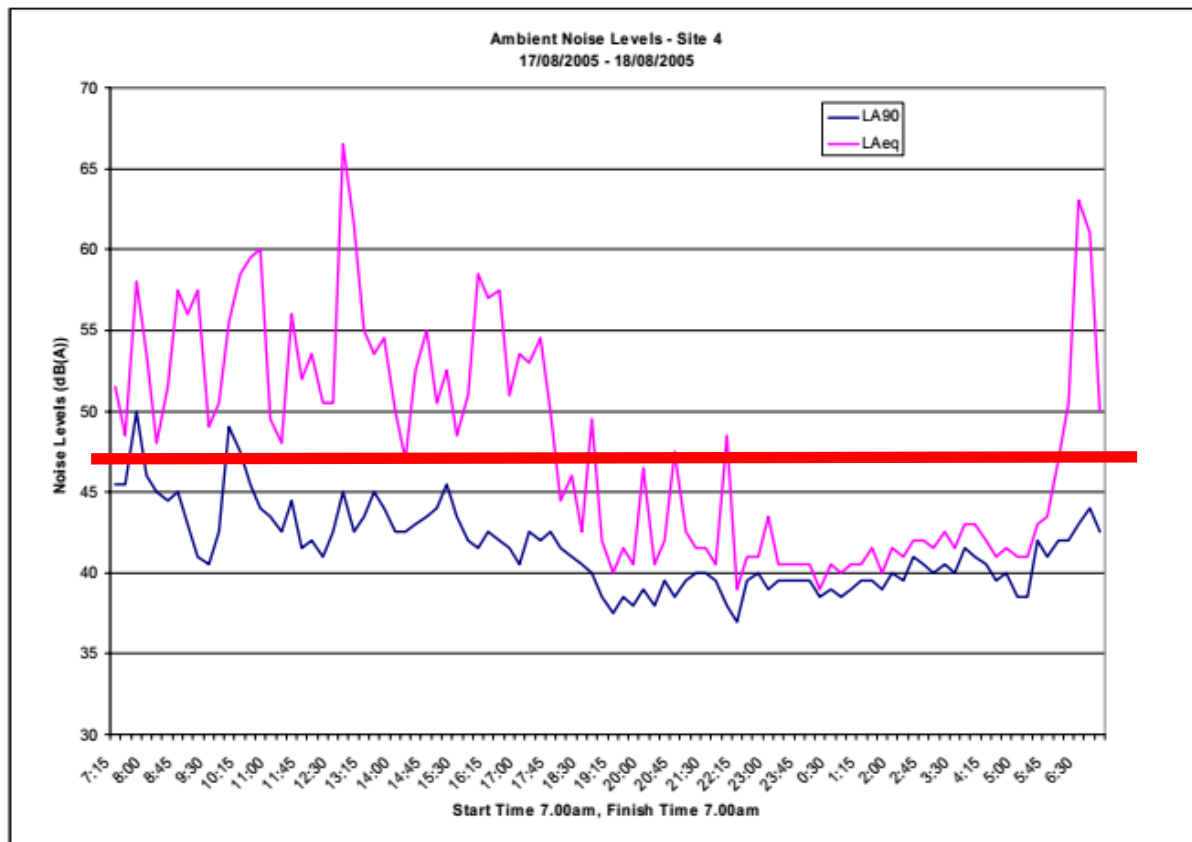


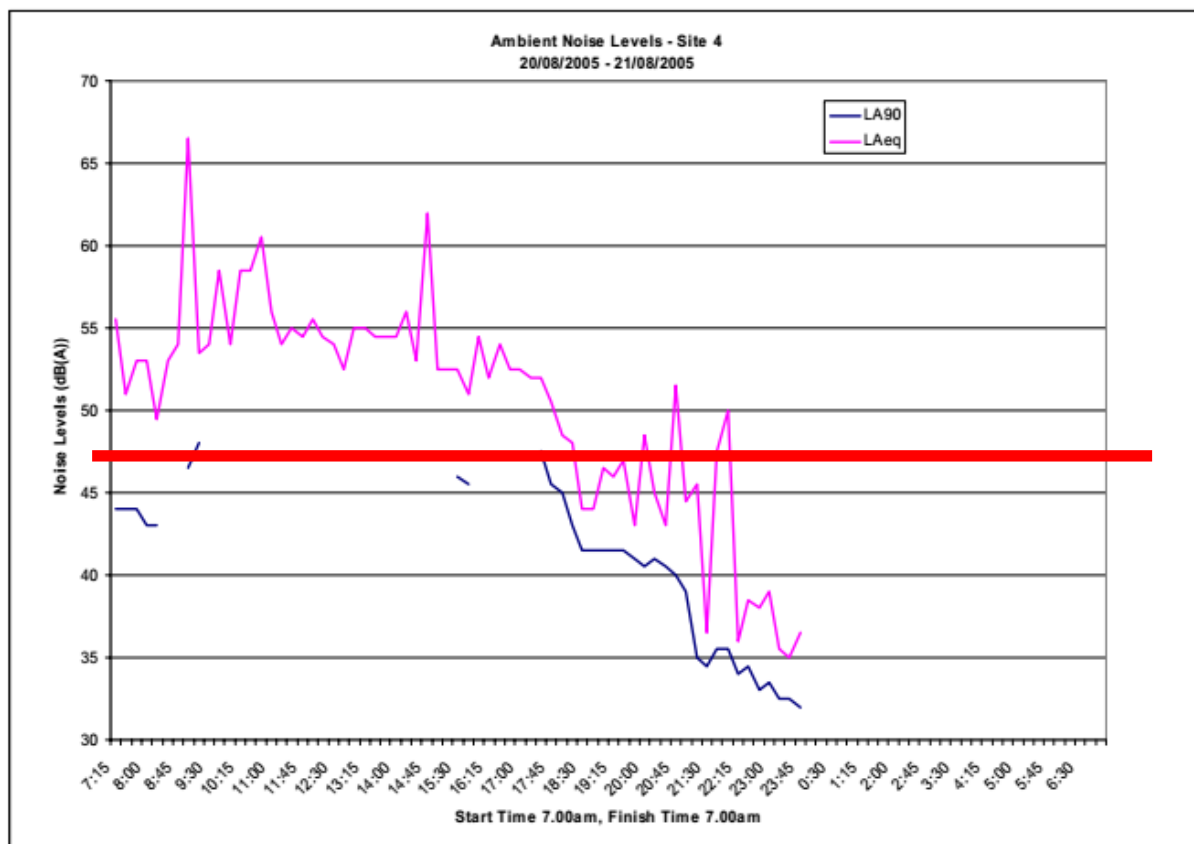
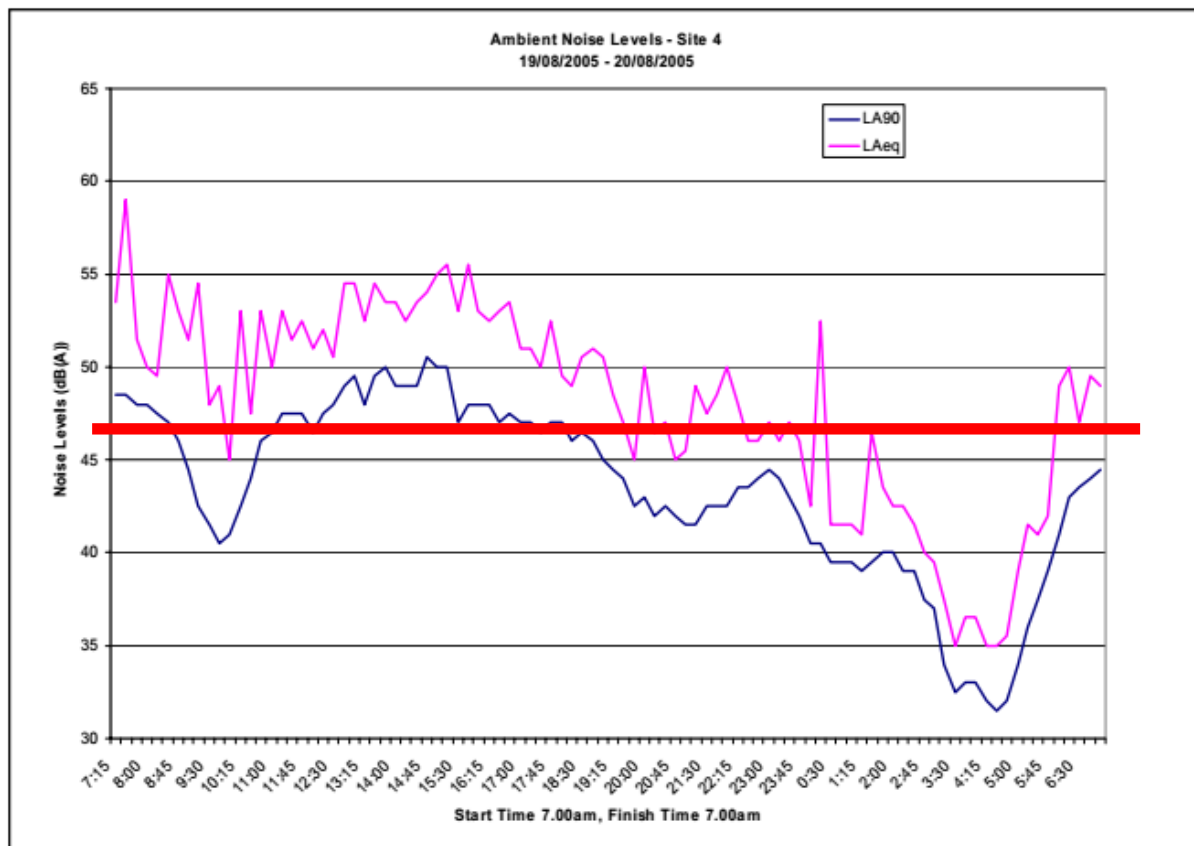


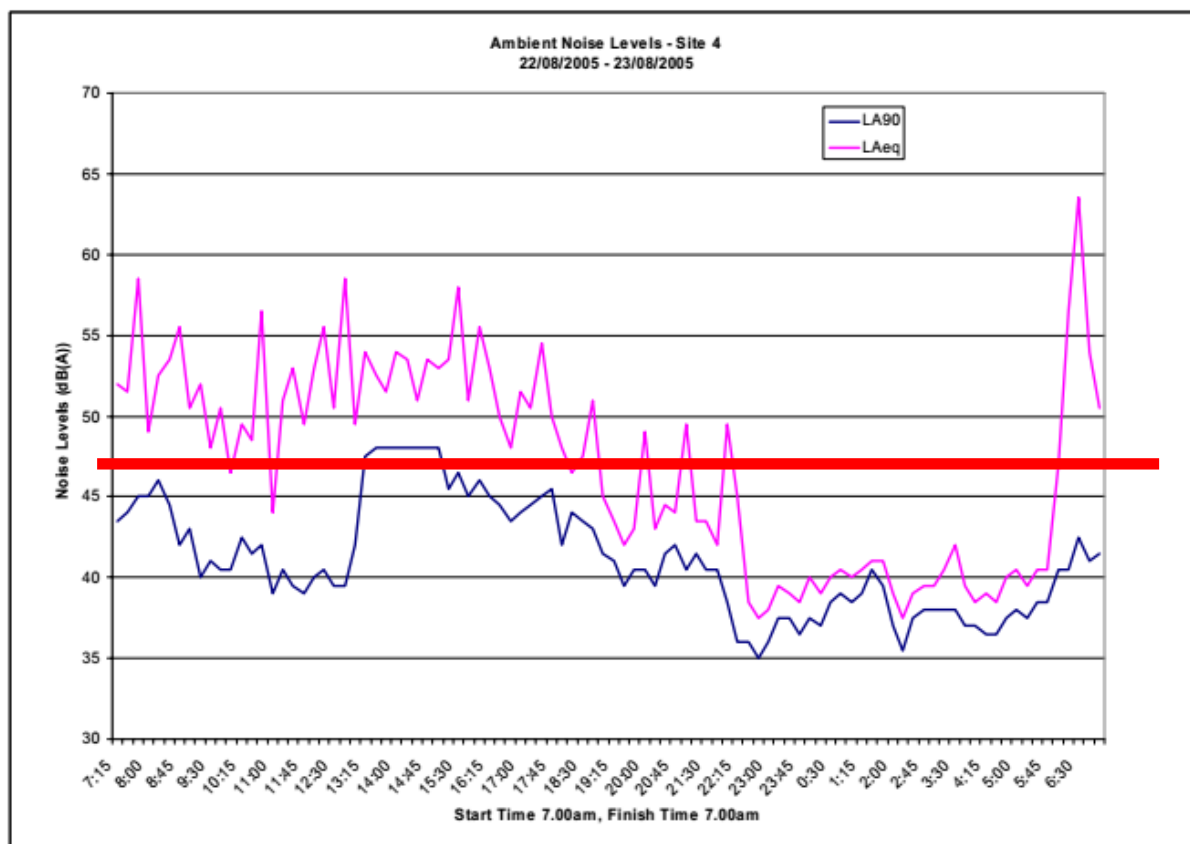
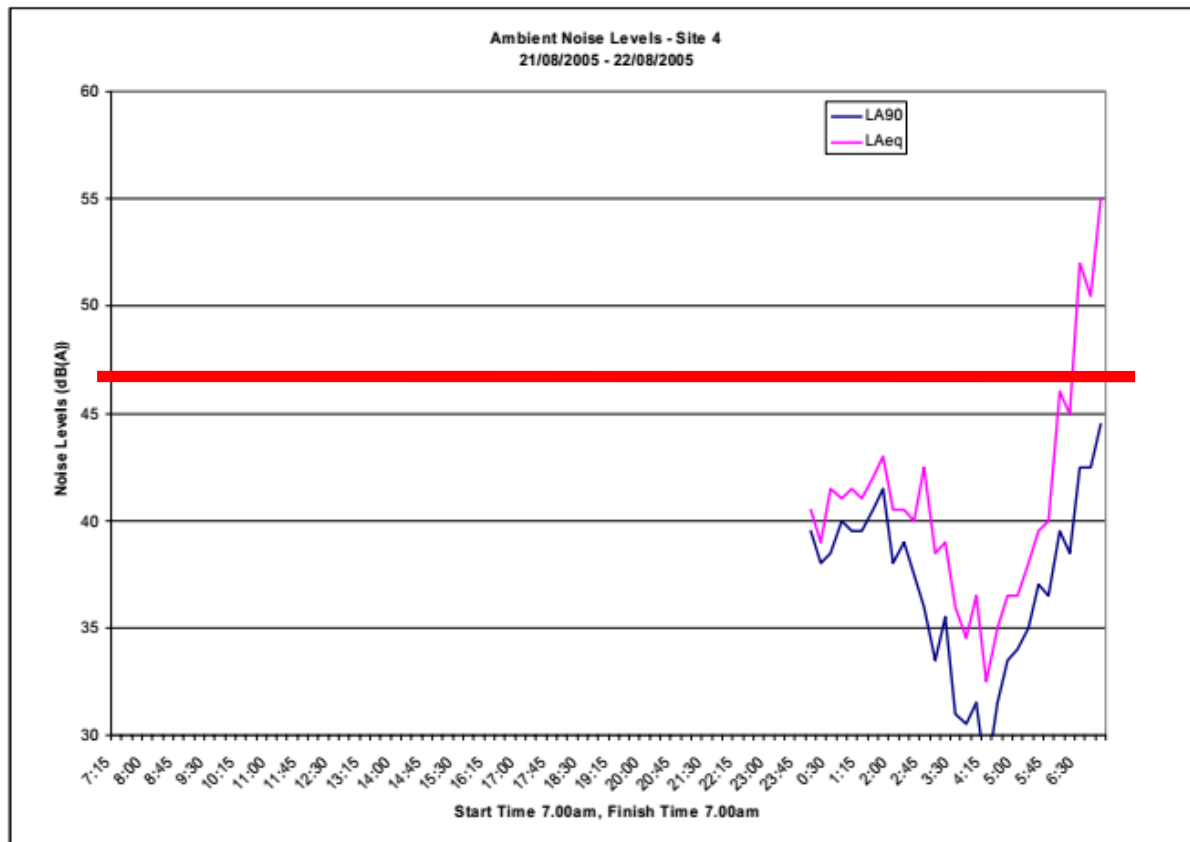












# Appendix 3

## Air Quality Monitoring Results

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## Cudgen Lakes Sand Quarry

### Deposited Dust Monitoring

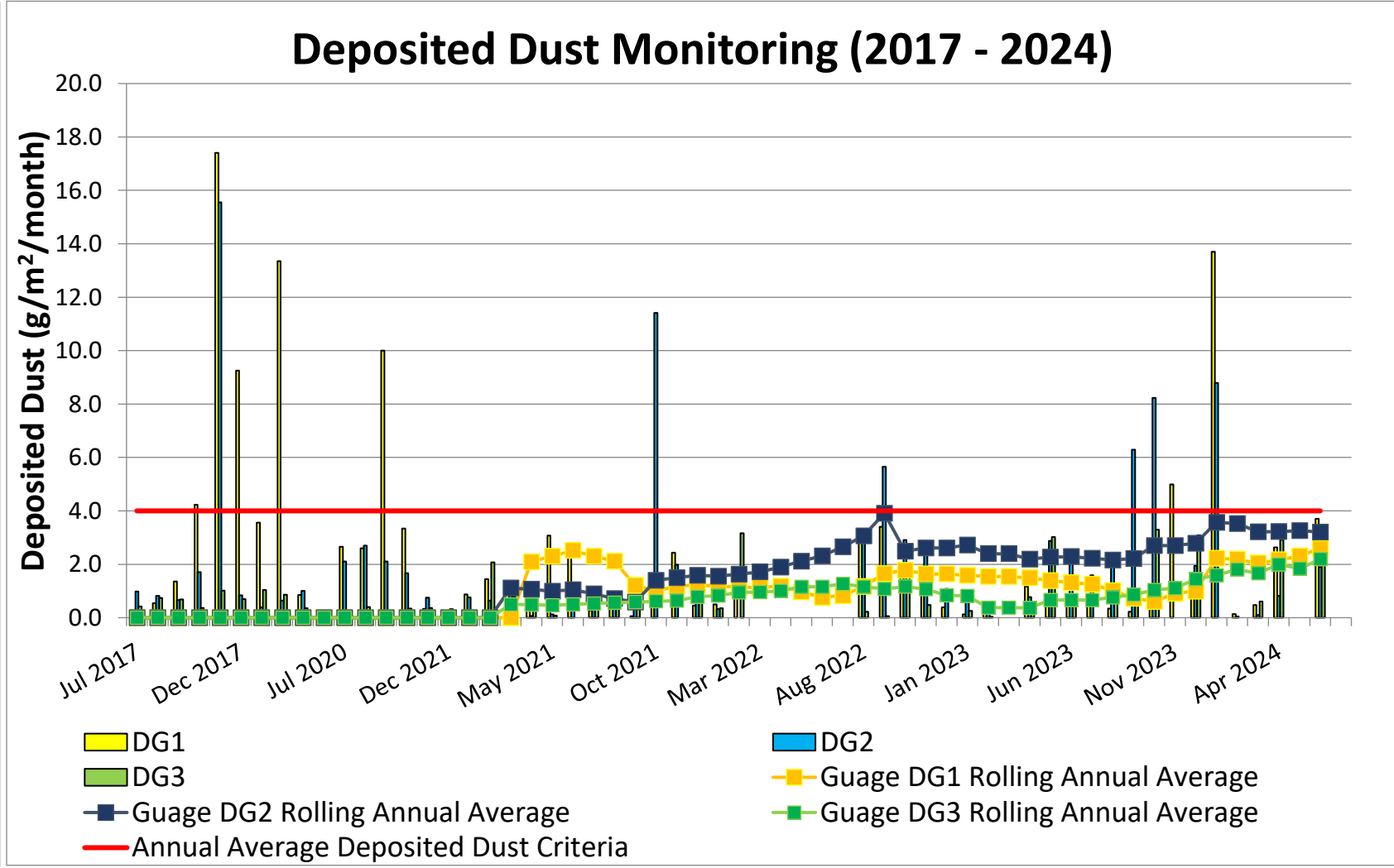
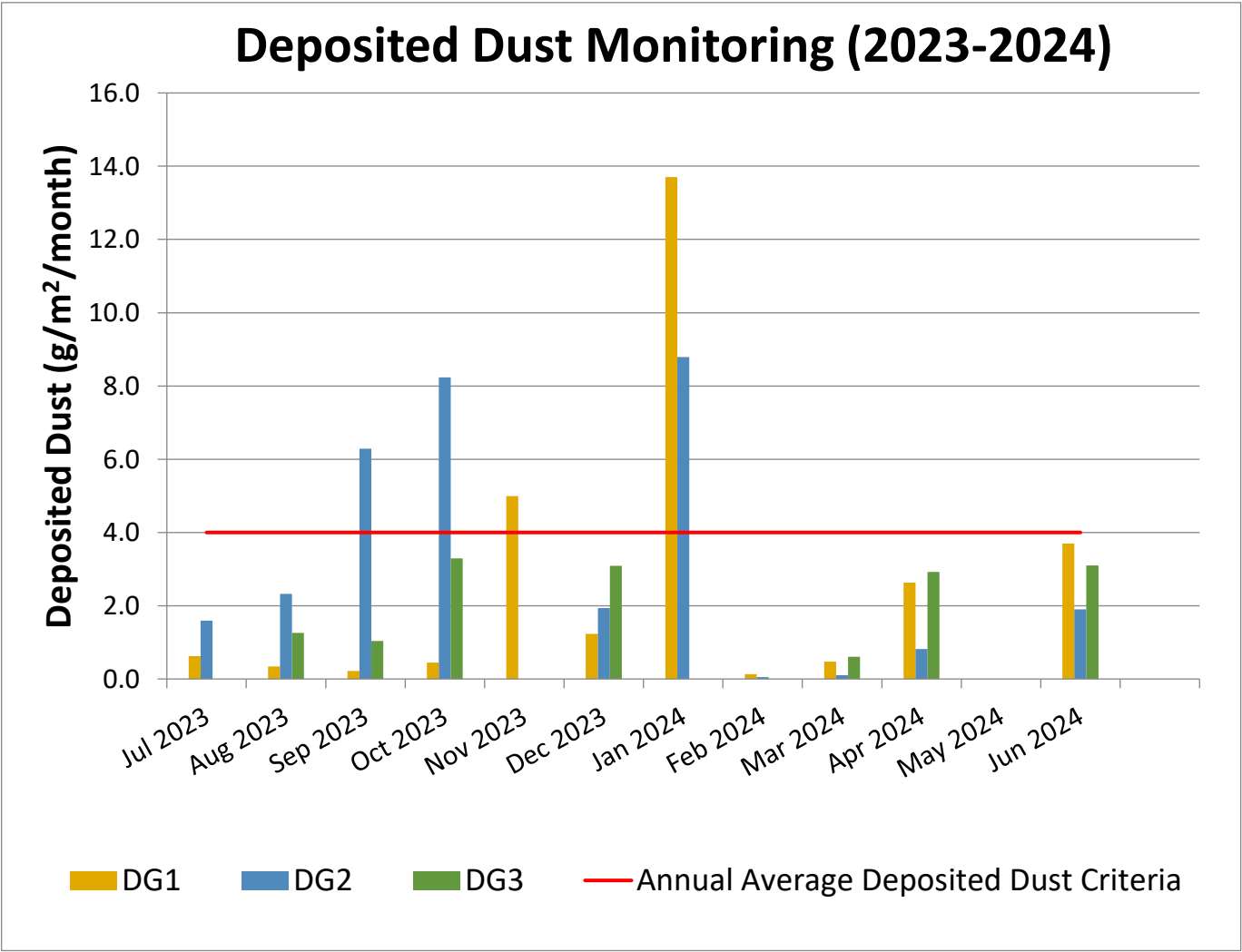
Samples On	Samples Off	Month	DG1		DG2		DG3		Annual Criteria	Comments
			Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average		
7/11/2017	8/10/2017	Jul-17	0.28	ID	0.98	ID	0.42	ID	4	
8/10/2017	9/9/2017	Aug-17	0.54	ID	0.82	ID	0.74	ID	4	DG1 - cloudy/organic matter.
9/9/2017	10/9/2017	Sep-17	1.36	ID	0.66	ID	0.68	ID	4	
10/9/2017	11/8/2017	Oct-17	4.23	ID	1.71	ID	0.36	ID	4	DG1 - cloudy/organic matter.
11/8/2017	12/9/2017	Nov-17	17.4	ID	15.55	ID	1.02	ID	4	DG1 - cloudy/organic matter. DG2 - green/organic matter. DG3 - slightly green/funnel missing. Only dredging undertaken at Quarry (i.e. no dust generating activities) - earthworks activiites occuring southeast of Quarry.
12/9/2017	1/9/2018	Dec-17	9.25	ID	0.84	ID	0.7	ID	4	DG1 - cloudy/organic matter. DG2 - insects. Only dredging undertaken at Quarry (i.e. no dust generating activities) - earthworks activiites occuring southeast of Quarry.
1/9/2018	2/9/2018	Jan-18	3.56	ID	0.39	ID	1.04	ID	4	DG1 - cloudy/organic matter. DG2 - organic matter. Only dredging undertaken at Quarry (i.e. no dust generating activities) - earthworks activiites occuring southeast of Quarry.
4/14/2020	5/14/2020	Apr-20	13.35	ID	0.64	ID	0.86	ID	4	DG1 - Insects, seeds, two frogs (deceased & semi mature). DG2 - Bird droppings, insects, seeds. DG3 - Insects.
5/14/2020	6/12/2020	May-20	0.85	ID	1.00	ID	0.35	ID	4	DG1 - Grass & seeds, live tree frog removed. DG2 - Ants, seeds, relatively clear. DG3 - Grass & seeds, ants, relatively clear.
6/12/2020	7/13/2020	Jun-20	0.21	ID	0.10	ID	0.13	ID	4	DG1 - Bee, seeds, bird droppings on funnel. DG2 - Insects, seeds, feather. DG3 - Insects, seeds.
7/13/2020	8/13/2020	Jul-20	2.66	ID	2.11	ID	0.17	ID	4	DG1 - Film on surface, ants, seeds. DG2 - Film on surface, ants, seeds. DG3 - Clear, few seeds, few insects.
8/13/2020	9/11/2020	Aug-20	2.6	ID	2.70	ID	0.40	ID	4	DG1 - Bird poo, algae, milky, seeds. DG2 - Seeds, milky. DG3 - Clear, algae, fly.
9/11/2020	10/13/2020	Sep-20	10	ID	2.10	ID	0.20	ID	4	DG1 - Dark grey/black colour, dead frog, bugs, beetles, flies, grass seeds. DG2 - Bird poo, spider, grass seeds, milky colour. DG3 - Clear, spider.
10/13/2020	11/10/2020	Oct-20	3.34	ID	1.66	ID	0.34	ID	4	DG1 - Insects, grass seeds, algae?, water is brown. DG2 - 20 beetles, bird poos, insects, grass seed, water is clear. DG3 - Bettle, insects, grass seeds, algae, water is clear.
11/10/2020	12/10/2020	Nov-20	0.33	ID	0.75	ID	0.37	ID	4	All sites - insects, grass seed, clear.
12/1/2020	1/11/2021	Dec-21	0.02	ID	0.04	ID	0.32	ID	4	All sites - insects, grass seeds. DG2 - Analysed sample volume (0.35L) reduced due to breakage.
1/11/2021	2/8/2021	Jan-21	0.87	ID	0.76	ID	0.00	ID	4	DG1 & DG2 - insects and grass seeds. DG3 - grass seeds.
2/8/2021	3/9/2021	Feb-21	1.44	ID	0.64	ID	2.07	ID	4	All sites - insects, grass seeds, clear.
3/9/2021	4/9/2021	Mar-21	NS	ID	0.83	1.11	0.80	0.50	4	DG2 & DG3 - insects, grass seeds, clear. DG1 sample broken during collection.
4/9/2021	5/10/2021	Apr-21	0.74	2.10	0.07	1.06	0.69	0.49	4	DG1 - grass seeds, insects, bird poo, cloudy. DG2 - grass seeds, ants. DG3 - Bird poo, grass seeds, slightly cloudy.
5/10/2021	6/7/2021	May-21	3.08	2.30	0.12	0.99	0.08	0.46	4	DG1 - insects, grass seeds, algae, cloudy. DG2 - grass seeds, insects, clear. DG3 -
6/7/2021	7/7/2021	Jun-21	2.62	2.52	0.75	1.04	NS	0.49	4	DG1 - grass seeds, insects, clear. DG2 - grass seeds, insects, clear. DG3 - grass seeds, bird poo, insects, algae, clear.
7/7/2021	8/6/2021	Jul-21	0.28	2.30	0.29	0.89	0.58	0.53	4	DG1 - grass, insects, clear. DG2 - grass, insects, clear. DG3 - grass, insects, bird droppings.
8/6/2021	9/6/2021	Aug-21	0.60	2.12	0.59	0.72	0.76	0.56	4	DG1 - grass seeds, insects, clear. DG2 - grass seeds, clear. DG3 - grass seeds, insects, clear.
9/6/2021	10/8/2021	Sep-21	0.06	1.22	0.55	0.59	0.45	0.59	4	All- ants
10/8/2021	11/9/2021	Oct-21	0.90	0.99	11.41	1.40	NS	0.61	4	DG1-bugs, fine org. matter, DG2- dirt, large org. matter
11/9/2021	12/8/2021	Nov-21	2.44	1.19	1.98	1.50	NS	0.64	4	DG2-bugs
12/8/2021	1/7/2022	Dec-21	0.45	1.23	1.06	1.59	1.62	0.78	4	All- fine org. matter
1/7/2022	2/9/2022	Jan-22	0.50	1.19	0.32	1.55	0.35	0.82	4	DG2 fine organic matter, all sites insects, grass (seeds)
2/9/2022	3/10/2022	Feb-22	0.87	1.14	17.37*	1.63	3.16	0.94	4	DG2 fine organic matter, cloudy
3/10/2022	4/27/2022	Mar-22	NS	1.14	NS	1.71	NS	0.96	4	No samples due to flooding
4/27/2022	4/27/2022	Apr-22	NS	1.18	NS	1.90	NS	1.00	4	No samples due to flooding
4/27/2022	5/23/2022	May-22	NS	0.97	NS	2.12	NS	1.15	4	No samples due to flooding
5/23/2022	6/29/2022	Jun-22	NS	0.76	NS	2.31	NS	1.15	4	Bottles reset
6/30/2022	7/26/2022	Jul-22	NS	0.83	NS	2.65	NS	1.27	4	
7/27/2022	8/25/2022	Aug-22	2.97	1.17	3.05	3.06	0.22	1.16	4	fine org. matter, cloudy, yellow
8/26/2022	9/28/2022	Sep-22	3.41	1.65	5.65	3.91	0.06	1.08	4	
9/28/2022	10/26/2022	Oct-22	1.75	1.77	2.91	2.50	1.56	1.16	4	fine org. matter
10/26/2022	11/24/2022	Nov-22	1.57	1.65	2.65	2.61	0.48	1.06	4	dead bugs, yellow, yellow, cloudy, dead bugs
11/24/2022	12/21/2022	Dec-22	0.39	1.64	1.08	2.61	0.00	0.83	4	beetles/ants, large org. matter , fine org. matter



