GALES–KINGSCLIFF

PTY LTD
ABN: 75 093 540 080

Annual Review

for the

Cudgen Lakes Sand Quarry

1 July 2020 to 30 June 2021

Compiled by:

R.W. CORKERY & CO. PTY. LIMITED

September 2021

This page has intentionally been left blank

GALES-KINGSCLIFF

PTY LTD
ABN: 75 093 540 080

Annual Review

for the

Cudgen Lakes Sand Quarry

1 July 2020 to 30 June 2021

Compiled for:

Gales-Kingscliff Pty Ltd
ABN: 75 093 540 080
20 Ginahgulla Road
BELLEVUE HILL NSW 2023

Telephone: (02) 9327 2481
Facsimile: (02) 9387 8230
Email: sdsegal@gmail.com

Compiled by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Telephone: (02) 9985 8511
Email: brooklyn@rwcorkery.com

Orange Office:
62 Hill Street
ORANGE NSW 2800

Telephone: (02) 6362 5411
Email: orange@rwcorkery.com

Brisbane Office:
Level 54, 111 Eagle Street
BRISBANE QLD 4000

Telephone: (07) 3205 5400
Email: brisbane@rwcorkery.com

Ref No. 617/41

September 2021

TITLE BLOCK

Name of Operation	Cudgen Lakes Sand Quarry
Name of Operator	Kingscliff Sands Pty Limited
Development consent / project approval #	Project Approval 05_0103
Name of holder of development consent / project approval	Gales-Kingscliff Pty Ltd
Mining Lease #	Not Applicable
Name of holder of mining lease	Not Applicable
Water licence #	WAL 40902
Name of holder of water licence	Gales-Kingscliff Pty Ltd
MOP/RMP start date	Not Applicable
MOP/RMP end date	Not Applicable
Annual Review start date	01/07/20
Annual Review end date	30/06/21

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 2020 to 30 June 2021 and that I am authorised to make this statement of behalf of Gales-Kingscliff Pty Ltd.

Note.

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

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

Name of authorised reporting officer	Stephen Segal
Title of authorised reporting officer	Managing Director
Signature of authorised reporting officer	
Date	30/09/2021

This Copyright is included for the protection of this document

CONTENTS

Page

CONTENTS

Page

APPENDICES

FIGURES

TABLES

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 there was a total of 6 non-compliances during the reporting period relating to the implementation of the Noise Management Plan, achieving a maintenance agreement for Altona Road within the specified timeframe, and the automatic rain gauge experiencing equipment failure. 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 05_0103B	No
Environment Protection Licence 12385	No

Table 1.2
Non-compliances

Relevant Approval	Condition	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
MP 05_0103B	2(2)	The Proponent, in acting on this approval, must carry out the project in accordance with the conditions of this approval.	Non-compliant	Non-compliance with the conditions of PA05_0103 were recorded during the reporting period (see below).	Section 1.
MP 05_0103B	3(3c)	Undertake attended noise monitoring 3 monthly or as otherwise agreed.	Non-compliant	The Q1 2021 noise monitoring was inadvertently not undertaken.	Sections 6.3 and 11.1
MP 05_0103B	3(4)	Prepare and implement the Noise Management Plan.	Non-compliant	The Q1 2021 noise monitoring was inadvertently not undertaken. As such, the noise management plan was not fully implemented.	Sections 6.3 and 11.1
MP 05_0103B	3(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.	Non-compliant	A draft agreement was prepared, in consultation with Council, but was referred to the Secretary for resolution on 25/9/2019 (i.e. beyond the required 20 August 2019 timeframe). An extension to the timeframe had also been sought from the Department but not responded to. The agreement is currently with DPIE awaiting resolution.	Section 11.1

Table 1.2 (Cont'd)
Non-compliances

Relevant Approval	Condition	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
EPL 12384	M4.1	Install and maintain a rainfall depth measuring device	Non-compliant	An automatic rainfall gauge and logger was previously installed. However, the logger failed resulting in data loss. Data was supplemented from the nearby Bureau of Meteorology Station at Tweed. The gauge has been replaced.	Section 11.1
EPL 12384	M4.2	Rainfall at the premises must be measured and recorded in millimetres per 24 hour period, at the same time each day	Non-compliant		

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:* • *potential for serious environmental consequences, but is unlikely to occur; or* • *potential for moderate environmental consequences, but is likely to occur.*
Low	*Non-compliant*	*Non-compliance with:* • *potential for moderate environmental consequences, but is unlikely to occur; or* • *potential for low environmental consequences, but is likely to occur.*
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 05_0103 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. Further 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 the Councils Kingscliff Development Control Plan.