12/21/2022	1/22/2023	Jan-23	0.12	1.58	1.01	2.73	0.26	0.82	4	
1/22/2023	2/23/2023	Feb-23	0.57	1.54	0.43	2.40	0.04	0.37	4	seeds and ants
2/23/2023	3/27/2023	Mar-23	NS	1.54	NS	2.40	NS	0.37	4	Samples not analysed, bottles broken during transit
3/27/2023	4/24/2023	Apr-23	1.17	1.49	0.77	2.19	0.28	0.36	4	seeds and bugs
4/24/2023	5/24/2023	May-23	0.55	1.39	2.88	2.27	3.02	0.66	4	small bugs/bugs, sticks, algae, fine org. matter, Green
5/24/2023	6/23/2023	Jun-23	0.66	1.32	2.44	2.29	0.69	0.66	4	fine and large org. matter, cloudy
6/23/2023	7/25/2023	Jul-23	0.62	1.25	1.59	2.22	*51.08	0.66	4	grass, plant material, org. matter, cloudy, brown. DG3 sample invalid due to high proportion of organic matter.
7/25/2023	8/23/2023	Aug-23	0.34	1.01	2.32	2.16	1.26	0.77	4	DG1 - spider, cricket, fine org. matter, DG2 - fine org. matter, cloudy, DG3 - twigs, bugs, fine org. matter
8/23/2023	9/19/2023	Sep-23	0.22	0.72	6.29	2.22	1.04	0.86	4	DG1-bugs, fine org. matter, DG2-twig, org. matter, cloudy, yellow, DG3-seed shells, org. matter, cloudy
9/19/2023	10/25/2023	Oct-23	0.45	0.61	8.23	2.70	3.29	1.04	4	DG1-bugs, org. matter, DG2-seeds, grass, fine org. matter, cloudy, brown, DG3-algae, fine org. matter, cloudy
10/25/2023	11/22/2023	Nov-23	4.99	0.92	*23.89	2.70	*67.9	1.10	4	DG1 - algae, bugs, fine org. matter, DG2 - algae, bugs, org. matter, DG3 - algae, bugs, fine org. matter, cloudy, yellow. DG2 & DG3 samples invalid due to high proportion of organic matter.
11/22/2023	12/20/2023	Dec-23	1.23	0.99	1.94	2.79	3.09	1.44	4	DG1- bugs, algae, twigs, fine org. matter, DG2- bugs, algae, fine org. matter, DG3- fine org. matter
12/20/2023	1/19/2024	Jan-24	13.70	2.23	8.79	3.57	*65	1.59	4	DG1 - bugs, algae, twigs, fine org. matter, DG2- bugs, algae, fine org. matter, DG3 - fine org. matter. DG3 sample deemed invalid due to high proportion of organic matter
1/19/2024	2/21/2024	Feb-24	0.13	2.19	0.05	3.53	NS	1.81	4	DG1- leaves, seeds, fine org. matter, cloudy, DG2-insects, fine org. matter, cloudy, DG3- bottle broken in transit to lab
2/21/2024	3/22/2024	Mar-24	0.47	2.04	0.1	3.22	0.61	1.66	4	DG1- bug, seeds, fine org. matter, cloudy, DG2-fine org. matter, DG3-bugs, fine org. matter
3/22/2024	4/22/2024	Apr-24	2.63	2.17	0.82	3.22	2.92	1.99	4	DG1- Fine org. matter, green colour, algae, cloudy, DG2-fine org. matter, DG3-fine org. matter, yellow, cloudy, seeds, algae, insects
4/22/2024	5/31/2024	May-24	NS	2.31	NS	3.26	NS	1.84	4	
5/31/2024	6/26/2024	Jun-24	3.70	2.59	1.9	3.20	3.1	2.19	4	DG1- Insects, grass (seeds), org. matter, DG2-Insects, grass (seeds), org. matter, DG3-Insects, grass (seeds), org. matter
Monthly Minimum (g/m <sup>2</sup> )			0.12	-	0.05	-	0.00	-	-	
Monthly Maximum (g/m2)			13.70	-	8.79	-	3.29	-	-	
Average (g/m2)			1.71	-	2.71	-	1.23	-	-	

ID = Insufficient Data

NS - Not Sampled



# Appendix 4

## Surface Water Monitoring Results

(Total No. of pages including blank pages = 19)



# Cudgen Lakes Sand Quarry

## Environmental Monitoring - Surface Water

<b>Project Approval (PA):</b>	05_0103B
<b>Environmental Protection Licence (EPL):</b>	12385
<b>Licensee:</b>	Gales-Kingscliff Pty Limited
<b>Licensee Address:</b>	20 Ginahgulla Road Bellevue Hill, NSW 2023
<b>Premises:</b>	Cudgen Lakes Altona Drive Cudgen, NSW 2487
<b>Licensee Website:</b>	<a href="http://www.galeskingscliff.com.au/">http://www.galeskingscliff.com.au/</a>
<b>Licensee Website - Monitoring Results:</b>	<a href="https://www.galeskingscliff.com.au/reports">https://www.galeskingscliff.com.au/reports</a>
<b>EPA Public Register:</b>	<a href="https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers">https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers</a>
<b>Date of Publication:</b>	7/31/2024
<b>Originator:</b>	R.W. Corkery & Co. Pty Limited

# Monitoring Requirements - Surface Water

## EPL 12385 Requirements

### Monitoring Points - Water and Land

EPL Condition	EPA Identification Number	Site ID	Type of Monitoring Point	Type of Discharge Point	Location Description*
P1.2	1	EPL 1	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond South Spillway West
	2	EPL 2	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond South Spillway East
* See 'Monitoring Map' tab.					

### Limit Conditions

EPL Condition	EPA Identification Number	Site ID	Pollutant	Units of Measure	50 Percentile Concentration Limit	90 Percentile Concentration Limit	3DGM Concentration Limit	100 Percentile Concentration Limit	Monitoring Frequency	Sampling Method
L2.4	1 & 2	EPL1 & EPL2	Oil & Grease	Visible	N/A	N/A	N/A	nil	Special Frequency 1*	Visual Inspection
			pH	pH	N/A	N/A	N/A	6.5 - 8.5	Special Frequency 1*	Probe
			Total Suspended Solids (TSS)	milligrams per litre (mg/L)	N/A	N/A	N/A	50	Special Frequency 1*	Grab Sample
*Special Frequency 1: sampling once <24 hours prior to; and, sampling the discharge daily during, each discharge event arising from rainfall of less than 82.5mm falling in total over a period of up to five days duration.										

## Management Plan Requirements - Soil and Water Management Plan

Version: May 2021

Note: The Soil and Water Management Plan (SWMP) fulfils the requirement for a Surface Water Monitoring Program under Condition 21 of Schedule 3 of PA 05\_0103.

### Water Quality Objectives - Dredge Pond

Parameters	Units of Measure	Objective	Comment
pH	pH	6.5 - 9.0	Upper objective value reflects upper limit of recorded data.~
Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)	6192	Objective value reflects upper limit of recorded data.~
Dissolved Oxygen (DO)	milligrams per litre (mg/L)	>6*	Original objective value retained.**
Turbidity	NTU	<20	Original objective value retained.**
Sodium (Na)	milligrams per litre (mg/L)	813	Objective value reflects upper limit of recorded data.~
Magnesium (Mg)	milligrams per litre (mg/L)	119	Objective value reflects upper limit of recorded data.~
Potassium (K)	milligrams per litre (mg/L)	<40	Original objective value retained.**
Chloride (Cl)	milligrams per litre (mg/L)	1390	Objective value reflects upper limit of recorded data.~
Sulfate (SO4)	milligrams per litre (mg/L)	<800	Original objective value retained.**
Bicarbonate (HCO3)	milligrams per litre (mg/L)	<400	Original objective value retained.**
Aluminium (Al)	milligrams per litre (mg/L)	<0.5	Original objective value retained.**
Arsenic (As)	milligrams per litre (mg/L)	<0.42	Derived from Australian and New Zealand Guidelines for Fresh and Marine Water Quality – 90% protection for freshwater species.
Filterable Iron (Fe)	milligrams per litre (mg/L)	<20	Original objective value retained.**
Ammonia (NH3)	milligrams per litre (mg/L)	<20	Original objective value retained.**
*Applicable to surface samples only (i.e. monitoring points DP1, DP2, DP3).			
**Objective value as specified in the original conditions for PA 05_0103.			
~ Data recorded between September 2015 and April 2019.			

Monitoring Points - Parameters, Locations & Frequency

Occurrence	Frequency	Parameters	Units of Measure	Measurement Type	Sampling Method	Location ID			
Operational Periods <sup>1</sup>	Twice Daily (prior to dredging & at cessation)	Standing Surface Water Level (Dredge Pond)	m AHD	Field	Calibrated height gauge, water level sensor or calibrated water level monitor	On Dredge			
	Weekly	Temperature	degrees Celsius (°C)	Field	Probe	DP1, DP2, DP3, DP4			
		pH	pH						
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)						
		Oxygen Reduction Potential (ORP)	millivolts (mV)						
		Turbidity	NTU						
		Dissolved Oxygen (DO)	milligrams per litre (mg/L)						
		Oil and Grease	Present / Absent						
	Monthly	Total Phosphorous (P)	milligrams per litre (mg/L)	Laboratory	Grab Sample	DP1, DP2, DP3, DP4			
		Total Nitrogen (N)	milligrams per litre (mg/L)						
		Orthophosphate (Reactive Phosphorous)	milligrams per litre (mg/L)						
		Ammonia Nitrogen	milligrams per litre (mg/L)						
		NOx Nitrogen	milligrams per litre (mg/L)						
		Oil and Grease	Present / Absent	Visual Inspection	Visual				
		Weather - Cloud Cover	Sunny / Overcast						
		Weather - Rain	Raining / Dry						
		Water Colour and Appearance	Cloudy / Clear						
		Odour	Present / Absent						
		Frothing	Present / Absent						
		Floating Debris	Present / Absent						
		Nuisance Organisms (e.g. Macrophytes, Phytoplankton Scum,	Present / Absent						
		Chlorophyll a	mg/m <sup>3</sup>				Laboratory	Grab Sample (Composite)	Composite of DP1, DP2, DP3 & DP4
		Total Algal Cell Count	cells/mL						
		Total Algal Biovolume	mm <sup>3</sup> /L						
		Potentially Toxic Cyanobacteria Cell Count	cells/mL						
		Potentially Toxic Cyanobacteria Biovolume	mm <sup>3</sup> /L						
		Toxins (cytotoxic cylindrospermopsin)	micrograms per litre (µg/L)	Laboratory	Grab Sample		DP1, DP2, DP3, DP4		
		Major Cations*	milligrams per litre (mg/L)						
	Major Anions**	milligrams per litre (mg/L)							
	Filterable Iron	milligrams per litre (mg/L)							
	Aluminium	milligrams per litre (mg/L)							
	Arsenic	milligrams per litre (mg/L)	Field	Probe	DP1-1, DP1-2, etc. (at 1m depth and then every 2m depth interval to the pond base)				
	Temperature	degrees Celsius (°C)							
	pH	pH							
	Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)							
	Oxygen Reduction Potential (ORP)	millivolts (mV)							
	Turbidity	NTU							
	Dissolved Oxygen (DO)	milligrams per litre (mg/L)							
	Oil and Grease	Present / Absent				Visual Inspection	Visual		
	Major Cations*	milligrams per litre (mg/L)							
	Major Anions**	milligrams per litre (mg/L)				Laboratory	Grab Sample		
	Filterable Iron	milligrams per litre (mg/L)							
	Aluminium	milligrams per litre (mg/L)							
	Arsenic	milligrams per litre (mg/L)							
	Total Phosphorous (P)	milligrams per litre (mg/L)							
Total Nitrogen (N)	milligrams per litre (mg/L)								
Orthophosphate (Reactive Phosphorous)	milligrams per litre (mg/L)								
Ammonia Nitrogen	milligrams per litre (mg/L)								
NOx Nitrogen	milligrams per litre (mg/L)								
Chlorophyll a	mg/m <sup>3</sup>								
Total Algal Cell Count	cells/mL								
Total Algal Biovolume	mm <sup>3</sup> /L								
Potentially Toxic Cyanobacteria Cell Count	cells/mL								
Potentially Toxic Cyanobacteria Biovolume	mm <sup>3</sup> /L								
Toxins (cytotoxic cylindrospermopsin)	micrograms per litre (µg/L)								



Non-Operational Periods <sup>2</sup>	Quarterly	Temperature	degrees Celsius (°C)	Field	Probe	DP1, DP2, DP3, DP4	
		pH	pH				
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)				
		Oxygen Reduction Potential (ORP)	millivolts (mV)				
		Turbidity	NTU				
		Dissolved Oxygen (DO)	milligrams per litre (mg/L)				
		Total Phosphorous (P)	milligrams per litre (mg/L)	Laboratory	Grab Sample		
		Total Nitrogen (N)	milligrams per litre (mg/L)				
		Orthophosphate (Reactive Phosphorous)	milligrams per litre (mg/L)				
		Ammonia Nitrogen	milligrams per litre (mg/L)				
		NOx Nitrogen	milligrams per litre (mg/L)				
		Chlorophyll a	mg/m³				
		Total Algal Cell Count	cells/mL				
		Total Algal Biovolume	mm³/L				
		Potentially Toxic Cyanobacteria Cell Count	cells/mL				
		Potentially Toxic Cyanobacteria Biovolume	mm³/L				
		Toxins (cytotoxic cylindrospermopsin)	micrograms per litre (µg/L)				
		Oil and Grease	Present / Absent	Visual Inspection	Visual		
		Weather - Cloud Cover	Sunny / Overcast				
		Weather - Rain	Raining / Dry				
		Water Colour and Appearance	Cloudy / Clear				
		Odour	Present / Absent				
		Frothing	Present / Absent				
		Floating Debris	Present / Absent				
		Nuisance Organisms (e.g. Macrophytes, Phytoplankton Scum,	Present / Absent				
	6-Monthly (Summer & Winter)	Temperature	degrees Celsius (°C)	Field	Probe	DP1-1, DP1-2, etc. (at 1m depth and then every 2m depth interval to the pond base)	
		pH	pH				
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)				
		Oxygen Reduction Potential (ORP)	millivolts (mV)				
		Turbidity	NTU				
		Dissolved Oxygen (DO)	milligrams per litre (mg/L)				
		Oil and Grease	Present / Absent	Visual Inspection	Visual		
		Major Cations*	milligrams per litre (mg/L)	Laboratory	Grab Sample		
		Major Anions**	milligrams per litre (mg/L)				
		Filterable Iron	milligrams per litre (mg/L)				
		Aluminium	milligrams per litre (mg/L)				
		Arsenic	milligrams per litre (mg/L)				
		Total Phosphorous (P)	milligrams per litre (mg/L)				
		Total Nitrogen (N)	milligrams per litre (mg/L)				
		Orthophosphate (Reactive Phosphorous)	milligrams per litre (mg/L)				
		Ammonia Nitrogen	milligrams per litre (mg/L)				
		NOx Nitrogen	milligrams per litre (mg/L)				
		Chlorophyll a	mg/m³				
		Total Algal Cell Count	cells/mL				
		Total Algal Biovolume	mm³/L				
		Potentially Toxic Cyanobacteria Cell Count	cells/mL				
		Potentially Toxic Cyanobacteria Biovolume	mm³/L				
		Toxins (cytotoxic cylindrospermopsin)	micrograms per litre (µg/L)				

<sup>1</sup> Operational Periods = periods during which extraction and/or processing of material, and/or the placement of fines and/or VENM material, is occurring at the Quarry.  
<sup>2</sup> Non-Operational Periods = periods during which no extraction, processing, fines placement or VENM placement activities are occurring. Note: for surface water monitoring purposes, non-operational periods also include periods during which transportation activities alone occur.  
\*Major Cations = Sodium, Calcium, Magnesium & Potassium  
\*\*Major Anions = Chloride, Sulfate & Bicarbonate



# Monitoring Location Map - Surface Water

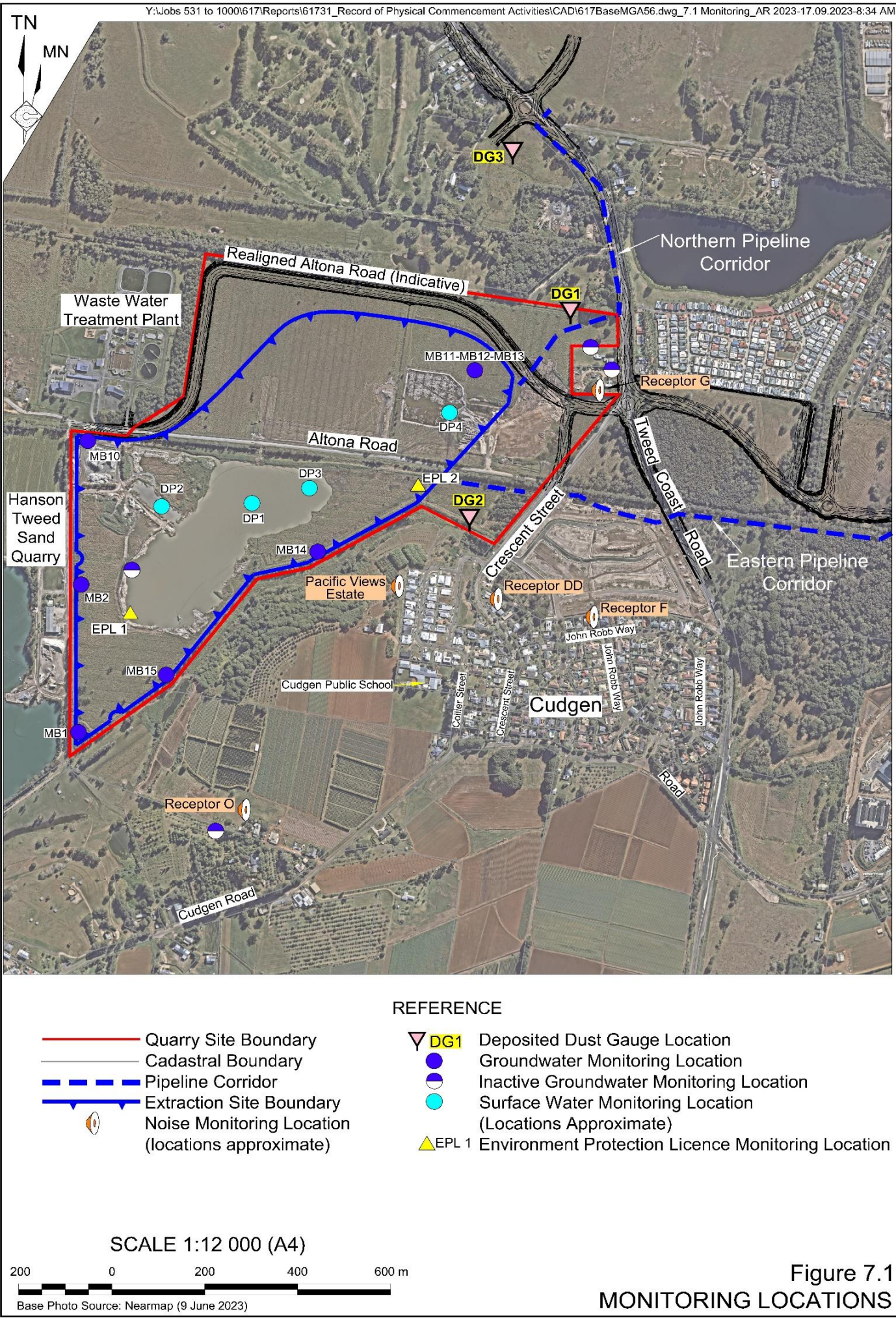


Figure 7.1  
MONITORING LOCATIONS

## Monitoring Point Location Description

The three dredge pond monitoring locations are shown indicatively in the monitoring location map. The three locations include two edge locations (DP2 and DP3) and one in the approximate middle of the southern dredge pond (DP1) and northern dredge pond (DP4). All depth measurements are to be taken at location DP1 at a depth of 1m and then at 2m intervals to the current floor of the dredge pond. Given the changing size and shape of the dredge pond the precise location of each monitoring point will vary over time and will be selected by the monitoring consultant based upon the pond condition at the time of sampling.



Site: DP1			Physical										Major Cations & Anions								Metals			Nutrients								Bacteria / Algae			
Sample Date			Comments/ Flow	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a	
			Objectives	-	-	6.5-9	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20								<20		-	-	<50000	<10
Pre-Extraction	2015-11-30	Fine Sunny Approx 30mm rain previous week (BoM - Coolangatta)		24.5	8.47	591	6.12	148	8.8	4	2		24	11	7	120	20	57	0.19	0.002	0.01	0.04	0.02	0.81			0.81	0.02	0.02	860	860				
	2016-01-26	Fine, Clear, some algae, cattle & ducks		27.3	8.61	663	5.87	192	4.3	3.8	2	64	25	12	7	120	16	76	0.08	0.001	0.01	0.03	0.02	0.84			0.84	0.02	0.02	128	174				
	2016-02-25	Algae, ducks, low turbidity		25.8	9.07	601	6.04	104	1.7	2.1	4	69	26	12	8	120	15	58	0.04		0.01	0.03	0.02	0.83			0.83	0.02	0.02	4800	360				
	2016-03-17	Sample taken in 20cm of clear water. Surface chop caused by wind. Cattle surrounding dam. Water birds. Approx 80mm rain previous week (BoM - Coolangatta).		26.8	7.82	593	5.97	70	7	5.9	4	64	26	12	8	110	14	92	0.16	0.001	0.02	0.05	0.02	0.86			0.86	0.02	0.02	270	820				
	2017-09-04			26.2	8.4	786	9.24	132	5	0.9	5	132	33	21	8	236	57	98	0.06	0.001	0.07	0.01	0.01	0.5	0.01	0.02	0.5	0.02	0.02	40	10	5	2		
	2017-10-05			28.3	7.71	901	7.36	48.7	68	138	5	95	46	17	7	182	40	130	0.03	0.001	0.05	0.09	0.01	1.1	0.01	0.03	1.1	0.01	0.03	320	1180				
	2017-10-08	Algae/chlorophyll only to lab		27.2	7.81	886	6.83	61.2		156																					5	10			
2017/2018	2017-10-30	Commencement of extraction																																	
	2017-10-30	Daily monitoring requirement for first 2 weeks of dredging.		23.4	8.0	1056	4.23	224																											
	2017-10-31	Daily monitoring requirement for first 2 weeks of dredging.		20.1	7.9	1069	4.28	210																											
	2017-11-01	Daily monitoring requirement for first 2 weeks of dredging.		22.1	7.9	1061	4.25	216																											
	2017-11-02	Daily monitoring requirement for first 2 weeks of dredging.		22.4	7.6	980	2.78	2.12																											
	2017-11-03	Daily monitoring requirement for first 2 weeks of dredging.		20.2	7.7	1142	3.26	206																											
	2017-11-06	Daily monitoring requirement for first 2 weeks of dredging.		22.4	7.6	1042	4.18	214																											
	2017-11-07	Daily monitoring requirement for first 2 weeks of dredging.		22.1	7.3	1031	3.76	210																											
	2017-11-08	Daily monitoring requirement for first 2 weeks of dredging.		21.9	8.0	1090	3.93	212																											
	2017-11-09	Daily monitoring requirement for first 2 weeks of dredging.		21.7	7.7	1052	4.05	209																											
	2017-11-10	Daily monitoring requirement for first 2 weeks of dredging.		21.5	7.9	1067	4.02	204																											
	2017-11-13	Daily monitoring requirement for first 2 weeks of dredging.		21.1	7.4	1767	4.2	132																											
	2017-11-14	Daily monitoring requirement for first 2 weeks of dredging.		21.7	8.1	1837	4	122																											
	2017-11-15	Daily monitoring requirement for first 2 weeks of dredging.		21	7.2	1795	3.9	134																											
	2017-11-21	Daily monitoring requirement for first 2 weeks of dredging.		21.5	7.4	1623	4.6	133																											
	2017-11-28			27.3	7.4	3058	3.14	50.4	55	97	5	454	110	72	19	874	197	237	0.01	0.001	0.05	0.1	0.01	1.6	0.01	0.12	1.5	0.32	0.12	110	2160	5	6		
	2017-11-30	Weekly monitoring requirement.		21.6	7.6	1455	4.8	143																											
	2017-12-06	Weekly monitoring requirement.		22	7.8	3210	6.53	206																											
	2017-12-13	Weekly monitoring requirement.		22.9	7.8	3150	3.95	147																											
	2017-12-13	Birds on Dredge pond and surrounds		27	7.36	3991	0.2	107		125.3		563	121	89	22	992	261	234	0.01	0.001	0.05	0.15	0.01	1.6	0.01	0.01	1.6	0.16	0.01			5	28		
	2017-12-20	Weekly monitoring requirement.		22.8	7.7	3550	4.15	157																											
	2018-01-11	Birds on Dredge pond and surrounds		30.9	8.07	4012	2.17	-0.7	12	20.1	5	628	136	97	24	1090	270	240	0.01	0.002	0.05	0.04	0.01	1.3	0.01	0.01	1.3	0.02	0.01	110	90	825	13		
	2018-01-12	Weekly monitoring requirement.		21.8	7.7	1610	4.16	172																											
	2018-01-17	Weekly monitoring requirement.		20.9	7.4	797	3.43	116																											
	2018-01-23	Weekly monitoring requirement.		21.8	7.7	1569	4.12	168																											
	2018-01-24	Birds on Dredge pond and surrounds		27.4	7.54	4685	3.27	36.2		55.2		606	129	96	22	1240	296	223	0.01	0.002	0.05	0.07	0.01	1.4	0.01	0.02	1.4	0.21	0.02			355	24		
	2018-01-31	Weekly monitoring requirement.		20.5	7.8	3391	5.73	161																											
	2018-02-07	Birds on Dredge pond and surrounds		26.6	7.72	4915	5.21	30.9		19.5	5	693	137	103	24	1350	315	264	0.01	0.002	0.05	0.06	0.01	1.2	0.01	0.01	1.2	0.1	0.01	20	40		22		
	2018-02-07	Weekly monitoring requirement.		19.1	7.8	4040	5.68	111																											
	2/8/2018	Last day of first extraction campaign.																																	
	2018-03-08	Water Birds on Dredge Pond, no algae visible, slight brown/green tinge to pond water, level		25	7.92	4642	5.33	63		10.1		602	126	93	22	1180	307	237	0.04	0.002	0.05	0.01	0.01	1.1	0.01	0.01	1.1	0.02	0.01			1940	51		
	2018-04-13	Birds on Dredge pond and surrounds. Algae numbers significantly reduced. Field measurements, algae counts and chlorophyll only for vertical profile samples in dredge pond.		26	8.07	4659	7.37	134		0.6		636	134	100	24	1120	263	245	0.02	0.002	0.05	0.02	0.01	0.9	0.01	0.01	0.9	0.01	0.1			6980	12		
	2018-05-31	Aquatic Birds on dredge pond																																	

2022/2023	2022-07-27	Cloudy, Turbid		15.7	7.60	416	6.12	126.0		593.0												0.30	0.004	1.5	0.01	0.33	1.2	0.01	0.33			5	5
	2022-08-31	Cloudy, Very Turbid		19.1	7.72	367	6.80	204.9		410.0		58	27	8	4	90	30	55	0.01	0.001	0.05	0.15	0.002	1.2	0.01	0.42	0.8	0.04	0.42		5	11	
	2022-09-28	Cloudy, Turbid		23.2	7.76	408	6.77	-90.7		312.0												0.14	0.002	1.6			1.2	0.01	0.38		5	5	
	2022-10-26	Cloudy, Turbid		26.4	7.56	454	5.05	106.9														0.11	0.003	1.1	0.01	0.39	0.7	0.01	0.39		5	2	
	2022-11-29	Cloudy, Turbid		23.6	7.85	497	4.21	75.2		187.0		48	37	7	4	92	40	64	0.01	0.001	0.05	0.03	0.004	2.1	0.01	0.46	1.6	0.08	0.46		5	22	
	2023-01-23	Cloudy, Turbid		26.9	6.61	569	8.00	164.3		76.9												0.04	0.001	0.9			0.5	0.01	0.42		5	5	
	2023-02-23	Cloudy, Turbid		27.1	6.47	573	7.42	173.1		54.0		49	43	7	4	82	42	70	0.01	0.001	0.05	0.04	0.001	1.0	0.01	0.38	0.6	0.01	0.38		5	4	
	2023-03-29	Cloudy, Turbid		26.1	8.13	541	2.87	-50.8		92.6												0.03	0.001	0.7			0.4	0.01	0.32		5	5	
	2023-04-27	Cloudy, Turbid		21.6	8.24	558	8.16	-54.2		92.8												0.05	0.002	0.9	0.02	0.32	0.6	0.05	0.34		5	2	
	2023-05-30	Cloudy, Turbid		19.3	7.68	587	5.90	-45.6		19.3												0.03	0.001	0.9	0.01	0.40	0.5	0.03	0.40		5	1	
	2023-06-28	Cloudy, Turbid		16.4	8.02	605	5.37	-61.0		91.1		56	43	10	5	100	55	90	0.01	0.001	0.05	0.06	0.003	1.0	0.01	0.38	0.6	0.04	0.38		5	2	
2023/2024	2023-07-31																														5	4	
		Cloudy, Turbid		18.5	8.11	624	5.98	-68.3		74.2												0.04	0.001	1.0	0.01	0.36	0.6	0.02	0.36				
	2023-08-23	Cloudy, Turbid		21.6	8.11	898	4.19	-77.4		27.3												0.02	0.001	0.9	0.01	0.36	0.5	0.07	0.36		5	3	
	2023-09-20	Clear		22.7	8.07	1779	9.10	-70.9		8.3												0.02	0.001	0.8	0.05	0.30	0.5	0.03	0.35		5	1	
	2023-10-25	Clear		25.2	8.22	2311	9.03	-71.5		24.3		277	103	52	13	560	245	135	0.01	0.001	0.05	0.02	0.001	1.0	0.01	0.30	0.7	0.23	0.31		5	2	
	2023-11-22	Clear		25.9	8.18	2356	9.22	-81.2		8.4												0.04	0.001	0.8			0.5	0.02	0.25		5	4	
	2023-12-19	Clear	7	29.3	8.34	3058	5.89	-90.9		7.1		423	138	72	18	763	322	165	0.01	0.001	0.05	0.01	0.003	0.5	0.01	0.01	0.5	0.10	0.01		5	10	
	2024-02-21	Clear		29.3	8.38	3515	5.69	-82.2		3.4		457	137	69	19	884	318	160	0.01	0.001	0.05	0.01	0.001	0.5	0.01	0.09	0.4	0.01	0.09		1240	2	
	2024-03-28	Clear Redox meter failed		25.4	8.26	3649	4.07		4.7													0.07	0.001	0.6	0.01	0.05	0.6	0.16	0.05		5	10	
	2024-04-22	Clear		23.8	8.37	3849	4.61	-87.1		7.9												0.01	0.018	0.6	0.01	0.01	0.6	0.09	0.01		605	10	
	2024-05-21	Clear		20.3	8.37	3102	8.18	-82.9		4.2												0.01	0.002	0.6	0.01	0.01	0.6	0.08	0.01		160	18	
2024-06-24	Clear	7.5	17.8	8.16	4884	8.11	-73.1		5.9		698	153	109	25	1280	407	188	0.01	0.001	0.05	0.06	0.007	0.6	0.01	0.01	0.6	0.08	0.60		160	11		

Reporting Period (2023/2024)	Average		24.8	8.21	2274	6.65	-77.5	NLM	19.7	NV	386	126	64	17	736	295	153	0.01	0.001	0.05	0.03	0.001	0.8	0.02	0.21	0.5	0.08	0.22	NLM	NLM	159	5
	Maximum		29.3	8.38	3649	9.22	-68.3	NLM	74.2	NV	457	138	72	19	884	322	165	0.01	0.001	0.05	0.07	0.003	1.0	0.05	0.36	0.7	0.23	0.36	NLM	NLM	1240	10
	Minimum		18.5	8.07	624	4.07	-90.9	NLM	3.4	NV	277	103	52	13	560	245	135	0.01	0.001	0.05	0.01	0.001	0.5	0.01	0.01	0.4	0.01	0.01	NLM	NLM	5	1
All Results	Average	-	23.6	7.98	2650	6.07	71.7	10	48.6	5	503	93	75	18	911	218	161	0.03	0.002	0.05	0.05	0.005	1.0	0.01	0.10	0.9	0.06	0.12	394	403	19731	9
	Maximum	-	30.9	9.07	7007	10.67	224.0	68	593.0	5	833	138	125	28	1400	364	270	0.19	0.005	0.07	0.36	0.020	2.1	0.05	0.46	1.6	0.37	0.46	4800	2160	284000	51
	80 <sup>th</sup> Percentile	-	27.1	8.46	4652	8.27	160.2	11	75.3	5	729	126	110	24	1332	316	224	0.03	0.002	0.05	0.05	0.010	1.3	0.01	0.30	1.2	0.07	0.33	444	828	21280	13
	Median (50 <sup>th</sup> Percentile)	-	23.4	8.02	2334	5.90	80.0	5	10.1	5	581	109	89	21	1075	262	168	0.02	0.002	0.05	0.03	0.002	1.0	0.01	0.02	0.9	0.03	0.02	110	120	870	8
	20 <sup>th</sup> Percentile	-	20.9	7.62	712	4.13	-43.2	5	3.9	4	117	43	16	8	170	52	97	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.6	0.01	0.01	20	18	5	2
	Minimum	-	15.7	6.40	318	0.20	-115.7	2	-9.7	2	41	14	6	3	75	14	33	0.01	0.001	0.01	0.01	0.001	0.5	0.01	0.01	0.4	0.01	0.01	10	10	5	1

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored  
NV - Not visible



Site:		DP2			Physical								Major Cations & Anions								Metals			Nutrients								Bacteria / Algae			
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a		
																																		Objectives	-
Pre-Extraction	2015-11-30	No sample collected due to equipment failure. Fine Sunny Approx 30mm rain previous week (BoM - Coolangatta).																																	
	2016-01-26	Fine, clear, some algae, ducks & ducks		27.3	8.61	663	5.87		4.3		2	64	25	12	7	120	16	94	0.07	0.001	0.07	0.05	0.020					0.94	0.02	0.02	128	174			
	2016-02-25	Fine, clear, some algae, ducks		23.7	8.26	613	3.75	124	9	5.1	4	67	27	12	8	120	15	96	0.10	0.002	0.01	0.04	0.020	0.91				0.91	0.02	0.02	140	50			
	2016-03-17	Overcast, some algae, water birds, cattle		26.6	7.79	615	3.43	82	4.3	3.5	4	65	27	12	8	110	14	94	0.05	0.002	0.01	0.04	0.020	0.82				0.82	0.02	0.02	150	340			
	2017-10-08	Algae/chlorophyll only to lab		27.5	7.8	890	6.41	58.8																									5	9	
2017/2018	2017-10-30	Commencement of extraction																																	
	2017-10-30	Daily monitoring requirement for first 2 weeks of dredging.		23.3	7.7	932	4.25	230																											
	2017-10-31	Daily monitoring requirement for first 2 weeks of dredging.		20.3	7.7	1029	4.01	175																											
	2017-11-01	Daily monitoring requirement for first 2 weeks of dredging.		21.2	7.4	997	4.11	192																											
	2017-11-02	Daily monitoring requirement for first 2 weeks of dredging.		21.8	7.7	957	2.77	209																											
	2017-11-03	Daily monitoring requirement for first 2 weeks of dredging.		20.4	7.7	1158	2.96	204																											
	2017-11-06	Daily monitoring requirement for first 2 weeks of dredging.		22.4	7.6	1118	4.1	217																											
	2017-11-07	Daily monitoring requirement for first 2 weeks of dredging.		22	7.6	1098	3.8	211																											
	2017-11-08	Daily monitoring requirement for first 2 weeks of dredging.		21.9	7.6	1125	3.9	210																											
	2017-11-09	Daily monitoring requirement for first 2 weeks of dredging.		21.4	7.7	1065	3.98	204																											
	2017-11-10	Daily monitoring requirement for first 2 weeks of dredging.		21.6	7.8	1069	3.92	208																											
	2017-11-13	Daily monitoring requirement for first 2 weeks of dredging.		21.3	7.6	1762	4.1	134																											
	2017-11-14	Daily monitoring requirement for first 2 weeks of dredging.		21.5	8.1	1806	4.3	124																											
	2017-11-15	Daily monitoring requirement for first 2 weeks of dredging.		20.5	7.1	1769	4.3	178																											
	2017-11-21	Daily monitoring requirement for first 2 weeks of dredging.		21.4	7.2	1586	4.7	143																											
	2017-11-28								38			5	453	109	71	18	882	198	239	0.01	0.001	0.05	0.09	0.010	1.4	0.01	0.02	1.4	0.13	0.02	150	1180	5	9	
	2017-11-30	Weekly monitoring requirement.		21.6	7.3	1458	5	154																											
	2017-12-06	Weekly monitoring requirement.		22	7.9	3290	6.28	199																											
	2017-12-13	Weekly monitoring requirement.		22.7	7.8	3140	3.58	144																											
	2017-12-13			27	7.42	4010	0.19	131			88.9		565	122	90	22	996	261	228	0.01	0.001	0.05	0.1	0.010	1.4	0.01	0.01	1.4	0.12	0.01			5	40	
	2017-12-20	Weekly monitoring requirement.		23.3	7.7	3450	3.88	158																											
	2018-01-11			32	8.11	3998	6.8	-0.8	18	22.1		5	624	137	95	24	1080	274	241	0.01	0.002	0.05	0.05	0.010	1.3	0.01	0.01	1.3	0.01	0.01	130	120	1250	12	
	2018-01-12	Weekly monitoring requirement.		21.7	7.6	1600	4.1	271																											
	2018-01-17	Weekly monitoring requirement.		20.9	7.4	791	3.37	153																											
	2018-01-23	Weekly monitoring requirement.		21.7	7.6	1560	4.07	265																											
	2018-01-24			29.1	7.78	4849	4.88	41.2			34.4		613	130	99	23	1250	298	220	0.01	0.002	0.05	0.08	0.010	1.4	0.01	0.05	1.4	0.21	0.05			6830	24	
	2018-01-31	Weekly monitoring requirement.		22.3	8.1	1008	5.02	1322																											
	2018-02-07			27.3	7.88	4918	5.35	32.5		23.8		5	680	135	101	24	1340	305	260	0.02	0.002	0.05	0.06	0.010	1.2	0.01	0.02	1.2	0.04	0.02				25	
	2018-02-08	Weekly monitoring requirement.		21.2	7.8	3900	5.66	206																											
	2018-02-08	Last day of first extraction campaign.																																	
	2018-03-08			25.3	7.92	4614	7.43	63			17.6		584	123	90	21	1180	292	236	0.03	0.002	0.05	0.01	0.010	1	0.01	0.04	1	0.02	0.04			4020	38	
	2018-04-13			26.2	8.4	4708	8.15	178			104																						7880	7	
2018-05-31			19.2	8.08	3929	4.98	61			7.1	5	628	127	95	22	1290	311	270	0.01	0.002	0.05	0.01	0.010	0.8	0.01	0.04	0.8	0.07	0.04	60	100	14300	8		
2018/2019	2018-10-25		25.1	8.61	4535	8.71	82	10	12	5		674	119	100	22	1210	335	190	0.05	0.005	0.05	0.04	0.010	1.1	0.01	0.01	1.1	0.03	0.01	80	110	46500	12		
	2018-12-03		27.9	8.83	5076	9.26	60.1	12	11.4			694	118	108	24	1320	303	181	0.05	0.002	0.05	0.02	0.01	1.2	0.01	0.02	1.2	0.02	0.02			264000	18		
	2018-12-17		26.3	8.71	5037	9.65	28	9	9.2			688	107	99	23	1300	294	174	0.04	0.002	0.05	0.01	0.01	1.4	0.01	0.01	1.4	0.01	0.01			409000	32		
	2019-01-15		30.5	8.53	5105	5	39.5	6	10.7	5		694	97	104	23	1310	297	139	0.03	0.002	0.05	0.02	0.01	1.2	0.01	0.01	1.2	0.05	0.01	180	460	76800	13		
	2019-02-07		29	8.46	5208	7.72	-7.8	5	4.6			772	116	119	27	1370	317	171	0.02	0.002	0.05	0.01	0.005	1.2	0.01	0.01	1.2	0.05	0.01			29500	12		
	2019-02-21		27.8	7.76	5410	7.76	41.5	5	39.3			774	109	116	26	1380	330	158	0.03	0.002	0.05	0.02	0.001	1.2	0.01	0.01	1.2	0.02	0.01			3970	6		
	2019-03-06		27	8.43	5367	8.98	11.8	5	2.1			739	112	113	25	1360	318	190	0.02	0.002	0.05	0.05	0.01	0.6	0.01	0.01	0.6	0.01	0.01			835	7		
	2019-03-21		28	8.67	5954	5.65	-109	5	3.22			731	110	110	25	1300	293	165	0.03	0.002	0.05	0.02	0.002	1	0.01	0.01	1	0.02	0.01			18100	6		
	2019-04-03		24.8	8.47	5179	5.24	107	8	7.9	5		745	125	114	24	1250	299	178	0.04	0.002	0.05	0.03	0.001	1.1	0.01	0.01	1.1	0.02	0.01	240	140	38300	12		
	2019-05-01		24	8.29	4616	8.78	51.9	5	4.7			782	126	119	26	1310	295	189	0.01	0.002	0.05	0.03	0.001	1	0.01	0.01	1	0.04	0.01			61500	9		
2019-06-05		18.4	7.8	4135	7.5	63.9	5	9.9			707	125	111	24	1280	309	224	0.01	0.002	0.05	0.02	0.002	1.3	0.02	0.05	1.2	0.36	0.07			9940	10			
2019/2020	2019-07-03		18.6	8.49	6564	6.68	85	5	3	5	728	126	112	24	1260	261	227	0.01	0.001	0.05	0.01	0.001	1.2	0.02	0.11	1.1	0.14	0.13	80	140	26000	9			
	2019-07-31		18.2	8.53	7136	6.24	117	5	7.3		719	124	109	24	1350	314	215	0.01	0.001	0.05	0.02	0.001	1.1	0.01	0.11	1	0.02	0.11			17000	8			
	2019-09-03		21.4	8.7	5497	8.2	122.3	5	6.8		741	125	113	24	1350	330	186	0.01	0.001	0.05	0.02	0.001	0.9	0.01	0.01	0.9	0.02	0.01			44600	8			
	2019-10-02		25.1																																



2022/2023	2022-07-27	Cloudy, Very Turbid		16.3	7.05	442	6.34	125.2		1000.0										0.96	0.004	4.6	0.01	0.35	4.2	0.1	0.35			5	5		
	2022-08-31	Cloudy, Very Turbid		20.6	7.22	400	7.02	209.2		615.0		54	32	7	4	89	32	58	0.01	0.001	0.05	0.24	0.002	2.0	0.01	0.46	1.5	0.1	0.46			5	10
	2022-09-28	Cloudy, Very Turbid		22.6	8.02	454	6.97	-103.4		966.0											0.46	0.005	2.4			2.1	0.1	0.33			5	5	
	2022-10-26	Cloudy, Turbid		25.1	7.53	463	5.12	111.9													0.16	0.003	1.5	0.01	0.37	1.1	0.0	0.37			5	2	
	2022-11-29	Cloudy, Turbid		23.1	7.84	500	4.25	87.9		759.0		48	37	7	4	91	41	77	0.01	0.001	0.05	0.74	0.002	5.8	0.01	0.43	5.4	0.0	0.43			5	22
	2023-01-23	Cloudy, Turbid		27.0	6.68	561	8.00	158.3		82.9											0.05	0.001	1.0			0.6	0.0	0.42			5	5	
	2023-02-23	Cloudy, Turbid		26.5	6.90	556	7.15	193.2		68.5		44	45	8	4	83	42	72	0.01	0.001	0.05	0.05	0.002	1.0	0.01	0.40	0.6	0.0	0.40			5	4
	2023-03-29	Cloudy, Turbid		26.1	8.15	548	2.82	-52.1		86.1											0.02	0.001	0.7			0.4	0.0	0.32			5	5	
	2023-04-27	Cloudy, Turbid		21.1	8.01	571	8.63	-43.1		177.1											0.08	0.002	1.2	0.01	0.29	0.9	0.1	0.29			5	2	
	2023-05-30	Cloudy, Turbid		18.9	7.69	583	7.08	-50.5		82.5											0.04	0.002	0.9	0.01	0.41	0.5	0.0	0.41			5	1	
2023-06-28	Cloudy, Turbid		16.8	7.82	603	4.99	-49.5		113.0		57	43	10	5	106	56	91	0.01	0.001	0.05	0.07	0.002	1.0	0.01	0.38	0.6	0.1	0.38			5	2	
2023/2024	2023-07-31	Cloudy, Turbid		20.0	8.42	557	5.80	-79.8		71.8											0.03	0.001	1.0	0.01	0.36	0.6	0.0	0.36			5	4	
	2023-08-23	Cloudy, Turbid		20.7	8.06	890	4.11	-74.3		33.9											0.02	0.001	0.8	0.01	0.37	0.4	0.0	0.37			5	3	
	2023-09-20	Cloudy/Turbid		22.7	8.08	1754	10.25	-70.5		23.1											0.01	0.001	1.0	0.05	0.31	0.6	0.1	0.36			5	1	
	2023-10-25	Clear		25.4	8.50	2265	10.13	-70.9		13.9		274	104	51	13	560	246	135	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.31	0.5	0.0	0.32			5	2
	2023-11-22	Clear		27.3	8.16	2319	10.06	-79.3		11.5											0.08	0.001	0.9			0.7	0.0	0.24			5	4	
	2023-12-19	Clear	7	29.5	8.34	3030	5.72	-90.6		7.7		419	138	72	18	774	326	165	0.01	0.001	0.05	0.01	0.003	0.5	0.01	0.01	0.5	0.0	0.01			5	10
	2024-02-21	Clear		29.4	8.33	3414	5.75	-79.4		5.1		467	144	69	19	803	323	161	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.0	0.01			1240	2
	2024-03-28	Clear		25.0	8.27	3666	5.61			6.2											0.27	0.001	0.7	0.01	0.01	0.7	0.0	0.01			5	10	
	2024-04-22	Clear		23.5	8.36	3838	4.44	-86.4		8.4											0.01	0.008	0.7	0.01	0.09	0.6	0.1	0.09			605	10	
	2024-05-21	Clear		20.2	8.40	3102	8.56	-85.4		5.2											0.01	0.002	0.4	0.01	0.01	0.4	0.0	0.01			160	18	
	2024-06-24	Clear	7.5	17.2	8.24	4906	8.08	-76.9		5.5		681	151	105	24	1280	406	189	0.01	0.001	0.05	0.02	0.004	0.6	0.01	0.02	0.6	0.1	0.60			160	11

Reporting Period (2023/2024)	Average	-	25.0	8.27	2236.9	7.18	-77.8	NLM	21.7	NV	386.7	128.7	64.0	16.7	712.3	298.3	153.7	0.01	0.001	0.05	0.06	0.001	0.8	0.02	0.20	0.6	0.0	0.21	NLM	NLM	159.4	4.5
	Maximum	-	29.5	8.50	3666.0	10.25	-70.5	NLM	71.8	NV	467.0	144.0	72.0	19.0	803.0	326.0	165.0	0.01	0.001	0.05	0.27	0.003	1.0	0.05	0.37	0.7	0.1	0.37	NLM	NLM	1240.0	10.0
	Minimum	-	20.0	8.06	557.0	4.11	-90.6	NLM	5.1	NV	274.0	104.0	51.0	13.0	560.0	246.0	135.0	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.0	0.01	NLM	NLM	5.0	1.0
All Results	Average	-	23.7	7.96	2686	6.22	91.5	7	84.8	5	518	97	79	19	954	229	163	0.02	0.002	0.05	0.08	0.004	1.2	0.01	0.11	1.1	0.1	0.12	160	208	24937	9
	Maximum	-	32.0	8.83	7136	10.60	1322.0	38	1000.0	5	844	144	126	28	1420	335	270	0.10	0.005	0.07	0.96	0.020	5.8	0.05	0.46	5.4	0.4	0.46	820	1180	409000	40
	80 <sup>th</sup> Percentile	-	27.1	8.45	4764	8.61	192.7	9	82.6	5	731	126	112	24	1340	317	220	0.03	0.002	0.05	0.08	0.010	1.2	0.01	0.31	1.2	0.1	0.33	180	340	24640	12
	Median (50 <sup>th</sup> Percentile)	-	23.1	8.02	2292	6.06	82.0	5	11.5	5	593	109	90	22	1080	283	167	0.01	0.002	0.05	0.02	0.002	1.0	0.01	0.02	0.9	0.0	0.02	100	120	1200	8
	20 <sup>th</sup> Percentile	-	20.8	7.60	740	4.10	-48.4	5	4.7	5	274	64	48	12	560	140	122	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.6	0.0	0.01	30	20	5	4
	Minimum	-	16.3	6.40	271	0.19	-110.3	4	2.1	2	37	14	6	2	64	14	36	0.01	0.001	0.01	0.01	0.001	0.4	0.01	0.01	0.4	0.0	0.01	10	10	5	1

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

NV - Not visible

Site: DP3			Physical										Major Cations & Anions							Metals			Nutrients										Bacteria / Algae				
Sample Date			Comments / Flow	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen mo/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a			
Objectives			-	-	6.5-9.0	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20								<20		<1000/10<230/100	<50000	<10				
Pre-Extraction	2017-10-08	Algae/chororophyll only to lab		27.3	7.87	898	7.17	63.4		139																						5					
	2017-10-30	Commencement of extraction																																			
2017/2018	2017-10-30	Daily monitoring requirement for first 2 weeks of dredging.		23.5	7.8	956	4.8	225																													
	2017-10-31	Daily monitoring requirement for first 2 weeks of dredging.		19.4	7.9	1266	4.83	184																													
	2017-11-01	Daily monitoring requirement for first 2 weeks of dredging.		20.5	7.9	1170	4.83	195																													
	2017-11-02	Daily monitoring requirement for first 2 weeks of dredging.		21.9	7.6	1119	2.17	211																													
	2017-11-03	Daily monitoring requirement for first 2 weeks of dredging.		20.7	7.7	1202	3.46	205																													
	2017-11-06	Daily monitoring requirement for first 2 weeks of dredging.		22.5	7.6	1117	4.1	219																													
	2017-11-07	Daily monitoring requirement for first 2 weeks of dredging.		22	7.6	1098	3.82	209																													
	2017-11-08	Daily monitoring requirement for first 2 weeks of dredging.		21.9	7.6	1128	3.88	212																													
	2017-11-09	Daily monitoring requirement for first 2 weeks of dredging.		21.7	7.6	1043	3.94	210																													
	2017-11-10	Daily monitoring requirement for first 2 weeks of dredging.		21.7	7.8	1073	3.97	211																													
	2017-11-13	Daily monitoring requirement for first 2 weeks of dredging.		21.1	7.6	1783	4.2	136																													
	2017-11-14	Daily monitoring requirement for first 2 weeks of dredging.		21.7	8.2	1784	4.8	120																													
	2017-11-15	Daily monitoring requirement for first 2 weeks of dredging.		21.3	7.4	1790	4.1	132																													
	2017-11-21	Daily monitoring requirement for first 2 weeks of dredging.		21.4	7.7	1752	5.3	136																													
	2017-11-28			30.5	8.02	3304	8.66	28.6	16	11.7	5	456	104	73	18	845	192	241	0.02	0.001	0.05	0.06	0.010	1.20	0.01	0.01	1.2	0.02	0.01	260	1620	5	3				
	2017-11-30	Weekly monitoring requirement.		21.7	7.4	1584	4.9	129																													
	2017-12-06	Weekly monitoring requirement.		22	7.9	3260	6.31	199																													
	2017-12-13	Weekly monitoring requirement.		22.6	7.8	3220	3.67	153																													
	2017-12-13			28.7	7.89	3977	0.19	92		31.4		562	120	89	22	994	249	225	0.01	0.001	0.05	0.12	0.010	1.50	0.01	0.01	1.5	0.21	0.01			5	25				
	2017-12-20	Weekly monitoring requirement.		23.3	7.5	3540	3.57	161																													
	2018-01-11			30.8	8.04	3935	2.14	-0.5	14	25.5	5	612	135	95	24	1090	272	240	0.01	0.002	0.05	0.04	0.010	1.20	0.01	0.01	1.2	0.01	0.01	130	260	5200	16				
	2018-01-12	Weekly monitoring requirement.		21.7	7.7	1660	4.3	180																													
	2018-01-17	Weekly monitoring requirement.		20.8	7.5	857	3.4	145																													
	2018-01-23	Weekly monitoring requirement.		21.7	7.7	1620	4.21	178																													
	2018-01-24			27.4	7.53	4665	2.75	5.3	53.7			592	127	94	22	1260	300	224	0.01	0.002	0.05	0.08	0.010	1.50	0.01	0.06	1.4	0.23	0.06			9200	13				
	2018-01-31	Weekly monitoring requirement.		23.3	8.2	1068	2.55	168																													
	2018-02-07	Depth 4.7m		26.4	7.52	4786	4.83	28		26.3	5	681	136	101	25	1350	307	266	0.01	0.002	0.05	0.08	0.010	1.30	0.01	0.01	1.3	0.14	0.01				25				
2018-02-07	Weekly monitoring requirement.		20.9	7.8	3980	5.08	201																														
2018-02-08	Last day of first extraction campaign.																																				
2018-03-08			25.1	7.91	4661	5.15	49		11.4			613	127	93	22	1190	249	241	0.03	0.002	0.05	0.01	0.010	1.20	0.01	0.06	1.1	0.01	0.06			1400	48				
2018-04-13			26.2	7.28	4564	7.17	166		0.7			609	131	97	22	1160	322	246	0.02	0.002	0.05	0.03	0.010	1.00	0.01	0.01	1	0.02	0.01			4970	10				
2018-05-31			19.6	8.09	3959	6.08	53		7.9	5	633	127	96	22	1300	311	273	0.01	0.002	0.05	0.01	0.010	0.70	0.01	0.03	0.7	0.06	0.03	50	80	20900	8					
2018/2019	2018-10-25		24.9	8.65	4541	6.87	79	10	14.8	5	690	121	101	22	1200	323	194	0.05	0.005	0.05	0.03	0.010	1.00	0.01	0.01	1	0.04	0.01	120	50	55600	13					
	2018-12-03		27.5	8.81	5042	9.25	116	14	12.4		656	110	100	22	1320	300	180	0.04	0.001	0.05	0.02	0.01	1.2	0.01	0.01	1.2	0.06	0.01			418000	18					
	2018-12-17		26.5	8.72	5054	9.71	18	6	10.8		686	107	99	23	1180	300	170	0.04	0.002	0.1	0.04	0.01	1.4	0.01	0.01	1.4	0.05	0.01			315000	32					
	2019-01-15		28.9	8.5	4938	4.94	69.5	13	7.3	5	679	96	103	23	1320	302	137	0.03	0.001	0.05	0.02	0.01	1.2	0.01	0.01	1.2	0.05	0.01	90	150	105000	16					
	2019-02-07		28.3	8.44	5156	7.62	-70.5	ND	3.1		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.005	1.2	0.01	0.02	1.2	0.05	0.02			23200	8				
	2019-02-21		28	8.36	5452	8.02	28.8	5	31.6		767	111	115	26	1390	331	154	0.03	0.002	0.05	0.01	0.001	1.1	0.01	0.01	1.1	0.01	0.01			3960	5					
	2019-03-06		26.7	8.36	5335	9.04	16.2	5	0.6		721	110	110	24	1380	320	188	0.02	0.002	0.05	0.05	0.006	0.7	0.01	0.01	0.7	0.02	0.01			1040	7					
	2019-03-21		27.7																																		

2022/2023	2022-07-27	Cloudy			16.16	7.46	415	6.02	128.6	627										0.29	0.002	1.4	0.01	0.32	1.1	0.01	0.32																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																</
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Reporting Period (2023/2024)	Average	-	24.8	8.21	2255.1	6.64	-78.2	NLM	17.3	NV	390	129	64	17	743	293	154	0.02	0.001	0.05	0.18	0.001	0.7	0.01	0.19	0.5	0.09	0.21	NLM	NLM	159	5
	Maximum	-	30.0	8.38	3656.0	9.81	-70.7	NLM	71.6	NV	470	142	72	19	906	324	166	0.03	0.001	0.05	1.29	0.004	1.0	0.04	0.36	0.6	0.55	0.36	NLM	NLM	1240	10
	Minimum	-	18.6	8.05	604.0	3.81	-90.3	NLM	4.5	NV	275	106	50	14	564	244	136	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	NLM	NLM	5	1
All Results	Average	-	23.5	7.94	2783	6.12	70.6	9	50.3	5	547	101	83	19	1007	242	169	0.02	0.002	0.05	0.07	0.004	1.0	0.01	0.11	0.9	0.06	0.12	89	182	25875	9
	Maximum	-	30.8	8.81	7215	10.50	225.0	54	627.0	5	846	142	126	28	1400	333	273	0.05	0.005	0.10	1.29	0.010	1.8	0.04	0.45	1.5	0.55	0.45	330	1620	418000	48
	80 <sup>th</sup> Percentile	-	26.8	8.38	4664	8.32	178.0	11	74.5	5	734	127	110	24	1320	314	224	0.03	0.002	0.05	0.06	0.010	1.3	0.01	0.31	1.2	0.07	0.35	126	216	27500	13
	Median (50 <sup>th</sup> Percentile)	-	23.1	7.91	2600.5	6.06	87.0	5	10.8	5	609	110	94	22	1160	293	170	0.01	0.002	0.05	0.02	0.001	1.0	0.01	0.01	0.9	0.02	0.02	65	65	1320	8
	20 <sup>th</sup> Percentile	-	20.8	7.60	910	4.10	-56.1	5	3.4	5	406	75	61	15	766	185	132	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.6	0.01	0.01	14	24	5	2
	Minimum	-	16.2	6.40	236	0.19	-180.1	5	-9.7	5	46	13	6	3	71	21	35	0.01	0.001	0.05	0.01	0.001	0.3	0.01	0.01	0.3	0.01	0.01	10	10	5	1

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

NV - Not visible

Site: DP4			Physical									Major Cations & Anions							Metals			Nutrients										Bacteria / Algae			
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen mo/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a		
Objectives			-	-	6.5-9.0	<6192	>6			<20		<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20								<20				<50000	<10	
2023/2024	2023-07-31	New northern dredge pond location Cloudy, Turbid																														5	2		
	2023-08-23	Cloudy, Turbid		20.31	7.92	686	5.25	-56.8		116		62	63	16	6	101	94	107	0.01	0.001	0.05	0.04	0.001	1.1	0.01	0.32	0.8	0.06	0.32						
	2023-09-20	Cloudy/Turbid, Frothing on bank		22.55	7.7	1218	3.99	-54.4		71.3												0.02	0.001	1	0.01	0.31	0.7	0.11	0.31			900	2		
	2023-10-25	Clear		23.65	7.82	1740	9.77	-56.9		22.9												0.02	0.001	0.8	0.05	0.23	0.5	0.09	0.28			5	1		
	2023-11-22	Cloudy, Turbid	0	26.27	7.97	2632	9.47	-68.5		20.1		296	136	58	16	604	320	180	0.01	0.001	0.05	0.02	0.001	0.9	0.03	0.26	0.6	0.07	0.29			5	4		
	2023-12-19	Cloudy, Turbid	-3.5	26.43	7.75	2347	9.52	-54.3		13.7												0.07	0.001	0.9			0.7	0.04	0.24			5	5		
	2024-02-21	Cloudy, Turbid		30.2	8.05	2574	6.78	-75.7		12.4		337	141	63	16	625	334	186	0.01	0.001	0.05	0.01	0.004	0.6	0.01	0.01	0.6	0.01	0.01			5	12		
	2024-03-28	Cloudy, Turbid		28.15	7.91	1591	6.73	-53.1		17.5		202	114	37	11	399	234	134	0.15	0.001	0.05	0.02	0.002	0.4	0.01	0.01	0.4	0.01	0.01			125	4		
	2024-04-22	Cloudy, Turbid		23.81	8.21	2578	4.55			17.6												0.06	0.001	0.8	0.01	0.01	0.8	0.01	0.01			5	8		
	2024-05-21	Cloudy, Turbid		22.51	7.8	1920	5.05	-53.8		47.5												0.04	0.004	0.7	0.01	0.01	0.7	0.06	0.01			5	7		
2024-06-24	Clear	-1	19.25	8.09	1408	8.7	-63.8		12.6												0.04	0.004	1	0.01	0.01	1	0.02	0.01			750	9			
			17.42	8.02	3428	9.57	-61.2		10.6		437	150	73	18	546	355	200	0.01	0.001	0.05	0.05	0.001	0.9	0.01	0.01	0.9	0.02	0.9			295	6			

Reporting Period (2023/2024)	Average	-	25.2	7.9	1920.8	7.0	-60.0	NLM	36.4	NV	224.3	113.5	43.5	12.3	432.3	245.5	151.8	0.0	0.0	0.1	0.0	0.0	0.8	0.0	0.2	0.6	0.1	0.2	NLM	NLM	131.9	4.8
	Maximum	-	30.2	8.2	2632.0	9.8	-53.1	NLM	116.0	NV	337.0	141.0	63.0	16.0	625.0	334.0	186.0	0.2	0.0	0.1	0.1	0.0	1.1	0.1	0.3	0.8	0.1	0.3	NLM	NLM	900.0	12.0
	Minimum	-	20.3	7.7	686.0	4.0	-75.7	NLM	12.4	NV	62.0	63.0	16.0	6.0	101.0	94.0	107.0	0.0	0.0	0.1	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	NLM	NLM	5.0	1.0
All Results	Average	-	25.2	7.9	1920.8	7.0	-60.0	NLM	36.4	NV	224.3	113.5	43.5	12.3	432.3	245.5	151.8	0.0	0.0	0.1	0.0	0.0	0.8	0.0	0.2	0.6	0.1	0.2	NLM	NLM	131.9	4.8
	Maximum	-	30.2	8.2	2632.0	9.8	-53.1	NLM	116.0	NV	337.0	141.0	63.0	16.0	625.0	334.0	186.0	0.2	0.0	0.1	0.1	0.0	1.1	0.1	0.3	0.8	0.1	0.3	NLM	NLM	900.0	12.0
	80 <sup>th</sup> Percentile	-	28.6	8.1	2588.8	9.6	-53.8	NLM	80.2	NV	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	0.1	0.0	1.0	0.0	0.3	0.8	0.1	0.3	NLM	NLM	280.0	8.8
	Median (50 <sup>th</sup> Percentile)	-	25.0	7.9	2043.5	6.8	-56.8	NLM	18.9	NV	249.0	125.0	47.5	13.5	501.5	277.0	157.0	0.0	0.0	0.1	0.0	0.0	0.9	0.0	0.2	0.7	0.1	0.3	NLM	NLM	5.0	4.0
	20 <sup>th</sup> Percentile	-	22.1	7.7	1111.6	4.4	-71.4	NLM	13.4	NV	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	NLM	NLM	5.0	1.8
	Minimum	-	20.3	7.7	686.0	4.0	-75.7	NLM	12.4	NV	62.0	63.0	16.0	6.0	101.0	94.0	107.0	0.0	0.0	0.1	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	NLM	NLM	5.0	1.0

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

NV - Not visible



Site: DP1-1			Physical										Major Cations & Anions								Metals			Nutrients									Bacteria / Algae			
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	Electrical Conductivity µS/cm	Dissolved Oxygen mg/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a			
Pre - Extraction	2017-09-04		-	-	6.5-9.0	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20							<20		<1000/100	<230/100	<50000	<10			
	2017-10-05			24	7.51	819	4.51	54.4	62	149		98	46	17	7	179	39	128	0.07	0.001	0.06	0.01	0.01	0.4	0.01	0.01	0.4	0.02	0.01	10	10	5	1			
2017/2018	2017-10-30	Commencement of extraction																																		
	2017-11-28			26.9	7.65	3066	3.11	19.4	53	85		456	110	72	18	877	281	237	0.01	0.001	0.05	0.08	0.01	1.4	0.01	0.01	1.4	0.29	0.01	180	100					
	2018-01-11			30.6	8.01	3997	2.16	-2	10	22.1	5	624	135	96	24	1100	224	239	0.01	0.002	0.05	0.05	0.01	1.2	0.01	0.01	1.2	0.02	0.01	60	120					
	2018-01-24			27.5	7.51	4693	2.88	37.3		53.6																										
	2018-05-31			19.5	8.12	3959	5.19	61		6.9	5	627	128	95	22	1280	290	274	0.01	0.002	0.05	0.02	0.01	0.7	0.01	0.03	0.7	0.06	0.03	40	80	16800	8			
	2018-02-07			26.4	7.72	4894	5.17	27.8		17.8	5	766	153	114	27	1350	308	263	0.01	0.002	0.05	0.08	0.01	1.3	0.01	0.01	1.3	0.11	0.01	90	80					
	2018-02-08	Last day of first extraction campaign.																																		
2018 / 2019	2018-10-25			24.9	8.62	4559	5.93	80	7	13.8	5	680	121	102	22	1220	334	193	0.05	0.005	0.05	0.03	0.01	1	0.01	0.01	1	0.05	0.01	90	50					
	2019-01-15			28.9	8.56	4899	4.85	13.5	5	8	5	693	98	104	24	1320	288	139	0.03	0.002	0.05	0.02	0.01	1.2	0.01	0.01	1.2	0.05	0.01	190	370					
	2019-04-03			24.6	8.44	5300	4.84	96.9	8	7.5	5	735	125	112	24	1240	298	173	0.03	0.002	0.05	0.04	0.002	1.2	0.01	0.01	1.2	0.04	0.01	340	160					
2019 / 2020	2019-07-03			18.7	8.49	6553	5.75	85	5	4.4	5	729	125	110	24	1270	248	221	0.01	0.001	0.05	0.02	0.001	1.1	0.01	0.12	1	0.13	0.13	100	140					
	2019-10-02			24.2	8.8	5286	6.5	65.9	5	7.7	5	758	131	115	25	1380	315	189	0.01	0.002	0.05	0.02	0.001	0.9	0.01	0.01	0.9	0.01	0.01	10	10					
	2020-01-15	Aquatic birds present. Cattle present. Low water level. pH meter calibration issue - spurious data		28.4	10.2*	5940	8	82.3	5	3		838	122	121	28	1410	316	164	0.01	0.001	0.05	0.02	0.002	1.1	0.01	0.01	1.1	0.03	0.01	350	270					
2020/2021	2020-07-07	Clear.		16.8	6.4	3694	9.1	121	5	2.6	5	602	87	90	20	1020	195	183	0.01	0.002	0.05	0.02	0.007	1	0.01	0.04	1	0.104	0.04	120	10					
	2020-08-12	Clear		18	8.3	3490	10.5	90	5	6.6	5	552	91	85	19	1020	185	162	0.01	0.001	0.05	0.29	0.001	1	0.01	0.04	1	0.04	0.05	20	10					
	2020-09-16			21.4	8.41	3640	10.71	94.5	6	60.1	5	565	87	83	18	1080	193	149	0.03	0.002	0.05	0.02	0.001	0.8	0.01	0.01	0.8	0.01	0.01	10	10					
	2020-10-14			24.5	8.63	3510	9.78	67.6	5	15.3	5	566	98	83	20	1040	230	139	0.03	0.002	0.05	0.02	0.001	0.8	0.01	0.01	0.8	0.02	0.01				6			
	2020-11-11			24.6	8.44	3691	9.5	77.4	5	2.4		534	86	80	18	1050	238	145	0.03	0.002	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	70	240					
	2021-02-24	Clear		26.7	8.34	3053	8.56	20.5	5	4.8		439	78	66	16	905	195	126	0.03	0.002	0.05	0.01	0.007	0.7	0.01	0.01	0.7	0.01	0.01	220	180					
	2021-06-10	Clear		17.5	8.04	2456	8.79	53.1	5	3.75		400	72	58	14	767	166	136	0.01	0.002	0.05	0.01	0.001	0.7	0.02	0.04	0.6	0.18	0.06	20	40					
2021/2022	N/A																																			
2022/2023	2022-08-31																														5	10				
		Cloudy, Very Turbid		18.59	7.64	353	6.79	212.4		428		53	24	7	3	88	30	50	0.01	0.001	0.05	0.16	0.004	1.1	0.01	0.43	0.7	0.01	0.43			5	4			
	2023-02-23			27	6.5	568	7.5	200.3		57.64		49	43	7	4	84	42	71	0.01	0.001	0.05	0.04	0.001	1	0.01	0.41	0.6	0.02	0.41							
2023/2024																																1240	2			
	2024-02-21			29.53	8.38	3499	5.49	-81.8		4.9		492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01							

Reporting Period (2023/2024)	Average	-	29.5	8.38	3499	5.49	-81.8	ND	4.9	ND	492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	ND	ND	ND	ID
	Maximum	-	29.5	8.38	3499	5.49	-81.8	ND	4.9	ND	492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	ND	ND	ND	ID
	Minimum	-	29.5	8.38	3499	5.49	-81.8	ND	4.9	ND	492	152	73	20	891	326	160	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	ND	ND	ND	ID
All Results	Average	-	23.9	8.04	3598	6.64	69.5	12	42.1	5	518	98	78	18	946	218	165	0.02	0.002	0.05	0.05	0.005	0.9	0.01	0.06	0.9	0.06	0.06	133	151	3611	5
	Maximum	-	30.6	8.80	6553	10.71	212.4	62	428.0	5	838	153	121	28	1410	334	274	0.07	0.005	0.06	0.29	0.010	1.4	0.02	0.43	1.4	0.29	0.43	480	840	16800	10
	80 <sup>th</sup> Percentile	-	27.7	8.52	4976	9.18	101.7	9	58.1	5	731	129	111	24	1296	311	227	0.03	0.002	0.05	0.08	0.010	1.2	0.01	0.04	1.2	0.12	0.05	244	246	ID	ID
	Median (50 <sup>th</sup> Percentile)	-	24.6	8.32	3691	6.50	67.6	5	7.7	5	566	98	84	20	1045	234	161	0.01	0.002	0.05	0.02	0.003	1.0	0.01	0.01	0.9	0.04	0.01	90	90	5	5
	20 <sup>th</sup> Percentile	-	18.7	7.59	2130	4.77	20.3	5	3.9	5	292	62	43	12	555	122	127	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	18	10	ID	ID
	Minimum	-	16.8	6.40	353	2.16	-81.8	5	2.4	5	49	24	7	3	84	30	50	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.01	0.01	10	10	5	1

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

Site: DP1-2			Physical									Major Cations & Anions							Metals			Nutrients										Bacteria / Algae																														
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen mo/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a																													
												<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20						<20		<1000/100	<230/100	<50000	<10																														
Pre-Extraction	2017-09-04			20.1	8.23	787	6.86	126	5	1.9		134	33	21	8	237	57	97	0.04	0.001	0.05	0.01	0.01	0.4	0.01	0.02	0.4	0.02	0.02	40	10	5	2																													
	2017-10-05			23	7.32	798	3.32	63.8	46	166		96	46	17	7	176	44	131	0.11	0.001	0.1	0.11	0.01	1.1	0.01	0.02	1.1	0.17	0.02	450	1010																															
2017/2018	2017-10-30	Commencement of extraction																																																												
	2017-11-28			26.8	7.53	3048	3.21	19	53	99		454	108	72	18	878	198	238	0.01	0.001	0.05	0.09	0.01	1.4	0.01	0.01	1.4	0.3	0.01	60	130																															
	2018-01-11			28.3	7.49	4114	2.17	-0.9	13	23.2	5	648	136	100	24	1130	281	242	0.01	0.002	0.05	0.05	0.01	1.4	0.01	0.01	1.4	0.31	0.01	30	50	5	8																													
	2018-01-24			27.4	7.5	4679	2.31	33		70.2		685	146	110	26	1250	301	223	0.01	0.002	0.05	0.07	0.01	1.4	0.01	0.01	1.4	0.12	0.01			12700	30																													
	2018-02-07			26.2	7.61	4903	6.96	21		23.6	5	693	138	102	25	1350	311	265	0.01	0.002	0.05	0.08	0.01	1.3	0.01	0.02	1.3	0.12	0.02	40	60																															
	2018-02-08	Last day of first extraction campaign																																																												
	2018-03-08			24.8	7.89	4658	3.29	61		14.9		600	125	92	22	1180	229	240	0.03	0.002	0.05	0.01	0.01	1	0.01	0.02	1	0.01	0.02			2360	29																													
	2018-04-13			24.9	8.11	4663	6.7	113		7.1																					5160	7																														
	2018-05-31			19.4	8.12	3944	5.95	61		7.8	5	634	128	96	22	1270	290	270	0.01	0.002	0.05	0.01	0.01	0.8	0.01	0.05	0.7	0.07	0.05	40	90	14200	8																													
2018/2019	2018-10-25			24.7	8.61	4524	6.54	79	8	15.2	5	673	119	100	22	1230	329	196	0.05	0.005	0.05	0.04	0.01	1	0.01	0.01	1	0.03	0.01	120	50	38800	13																													
	2018-12-03			27.3	8.78	5056	8.53	67.7	13	9.6		643	110	99	22	1320	306	180	0.03	0.001	0.05	0.02	0.01	1.2	0.01	0.01	1.2	0.09	0.01			299000	16																													
	2018-12-17			26.2	8.61	5022	8.78	-11	9	9.6		686	106	99	23	1170	282	175	0.04	0.002	0.05	0.01	0.01	1.3	0.01	0.01	1.3	0.12	0.01			199000	32																													
	2019-01-15			29	8.55	4913	7.26	1.8	6	9.5	5	693	97	104	23	1310	300	135	0.03	0.002	0.05	0.02	0.01	1.2	0.01	0.01	1.2	0.04	0.01	180	170	102000	16																													
	2019-02-07			28.4	8.46	5153	7.75	-77.5	9	6.1		776	117	118	27	1350	314	162	0.02	0.002	0.05	0.02	0.005	1.2	0.01	0.01	1.2	0.02	0.01			17600	12																													
	2019-02-21			23.7	8.29	5351	7.98	-4.8	5	22.5		766	110	114	26	1380	345	154	0.03	0.002	0.05	0.01	0.001	1.1	0.01	0.01	1.1	0.05	0.01			3430	6																													
	2019-03-06			26.1	8.38	5268	8.95	-7.5	5	2.4		733	113	111	25	1360	321	189	0.02	0.002	0.05	0.05	0.005	0.8	0.01	0.01	0.8	0.01	0.01			955	7																													
	2019-03-21			27.8	8.63	5968	5.77	-106	8	3.22		732	110	111	25	1290	287	161	0.03	0.002	0.05	0.01	0.001	1	0.01	0.01	1	0.01	0.01			13100	9																													
	2019-04-03			24.9	8.43	5310	4.23	92	13	6.7	5	721	124	111	24	1240	301	177	0.03	0.001	0.05	0.03	0.001	1	0.01	0.01	1	0.04	0.01	120	110	29300	11																													
	2019-05-01			23.1	8.25	4518	8.14	19.6	5	4.5		726	120	110	24	1290	286	189	0.01	0.002	0.05	0.02	0.003	1	0.01	0.01	1	0.04	0.01			31400	13																													
	2019-06-05			17.9	7.8	4096	6.8	57.7	5	-9.8		724	133	115	26	1270	302	225	0.01	0.002	0.05	0.02	0.003	1.3	0.02	0.04	1.2	0.36	0.06			13200	12																													
	2019 / 2020	2019-07-03			18.5	8.47	6558	5.65	85	5	1.6	5	706	123	106	24	1260	252	224	0.03	0.001	0.05	0.02	0.001	1.1	0.02	0.11	1	0.14	0.13	90	60	22000	11																												
2019-07-31				17.9	8.54	7123	5.65	109.2	5	5.2		733	129	113	24	1340	312	217	0.01	0.001	0.05	0.02	0.001	1.1	0.01	0.11	1	0.01	0.11			30500	8																													
2019-09-03				19.7	8.7	5468	7.3	127	5	7.3		780	127	120	25	1340	333	188	0.01	0.001	0.05	0.02	0.001	0.9	0.01	0.01	0.9	0.02	0.01			40300	8																													
2019-10-02				24	8.8	5278	6	65.5	6	7.4	5	761	131	114	25	1370	308	190	0.01	0.002	0.05	0.02	0.001	1	0.01	0.01	1	0.01	0.01	40	20	130000	10																													
2019-11-06		Aquatic birds present. Cattle present. Low water level.	22.7	8.5	4942	8.7	117.1	13	3.9			735	105	109	25	1320	319	186	0.02	0.002	0.05	0.02	0.001	1.1	0.01	0.01	1.1	0.03	0.01			111000	13																													
2020-01-15		Aquatic birds present. Cattle present. Low water level. pH meter calibration issue - spurious data		27.4	12.6*	5934	7.9	90.1	5	4.3			831	121	123	28	1410	315	162	0.01	0.002	0.05	0.01	0.002	1	0.01	0.01	1	0.03	0.01	350	460	5	8																												
2020/2021	2020-07-07	Clear.		16.8	6.4	3692	9.1	119	5	3	5	586	86	88	20	1010	217	175	0.01	0.002	0.05	0.01	0.004	1	0.01	0.04	1	0.24	0.04	80	10	7160																														
	2020-08-12	Clear		17	8.3	3494	10.4	90	5	7.6	5	544	87	82	18	1030	182	170	0.01	0.002	0.05	0.11	0.001	1.2	0.01	0.04	1.1	0.04	0.05	20	10	20600	12																													
	2020-09-16			21	8.5	3633	10.72	95.7	5	33.5	5	570	88	84	19	1080	193	149	0.01	0.001	0.05	0.02	0.001	0.8	0.01	0.01	0.8	0.02	0.01	10	10	19600	9																													
	2020-10-14			23.5	8.72	3496	9.78	68.1	5	13.5	5	578	100	85	20	1040	231	142	0.02	0.002	0.05	0.02	0.001	0.8	0.01	0.01	0.8	0.01	0.01			11600	6																													
	2020-11-11			23.7	8.45	3675	9.49	76.6	5	2.9		551	88	82	19	1060	236	144	0.03	0.002	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	40	120	1260	6																													
	2021-02-24	Clear		26.6	8.37	3084	8.92	35.2	5	4.6		441	78	66	16	910	197	126	0.03	0.002	0.05	0.01	0.001	0.6	0.01	0.01	0.																																			



Site: DP1-4			Physical									Major Cations & Anions								Metals			Nutrients										Bacteria / Algae																									
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	ElectricalConducti vity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a																									
		Objectives	-	-	6.5-9.0	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20							<20		<1000/100	<230/100	<50000	<10																									
Pre-E	2017-09-04			17.9	7.95	746	5.57	125	7	4.8		131	33	20	8	234	57	97	0.05	0.001	0.06	0.01	0.01	0.4	0.02	0.02	0.4	0.04	0.04			5	2																									
	2017-10-05			22.7	7.06	777	1.79	81.1	61	166		90	46	17	6	173	43	134	0.01	0.001	0.05	0.1	0.01	1	0.01	0.02	1	0.2	0.02	290	850																											
2017/2018	2017-10-30	Commencement of extraction																																																								
	2017-11-28			26.8	7.51	3072	2.85	17	2660	102		451	108	72	18	883	224	236	0.01	0.001	0.05	1.81	0.01	7.3	0.01	0.01	7.3	0.24	0.01	100	220																											
	2017-12-13																																																									
	2018-01-11			28.1	7.42	4052	0.68	-20	7	22	5	636	134	100	24	1130	269	240	0.01	0.002	0.05	0.04	0.01	1.3	0.01	0.01	1.3	0.33	0.01	10	10	250	6																									
	2018-01-24			27.8	7.59	4729	2.49	23		101		681	146	108	25	1250	300	222	0.01	0.002	0.05	0.1	0.01	1.6	0.01	0.03	1.6	0.24	0.03			15900	22																									
	2018-02-07			25.3	7.57	4981	4.57	24		58.7	5	710	140	106	26	1380	308	260	0.02	0.002	0.05	0.07	0.01	1.2	0.01	0.02	1.2	0.2	0.02	70	70																											
	2018-02-08	Last day of first extraction campaign																																																								
	2018-03-08			24.3	7.85	4651	3.37	53		14.2		602	127	93	22	1190	285	238	0.03	0.002	0.05	0.01	0.01	1	0.01	0.01	1	0.01	0.01			6120	30																									
	2018-04-13			24.9	8.1	4651	6.16	131		8.7																					3380	5																										
	2018-05-31			19.2	8.11	3931	5.65	60.3		7.7	5	629	129	95	22	1270	286	261	0.01	0.002	0.05	0.01	0.01	0.6	0.01	0.02	0.6	0.06	0.02	40	80	4980	8																									
2018/2019	2018-10-25			21.1	8.48	4493	5.24	88	6	11.7	5	674	121	102	22	1250	332	210	0.05	0.005	0.05	0.02	0.01	0.8	0.01	0.01	0.8	0.04	0.01	20	10	62800	14																									
	2018-12-03			25.8	8.52	5015	5.15	40.5	8	4.3		624	108	97	22	1310	305	201	0.03	0.001	0.05	0.02	0.01	1.1	0.01	0.01	1.1	0.06	0.01			115000	15																									
	2018-12-17			25.2	8.32	4925	3.15	-54	8	3.8		690	110	100	24	1180	289	176	0.03	0.002	0.05	0.01	0.01	1.2	0.01	0.01	1.2	0.05	0.01			387000	30																									
	2019-01-15			27.1	7.98	4657	0.33	-206.6	5	5.3	5	684	103	102	23	1290	301	190	0.02	0.002	0.05	0.04	0.01	1.1	0.01	0.01	1.1	0.05	0.01	10	20	9170	9																									
	2019-02-07			23.4	7.33	4450	0.78	-209.4	14	33.4		710	128	103	22	1250	286	264	0.02	0.002	0.19	0.02	0.005	1.1	0.01	0.01	1.1	0.05	0.01			225	89																									
	2019-02-21			24.8	7.63	5070	0.91	-219.7	5	39.5		765	111	114	25	1360	333	187	0.02	0.002	0.05	0.03	0.004	1.2	0.01	0.01	1.2	0.05	0.01			155	18																									
	2019-03-06			24.6	8.16	5090	6.35	-103	5	3.1		731	112	110	24	1350	306	206	0.02	0.002	0.05	0.05	0.005	0.6	0.01	0.01	0.6	0.01	0.01			760	12																									
	2019-03-21			26.8	8.42	5956	4.18	-34	5	3.22		752	111	113	26	1290	288	178	0.03	0.002	0.05	0.01	0.002	0.8	0.01	0.01	0.8	0.02	0.01			19500	6																									
	2019-04-03			24.5	8.41	5301	4.46	74.4	5	7.5	5	748	128	114	24	1230	292	181	0.02	0.002	0.05	0.02	0.003	1	0.01	0.01	1	0.06	0.01	110	120	24200	10																									
	2019-05-01			22.8	8.2	4491	7.64	7.9	5	4.6		783	131	121	26	1300	286	188	0.01	0.002	0.05	0.02	0.001	0.9	0.01	0.01	0.9	0.03	0.01			65600	11																									
	2019-06-05			17.8	7.8	4086	6.8	58.8	5	-9.8		714	128	112	25	1280	297	226	0.01	0.002	0.05	0.01	0.002	1.3	0.02	0.04	1.2	0.37	0.06			16600	10																									
	2019/2020	2019-07-03			18.2	8.25	6627	4.67	85	5	2.9	5	733	127	110	24	1280	260	229	0.01	0.001	0.05	0.01	0.001	1.1	0.02	0.12	1	0.17	0.14	100	430	29400	7																								
		2019-07-31			17.5	8.25	7103	4.89	111.9	5	7.5		704	122	107	24	1340	311	231	0.01	0.001	0.05	0.02	0.001	1	0.01	0.14	0.9	0.04	0.14			20000	8																								
		2019-09-03			18.4	8.3	5479	5.1	137.6	5	5.7		741	125	112	24	1340	328	216	0.01	0.001	0.05	0.01	0.002	0.9	0.01	0.01	0.9	0.02	0.01			18700	9																								
2019-10-02				20.5	8.2	5192	3.2	46.2	5	1.3	5	752	128	111	25	1330	296	230	0.01	0.002	0.05	0.01	0.001	0.8	0.01	0.01	0.8	0.01	0.01	10	10	6080	6																									
2019-11-06		Aquatic birds present. Cattle present. Low water level		22.5	8.5	4917	8.4	98.1	6	5.9		739	106	109	25	1310	318	190	0.02	0.002	0.05	0.02	0.001	1.1	0.01	0.01	1.1	0.01	0.01			155000	15																									
2020-01-15		pH meter calibration issue - spurious data.		26.7	10*	5738	7.7	89.2	5	4		833	123	124	28	1410	322	164	0.01	0.001	0.05	0.02	0.005	1	0.01	0.01	1	0.01	0.01	420	140	5	10																									
Reporting Period (2021/2022)		2020-07-07	Clear.		16.6	6.4	3695	9	115	5	2.8	5	605	88	91	20	1020	197	175	0.01	0.002	0.05	0.01	0.004	0.9	0.01	0.04	0.9	0.15	0.04	40	10	6860																									
	2020-08-12	Clear		16.8	8.2	3496	9.6	89	12	7.6	5	535	91	82	19	1020	182	166	0.01	0.002	0.05	0.02	0.001	1	0.01	0.04	0.9	0.06	0.05	50	10	43800	8																									
	2020-09-16			19.4	8.18	3629	8.41	108.1	5	23.42	5	575	88	85	19	1080	191	174	0.01	0.001	0.05	0.02	0.001	0.8	0.01	0.01	0.8	0.06	0.01	20	80	4170	11																									
	2020-10-14			21	8.41	3445	5.64	94.8	5	16.1	5	563	94	82	19	1030	224	171	0.01	0.002	0.05	0.02	0.001	0.7	0.01	0.01	0.7	0.01	0.01			2940	5																									
	2020-11-11			22.9	8.42	3659	8.96	75.1	5	3.1		544	87	81	19	1050	232	146	0.03	0.002	0.05	0.01	0.003	0.7	0.																																	

Site: DP1-6		Physical										Major Cations & Anions							Metals			Nutrients										Bacteria / Algae			
Sample Date		Comments / Flow	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a		
		Objectives	-	-	6.5-9.0	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20								<20		<1000/100	<230/100	<50000	<10	
2017/2018	2017-10-30	Commencement of extraction																																	
	2018-01-24			27.4	7.47	4667	2.09	34.4		95		605	131	97	23	1250	302	220	0.01	0.002	0.05	0.08	0.01		1.5	0.01	0.01	1.5	0.21	0.01			33600	21	
	2018-02-07			24.8	7.56	4858	1.11	23.1		10																									
	2018-02-08	Last day of first extraction campaign.																																	
	2018-03-08			24.3	7.85	4651	3.37	53				630	133	96	23	1230	238	252	0.02	0.002	0.05	0.01	0.01		1	0.01	0.01	1	0.01	0.01			1220	39	
2018/2019	2018-04-13			24.9	8.09	4655	6.34	138		4.3																							5030	5	
	2018-05-31			19.4	8.1	3942	5.38	59		7.1	5	630	127	95	22	1280	283	271	0.01	0.002	0.05	0.01	0.01		0.7	0.01	0.03	0.7	0.07	0.03	50	70	12900	8	
	2018-10-25			19.6	8.31	4531	3.12	82	5	3.1	5	710	124	105	23	1270	344	220	0.05	0.005	0.05	0.02	0.01		0.8	0.01	0.01	0.8	0.03	0.01	70	20	24100	8	
	2018-12-03			21.6	7.79	5041	2.31	-130	10	2.3		637	122	100	22	1310	287	275	0.02	0.002	0.18	0.02	0.01		1	0.01	0.01	1	0.11	0.01			276000	8	
	2018-12-17			23.4	7.99	4724	1.5	-130	5	2.1		654	122	95	23	1140	276	225	0.02	0.001	0.13	0.02	0.01		1	0.01	0.01	1	0.04	0.01			16900	5	
	2019-01-15			21.8	7.42	4098	0.3	-276.5	5	2.3	5	648	121	98	22	1240	278	265	0.01	0.002	0.16	0.02	0.01		0.7	0.01	0.01	0.7	0.04	0.01	30	90	5	4	
	2019-02-07			20.2	7.14	4332	0.11	-268.3	19	2.3		731	148	114	25	1270	274	302	0.01	0.002	0.05	0.01	0.005		1.4	0.01	0.01	1.4	0.56	0.01			75	2	
	2019-02-21			20.6	7.07	4545	0.45	-219.7	5	16		728	137	111	25	1310	271	304	0.01	0.002	0.08	0.01	0.001		1.6	0.01	0.01	1.6	0.83	0.01			5	5	
	2019-03-06			21.3	7.27	4701	0.64	-313	5	3.4		692	133	107	23	1320	196	342	0.01	0.002	0.05	0.05	0.005		2.6	0.01	0.01	2.6	1.43	0.01			5	4	
	2019-03-21			24.4	7.69	6192	0.56	-53	5	3.37		751	120	115	26	1340	283	239	0.02	0.002	0.1	0.04	0.002		1.2	0.01	0.01	1.2	0.14	0.01			5	14	
	2019-04-03			24	7.62	5477	0.21	-38.7	9	12.2	5	733	132	113	24	1260	311	217	0.02	0.002	0.13	0.04	0.003		1.2	0.01	0.01	1.2	0.04	0.01	60	80	2110	46	
	2019-05-01			22.8	8.17	4511	7.4	-7.4	6	5.9		786	130	118	26	1310	287	187	0.02	0.002	0.05	0.02	0.001		0.9	0.01	0.01	0.9	0.03	0.01			6590	11	
	2019-06-05			17.7	7.8	4071	6.9	63.5	5	-9.7		722	130	113	25	1280	294	218	0.01	0.002	0.05	0.01	0.003		1.4	0.02	0.04	1.3	0.38	0.06			17400	10	
2019/2020	2019-07-03			18.1	8.13	6676	2.41	86	5	1.6	5	724	125	110	24	1300	255	234	0.01	0.001	0.05	0.01	0.001		1.2	0.02	0.1	1.1	0.33	0.12	260	210	580	5	
	2019-07-31			17.5	8.18	7141	1.92	114.4	5	9.9		672	118	102	23	1320	313	232	0.01	0.001	0.05	0.02			1.1	0.01	0.12	1	0.19	0.12			1180	6	
	2019-09-03			17.8	7.9	5473	2.7	153	5	2.7		730	123	110	23	1330	316	218	0.01	0.002	0.05	0.01	0.001		0.9	0.01	0.03	0.9	0.17	0.03			590	4	
	2019-10-02			20.1	8	5207	1.46	5	5	1.3	5	736	129	112	24	1350	303	242	0.01	0.002	0.05	0.01	0.001		0.8	0.01	0.01	0.8	0.02	0.01	90	40	1180	2	
	2019-11-06			18.8	7.8	4932	1.5	-154.9	5	-3.1		702	108	104	24	1250	281	256	0.01	0.002	0.13	0.02	0.001		1.2	0.01	0.01	1.2	0.42	0.01			1320	3	
	2020-01-15	pH meter calibration issue - spurious data.		21.8	10.7*	4817	1.3	-162.4	5	12.9		791	124	119	27	1360	302	186	0.01	0.001	0.05	0.15	0.025		1.3	0.01	0.01	1.3	0.02	0.01	10	20	5	149	
2020/2021	2020-07-07	Clear.		16.7	6.4	3691	9	114	5	2.7	5	596	87	90	20	1020	194	175	0.01	0.002	0.05	0.01	0.002		0.9	0.01	0.03	0.9	0.14	0.03	50	10	6780		
	2020-08-12	Clear		17	8	3529	7.8	93	5	11.5	5	547	89	82	19	1020	188	168	0.02	0.002	0.05	0.02	0.001		1	0.03	0.02	1	0.15	0.05	10	20	27700	5	
	2020-09-16			17.5	7.54	3635	3.38	122.1	5	20.94	5	562	87	83	19	1080	192	177	0.01	0.001	0.05	0.02	0.001		0.8	0.02	0.01	0.8	0.09	0.02	10	10	3810	6	
	2020-10-14			18.3	7.68	3431	1.19	-99.8	5	16.1	5	526	90	79	18	1020	216	176	0.02	0.002	0.05	0.01	0.001		0.8	0.01	0.01	0.8	0.25	0.01			360	8	
	2020-11-11			19.3	7.73	3638	2.33	-109.5	5	5.2		541	86	82	19	1040	219	170	0.01	0.002	0.22	0.01	0.001		0.8	0.01	0.01	0.8	0.14	0.01	60	160	125	5	
	2021-02-24	Clear		25.1	7.99	3173	4.89	55.6	5	5.7		450	80	68	16	936	199	136	0.02	0.002	0.05	0.01	0.001		0.7	0.01	0.01	0.7	0.02	0.01	60	20	5380	7	
	2021-06-10	Clear		17.2	8.02	2431	8.51	63.1		3.95		403	72	58	15	774	168	134	0.01	0.001	0.05	0.01	0.001		0.8	0.02	0.04	0.7	0.2	0.06	10	60	5	1	
2021/2022	N/A																																		
2022/2023	2022-08-31	Cloudy, Very Turbid		16.68	7.4	363	6.51	205.1		394		50	24	7	3	90	31	50	0.01	0.001	0.05	0.14	0.002		1.2	0.01	0.46	0.7	0.01	0.46			5	10	
	2023-02-23	Cloudy, Turbid		25.9	7.25	548	6.93	248.4		61.67		47	43	7	4	86	42	71	0.01	0.001	0.05	0.03	0.001		1	0.01	0.4	0.6	0.01	0.4			5	3	
2023/2024	2024-02-21	Clear		27.79	8.29	3543	4.74	-76.5		8.2		460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001		0.4	0.01	0.01	0.4	0.02	0.01			1240	3	

Reporting Period (2023/2024)	Average	-	27.8	8.29	3543	4.74	-76.5	NS	8.2	NS	460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	NS	NS	1240	3
	Maximum	-	27.8	8.29	3543	4.74	-76.5	NS	8.2	NS	460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	NS	NS	1240	3
	Minimum	-	27.8	8.29	3543	4.74	-76.5	NS	8.2	NS	460	142	68	19	910	330	164	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.02	0.01	NS	NS	1240	3
All Results	Average	-	21.1	7.73	4288	3.39	-10.2	6	22.8	5	606	111	92	21	1123	249	211	0.01	0.002	0.07	0.03	0.005	1.1	0.01	0.05	1.0	0.20	0.05	59	62	14394	14
	Maximum	-	27.8	8.31	7141	9.00	248.4	19	394.0	5	791	148	119	27	1360	344	342	0.05	0.005	0.22	0.15	0.025	2.6	0.03	0.46	2.6	1.43	0.46	260	210	276000	149
	80 <sup>th</sup> Percentile	-	24.6	8.10	5107	6.67	114.2	5	14.9	5	731	132	113	25	1318	303	263	0.02	0.002	0.12	0.04	0.010	1.3	0.01	0.04	1.3	0.31	0.06	74	104	15300	11
	Median (50 <sup>th</sup> Percentile)	-	20.4	7.80	4538	2.37	28.8	5	5.5	5	651	123	99	23	1255	277	219	0.01	0.002	0.05	0.02	0.002	1.0	0.01	0.01	1.0	0.13	0.01	50	40	1220	6
	20 <sup>th</sup> Percentile	-	17.6	7.41	3537	0.92	-140.0	5	2.3	5	529	87	80	19	1020	194	168	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.7	0.02	0.01	10	18	5	3
	Minimum	-	16.7	6.40	363	0.11	-313.0	5	-9.7	5	47	24	7	3	86	31	50	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.01	0.01	10	10	5	1

Site: DP1-8			Physical									Major Cations & Anions							Metals			Nutrients										Bacteria / Algae			
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mg/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a		
			-	-	6.5-9.0	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20								<20		<1000/100	<230/100	<50000	<10	
2017/2018	2017-10-30	Commencement of extraction																																	
	2018-02-07		25.7	7.55	4994	4.64	18		153																					40	80				
	2018-03-08		24.7	7.49	4973	0.72	15.3		7.4		633	134	97	23	1240	176	262	0.04	0.002	0.12	0.01	0.01	1.2	0.01	0.01	1.2	0.04	0.01				540	26		
	2018-04-13		25	8	4656	6.03	102		6.9																							8790	6		
	2018-02-08	Last day of first extraction campaign.																																	
2018/2019	2018-05-31		19.6	8.11	3968	5.71	57		7.7	5	633	129	95	22	1270	306	271	0.01	0.002	0.05	0.01	0.01	0.7	0.01	0.03	0.7	0.06	0.03	110	170	19100	9			
	2018-10-25		26.1	8.39	4586	4.64	78	5	4.6	5	677	122	101	22	1260	333	221	0.05	0.005	0.05	0.03	0.01	0.8	0.01	0.01	0.8	0.01	0.01	10	90	26000	13			
	2018-12-03		22.8	8	5042	4.02	-111	8	5.2		633	116	99	22	1330	284	294	0.02	0.002	0.1	0.03	0.01	1.5	0.01	0.01	1.5	0.59	0.01			34800	8			
	2018-12-17		21.3	7.62	4463	0.64	-162	5	1.4		640	118	93	22	1120	264	259	0.02	0.001	0.13	0.01	0.01	0.8	0.01	0.01	0.8	0.01	0.01			405	2			
	2019-02-07																																		
2019-02-21	Hit Bottom																																		
2019/2020	2020-01-15																														5	6			
	pH meter calibration issue - spurious data.		19.6	9.9*	4577	1.1	-246.3	5	3.5		759	132	111	25	1290	229	258	0.01	0.001	0.05	0.04	0.015	2.4	0.01	0.01	2.4	1.22	0.01	60	270					
2020/2021	2020-07-07	Clear.	16.7	6.4	3692	8.8	116	5	3.2	5	608	88	91	20	1020	196	175	0.01	0.002	0.05	0.01	0.001	0.9	0.01	0.04	0.9	0.13	0.04	50	10	2680				
	2020-11-11		18	7.46	3625	1.79	-185.4	5	3.1		520	83	79	18	1060	212	207	0.01	0.002	0.11	0.01	0.002	1.4	0.01	0.01	1.4	0.17	0.01	40	190	5	2			
	2021-02-24	Clear	20.9	7.19	3632	0.9	-233.7	5	14.6		517	91	80	19	1050	178	218	0.02	0.004	0.06	0.03	0.003	2.2	0.01	0.01	2.2	1.3	0.01	120	280	390	34			
	2021-06-10	Clear	17.2	8.02	2434	8.57	62.6		3.97		402	71	58	15	774	170	139	0.01	0.002	0.05	0.01	0.001	0.7	0.02	0.04	0.6	0.2	0.06	10	20	5	1			
2021/2022	N/A																																		
2022/2023	2022-08-31	Cloudy, Very Turbid	16.7	7.22	371	6.57	205.5		443		52	26	7	4	92	31	49	0.01	0.001	0.05	0.17	0.003	1.4	0.01	0.44	1	0.01	0.44			5	10			
	2023-02-23	Cloudy, Turbid	25.2	6.62	545	5.47	207.4		106.23		42	44	7	4	87	41	73	0.01	0.001	0.05	0.04	0.002	0.9	0.01	0.44	0.5	0.01	0.44			5	2			
2023/2024	2024-02-21	Clear	27.69	8.28	3552	4.37	-76.2		6.8		466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01			1240	3			
Reporting Period (2023/2024)	Average	-	27.7	8.28	3552	4.37	-76.2	NS	6.8	NS	466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01	NS	NS	1240	3			
	Maximum	-	27.7	8.28	3552	4.37	-76.2	NS	6.8	NS	466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01	NS	NS	1240	3			
	Minimum	-	27.7	8.28	3552	4.37	-76.2	NS	6.8	NS	466	139	69	18	905	331	167	0.01	0.001	0.05	0.02	0.001	0.4	0.01	0.01	0.4	0.02	0.01	NS	NS	1240	3			
All Results	Average	-	21.8	7.54	3674	4.26	-10.2	5	51.4	5	506	99	76	18	961	212	199	0.02	0.002	0.07	0.03	0.006	1.2	0.01	0.08	1.1	0.29	0.08	55	139	6712	9			
	Maximum	-	27.7	8.39	5042	8.80	207.4	8	443.0	5	759	139	111	25	1330	333	294	0.05	0.005	0.13	0.17	0.015	2.4	0.02	0.44	2.4	1.30	0.44	120	280	34800	34			
	80 <sup>th</sup> Percentile	-	25.6	8.04	4910	6.46	113.2	6	87.9	IS	647	132	99	22	1274	311	264	0.02	0.002	0.11	0.04	0.010	1.6	0.01	0.12	1.6	0.72	0.14	112	272	19100	16			
	Median (50 <sup>th</sup> Percentile)	-	21.3	7.55	3968	4.64	18.0	5	6.8	5	608	116	91	20	1060	212	218	0.01	0.002	0.05	0.02	0.003	0.9	0.01	0.01	0.9	0.06	0.01	45	130	473	6			
	20 <sup>th</sup> Percentile	-	17.4	7.08	2658	0.94	-180.7	5	3.3	IS	332	66	48	13	638	144	126	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.6	0.01	0.01	10	18	5	2			
	Minimum	-	16.7	6.40	371	0.64	-246.3	5	1.4	5	42	26	7	4	87	31	49	0.01	0.001	0.05	0.01	0.001	0.4	0.01	0.01	0.4	0.01	0.01	10	10	5	1			

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data

Site: DP1-10		Physical										Major Cations & Anions								Metals			Nutrients										Bacteria / Algae			
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Metals			Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nutrients					Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a		
																				Arsenic mg/L	Iron (filterable) mg/L					Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L						
		Objectives	-	-	6.5-9.0	<6192	>6			<20	10	<813		<119	<40	<1390	<800	<400	<0.5	<0.42	<20								<20		<1000/100	<230/100	<50000	<10		
2022/2023	8/31/2022	Cloudy, Very Turbid		16.95	7.34	359	6.5	215.1		514		54	27	8	4	90	31	50	0.01	0.001	0.05	0.18	0.004	1.3	0.01	0.44	0.9	0.01	0.44			5	10			
	2/23/2023	Cloudy, Turbid		25.1	6.81	542	5.46	203.2			103.46	49	44	8	4	85	41	73	0.01	0.001	0.05	0.08	0.003	1	0.01	0.43	0.6	0.01	0.43			5	2			

Reporting Period (2022/2023)	Average	-	21.0	7.08	451	5.98	209.2	NS	308.7	NS	52	36	8	4	88	36	62	0.01	0.001	0.05	0.13	0.004	1.2	0.01	0.44	0.8	0.01	0.44	NS	NS	5	6
	Maximum	-	25.1	7.34	542	6.50	215.1	NS	514.0	NS	54	44	8	4	90	41	73	0.01	0.001	0.05	0.18	0.004	1.3	0.01	0.44	0.9	0.01	0.44	NS	NS	5	10
	Minimum	-	17.0	6.81	359	5.46	203.2	NS	103.5	NS	49	27	8	4	85	31	50	0.01	0.001	0.05	0.08	0.003	1.0	0.01	0.43	0.6	0.01	0.43	NS	NS	5	2
All Results	Average	-	21.0	7.08	451	5.98	209.2	NS	308.7	NS	52	36	8	4	88	36	62	0.01	0.001	0.05	0.13	0.004	1.2	0.01	0.44	0.8	0.01	0.44	NS	NS	5	6
	Maximum	-	25.1	7.34	542	6.50	215.1	NS	514.0	NS	54	44	8	4	90	41	73	0.01	0.001	0.05	0.18	0.004	1.3	0.01	0.44	0.9	0.01	0.44	NS	NS	5	10
	80 <sup>th</sup> Percentile	-	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS
	Median (50 <sup>th</sup> Percentile)	-	21.0	7.08	451	5.98	209.2	NS	308.7	NS	52	36	8	4	88	36	62	0.01	0.001	0.05	0.13	0.004	1.2	0.01	0.44	0.8	0.01	0.44	NS	NS	5	6
	20 <sup>th</sup> Percentile	-	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS
	Minimum	-	17.0	6.81	359	5.46	203.2	NS	103.5	NS	49	27	8	4	85	31	50	0.01	0.001	0.05	0.08	0.003	1.0	0.01	0.43	0.6	0.01	0.43	NS	NS	5	2

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data



# Appendix 5

## Groundwater Monitoring Results

(Total No. of pages including blank pages = 17)



# Cudgen Lakes Sand Quarry

## Environmental Monitoring - Groundwater

<b>Project Approval (PA):</b>	05_0103B
<b>Environmental Protection Licence (EPL):</b>	12385
<b>Licensee:</b>	Gales-Kingscliff Pty Limited
<b>Licensee Address:</b>	20 Ginahgulla Road Bellevue Hill, NSW 2023
<b>Premises:</b>	Cudgen Lakes Altona Drive Cudgen, NSW 2487
<b>Licensee Website:</b>	<a href="http://www.galeskingscliff.com.au/">http://www.galeskingscliff.com.au/</a>
<b>Licensee Website - Monitoring Results:</b>	<a href="https://www.galeskingscliff.com.au/reports">https://www.galeskingscliff.com.au/reports</a>
<b>EPA Public Register:</b>	<a href="https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers">https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers</a>
<b>Date of Publication:</b>	7/31/2024
<b>Originator:</b>	R.W. Corkery & Co. Pty Limited



## Monitoring Requirements - Groundwater

## EPL 12385 Requirements

### Monitoring Points - Water and Land

EPL Condition	EPA Identification Number	Site ID	Type of Monitoring Point	Location Description*
P1.2	4	MB15	Groundwater Monitoring - MB15	Groundwater monitoring bore. Defined as MB15 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, May 2017 (GKSWMP). Location described in Section 5.2.2 Figure 5.1.
	5	MB10	Groundwater Monitoring - MB10	Groundwater monitoring bore. Defined as MB10 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, May 2017 (GKSWMP). Location described in Section 5.2.2 Figure 5.1.
	6	MB11	Groundwater Monitoring - MB11	Groundwater monitoring bore. Defined as MB11 in Gales-Kingscliff Pty Ltd, Soil and Water Management Plan for the Cudgen Lakes Sand Quarry, May 2017 (GKSWMP). Location described in Section 5.2.2 Figure 5.1.

\* See 'Monitoring Map' tab.

### Monitoring Conditions

EPL Condition	EPA Identification Number	Site ID	Pollutant	Units of Measure	Monitoring Frequency	Sampling Method
M2.2	4, 5 & 6	MB 15, MB10 & MB11	Ammonia	milligrams per litre (mg/L)	Yearly	Grab Sample
			Chloride	milligrams per litre (mg/L)	Yearly	Grab Sample
			Electrical Conductivity	milligrams per litre (mg/L)	Yearly	Grab Sample
			Oil and Grease	milligrams per litre (mg/L)	Yearly	Grab Sample
			pH	pH	Yearly	Grab Sample
			Standing Water Level	metres (Australian Height Datum)	Yearly	No method specified
			Sulfate	milligrams per litre (mg/L)	Yearly	Grab Sample
			Total Suspended Solids	milligrams per litre (mg/L)	Yearly	Grab Sample

## Management Plan Requirements - Soil and Water Management Plan

**Version:** May-21

*Note: The Soil and Water Management Plan (SWMP) fulfils the requirement for a Groundwater Monitoring Program under Condition 22 of Schedule 3 of PA 05\_0103.*

## Groundwater Levels

Groundwater drawdowns are not to exceed 1.75m in any of the bores / piezometers over a 6-month (or shorter) period. Any decrease greater than 1.75 over a 6-month (or shorter) period is considered a 'significant decrease'.

### Groundwater Quality Objectives

Parameters	Units of Measure	All Bores*	MB2**	MB10**	MB13**	GW62045**	GW300856**
pH	pH	6.5 - 8.5	5.2 - 6.5	-	-	5.5 - 6.8	6.1 - 7.0
Electrical Conductivity (EC)	microSiemens per centimeter (µS/cm)	<3000	-	37344	36384	-	-
Sodium (Na)	milligrams per litre (mg/L)	<500	-	7204	6884	-	-
Magnesium (Mg)	milligrams per litre (mg/L)	<100	-	1082	1146	-	-
Potassium (K)	milligrams per litre (mg/L)	<40	-	249	215	-	-
Chloride (Cl)	milligrams per litre (mg/L)	<1000	-	12811	12600	-	-
Sulfate (SO4)	milligrams per litre (mg/L)	<800	-	1878	2276	-	-
Bicarbonate (HCO3)	milligrams per litre (mg/L)	<400	-	1130	545	-	-
Aluminium (Al)	milligrams per litre (mg/L)	<0.5	1.67	-	-	-	0.72
Filterable Iron (Fe)	milligrams per litre (mg/L)	<20	20.92	-	-	-	-
Ammonia (NH3)	milligrams per litre (mg/L)	<20	-	150	-	-	-

\*Unless value is otherwise specified in this table.

\*\*Objectives based on 80th percentile of all previous data (to July 2019) except pH which is presented as the 20th to 80th percentile range.

### Monitoring Points - Parameters, Locations & Frequency

Occurrence	Frequency	Parameters	Units of Measure	Measurement Type	Sampling Method	Location ID
Operational Periods <sup>1</sup>	Continuous	Standing Water Level	m (AHD)	Logger (Downloaded Quarterly)	Logger	MB1, MB2, MB10, MB14, CSP1, MB11, MB15
		Temperature	degrees Celsius (°C)			
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)			MB11, MB15
	Monthly	Standing Water Level	m (AHD)	Field	Probe	MB1, MB2, MB10, MB11, MB12, MB13, MB14, MB15, CSP1, CSP3, GW300856, GW062045
		Temperature	degrees Celsius (°C)			
		pH	pH			
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)			
		Oxygen Reduction Potential (ORP)	millivolts (mV)			
		Major Cations*	milligrams per litre (mg/L)	Laboratory	Grab Sample	
		Major Anions**	milligrams per litre (mg/L)			
		Filterable Iron	milligrams per litre (mg/L)			
		Aluminium	milligrams per litre (mg/L)			
	Arsenic	milligrams per litre (mg/L)				
	Quarterly	Total Phosphorous (P)	milligrams per litre (mg/L)	Laboratory	Grab Sample	MB1, MB2, MB10, MB11, MB12, MB13, MB14, MB15, CSP1, CSP3, GW300856, GW062045
		Ammonia Nitrogen	milligrams per litre (mg/L)			
NOx Nitrogen		milligrams per litre (mg/L)				
During Use of Makeup Water from Spear Point Extraction System	During Operation - Frequency Unspecified	Standing Water Level	m (AHD)	Field	Probe	At the end of each line of spear points & a spear point within 10m of each end.  At the centre of each line of spear points & a spear point within 10m either side of the centre.
		Temperature	degrees Celsius (°C)			
		pH	pH			
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)			
		Oxygen Reduction Potential (ORP)	millivolts (mV)			
Non-Operational Periods <sup>2</sup>	Continuous	Standing Water Level	m (AHD)	Logger (Downloaded Quarterly)	Logger	MB1, MB2, MB10, MB14, CSP1, MB11, MB15
		Temperature	degrees Celsius (°C)			
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)			MB11, MB15
	Quarterly	Temperature	degrees Celsius (°C)	Field	Probe	MB1, MB2, MB10, MB11, MB12, MB13, MB14, MB15, CSP1, CSP3, GW300856, GW062045
		pH	pH			
		Electrical Conductivity (EC)	micro Siemens per centimetre (µS/cm)			
		Oxygen Reduction Potential (ORP)	millivolts (mV)			
		Standing Water Level	m (AHD)			
	6-Monthly	Major Cations*	milligrams per litre (mg/L)	Laboratory	Grab Sample	MB1, MB2, MB10, MB11, MB12, MB13, MB14, MB15, CSP1, CSP3, GW300856, GW062045
		Major Anions**	milligrams per litre (mg/L)			
		Filterable Iron	milligrams per litre (mg/L)			
		Aluminium	milligrams per litre (mg/L)			
		Arsenic	milligrams per litre (mg/L)			
		Total Phosphorous (P)	milligrams per litre (mg/L)			
		Ammonia Nitrogen	milligrams per litre (mg/L)			
NOx Nitrogen	milligrams per litre (mg/L)					

<sup>1</sup> Operational Periods = periods during which extraction and/or processing of material, and/or the placement of fines and/or VENM material, is occurring at the Quarry.

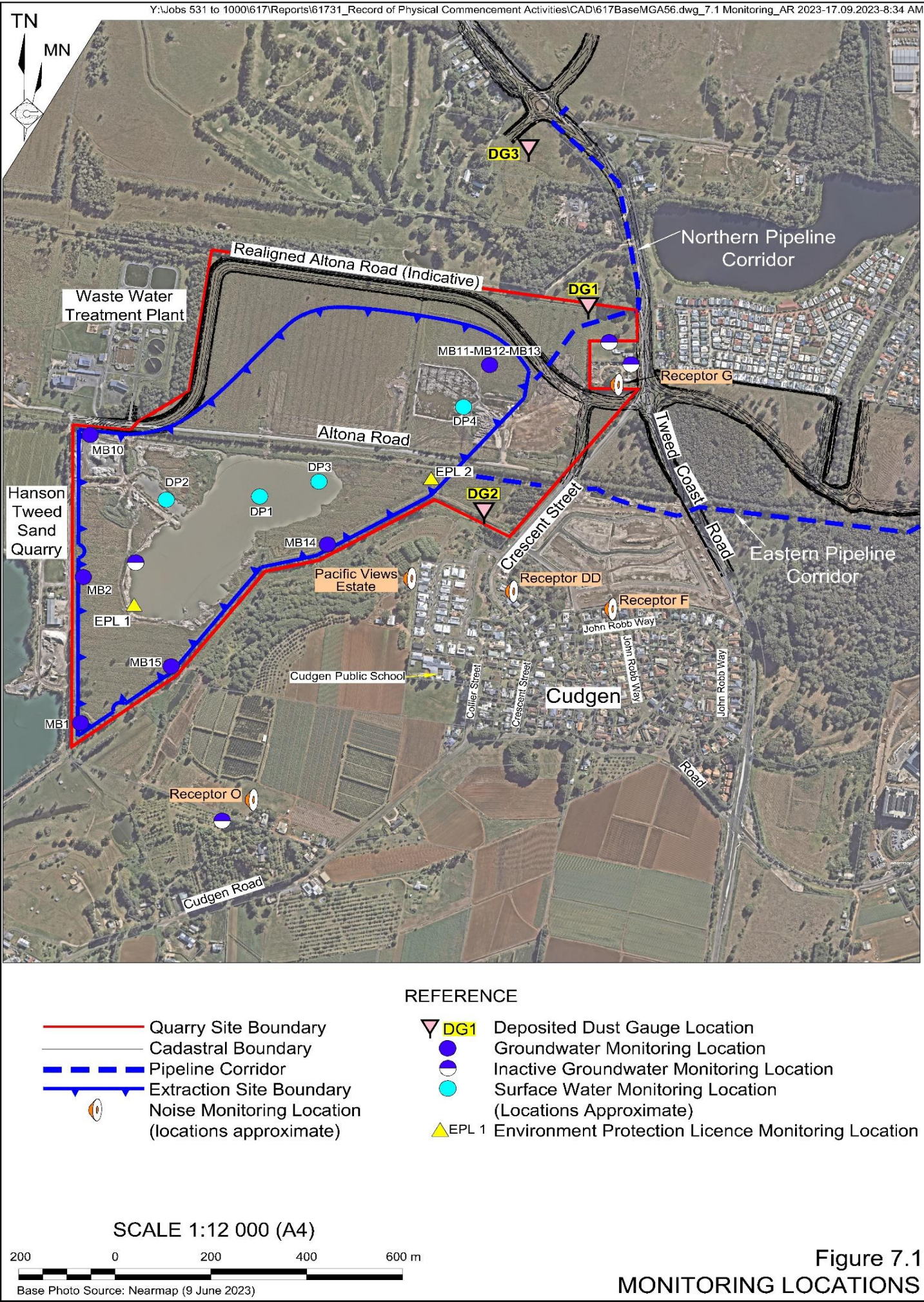
<sup>2</sup> Non-Operational Periods = periods during which no extraction, processing, fines placement or VENM placement activities are occurring. Note: for groundwater monitoring purposes, non-operational periods also include periods during which transportation activities alone occur.

\*Major Cations = Sodium, Calcium, Magnesium & Potassium

\*\*Major Anions = Chloride, Sulfate & Bicarbonate



# Monitoring Location Map - Groundwater



## Groundwater Monitoring Bore Location Descriptions

**MB1:** located at the southwestern boundary between the extraction area and the neighbouring (Hanson Tweed Sand Quarry) sand dredge pond.

**MB2:** located at the central western boundary between the extraction area and the neighbouring (Hanson Tweed Sand Quarry) sand dredge pond.

**MB10:** located at the north western boundary between the extraction area and the adjoining Waste Water Treatment Plant.

**CSP1–CSP2–CSP3:** nested monitoring bore located west of the initial dredge pond and south of the existing Altona Road. This bore has since been removed. This bore has been removed as part of the planned expansion of the dredge pond and the SWMP updated accordingly.

**MB11–MB12–MB13:** Nested monitoring location within the north-eastern part of the extraction area, north of the existing Altona Road. Noble Lake is located approximately 1km to the northeast.

**MB14 and MB15:** Replacement bores for MB8A, MB8, MB9 and MB6A, MB6, MB7 which have been damaged over time. Located on the southern boundary of the extraction area; these locations are closest to the two dams and spear points Julius West and Julius East located within the adjoining property owned by R. Julius to the southeast of the Quarry.

**GW062045 and GW300856:** Registered groundwater bores located south and east of the Quarry Site.

## Spearpoint Monitoring Location Descriptions

The additional monitoring points would be spear points located:

- at the end of each row / line of spear points and a further spear within 10 metres of each end; and
- at the centre of the row / line of spear points and a further spear on either side within 10 metres of the line.



617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB1

MB1		Physical										Major Cations & Anions							Metals			Nutrients									
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	
			Objective	-	-	6.5-8.5	<3000	-	-	-	-	<10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	
Pre-Extraction	7/2/2002				6.98	1516											108	492		0.01		1.09									
	7/18/2002				6.59	1854	0.91																								
	7/19/2002																53	437		0.01		7.15									
	8/28/2002				6.85	1364											35	425		0.01		15.7									
	10/1/2002				6.84	1272	0.64																								
	10/23/2002				6.54	1372	0.91																								
	10/24/2002																55	227		0.09		3.14									
	11/28/2002				6.66	1215	1.07																								
	12/13/2002				7.32	1463	1.28																								
	12/16/2002																59	271		0.01		0.69									
	1/20/2003				7.31	1587											58	287		0.01		3.61									
	6/24/2003				7.01		4.98	23					58	193	36		103	375	230	0.01		3.95									
	7/22/2003				7.11		7.66																								
	8/28/2003				6.79		2.03																								
	9/29/2003				6.76		0.9																								
	10/24/2003				6.96		3.53																								
	11/30/2004				7	1536																									
	12/16/2004				7.24	1087																									
	1/13/2005				7	978																									
	2/2/2005				6.9		0.14																								
	3/8/2005				6.85	872	0.05	-85						40	139	25	5	55	216	153	0.04		18								
	5/10/2005				6.85	880													143												
	7/19/2005				7.07	1109	0.54							44	178	25	5	80	246	165	0.12		19								
	8/5/2005				7.48	1066	0.68																								
	11/10/2005				7.21	985	0.27							31	121	20	5	75	173	142	0.11		13								
	1/12/2006				7.12	1214	0.29							36	136	22	5	63		170	0.11		14								
	4/7/2006				7.18	1036	0.20																								
	5/3/2006				7.12	1005	0.18												161												
	5/10/2006				7.01	1002	0.20	-155						38	135	21	5	42	186	218	0.01		5.51								
	5/19/2006				6.88	1008	0.66																								
	5/26/2006				6.43	905	0.42																								
	6/1/2006				6.92	948	0.48																								
	6/8/2006				6.84	1016	0.36																								
6/15/2006				7.08	1029	0.21							37	176	25	5	124	191	110	0.14		12									
6/23/2006				6.71	1100	0.38	-113																								
6/29/2006				6.43	1006	0.20																									
7/6/2006				7.76	935	0.21	-168																								
7/13/2006																			183												
7/14/2006				7.05	978	0.35																									
2/8/2007				6.87	979	0.32	-102						45	143	20	5	80	171		0.04		22									
3/4/2007																															
8/29/2007				7.1	1026	0.31	-1398						33	113	15	5	40	103	160	0.01		6.51									
10/26/2007				7.02	733	0.20							32	100	16	5	52	102	181	0.01		0.24									
11/14/2007				6.74	828	0.26							37	105	17	5	38	96	180	0.01		11									
9/2/2008				7.4	840																										
9/4/2017		0.86	0.34	19.8	6.96	581	0.2	-81		1.4	5	43	81	15	4	48	12	292	0.02	0.001	5.04	0.11	0.010	0.60	0.01	0.01	0.6	0.39	0.01		
10/5/2017		0.97	0.23	21.8	7.16	576	1.77	-18.1	32	35	5	36	77	13	4	50	10	275	0.12	0.001	12.8	0.46	0.010	0.70	0.01	0.01	0.7	0.28	0.01		
2017/2018	10/30/2017	Commencement of extraction																													
	11/28/2017	1.27	-0.07	23.6	7.2	526	1.2	11.5	12	4.9	5	38	77	13	4	41	7	287	0.01	0.001	0.05	0.08	0.010	0.70	0.01	0.21	0.5	0.14	0.22		
	12/13/2017	1.13	0.07	25.3	7	624	0.21	-83		4.5		31	87	10	3	32	4	268	0.01	0.001	0.05	0.16	0.010	0.60	0.01	0.01	0.6	0.43	0.01		

617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB1

2019/2020	7/4/2019		0.81	0.39	21.65	7.19	1098	0.18	-62.2	51	7.8	5	29	132	8	5	24	6	378	0.01	0.001	19.4	0.26	0.001	1.9	0.01	0.01	1.9	0.91	0.01
	7/31/2019	Ants and eggs	0.9	0.3	20.4	6.87	1327	0.33	-114.4	35	14.7		32	116	10	4	39	6	348	0.01	0.001	11.1	0.17	0.045	1.4	0.01	0.01	1.4	0.91	0.01
	9/4/2019	Logger removed on 04/09/19 and replaced on 06/09/19	0.98	0.22	22.1	6.9	918	0.7	-137	17	12.2		44	111	10	4	40	5	336	0.01	0.001	11.7	0.2	0.108	1.6	0.01	0.01	1.6	1.11	0.01
	10/2/2019		1.13	0.07	21.9	6.9	852	1.7	-93.8	26	3.2	5	42	114	10	4	48	1	313	0.01	0.001	10	0.23	0.079	2.6	0.01	0.01	2.6	1.44	0.01
	11/6/2019		1.3	-0.1	21.8	6.8	756	2.6	-72.1	86	6.1		32	105	10	4	36	2	364	0.01	0.001	10.9	0.25	0.011	1.8	0.01	0.01	1.8	0.97	0.01
	1/15/2020	data logger would not sync. pH meter calibration issue - spurious data.	1.6	-0.4	22.1	8.4*	744	0.55	-67.9	5	1.3		43	103	10	4	43	2	302				0.19	0.01	1.4	0.01	0.01	1.4	0.62	0.01
2020/2021	4/28/2020	Monitoring bore damaged (buried during drain cleaning) and requires repair. No sample could be obtained. Bore and logger recovered 10/07/20.																												
	9/16/2020		0.61	0.59	20.3	6.76	705	1.39	-113.3	47	2546.77	5	27	112	11	4	27	1	368	0.01	0.001	10.9	0.22	0.017	0.01	0.01	0.01	1.2	0.56	0.01
	10/14/2020	Overcast	0.79	0.41	21.2	6.51	670	2.09	-92.6	30	25.4	5	26	119	11	4	28	1	355	0.01	0.001	10.2	0.18	0.001	0.01	0.01	0.01	1	0.47	0.01
	11/11/2020		0.83	0.37	22	6.67	722	1.69	-94.7	29	4.9		28	117	11	4	27	5	332	0.01	0.001	13	0.18	0.044	0.04	0.01	0.04	1.2	0.62	0.04
	6/10/2021		0.47	0.73	18.9	6.88	528	2.4	7.5	20	48.38		23	93	9	3	26	4	280	0.01	0.001	0.05	0.04	0.001	0.4	0.01	0.05	0.3	0.01	0.05
	10/20/2021		0.49	0.71	22.41	7.04	642	1.15	-14.1	NLM	63	NLM	22	100	7	3	28	1	297	0.01	0.001	12.3								
2021/2022	1/25/2022		0.42	0.78	22.7	7.04	610	2.55	-34.5	NLM	63	NLM	23	107	8	9	22	1	308	0.01	0.004	6.79	1.28		6.6	0.01	0.01	6.6	4.99	0.01
	2/22/2022		0.47	0.73	23.79	7.16	527	1.42	-36.3	NLM	66	NLM	23	99	7	5	29	1	290	0.01	0.001	8.93								
	4/27/2022		0.3	0.9	21.66	6.46	74	1.22	-11.5	NLM	83	NLM	12	6	3	3	20	7	24	0.01	0.001	0.05	0.16		1.3	0.01	0.31	1	0.08	0.31
	5/23/2022	Due to major flood event, high rainfall, and poor drainage the site was deemed inaccessible to undertake sampling during May 2022.																												
2022/2023	6/22/2022	Due to previous major flood events, ongoing rain and slow drainage, the site was deemed inaccessible to undertake sampling during June 2022.																												
	7/27/2022	Within a waterlogged area	0.42	0.78	17.6	7.27	554	0.44	107		47		27	78	9	3	24	4	241	0.01	0.001	0.05								
	8/31/2022		0.54	0.66	17.9	7.26	507	1.22	194.9		10.2		26	77	8	3	31	2	235	0.01	0.001	0.05	0.06		0.7	0.01	0.34	0.4	0.03	0.34
	9/28/2022		0.46	0.74	19.9	7.25	539	1.46	-64.6		4.7		31	83	10	5	32	2	260	0.01	0.001	0.05								
	10/26/2022	Clear, waterlogged area	0.35	0.85	21.2	7.14	577	5.56	72.1				28	84	9	3	33	1	270	0.01	0.001	0.05								
	11/29/2022		0.67	0.53	19.6	6.55	587	2.91	84.5		4.5		28	90	9	4	32	1	266	0.01	0.001	0.43	0.04		0.8	0.01	0.33	0.5	0.03	0.33
	1/23/2023		0.81	0.39	22.2	6.62	585	2.24	68.9		4.3		26	82	8	3	24	1	277	0.01	0.001	4.9								
	2/23/2023		0.72	0.48	22.1	6.83	599	2.55	-82.4		5.5		28	87	9	3	26	1	267	0.01	0.001	4.78	0.14		0.8	0.01	0.02	0.8	0.4	0.02
	3/29/2023	Dead ants and slime in water	0.81	0.39	22.3	7.29	633	1.43	-128.4		41.3		30	87	10	5	30	1	255	0.01	0.001	3.87								
	4/27/2023		0.87	0.33	21.8	7.66	602	3.43	-24.2		33.5		28	91	10	4	32	1	262	0.01	0.001	0.05								
	5/30/2023		0.85	0.35	19.5	7.02	625	1.05	-13.9		74.9		33	86	11	4	39	2	285	0.01	0.001	0.05								
	6/28/2023		0.80	0.40	18.5	7.49	569	5.2	-30.7		30.4		30	75	10	4	34	2	264	0.01	0.001	0.05	0.09		0.6	0.01	0.25	0.3	0.01	0.25
	7/31/2023		0.95	0.25	18.2	7.36	464	2.51	-27.9		8.3		30	81	11	4	38	2	257	0.01	0.001	0.05								
2023/2024	8/23/2023	Laptop battery fail. Loggers returned to HMC offices to download & returned to site 24.08.2023	0.96	0.24	19.2	6.84	601	1.13	-10.1		7.7		35	84	12	4	39	3	268	0.01	0.001	0.05								
	9/20/2023		0.97	0.23	20.3	6.88	609	6.08	-6.1		1.3		34	83	12	4	38	4	276	0.01	0.001	6.24								
	10/25/2023		1.1	0.1	20.9	6.5	526	6.13	-9.4		4.2		31	84	9	4	31	2	248	0.01	0.001	6.62	0.2		0.6	0.01	0.03	0.6	0.34	0.03
	11/22/2023		0.7	0.5	21.7	6.78	563	6.26	-2.1		3.1		30	78	8	3	28	1	246	0.01	0.001	7.4								
	12/19/2023		0.87	0.33	25.5	6.55	658	3.29	1.2		24.1		31	85	10	4	31	2	278	0.01	0.001	6.31	0.21		1.4	0.01	0.05	1.4	0.43	
	2/21/2024	Lots of ants within bore	0.44	0.76	24.6	6.43	593	2.32	16.4		14.1		29	97	9	6	28	<1	284	0.01	0.001	6.18	0.51		2.1	0.01	0.01	2.1	1.2	
	3/28/2024	Ants present Redox meter failed	0.4	0.8	23.2	6.84	697	2.43			15.2		11	114	11	5	35	1	338	0.01	0.001	8.11								
	4/22/2024	Ants present	0.3	0.9	22.1	9	652	2.88	-6.9		87.1		29	105	10	5	28	1	299	0.01	0.001	0.05								
	5/21/2024	Ants nesting in the bore casing	0.34	0.86	20.5	6.8	604	2.71	-0.53		67.1		26	117	9	5	31	1	286	0.01	0.001	0.06								
	6/24/2024		0.51	0.69	18.8	6.73	702	2.87	4.3		72.9		26	114	10	4	32	2	329	0.01	0.001	0.05	0.14		0.9	0.01	0.26	0.6	0.03	0.26

Reporting Period (2023/2024)	Average	0.70	0.50	21.60	7.00	596.70	3.57	-5.05	NLM	23.22	NLM	28.60	92.80	10.10	4.40	32.70	1.89	278.00	0.01	0.00	4.11	0.31	NLM	1.37	0.01	0.03	1.37	0.66	0.03
	Maximum	1.10	0.90	25.47	9.00	697.00	6.26	16.40	NLM	87.10	NLM	35.00	117.00	12.00	6.00	39.00	4.00	338.00	0.01	0.00	8.11	0.51	NLM	2.10	0.01	0.05	2.10	1.20	0.03
	Minimum	0.30	0.10	18.17	6.43	464.00	1.13	-27.90	NLM	1.30	NLM	11.00	78.00	8.00	3.00	28.00	1.00	246.00	0.01	0.00	0.05	0.20	NLM	0.60	0.01	0.01	0.60	0.34	0.03
All Results	Average	0.88	0.32	21.90	7.01	824.54	1.48	-76.57	30.45	65.02	5.00	31.10	102.06	11.93	4.05	41.00	61.53	275.16	0.02	0.00	6.68	0.21	0.02	1.06	0.01	0.05	1.09	0.59	0.05
	Maximum	1.76	0.90	26.00	9.00	1854.00	7.66	194.90	86.00	2546.77	5.00	58.00	193.00	36.00	9.00	124.00	492.00	596.00	0.14	0.01	22.00	1.28	0.11	6.60	0.01	0.34	6.60	4.99	0.34
	80th Percentile	1.13	0.72	24.03	7.21	1028.40	2.52	-4.50	34.40	43.94	5.00	36.40	117.40	13.00	5.00	50.40	126.20	327.20	0.01	0.00	11.64	0.23	0.02	1.40	0.01	0.04	1.40	0.75	0.03
	Median (50th Percentile)	0.87	0.33	21.85	7.00	721.50	0.81	-70.55	29.00	7.50	5.00	31.00	99.00	10.00	4.00	34.00	6.00	282.00	0.01	0.00	6.71	0.17	0.01	0.75	0.01	0.01	0.80	0.43	0.01
	20th Percentile	0.48	0.07	19.89	6.76	593.00	0.31	-123.20	21.80	1.38	5.00	26.20	83.00	9.00	3.00	27.00	1.20	232.00	0.01	0.00	0.05	0.11	0.01	0.60	0.01	0.01	0.52	0.29	0.01
	Minimum	0.30	-0.56	17.60	6.43	74.00	0.05	-1398.00	5.00	-8.60	5.00	11.00	6.00	3.00	3.00	20.00	1.00	24.00	0.01	0.00	0.05	0.04	0.00	0.01	0.01	0.01	0.09	0.01	0.01

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB2

Site: MB2		Physical										Major Cations & Anions							Metals			Nutrients									
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	
			-	-	-	5.2-6.5	<3000	-	-	-	-	-	10	<500	-	<100	<40	<1000	<800	<400	<1.67	<0.42	<20.92	-	-	-	-	-	-	<150	-
Pre-Extraction	5/22/2002																20	27		0.86		7.77									
	7/2/2002				7.42	1875											20	17		1.08		7.04									
	7/18/2002				6.88	2380	1.13																								
	7/19/2002																14	17		0.97		7.93									
	8/28/2002				5.93	160											10	18		1.45		9.5									
	10/1/2002				7.72	180	0.67																								
	10/23/2002				7.38	2394	0.86																								
	10/24/2002																														
	11/28/2002				6.67	178	0.79											22	13		1.5		8.06								
	12/13/2002				6.36	174	1.15																								
	12/16/2002																	27	19		1.32		8.28								
	1/20/2003				6.92	1909												24	16		1.92		8.84								
	6/24/2003				6.39		0.8	216					18	1	1		24	13	11	0.44		3.13									
	7/22/2003				6.53		5.09																								
	8/28/2003				6.61		3.8																								
	9/29/2003				5.96		0.6																								
	10/24/2003				6.66		3.47																								
	11/30/2004				5.65	138																									
	12/16/2004				6.43	139																									
	1/13/2005				6.67	365																									
	2/2/2005				6.22		0.37																								
	3/8/2005				6.81	115	0.28	-130					15	0.43	0.46	17	22	14	15.9	6.37		9.14									
	5/10/2005				5.56	118													24												
	7/19/2005				4.62	161	0.21						18	0.8	0.4	17	40	17	14.6	3.95		6.57									
	11/10/2005				5.87	348	0.21						15	1.42	0.4	14	45	14	17	4.81		7.38									
	1/12/2006				5.49	182	0.26						17	1.8	0.6	19	34		60	6.16		7.71									
	4/7/2006				5.88	188	0.20																								
	5/3/2006				5.6	142	0.25												23												
	5/10/2006				6.07	88	0.16	-104					12	0.2	0.2	19	14	14	14	0.73		3.12									
	5/19/2006				5.61	123	0.32																								
	5/26/2006				6.1	139	0.23																								
	6/1/2006				6.07	199	0.43																								
	6/8/2006				6.4	139	0.30																								
	6/15/2006				6.05	134	0.28						16	0.5	0.2	20	37	16	11	1.21		4.85									
	6/23/2006				4.95	131	0.23	-29																							
	6/29/2006				5.75	133	0.28																								
	7/6/2006				5.28	115	0.17	-21																							
	7/13/2006																		7.8												
	7/14/2006				5.33	132	0.27																								
	2/8/2007				5.05	150	0.33	-10					16	0.4	0.3	20	27	16		1.98		6.88									
	8/29/2007				5.69	178.4	0.24	110.9					17	0.4	0.6	15	28	16	10	2.08		5.76									
	10/26/2007				5.4	124.4	0.17						23	0.7	1	15	33	14	7	1.42		5.8									
	11/14/2007				5.76	129.3	0.22						22	0.3	2	13	38	21	7	1.5		6.78									
	9/2/2008				6.1	127.6																									
	9/4/2017	1.64	0.31	20.8	5.47	114	0.17	46				7.3	5	12	0.9	0.9	6	16	0.9	16	0.48	0.011	3.84	0.07	0.07	0.80	0.01	0.01	0.8	0.29	0.01
	10/5/2017	1.77	0.18	21.7	5.53	99.9	0.53	-32.7	9		14.4	5	13	1	0.9	4	22	2	11	0.43	0.009	3.54	0.08	0.03	0.60	0.01	0.01	0.6	0.19	0.01	
2017/2018	10/30/2017	Commencement of extraction																													
	11/28/2017	2.89	-0.94	23.5	5.64	514	2.46	7.2	5	0.3	5	70	4	2	14	125	80	12	0.04	0.004	37.4	0.03	0.01	0.60	0.01	0.01	0.6	0.39	0.01		
	12/13/2017	2.34	-0.39	25.4	5.17	470	0.65	-103		5.8		57	7	3	8	102	51	1	0.11	0.004	19.5	0.04	0.02	0.50	0.01	0.01	0.5	0.23	0.01		
	1/11/2018	2.69	-0.74	25.1	5.56	749	0.62	-5		6.7	5	119	11	8	26	182	159														



617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB2

2020/2021	7/7/2020	Cloudy	1.35	0.6	21.8	6.9	153	0.9	9.2	5	153	5	19	2	1	4	25	10	7	0.46	0.071	5.84	0.25	0.22	1.9	0.01	0.01	1.9	0.2	0.01	
	8/12/2020	Clear	1.22	0.73	21	5.2	98	0.77	-47	16	431	5	14	1	1	3	8	7	17	0.39	0.027	1.2	0.21	0.028	2	0.01	0.01	2	0.15	0.01	
	9/16/2020		1.36	0.59	20.8	5.49	118.4	2.01	26.1	14	4009.23	5	16	2	1	4	15	8	13	0.62	0.058	4.6	0.26	0.026	0.01	0.01	0.01	2	0.28	0.01	
	10/14/2020		1.57	0.38	20.2	6.09	123.3	1.74	-26.7	6	724.5	5	15	2	1	4	25	10	11	0.58	0.051	4.85	0.17	0.006	0.01	0.01	0.01	2	0.29	0.01	
	11/11/2020	Cloudy, Odour	1.61	0.34	21.3	5.72	159.7	1.86	-13.9	5	133.7		18	2	1	4	31	8	5	0.49	0.047	7.44	0.08	0.013	0.01	0.01	0.01	1.3	0.24	0.01	
	6/10/2021		1.25	0.7	20.6	5.32	121.2	1.23	80.33	10	13.5		17	2	1	4	21	8	11	0.32	0.001	0.05	0.07	0.002	1.3	0.01	0.01	1.3	0.31	0.01	
2021/2022	10/20/2021		1.2	0.75	20.9	5.18	174	0.53	92.4		10		22	2	2	5	31	8	11	0.34	0.01	6.01									
	1/25/2022		1.13	0.82	24.4	5.73	65	3.05	51.3		15		15	2	1	6	20	2	17	0.13	0.008	2.83	0.12			1.5	0.01	0.03	1.5	0.61	0.03
	2/22/2022		1.2	0.75	25.05	5.31	69	1.83	70.7		14		15	2	15	6	30	2	10	0.12	0.007	2.55									
	4/27/2022		0.98	0.97	22.73	5.59	78	1.68	38.4		45.7		18	2	1	7	32	10	12	0.1	0.007	0.2	0.07			1.1	0.01	0.28	0.8	0.09	0.28
	5/23/2022	Due to major flood event, high rainfall, and poor drainage the site was deemed inaccessible to undertake sampling during May 2022.																													
	6/22/2022	Due to previous major flood events, ongoing rain and slow drainage, the site was deemed inaccessible to undertake sampling during June 2022.																													
2022/2023	7/27/2022		1.12	0.83	18.6	5.36	131	0.41	117		53		17	2	1	15	21	11	27	0.13	0.017	0.56									
	8/31/2022		1.37	0.58	18.66	5.49	96	1.68	210.1		40.2		24	2	2	13	28	11	22	0.19	0.012	0.71	0.09			1	0.01	0.18	0.8	0.01	0.18
	9/28/2022	Groundwater level lower than surrounding bores	1.2	0.75	19.89	5.37	136	1.33	49.1		32.9		17	2	1	16	22	10	26	0.14	0.056	1.85									
	10/26/2022	Clear	1.03	0.92	20.4	5.45	189.9	2.55	86.5				17	3	2	19	28	12	19	0.12	0.051	2.6									
	11/29/2022		1.46	0.49	19.94	7.42	206	1.49	-32.1		13.1		16	4	2	21	33	14	21	0.13	0.069	2.54	0.12			1.3	0.01	0.14	1.2	0.24	0.14
	1/23/2023	Ants	1.61	0.34	22	4.7	266	2.4	37		22.5		16	3	2	23	23	13	25	0.15	0.15	2.75									
	2/23/2023		1.6	0.35	22.5	5.35	190.5	1.89	64.4		32.8		22	2	2	13	6	1	25	0.45	0.189	3.13	0.13			1.5	0.01	0.01	1.5	0.26	0.01
	3/29/2023	Ants	1.64	0.31	22.93	5.72	274	0.64	-98.1		54.3		25	2	2	10	39	3	26	0.44	0.05	3.16									
	4/27/2023		1.76	0.19	22.92	6.04	179	5.59	62.7		88.9		22	3	2	10	27	8	26	0.33	0.009	0.72									
	5/30/2023		1.56	0.39	21.29	5.07	147	0.11	86.5		116		22	3	2	11	28	10	22	0.17	0.007	0.62									
6/28/2023		1.7	0.25	19.5	5.25	153	3.91	85.7		76.5		24	2	2	10	34	11	19	0.2	0.014	1.09	0.14			1.4	0.01	0.05	1.4	0.18	0.05	
2023/2024	7/31/2023		1.75	0.2	20.27	5.36	110	0.13	74.4		64.1		35	3	2	9	36	12	40	0.26	0.009	1.08									
	8/23/2023	Laptop battery fail. Loggers returned to HMC offices to download & returned to site 24.08.2023	1.71	0.24	20.21	5.13	165	0.53	78.5		65.1		28	3	2	8	29	14	25	0.26	0.016	1.2									
	9/20/2023		1.68	0.27	20.3	5.06	127	5.66	85.5		58.8		21	2	2	9	22	16	29	0.22	0.013	0.73									
	10/25/2023		1.77	0.18	21.03	5.19	102	5.51	69.8		52.9		17	2	2	10	21	10	20	0.24	0.07	3.44	0.19			1.7	0.01	0.07	0.07	0.38	0.04
	11/22/2023		1.41	0.54	20.65	5.58	66	5.72	67.1		28.5		15	2	2	8	19	10	19	0.21	0.078	2.4									
	12/19/2023		1.5	0.45	27.06	6.45	105	5.84	43.7		40.5		13	2	1	6	18	7	18	0.49	0.077	3.57	0.13			1.6	0.01	0.02	1.6	0.18	
	2/21/2024		1.13	0.82	24.84	5.04	99	4.51	100.1		22.5		10	2	2	9	18	8	10	0.12	0.009	1.24	0.05			0.5	0.01	0.01	0.5	0.15	
	3/28/2024		1.07	0.88	23.72	5.64	117	4.59			36.6		2	2	2	10	20	8	10	0.09	0.005	0.44									
	4/22/2024	Ants present	0.92	1.03	23.08	5.97	76	2.22	58.1		20.2		11	2	2	8	21	5	8	0.09	0.007	1.13									
	5/21/2024	Ants nesting in the bore casing	1.03	0.92	27.53	5.32	463	3.12	81.9		25.1		15	3	3	7	32	5	8	0.04	0.001	0.17									
6/24/2024	Ants nesting in bore casing	1.2	0.75	20.42	5.72	137	2.14	64.1		64.1		13	2	1	6	23	3	14	0.48	0.017	2.04	0.11			1.2	0.01	0.01	1.2	0.2	0.01	

Reporting Period (2023/2024)	Average		1.42	0.53	22.56	5.45	143.91	3.79	74.48	NLM	44.62	NLM	17.36	2.27	2.00	8.55	24.55	9.64	18.73	0.20	0.03	1.50	0.13	NLM	1.30	0.01	0.04	0.89	0.22	0.05
	Maximum		1.77	1.03	27.53	6.45	463.00	5.84	100.10	NLM	76.50	NLM	35.00	3.00	3.00	10.00	36.00	16.00	40.00	0.49	0.08	3.57	0.19	NLM	1.70	0.01	0.07	1.60	0.38	0.05
	Minimum		0.92	0.18	19.50	5.04	66.00	0.13	43.70	NLM	20.20	NLM	2.00	2.00	1.00	6.00	18.00	5.00	8.00	0.04	0.00	0.17	0.05	NLM	0.50	0.01	0.01	0.07	0.15	0.04
All Results	Average		1.65	0.30	22.47	5.74	361.30	1.38	25.74	14.65	124.46	5.00	38.13	4.68	3.07	10.72	58.92	35.70	14.54	0.69	0.04	10.27	0.09	0.02	0.97	0.01	0.03	1.04	0.31	0.03
	Maximum		2.89	1.03	27.53	7.72	2394.00	5.84	216.00	62.00	4009.23	5.00	119.00	25.00	15.00	26.00	189.00	159.00	60.00	6.37	0.19	37.40	0.26	0.22	2.00	0.01	0.28	2.00	0.77	0.28
	80th Percentile		1.90	0.73	24.40	6.28	574.20	2.36	78.00	26.60	64.30	5.00	71.60	8.80	5.80	15.00	126.20	80.00	22.00	0.93	0.07	20.30	0.13	0.03	1.50	0.01	0.01	1.50	0.39	0.01
	Median (50th Percentile)		1.64	0.31	22.30	5.56	169.50	0.66	38.40	8.00	17.50	5.00	22.00	2.00	2.00	10.00	31.00	14.00	12.00	0.21	0.03	6.29	0.07	0.01	0.90	0.01	0.01	0.90	0.29	0.01
	20th Percentile		1.22	0.05	20.60	5.24	118.24	0.27	-28.54	5.00	6.60	5.00	15.00	1.84	1.00	6.00	21.00	8.00	7.00	0.13	0.01	1.48	0.05	0.01	0.60	0.01	0.01	0.68	0.19	0.01
	Minimum		0.92	-0.94	18.60	4.62	65.00	0.11	-130.00	2.00	0.00	5.00	2.00	0.20	0.20	3.00	6.00	0.90	1.00	0.04	0.00	0.05	0.02	0.00	0.01	0.01	0.01	0.07	0.01	0.01

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB11

Site: MB11			Physical										Major Cations & Anions							Metals			Nutrients									
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L		
			Objective	-	-	-	6.5-8.5	<3000	-	-	-	-	10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	
Pre-Extraction	6/16/2005				6.81	1625	0.65						220	211	72	19	300	484		3.13		11										
	7/19/2005				7.42	1553	1.00						127	289	65	11	311	456	302	0.64		3.57										
	8/5/2005				7.54	1492	1.13																									
	11/10/2005				7.37	1505	0.54						51	191	50	11	90	520	235	0.15		1.08										
	1/12/2006				7.25	1743	0.40						149	215	67	16	74		432	0.15		3.14										
	5/3/2006																	360														
	2/8/2007				7.32	1312	2.11	-144																								
	9/2/2008				7.6	1552																										
	9/4/2017	Purged for 5 mins to clear debris - sulphide (black) particles & ants removed. Strong odour	1.39	0.2	19.1	7.14	1056	0.37	-74			43.1	5	39	180	49	10	47	328	351	0.39	0.001	5.42	0.64	0.01	4.60	0.01	0.01	4.6	1.48	0.01	
10/5/2017	Few black particles (sulphides)	1.29	0.3	20.8	7.08	1174	1.99	-104	5	11.3	5	34	168	45	9	54	346	345	0.01	0.001	0.87	0.42	0.27	2.80	0.01	0.01	2.8	1.8	0.01			
2017/2018	10/30/2017	Commencement of extraction																														
	11/28/2017	1.21	0.38	24.5	7.56	1130	0.98	-36.4	5	0.1	5	37	173	48	10	48	335	352	0.01	0.001	0.09	0.24	0.16	2.20	0.33	0.39	1.5	0.54	0.72			
	12/13/2017	1.25	0.34	24.5	7.37	1365	0.18	-134		0.7	5	41	181	55	11	50	347	317	0.01	0.001	0.08	0.29	0.19	1.80	0.06	0.32	1.4	1.15	0.38			
	1/11/2018	1.48	0.11	27.1	7.34	1234	1.16	-139		9.4	5	38	192	51	11	46	324	326	0.01	0.001	0.06	0.31	0.28	2.10	0.02	0.02	2.1	1.66	0.04			
	1/24/2018	1.56	0.03	24.6	6.99	1222	0.37	-30		6.6		20	33	8	2	17	21	98	0.01	0.001	3.58	0.1	0.01	0.20	0.01	0.02	0.2	0.04	0.02			
	2/6/2018	1.37	0.22	25.5	7.29	1334	0.73	-88			3.7	5	39	172	47	10	49	334	341	0.01	0.001	0.38	0.24	0.22	1.40	0.04	0.11	1.3	0.94	0.15		
	2/8/2018	Last day of first extraction campaign.																														
	3/8/2018	0.77	0.82	23.9	6.89	1115	0.28	-42			7.8		35	170	42	10	55	338	324	0.02	0.001	0.16	0.24	0.16	1.80	0.03	0.56	1.2	0.47	0.59		
	4/13/2018	1.24	0.35	24	7.45	1531	3.1	-91			5.4		85	176	52	11	46	337	320	0.01	0.001	0.26	0.2	0.12	1.30	0.03	0.3	1	0.53	0.33		
	5/31/2018	1.13	0.46	21.6	7.32	1083	2.02	41			8.8	5	33	160	41	9	43	326	336	0.01	0.001	1.25	0.23	0.03	1.50	0.01	0.07	1.4	0.66	0.08		
2018/2019	10/24/2018	1.03	0.56	20.7	7.29	1345	0.14	-238	11	6.7	5	33	166	53	10	52	387	333	0.05	0.005	0.21	0.51	0.34	2.4	0.05	0.2	2.2	1.26	0.25			
	12/3/2018	1.48	0.11	22	7.51	1625	2.74	-285	20	9.1		39	201	45	10	83	222	466	0.02	0.001	0.45	0.9	1	6.8	0.01	0.03	6.8	5.9	0.03			
	12/17/2018	1.27	0.32	21.6	7.75	1303	0.64	-295	32	13.4		41	161	42	11	115	174	500	0.02	0.001	0.47	1.37	0.89	11.8	0.01	0.08	11.7	9.71	0.08			
	1/15/2019	1.56	0.03	24.2	7.24	1388	0.26	-334.6	6	3.7	5	38	177	45	10	81	203	460	0.01	0.001	0.08	0.75	0.63	5.2	0.01	0.01	5.2	5.22	0.01			
	2/6/2019	1.63	-0.04	24.8	7.21	1183	1.1	-309	35	2.7		36	165	42	9	54	280	364	0.01	0.001	0.72	0.3	0.261	2.6	0.01	0.01	2.6	1.15	0.01			
	2/21/2019	1.72	-0.13	23.4	7.18	1242	0.27	297.1	5	25.5		50	43	45	10	43	286	331	0.01	0.001	0.19	0.36	0.05	1.8	0.01	0.03	1.8	1.18	0.03			
	3/6/2019	1.65	-0.06	26.2	7.38	1272	7.07	-243	5	0.6		42	164	43	11	44	277	350	0.05	0.001	0.39	0.32	0.355	1.4	0.1	0.01	1.4	0.96	0.01			
	3/20/2019	0.89	0.7	25.5	7.36	1744	0.48	-34.8	8	0.88		44	180	54	12	46	303	343	0.01	0.001	0.73	0.22	0.098	1.4	0.01	0.01	1.4	0.6	0.01			
	4/4/2019	0.74	0.85	25.5	7.32	1498	0.34	-33.5	93	0.75	5	50	192	50	12	52	282	367	0.01	0.001	0.08	0.61	0.464	3.6	0.01	0.01	3.6	2.75	0.01			
	5/1/2019	0.96	0.63	22.9	7.02	1264	0.1	-354	18	21.2		40	195	50	11	88	172	496	0.01	0.001	0.34	0.71	0.342	5.6	0.01	0.03	5.6	4.42	0.03			
6/5/2019	1.2	0.39	21.2	7.6	1212	2	-288	9	-5.5		42	193	52	11	50	312	360	0.02	0.001	0.11	0.34	0.267	2.4	0.01	0.01	2.4	1.84	0.01				
2019/2020	7/4/2019	0.9	0.69	19.83	7.58	1935	0.2	-145.1	5	25.1	5	45	198	54	11	50	319	348	0.01	0.001	0.26	0.19	1.75	1.2	0.01	0.01	1.2	0.78	0.01			
	7/31/2019	1.22	0.37	19.4	7.48	1901	2.92	-138.3	5	34.8		36	189	48	10	44	302	369	0.01	0.001	0.13	0.24	0.229	1.6	0.01	0.01	1.6	1.27	0.01			
	9/4/2019	1.34	0.25	20.4	7.3	1398	0.6	-100.9	5	40.6		32	167	42	9	42	310	340	0.01	0.001	0.23	0.16	0.1	1.6	0.01	0.01	1.6	1.67	0.01			
	10/2/2019	1.52	0.07	21.5	7.4	1349	1	-179.9	5	7.2	5	36	182	45	9	52	236	321	0.01	0.001	0.08	0.21	0.222	1.6	0.01	0.01	1.6	1.04	0.01			
	11/6/2019	1.64	-0.05	21	7.5	1199	2.6	-188.2	5	-3.4		39	164	43	10	49	284	357	0.01	0.001	0.1	0.29	0.266	1.8	0.01	0.01	1.8	1.47	0.01			
	1/15/2020	pH meter calibration issue - spurious data.	1.8	-0.21	24.8	12.9*	1280	1.6	-208	12	3.9		35	177	44	11	52	205	336				0.62	0.52	2.4	0.01	0.01	2.4	2.12	0.01		
2020/2021	4/28/2020	Land-based extraction commenced 16/04/20.	1.24	0.35	24.7	5.3	157.8	0.94	-67.1	26	452.5	5	17	2	1	4	33	11	3	0.27	0.063	4.66	0.12	0.022	1.6	0.01	0.01	1.6	0.24	0.01		
	7/6/2020		1.12	0.47	19.9	6.4	1240	0.9	-130	65	29	5	32	170	45	10	40	259	360	0.01	0.001	1.01										

617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB11

2023/2024	7/31/2023		1.46	0.13	17.16	7.41	1166	2.66	-29.4		1.9		31	151	42	9	51	205	346	0.01	0.001	0.1								
	8/23/2023	Laptop battery fail. Loggers returned to HMC offices to download & returned to site 24.08.2023	1.94	-0.35	18.65	7.39	1170	2.47	-37.9		19		33	165	47	9	42	237	349	0.01	0.001	0.13								
	9/20/2023		2.21	-0.62	19.17	7.11	1043	6.68	-17.1		77.5		28	149	37	9	43	146	360	0.01	0.001	0.17								
	10/25/2023		2.27	-0.68	19.4	7.3	1103	6.75	-32.1		21		29	139	38	9	39	169	351	0.01	0.001	1.62	0.19		0.7	0.01	0.01	0.01	0.23	0.01
	11/22/2023		1.74	-0.15	21.11	7.13	1103	6.73	-20.5		13.6		31	151	40	9	41	185	338	0.01	0.001	4.25								
	12/19/2023		2.15	-0.56	20.98	7.24	1413	0.34	-26.4		1.6		37	191	52	10	46	354	352	0.01	0.001	3.36	0.25		1.2	0.02	0.12	1.1	0.25	
	2/21/2024		1.24	0.35	23.38	7.06	1722	4.64	-7.4		6.9		36	223	53	11	43	478	335	0.01	0.001	3.23	0.16		0.7	0.02	0.08	0.6	0.22	
	3/28/2024		1.17	0.42	23.43	6.99	2168	3.56			12.4		103	355	103	13	52	984	293	0.01	0.001	9.5								
	4/22/2024		0.92	0.67	21.58	7.43	2559	3.82	-31.9		140		48	411	130	14	52	1640	226	0.01	0.001	2.09								
	5/21/2024	Ants present. Water very turbid orange	1.03	0.56	20.71	7.03	2844	3.26	-7.6		392		52	592	173	17	52	2240	102	0.01	0.001	56.8								
6/24/2024	Water turbid orange	2.05	-0.46	20.47	7.08	2781	3.74	-8.7		332		50	534	158	16	44	2000	151	0.01	0.001	40.1	0.41		1.1	0.06	0.01	1.1	0.33	0.01	
Reporting Period (2023/2024)	Average	1.65	-0.06	20.55	7.20	1733.82	4.06	-21.90	NLM	92.54	NLM	43.45	278.27	79.36	11.45	45.91	785.27	291.18	0.01	0.00	11.03	0.25	NLM	0.93	0.03	0.06	0.70	0.26	0.01	
	Maximum	2.27	0.67	23.43	7.43	2844.00	6.75	-7.40	NLM	392.00	NLM	103.00	592.00	173.00	17.00	52.00	2240.00	360.00	0.01	0.00	56.80	0.41	NLM	1.20	0.06	0.12	1.10	0.33	0.01	
	Minimum	0.92	-0.68	17.16	6.99	1043.00	0.34	-37.90	NLM	1.60	NLM	28.00	139.00	37.00	9.00	39.00	146.00	102.00	0.01	0.00	0.10	0.16	NLM	0.70	0.01	0.01	0.01	0.22	0.01	
All Results	Average	1.26	0.33	21.86	7.25	1324.54	2.00	-84.48	23.70	39.48	5.00	42.52	182.91	49.38	10.20	57.03	342.09	329.53	0.09	0.00	2.65	0.37	0.35	2.25	0.02	0.11	2.30	1.54	0.13	
	Maximum	2.27	1.46	27.10	7.75	2844.00	7.67	297.10	140.00	452.50	5.00	220.00	592.00	173.00	19.00	311.00	2240.00	500.00	3.13	0.06	56.80	1.37	1.75	11.80	0.33	1.30	11.70	9.71	1.30	
	80th Percentile	1.56	0.68	24.50	7.49	1535.20	3.22	-15.54	33.20	39.44	5.00	43.60	192.00	52.00	11.00	52.00	344.40	360.00	0.02	0.00	2.09	0.62	0.56	3.06	0.02	0.20	3.38	2.06	0.25	
	Median (50th Percentile)	1.24	0.35	21.58	7.30	1212.50	1.66	-70.00	11.00	8.45	5.00	35.00	169.00	45.00	10.00	47.00	263.00	342.00	0.01	0.00	0.30	0.29	0.26	1.60	0.01	0.01	1.60	1.15	0.01	
	20th Percentile	0.91	0.03	19.77	7.08	1080.80	0.39	-200.08	5.00	1.66	5.00	29.00	149.40	38.00	9.00	42.00	169.60	318.00	0.01	0.00	0.09	0.19	0.10	1.00	0.01	0.01	1.10	0.24	0.01	
	Minimum	0.13	-0.68	17.16	5.30	157.80	0.10	-354.00	5.00	-5.50	5.00	17.00	2.00	1.00	2.00	17.00	11.00	3.00	0.01	0.00	0.05	0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Red and bold values exceed the objective value for that analyte. IS = Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored																														

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored



617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB12

Site: MB12			Physical										Major Cations & Anions							Metals			Nutrients									
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L		
			Objective	-	-	6.5-8.5	<3000	-	-	-	-	10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-		
Pre-Extraction	6/16/2005					6.9	1588	0.68					66	433	54	13	147	706		0.74		2.98										
	7/19/2005					6.8	1587	0.54					43	322	59	12	87	528	223	0.12		1.61										
	8/5/2005					7.5	1619	1.02																								
	11/10/2005					7.150	1531.000	0.110					47.00	219.000	54.000	11.000	62.000	643.000	238.000	0.18		1.310										
	1/12/2006					7.110	1818.000	0.110					39.00	261.000	58.000	12.000	54.000		230.000	0.15		1.450										
	5/3/2006																	410														
	2/8/2007					7.2	1433	1.55	-98.0																							
	9/2/2008					7.4	1962																									
	9/4/2017	Purged for 5 mins to clear debris	1.19	0.18	20.7	6.74	1795	0.09	-54		7.1	5	55	375	52	12	122	646	329	0.01	0.001	20.4	0.11	0.02	0.60	0.01	0.01	0.6	0.33	0.01		
10/5/2017		1.06	0.31	21.9	6.91	2080	1.65	-72.9	15	20.1	5	45	362	46	10	131	720	317	0.009	0.001	14.2	0.11	0.01	0.60	0.01	0.01	0.6	0.34	0.01			
2017/2018	10/30/2017	Commencement of extraction																														
	11/28/2017		0.99	0.38	24.1	7.16	1795	3.75	8	14	32.7	5	49	363	49	11	138	728	340	0.01	0.001	0.05	0.01	0.01	0.70	0.01	0.3	0.4	0.12	0.3		
	1/11/2018		1.24	0.13	25.6	7.04	1836	1.43	-69		21.8	5	44	373	49	11	112	719	304	0.01	0.001	0.05	0.03	0.01	0.80	0.01	0.02	0.8	0.34	0.02		
	1/24/2018		1.32	0.05																												
	2/6/2018		1.15	0.22	26.5	6.82	1984	0.74	-81		7.1	5	42	336	46	11	115	686	319	0.01	0.001	7.65	0.05	0.01	0.5	0.01	0.01	0.5	0.38	0.02		
	2/8/2018	Last day of first extraction campaign.																														
	5/31/2018		0.9	0.47	20.3	6.96	1593	2	45		47.9	5	38	324	40	10	111	658	324	0.01	0.001	11.7	0.03	0.01	0.40	0.01	0.05	0.4	0.36	0.05		
2018/ 2019	10/24/2018		0.79	0.58	19.9	6.98	1580	1.83	-69	5	9.9	5	29	324	43	10	122	771	290	0.05	0.005	0.05	0.03	0.01	0.8	0.02	0.44	0.3	0.1	0.46		
	1/15/2019		1.33	0.04	24.4	6.86	1810	0.63	-124.1	32	32.4	5	49	342	42	10	115	653	314	0.01	0.001	13.6	0.01	0.01	0.5	0.01	0.02	0.5	0.38	0.02		
	4/4/2019		0.52	0.85	25.03	7.04	2146	2.17	-17.5	43	1.09	5	55	371	43	11	91	664	313	0.01	0.001	0.06	0.02	0.007	0.6	0.01	0.02	0.6	0.38	0.02		
	7/4/2019		0.69	0.68	20.49	7.26	2667	2.77	73.5	29	33.6	5	57	354	41	11	84	596	316	0.01	0.001	0.61	0.02	0.001	0.7	0.01	0.18	0.5	0.25	0.18		
2019 / 2020	10/2/2019		1.3	0.07	20.7	7.1	2055	3.1	1	5	74.4	5	67	350	41	11	89	666	278	0.01	0.001	0.05	0.01	0.001	0.5	0.01	0.36	0.1	0.01	0.36		
	1/15/2020	pH meter calibration issue - spurious data.	1.58	-0.21	22.4	11.2*	1885	1.7	-80	5	7.4		76	334	39	12	72	673	268				0.01	0.01	0.2	0.01	0.04	0.2	0.03	0.04		
	4/28/2020	Land-based extraction commenced 16/04/20.	0.82	0.55	23.3	7.2	1757	6.78	-75.2	28	19.9	5	79	259	35	11	72	675	288	0.01	0.001	4.98	0.01	0.003	0.8	0.01	0.08	0.7	0.37	0.08		
	7/6/2020		0.9	0.47	20.2	6.4	1755	5.6	28	155	24	5	82	331	36	11	59	790	309	0.01	0.001	12.8	0.04	0.026	0.7	0.01	0.09	0.6	0.31	0.09		
2020/2021	8/13/2020	Clear	0.73	0.64	21.1	6.7	1814	3.8	77	12	138	5	94	302	38	12	64	759	310	0.01	0.001	0.05	0.22	0.001	0.9	0.01	0.06	0.8	0.28	0.06		
	9/16/2020		0.87	0.5	19.7	6.68	1866	1.62	172	5	197.64	5	98	308	39	12	64	794	306	0.01	0.001	0.05	0.04	0.004	0.24	0.01	0.24	0.2	0.02	0.24		
	10/14/2020		1.21	0.16	20.5	6.74	1766	0.52	-177.9	26	71.8	5	90	317	37	11	64	699	302	0.01	0.001	8.55	0.14	0.001	0.01	0.01	0.6	0.36	0.01			
	11/11/2020	Ants & Eggs	1.16	0.21	20.7	7.21	1995	1.66	-117.1	42	10.4		82	309	36	10	81	756	378	0.01	0.001	17.7	0.13	0.001	0.01	0.01	0.6	0.31	0.01			
	2/24/2021	Clear, ants	0.52	0.85	23.7	7.05	1917	1.33	-145.2	32	25.2		34	314	40	11	68	790	287	0.01	0.001	15.6	0.02	0.002	0.6	0.01	0.04	0.6	0.38	0.04		
	6/10/2021		0.89	0.48	20.3	7.29	1974	5.83	2.8	23	5.49		88	318	42	12	86	814	285	0.01	0.001	3.86	0.01	0.001	0.5	0.01	0.43	0.1	0.05	0.43		
	10/20/2021		0.89	0.48	19.4	7.21	1213	2.25	-23.3				32	165	44	9	41	255	353	0.01	0.001	0.8										
2021/2022	1/25/2022		0.88	0.49	24.42	7.63	1094	3.7	-70		67		31	190	42	10	35	256	357	0.01	0.001	0.19	0.32		1.5	0.01	0.29	1.2	0.67	0.3		
	2/22/2022		0.72	0.65	24.27	7.19	1858	1.68	-38.2		6		79	317	46	12	248	650	246	0.01	0.001	6.69										
	4/27/2022		0.56	0.81	21.6	7.41	1712	1.71	-66.3		13		87	265	40	9	318	430	193	0.01	0.007	0.05	0.06			0.9	0.01	0.4	0.5	0.03	0.4	
	5/23/2022	Due to major flood event, high rainfall, and poor drainage the site was deemed inaccessible to undertake sampling during May 2022.																														
6/22/2022	Due to previous major flood events, ongoing rain and slow drainage, the site was deemed inaccessible to undertake sampling during June 2022.																															
2022/2023	7/27/2022		0.67	0.7	17.66	7.18	1948																									

617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB13

Site: MB13			Physical										Major Cations & Anions							Metals			Nutrients									
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L		
			Objective	-	-	6.5-8.5	<36384	-	-	-	-	10	<6884	-	<1146	<215	<12600	<2276	<545	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-		
Pre-Extraction	6/16/2005					6.87	32200	0.22					6940	1170	2040	215	15198	4000		0.75		19										
	7/19/2005					6.36	36800	0.24					6870	559	1050	217	247	2260	304	0.17		1.8										
	8/5/2005					7.18	33300	1.22																								
	11/10/2005					6.84	32300	0.24					6600	609	925	127	12600	2110	401	0.08		10										
	1/12/2006					6.77	35400	0.45					6040	2350	1370	240	11365		194	0.32		6.06										
	5/3/2006																	2170														
	2/8/2007					7.1	21800	1.48	-250																							
	9/2/2008					7	38200																									
9/4/2017	Purged for 5 mins to clear debris	1.46	0.25	20.7	6.63	2826	0.05	-34		5.9	5	6850	539	1090	200	12600	2240	534	0.05	0.005	0.05	0.56	0.02	0.80	0.01	0.3	0.5	0.14	0.3			
10/5/2017		1.63	0.08	24	6.8	33318	2.97	-52.3	26	1.6	5	5700	533	888	157	12200	2160	496	0.009	0.001	13.7	0.27	0.01	2.90	0.01	0.02	2.9	2.59	0.02			
2017/2018	10/30/2017	Commencement of extraction																														
	11/28/2017		1.53	0.18	24.5	6.79	30674	2.56	-58.2	33	24.2	5	6070	551	935	168	10900	2300	544	0.01	0.001	0.05	0.3	0.01	3.40	0.33	0.13	2.9	2.3	0.46		
	1/11/2018		1.8	-0.09	24.4	6.83	30446	2.17	-81		39.6		7080	629	1060	189	11700	1540	466	0.05	0.005	0.05	0.22	0.01	4.50	0.35	0.33	3.8	2.36	0.68		
	1/24/2018		1.88	-0.17																												
	2/6/2018		1.7	0.01	24.3	6.76	34036	2.42	-73		30.1	5	5970	541	908	163	12000	2170	495	0.01	0.001	10.2	0.16	0.01	2.7	0.18	0.09	2.4	2.41	0.27		
	2/8/2018	Last day of first extraction campaign.																														
5/31/2018		1.6	0.11	22.1	6.87	29235	0.73	-41		3.8	5	5420	430	821	150	11400	1980	503	0.05	0.005	11.7	0.08	0.01	2.30	0.03	0.05	2.2	2.32	0.08			
2018/ 2019	10/24/2018		1.38	0.33	20.1	6.82	35760	1.33	-24	5	0.7	5	5860	530	892	155	11400	2270	468	0.05	0.005	0.05	0.06	0.01	1.4	0.01	0.01	1.4	1.03	0.01		
	1/15/2019		1.9	-0.19	23.4	6.66	29980	0.38	-217.2	19	0.9	5	5200	503	845	147	11400	1990	547	0.05	0.005	2.79	0.59	0.01	4.6	0.01	0.01	4.6	4.49	0.01		
	4/4/2019	Very dark colour			25.42	7.33	37420	0.74	-34	22	23.7	5	6820	595	1020	186	10500	1860	582	0.05	0.005	0.34	1	0.848	4.8	0.01	0.01	4.8	3.63	0.01		
	7/4/2019		1.24	0.47	20.72	7.12	46890	0.91	72	13	12.2	5	6530	609	1000	182	11100	2000	571	0.05	0.005	0.99	0.32	0.325	5.7	0.01	0.01	5.7	4.82	0.01		
2019 / 2020	10/2/2019		1.85	-0.14	20.4	6	35800	2.9	-68.9	6	24.3	5	6700	601	1070	183	11500	2050	488	0.05	0.005	2.91	0.08	0.076	4.6	0.01	0.01	4.6	3.47	0.01		
	1/15/2020	pH meter calibration issue - spurious data.	2.12	-0.41	22.9	9*	32749	0.6	-267	7	5.4		6060	568	959	167	11000	1860	597				0.99	0.5	11.5	0.01	0.01	11.5	9.21	0.01		
	4/28/2020	Land-based extraction commenced 16/04/20.	1.4	0.31	23.4	6.8	31094	1.14	-206.7	16	92.5	5	6520	592	1030	174	11500	2050	545	0.05	0.005	0.31	0.73	0.743	7.6	0.01	0.01	7.6	5.79	0.01		
	7/6/2020		1.47	0.24	20.8	6.2	31499	0.9	-156	5	9.4	5	6080	578	954	169	10700	2220	557	0.01	0.001	0.14	1.2	0.827	6.1	0.01	0.02	6.1	5.12	0.02		
2020/2021	8/13/2020	Clear	1.3	0.41	21.1	7.1	31437	0.9	-117	5	4.1	5	5830	519	944	158	11100	1880	581	0.05	0.005	1.6	0.52	0.492	5.1	0.01	0.01	5.1	4.7	0.01		
	9/16/2020		1.41	0.3	19.1	6.5	33096	1.34	-70.3	11	112.75	5	6030	580	932	166	12100	2270	560	0.05	0.005	3.22	0.16	0.106	0.01	0.01	0.01	4.2	3.83	0.01		
	10/14/2020		1.78	-0.07	20	6.75	31185	0.53	-195	18	5.3	5	6050	576	955	174	11200	2040	491	0.05	0.005	855	0.2	0.001	0.01	0.01	0.01	3.6	3.51	0.01		
	11/11/2020	Ants & Eggs	1.73	-0.02	21	6.6	32924	1.04	-66.4	22	0.4		6220	588	1040	168	11600	2040	476	0.01	0.005	11	0.2	0.152	0.01	0.01	0.01	3.3	2.94	0.01		
	2/24/2021	Clear, ants	1.08	0.63	25.4	6.47	32870	1.02	-57.6	14	48.4		6090	621	949	171	11600	2320	504	0.05	0.005	8.64	0.3	0.276	3.3	0.01	0.01	3.3	3.38	0.01		
	6/10/2021	Ants	1.41	0.3	20.6	6.85	30919	4.45	-47.7	10	97.61		5970	557	905	174	11300	2110	490	0.01	0.001	5.75	0.27	0.001	2.9	0.01	0.01	2.9	2.4	0.01		
2021/2022	10/20/2021	Ants	1.22	0.49	20.1	6.85	33440	1.1	-3.6		78		6770	617	1040	204	11000	1870	544	0.05	0.005	3.46										
	1/25/2022		1.2	0.51	23.66	6.81	32976	2.17	-23.1		92		6660	607	1020	180	11400	2060	540	0.05	0.005	4.9	0.41		4.2	0.03	0.38	3.8	3.23	0.41		
	2/22/2022		1.28	0.43	23.5	7.04	36440	1.39	-29.7		94		5640	491	882	153	11100	1980														



617 - CUDGEN LAKES SAND QUARRY  
Groundwater Monitoring Site MB14

Site: MB14		Physical											Major Cations & Anions							Metals			Nutrients									
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	Electrical Conductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L		
		Objective	-	-	-	6.5-8.5	<3000	-	-	-	-	10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-		
2017/2018	10/30/2017	Commencement of extraction																														
	11/28/2017				21.1	7.7	572	0.3	-145	195		5	66	48	21	2	32	82	245	0.01	0.001	0.05	0.28	0.1	0.60	0.01	0.01	0.6	0.03	0.01		
	12/13/2017	1.7	0.475	23.5	6.37	795	0.85	-42			9.2		50	77	26	3	33	94	284	0.01	0.001	0.05	0.3	0.01	0.40	0.01	0.01	0.4	0.15	0.01		
	1/11/2018	2.08	0.095	25.6	7.55	505	0.51	-118			9.1	5	27	61	14	5	37	39	161	0.01	0.001	0.05	0.12	0.01	0.20	0.01	0.01	0.2	0.07	0.01		
	1/24/2018	2.33	-0.155	28.3	7.5	545	0.39	-109.2			34.6		20	33	8	2	17	21	98	0.01	0.001	3.58	0.1	0.01	0.2	0.01	0.02	0.2	0.04	0.02		
	2/7/2018	2.57	-0.395	22.4	6.99	751	5.91	-125.6			69.4	5	27	59	29	2	38	81	161	0.05	0.005	22.9	0.43	0.01	0.4	0.01	0.01	0.4	0.06	0.01		
	2/8/2018	Last day of first extraction campaign.																														
	3/8/2018		1.82	0.355	22.6	7.61	2296	2.05	61		14.8		182	154	39	8	491	181	218	0.01	0.001	5.03	0.15	0.01	0.50	0.01	0.02	0.5	0.11	0.02		
	4/13/2018		1.78	0.395	23.7	6.78	1326	3.96	-95		2.9		122	94	24	7	277	92	197	0.02	0.001	3.96	0.17	0.01	0.40	0.01	0.01	0.4	0.06	0.01		
	5/31/2018		1.75	0.425	21.6	6.98	954	0.61	-6		27.1	5	123	86	23	7	296	84	190	0.01	0.001	1.45	0.08	0.01	0.30	0.01	0.01	0.3	0.06	0.01		
2018/2019	12/3/2018		1.92	0.255	21.5	7.76	928	0.81	-121.9	34	17		112	61	23	7	156	49	191	0.01	0.001	0.94	0.1	0.01	0.3	0.01	0.01	0.3	0.06	0.01		
	12/17/2018		1.92	0.255	21.7	6.94	840	3.18	-100	42	26.8		85	60	18	6	151	54	185	0.01	0.001	0.63	0.27	0.01	1.1	0.01	0.15	0.9	0.1	0.16		
	1/15/2019		2.12	0.055	22.1	7.56	797	0.7	-181.4	45	34	5	99	65	20	7	155	43	193	0.01	0.001	0.63	0.13	0.01	0.4	0.01	0.01	0.4	0.12	0.01		
	2/6/2019		2.27	-0.095	22.6	7.26	805	0.32	-161.6	30	13.7		98	60	18	6	143	52	196	0.01	0.001	1.06	0.1	0.022	0.3	0.01	0.01	0.3	0.1	0.01		
	2/21/2019		2.37	-0.195	21.9	7.73	838	0.6	210.7	6	217.4		100	143	20	7	143	45	185	0.01	0.001	1.23	0.1	0.01	0.4	0.01	0.01	0.4	0.1	0.01		
	3/6/2019		2.36	-0.185	22.9	7.54	851	10.3	-206	14	3.3		83	60	19	6	149	47	194	0.01	0.001	1.29	0.09	0.021	0.2	0.1	0.01	0.2	0.07	0.01		
	3/21/2019		7.54	-5.365	24.2	7.54	1102	1.94	-105	26	0.55		85	56	20	5	136	42	196	0.01	0.001	5.22	0.16	0.004	0.4	0.01	0.01	0.4	0.06	0.01		
	4/3/2019		1.67	0.505	23.8	6.78	909	1.26	-67	25	8.7	5	80	63	22	5	102	43	205	0.01	0.001	6.06	0.14	0.006	0.3	0.01	0.01	0.3	0.08	0.01		
	4/30/2019		1.7	0.475	22.7	7.05	593	-0.3	-244	7	3.1		68	44	14	5	90	33	172	0.01	0.001	0.99	0.09	0.033	0.2	0.01	0.01	0.2	0.06	0.01		
	6/5/2019		1.73	0.445	22.1	7.6	675	1.15	-9.5	9	19.2		98	51	14	6	110	28	186	0.01	0.001	0.71	0.1	0.054	0.3	0.01	0.01	0.3	0.03	0.01		
2019/2020	7/4/2019	Site inaccessible (too wet)																														
	7/31/2019		1.71	0.465	21.1	8.17	1172	0.77	33.2	5	31.3		76	44	12	5	83	29	202	0.01	0.001	0.21	0.17	0.042	0.2	0.01	0.01	0.2	0.03	0.01		
	9/4/2019		1.88	0.295	20.9	7.9	683	0.4	79.1	5	46		38	52	14	5	49	29	168	0.01	0.001	0.05	0.2	0.03	0.1	0.01	0.01	0.1	0.02	0.01		
	10/2/2019		2.09	0.085	22.1	7.9	583	2.3	-131.9	14	10.8	5	42	53	15	5	56	29	155	0.01	0.001	0.99	0.36	0.054	0.3	0.01	0.01	0.3	0.01	0.01		
	11/6/2019		2.28	-0.105	21.9	7.7	487	1.4	-119.3	18	14.2		30	46	13	5	42	33	169	0.01	0.001	0.73	0.2	0.029	0.3	0.01	0.01	0.3	0.04	0.01		
	1/15/2020	Knocked over by cattle. pH meter calibration issue - spurious data.	2.55	-0.375	22.2	10.6*	566	1.7	-39	13	18.5		49	48	12	5	56	25	154				0.11	0.02	0.2	0.01	0.01	0.2	0.04	0.01		
	4/28/2020	Land-based extraction commenced 16/04/20.	1.59	0.585	23.4	7	562	0.84	-117.4	22	127.2	5	69	53	17	6	84	30	190	0.01	0.001	0.74	0.12	0.033	0.3	0.01	0.01	0.3	0.05	0.01		
2020/2021	7/7/2020		1.66	0.515	21.3	7.17	319	2.57	-59	19	10.3	5	72	53	17	6	83	31	207	0.01	0.001	0.78	0.12	0.47	0.4	0.01	0.01	0.4	0.06	0.01		
	8/12/2020	Clear	1.52	0.655	20.9	7	588	1.2	47	15	99	5	52	52	16	5	60	34	196	0.01	0.001	0.2	0.12	0.008	0.2	0.01	0.01	0.2	0.05	0.01		
	9/16/2020		1.67	0.505	21.3	7.58	598	1.04	-18.8	8	203.55	5	45	54	16	5	58	43	192	0.01	0.001	0.93	0.11	0.067	0.01	0.01	0.01	0.2	0.04	0.01		
	10/14/2020		0.191	1.984	21.5	7.64	502	0.97	-107.9	5	18.8	5	34	58	16	5	48	36	176	0.01	0.001	0.74	0.11	0.024	0.01	0.01	0.01	0.1	0.05	0.01		
	11/11/2020		1.93	0.245	21.4	7.72	533	0.69	-156.1	12	21.6		27	62	22	6	46	39	168	0.01	0.001	1.03	0.12	0.052	0.01	0.01	0.01	0.1	0.03	0.01		
	2/24/2021	Clear, no cap	1.31	0.865	23.5	7.02	471	2.																								

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Groundwater Monitoring Site MB14

Reporting Period (2023/2024)	Average	1.77	0.89	21.66	7.61	489.25	4.50	-41.08	NLM	12.13	NLM	26.25	64.50	13.25	5.88	38.63	26.75	182.88	0.03	0.00	0.18	0.18	NLM	0.85	0.01	0.16	0.74	0.19	0.19
	Maximum	2.09	2.18	25.33	7.72	650.00	6.62	-11.30	NLM	33.40	NLM	33.00	80.00	15.00	7.00	62.00	31.00	204.00	0.16	0.00	0.88	0.36	NLM	2.20	0.02	0.34	2.10	0.66	0.34
	Minimum	1.43	0.09	19.26	7.24	365.00	2.21	-51.30	NLM	1.50	NLM	23.00	49.00	9.00	5.00	31.00	22.00	146.00	0.01	0.00	0.05	0.05	NLM	0.30	0.01	0.03	0.10	0.01	0.03
All Results	Average	1.91	0.37	21.99	7.35	646.70	2.41	-36.34	24.54	29.19	5.00	52.30	62.70	16.68	5.47	79.62	42.23	181.77	0.02	0.00	1.71	0.16	0.04	0.46	0.01	0.05	0.44	0.15	0.04
	Maximum	7.54	2.18	28.30	8.17	2296.00	10.30	210.70	195.00	217.40	5.00	182.00	154.00	39.00	10.00	491.00	181.00	321.00	0.16	0.02	22.90	0.43	0.47	3.20	0.10	0.37	3.20	3.29	0.37
	80th Percentile	2.09	0.67	23.50	7.71	811.60	3.83	49.24	30.00	34.36	5.00	83.40	69.20	20.20	6.00	115.20	47.40	197.40	0.01	0.00	1.35	0.25	0.05	0.50	0.01	0.03	0.40	0.10	0.02
	Median (50th Percentile)	1.79	0.41	21.90	7.54	566.00	1.70	-42.00	14.50	15.80	5.00	38.00	59.00	15.00	5.00	48.00	31.00	185.00	0.01	0.00	0.63	0.12	0.01	0.30	0.01	0.01	0.30	0.06	0.01
	20th Percentile	1.54	0.09	20.63	6.96	471.00	0.71	-118.26	6.00	3.72	5.00	25.00	49.00	12.80	5.00	36.00	25.80	165.00	0.01	0.00	0.05	0.10	0.01	0.20	0.01	0.01	0.20	0.02	0.01
	Minimum	0.19	-5.37	18.18	6.35	137.00	-0.30	-244.00	5.00	0.55	5.00	20.00	22.00	6.00	2.00	17.00	7.00	71.00	0.01	0.00	0.05	0.05	0.00	0.01	0.01	0.01	0.10	0.01	0.01

Red and bold values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

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Groundwater Monitoring Site MB15

Site: MB15		Physical											Major Cations & Anions							Metals			Nutrients								
Sample Date		Comments	Water Level Top of Casing	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen mol/L	Redox mV	Total Suspended Solids mg/L	Turbidity NTU	Oil & Grease mg/L	Sodium mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Aluminium mg/L	Arsenic mg/L	Iron (filterable) mg/L	Total Phosphorous mg/L	Reactive Phosphorous mg/L	Total Nitrogen mg/L	Nitrite mg/L	Nitrate mg/L	TKN mg/L	Ammonia mg/L	NOx mg/L	
		Objective	-		-	6.5-8.5	<3000	-	-	-	-	10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	-	-	-	-	-	-	<20	-	
2017/2018	9/4/2017		1.06	0.375	20.6	7.45	555	0.01	-87	-	62	5	86	40	14	8	74	37	208	0.52	0.001	1.35	0.22	0.21	0.30	0.01	0.01	0.3	0.12	0.01	
	10/5/2017		1.27	0.165	21.6	7.63	625	0.65	-152.6	14	10.9	5	116	25	10	6	83	48	217	0.03	0.002	0.13	0.33	0.22	0.60	0.01	0.01	0.6	0.26	0.01	
	10/30/2017	Commencement of extraction																													
	11/28/2017		1.84	-0.405	25.1	7.51	916	1.4	-31.3	8	18.7	5	132	30	14	11	99	91	217	0.01	0.001	0.05	0.28	0.19	0.80	0.03	0.02	0.7	0.51	0.05	
	12/13/2017		1.47	-0.035	24.6	7.87	670	0.52	-107		48		68	41	15	8	60	47	176	0.01	0.001	0.05	0.15	0.16	0.20	0.01	0.01	0.2	0.19	0.01	
	1/11/2018		1.87	-0.435	24.8	7.88	614	0.48	-183		6.9	5	106	28	12	11	66	53	189	0.01	0.001	0.05	0.27	0.18	0.80	0.02	0.01	0.8	0.48	0.02	
	1/24/2018		2.43	-0.995	22.6	7.45	948	0.38	-67.7		23.9		144	32	15	14	119	138	181	0.01	0.001	0.81	0.27	0.14	1.40	0.01	0.01	1.4	0.66	0.01	
	2/7/2018		2.39	-0.955	23.4	7.52	835	6.45	-55.3		8.4	5	107	40	18	13	88	83	199	0.01	0.001	0.36	0.26	0.14	0.40	0.01	0.01	0.4	0.39	0.01	
	2/8/2018	Last day of first extraction campaign.																													
	3/8/2018		0.79	0.645	24.5	7.67	850	0.52	-72		2.4		95	41	15	11	98	79	198	0.01	0.001	0.32	0.18	0.12	0.80	0.01	0.02	0.8	0.48	0.02	
2018/2019	4/13/2018		0.97	0.465	24.9	7.44	767	2.29	87		2.4		78	51	16	10	82	71	186	0.01	0.001	0.07	0.21	0.15	0.40	0.03	0.19	0.2	0.04	0.22	
	5/31/2018		1.02	0.415	21.1	7.96	627	0.54	-85		32.9	5	76	42	13	9	79	62	194	0.01	0.001	0.05	0.12	0.11	0.20	0.01	0.03	0.2	0.17	0.03	
	10/24/2018		0.86	0.575	19.9	7.32	735	0.03	-175	24	13.4	5	71	48	17	9	92	67	190	0.05	0.005	0.24	0.2	0.11	0.5	0.01	0.01	0.5	0.31	0.01	
	12/3/2018		1.21	0.225	22.2	3.18	990	2.4	169	16	3.6		61	59	17	8	90	41	206	0.01	0.001	0.19	0.13	0.08	0.3	0.01	0.01	0.3	0.21	0.01	
	12/17/2018		1.22	0.215	21.1	8.38	699	0.57	-157	6	1.8		60	56	16	8	89	41	206	0.01	0.001	0.28	0.17	0.11	0.3	0.01	0.01	0.3	0.22	0.01	
	1/15/2019		1.44	-0.005	24.7	7.64	683	0.32	-200	5	8	5	64	52	17	9	87	41	203	0.01	0.001	0.24	0.18	0.12	0.4	0.01	0.01	0.4	0.29	0.01	
	2/6/2019	Cap Missing	1.62	-0.185	23	7.49	674	0.65	-152.5	12	0		84	48	17	10	84	56	201	0.01	0.001	0.34	0.17	0.105	0.4	0.01	0.02	0.4	0.32	0.03	
	2/21/2019		1.73	-0.295	22.7	7.6	703	0.53	203.7	5	1.4		78	83	16	10	83	53	190	0.01	0.001	0.27	0.17	0.14	0.4	0.01	0.01	0.4	0.28	0.01	
	3/6/2019		1.68	-0.245	25	7.78	731	0.79	-197	12	1.1		75	45	17	9	87	53	198	0.01	0.001	0.33	0.18	0.136	0.4	0.1	0.01	0.4	0.24	0.01	
	3/20/2019		1.03	0.405	24.84	7.29	978	1.06	-25.4	6	0.48		97	42	17	12	93	68	203	0.01	0.001	0.42	0.2	0.113	0.5	0.01	0.01	0.5	0.46	0.01	
2019/2020	4/4/2019		0.88	0.555	23.81	7.26	824	0.45	-30	19	0.4	5	124	46	17	13	98	91	202	0.01	0.001	0.58	0.23	0.134	0.4	0.01	0.01	0.4	0.28	0.01	
	4/30/2019		0.99	0.445	22.6	7.15	740	0.64	-135	11	4		80	42	15	10	86	58	196	0.01	0.001	0.1	0.23	0.165	0.7	0.01	0.34	0.4	0.2	0.34	
	6/5/2019		1.06	0.375	21.9	7.1	670	0.53	-148	20	-7.1		84	52	16	10	84	53	196	0.01	0.001	0.21	0.2	0.149	0.5	0.01	0.01	0.5	0.31	0.01	
	7/4/2019		0.65	0.785	21.65	7.7	1170	0.2	32.2	8	20	5	87	50	17	11	86	45	213	0.01	0.001	0.28	0.19	0.169	0.8	0.01	0.01	0.8	0.63	0.01	
	7/31/2019		0.99	0.445	20.1	8.13	1135	3.13	-136	5	22		71	60	17	9	85	35	228	0.02	0.001	0.11	0.2	0.188	0.7	0.01	0.01	0.7	0.65	0.01	
	9/4/2019		1.14	0.295	21.7	7.8	865	0.7	-147.8	5	7.2		66	60	18	9	98	30	216	0.01	0.001	0.11	0.16	0.146	0.6	0.01	0.01	0.6	0.25	0.01	
	10/2/2019		1.34	0.095	22.6	7.8	868	0.9	-180.4	5	0	5	70	69	20	9	121	29	203	0.01	0.001	0.06	0.18	0.154	1.6	0.01	0.01	1.6	0.35	0.01	
	11/6/2019		1.58	-0.145	22.6	7.5	704	2	-90.7	20	-3.1		70	46	17	10	84	26	222	0.01	0.001	0.16	0.19	0.123	0.4	0.01	0.01	0.4	0.32	0.01	
	1/15/2020	pH meter calibration issue - spurious data.	1.87	-0.435	24.1	8.5*	755	0.7	-149	5	0.9		77	49	17	11	86	4	178				0.21	0.22	4.8	0.01	0.01	4.8	0.28	0.01	
	4/28/2020	16/04/20. Land-based extraction commenced	0.73	0.705	23.6	7.5	689	1.13	-224.4	6	20.8	5	67	46	15	8	101	31	187	0.01	0.001	0.05	0.14	0.16	0.3	0.01	0.01	0.3	0.16	0.01	
2020/2021	7/7/2020	Clear, Ants	0.84	0.595	21.1	6.6	683	0.9	-142	8	4.1	5	74	55	16	9	90	39	194	0.01	0.001	0.13	0.17	0.173	0.6	0.01	0.01	0.6	0.19	0.01	
	8/12/2020	Clear	0.7	0.735	20.5	7.5	685	1.2	-162	5	6.8	5	71	55	16	9	96	37	200	0.01	0.001	0.11	0.31	0.17	0.3	0.02	0.01	0.3	0.18	0.02	
	9/16/2020		0.79	0.645	20.8	7.54	727	1.8	-149.2	8	69.94	5	72	57	16	9	97	52	201	0.01	0.001	0.09	0.16	0.129	0.01	0.01	0.01	0.5	0.16	0.01	
	10/14/2020		1.07	0.365	20	7.45	665	1.49	-180.6	6	4.4	5	68	64	15	8	98	40	196	0.01	0.001	0.06	0.13	0.126	0.02	0.					

**617 - CUDGEN LAKES SAND QUARRY**  
**Groundwater Monitoring Site MB15**

Reporting Period (2023/2024)	Average	0.84	0.60	21.86	7.50	542.00	2.94	-38.06	NLM	6.80	NLM	64.64	38.91	10.27	7.27	44.09	13.55	209.09	0.01	0.00	0.09	0.41	NLM	1.10	0.05	0.28	0.70	0.34	0.02
	Maximum	1.29	0.99	26.09	7.81	588.00	5.83	-6.40	NLM	26.40	NLM	76.00	43.00	12.00	9.00	49.00	19.00	226.00	0.01	0.00	0.16	0.78	NLM	2.60	0.18	1.07	1.40	0.46	0.02
	Minimum	0.45	0.15	18.74	7.09	485.00	0.35	-60.40	NLM	3.10	NLM	10.00	32.00	8.00	6.00	23.00	6.00	177.00	0.01	0.00	0.05	0.23	NLM	0.30	0.01	0.01	0.01	0.21	0.01
All Results	Average	1.07	0.37	22.09	7.48	692.47	1.76	-69.28	9.58	9.95	5.00	77.27	45.78	13.87	8.65	76.92	39.12	198.08	0.02	0.00	0.18	0.23	0.15	0.69	0.02	0.07	0.67	0.28	0.05
	Maximum	2.43	0.99	26.09	8.38	1170.00	6.45	203.70	24.00	69.94	5.00	144.00	83.00	23.00	14.00	121.00	138.00	228.00	0.52	0.01	1.35	0.78	0.22	4.80	0.18	1.07	4.80	0.66	0.46
	80th Percentile	1.33	0.78	24.06	7.80	764.60	2.47	-25.40	15.20	18.70	5.00	87.00	56.80	17.00	10.00	97.00	53.00	216.80	0.01	0.00	0.28	0.28	0.17	0.80	0.01	0.03	0.80	0.42	0.03
	Median (50th Percentile)	1.01	0.43	22.05	7.54	670.50	1.32	-72.00	7.00	4.00	5.00	73.50	42.00	15.00	8.00	83.50	35.00	198.00	0.01	0.00	0.11	0.20	0.14	0.40	0.01	0.01	0.40	0.26	0.01
	20th Percentile	0.66	0.11	20.18	7.29	572.00	0.53	-150.30	5.00	1.40	5.00	66.20	36.20	10.00	7.00	49.60	16.20	186.20	0.01	0.00	0.05	0.17	0.11	0.30	0.01	0.01	0.30	0.16	0.01
	Minimum	0.45	-1.00	17.50	3.18	485.00	0.01	-224.40	5.00	-7.10	5.00	10.00	25.00	8.00	6.00	23.00	4.00	128.00	0.01	0.00	0.05	0.05	0.08	0.01	0.01	0.01	0.01	0.01	0.01

**Red** and **bold** values exceed the objective value for that analyte. IS - Insufficient data for statistical analysis. NS = No Sample Required. ND = No Data. NLM = No Longer Monitored

# Appendix 6

## DRG Extractive Materials Return

(Total No. of pages including blank pages = 3)



# Extractive Materials Return 2023-24

Form S1 – 1 July 2023 to 30 June 2024



Regional  
NSW

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

Quarry ID	
RIMS ID	
Operator Name	JBM Development Group
Operator Address	146 Tweed Coast Road, Chinderah
Operator Email	Brad@kingscliffsands.com
Operator Phone Number	0449 965 772
Quarry Name	Kingscliff Sands
Quarry Address	103 Altona Road, Cudgen
Mining Lease(s) – if any	-
Leaseholder(s) Name	-
Leaseholder Email	-
Leaseholder Phone Number	-
Licence or Lease Number – if any (from Crown Lands or other Government Department)	-
Licensee Name	-
Licensee Email	-
Licensee Phone Number	-
Deposited Plan and Lot Number of Quarry	51//DP1268405, 21//DP1082482
Land Owner	Gales Holdings
Nearest Town to Quarry	Chinderah
Local Council Name	Tweed Shire Council
Typical Geology	Natural Fine Sand

For inquiries or to submit completed or nil returns please email: [mineral.royalty@regional.nsw.gov.au](mailto:mineral.royalty@regional.nsw.gov.au)

If no work was done during the year, a **NIL** return must be provided.

If completion of the return is unavoidably delayed, an application for extension of time should be requested **before** the due date.

## Employment

Include PERSONS in and around the mining establishment (pit or quarry) on quarrying operations, in TRANSPORT, in ADMINISTRATION and PRODUCER-CONSUMERS'S employees, who are engaged in manufacturing (eg of bricks). Head office staff should be excluded (estimate if necessary). Employees on long term service leave or otherwise temporarily absent should be included, but persons on permanent compensation should be omitted.

EMPLOYMENT during the LAST PAY PERIOD of JUNE 2024 All personnel employed at this site including working managers, partner's managers, and contractors.	Employed at site:6
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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.

Submission of this form by email constitutes a declaration by the Leaseholder (if any) Licensee (if any) or Operator that the information contained in this return is correct, to the best of their knowledge, and that there are no blank spaces left where figures should have been inserted.

# Extractive Materials Return 2023-24

Form S1 – 1 July 2023 to 30 June 2024



Regional  
NSW

## Sales During 2023-2024

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
<b>Virgin Materials</b>		
<b>Crushed Coarse Aggregates</b>		
Over 75mm		
Over 30mm to 75mm		
5mm to 30mm		
Under 5mm		
Natural Sand	Washed Fine Sand	264,801
Manufactured Sand		
Prepared Road Base & Sub Base		
Other Unprocessed Materials		
<b>Recycled Materials</b>		
<b>Crushed Coarse Aggregates</b>		
Over 75mm		
Over 30mm to 75mm		
5mm to 30mm		
Under 5mm		
Natural Sand		
Manufactured Sand		
Prepared Road Base & Sub Base		
Other Unprocessed Materials		
<b>River Gravel</b>		
Over 30mm		
5mm to 30mm		
Under 5mm		
<b>Construction Sand</b>	Excluding Industrial	
<b>Industrial Sand</b>		
Foundry, Moulding		
Glass		
Other (Specify)		
<b>Dimension Stone</b>	Building, Ornamental, Monumental	
Quarried in Blocks		
Quarried in Slabs		
<b>Decorative Aggregate</b>	Including Terrazzo	
<b>Loam</b>	Soil for Topdressing, Garden soil, Horticultural purposes)	
<b>TOTAL SITE PRODUCTION</b>		
<b>Gross Value (\$) of all Sales</b>		
<b>Type of Material</b>		
<b>Number of Full-Time Equivalent (FTE) Employees</b>	Employees 6	Contractors 2