2.2 SCOPE AND FORMAT

This Annual Review for the Quarry has been compiled by R.W. Corkery & Co. Pty. Limited on behalf of Gales-Kingscliff Pty Ltd ("the Company").

Figure 2.1
LOCALITY PLAN

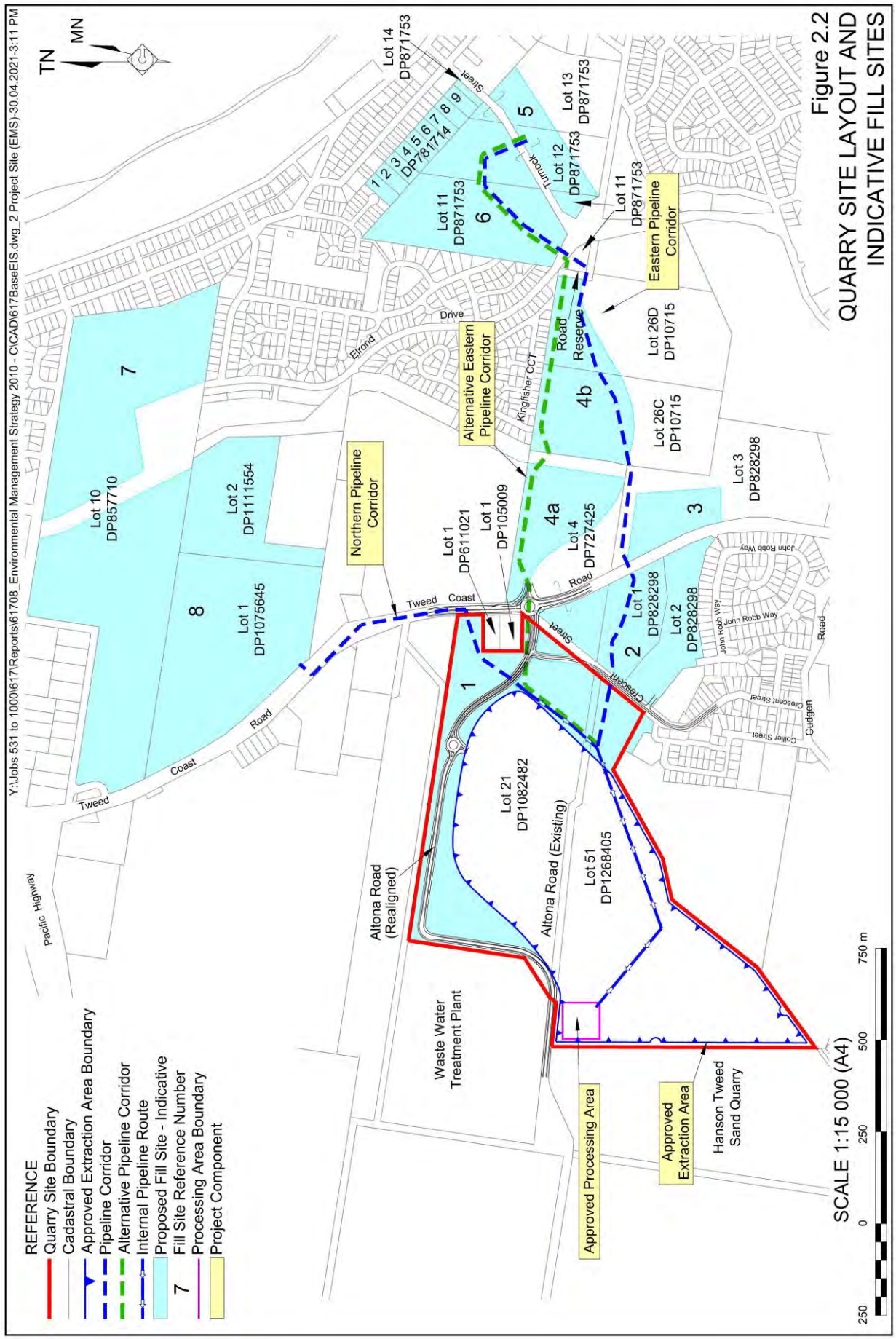
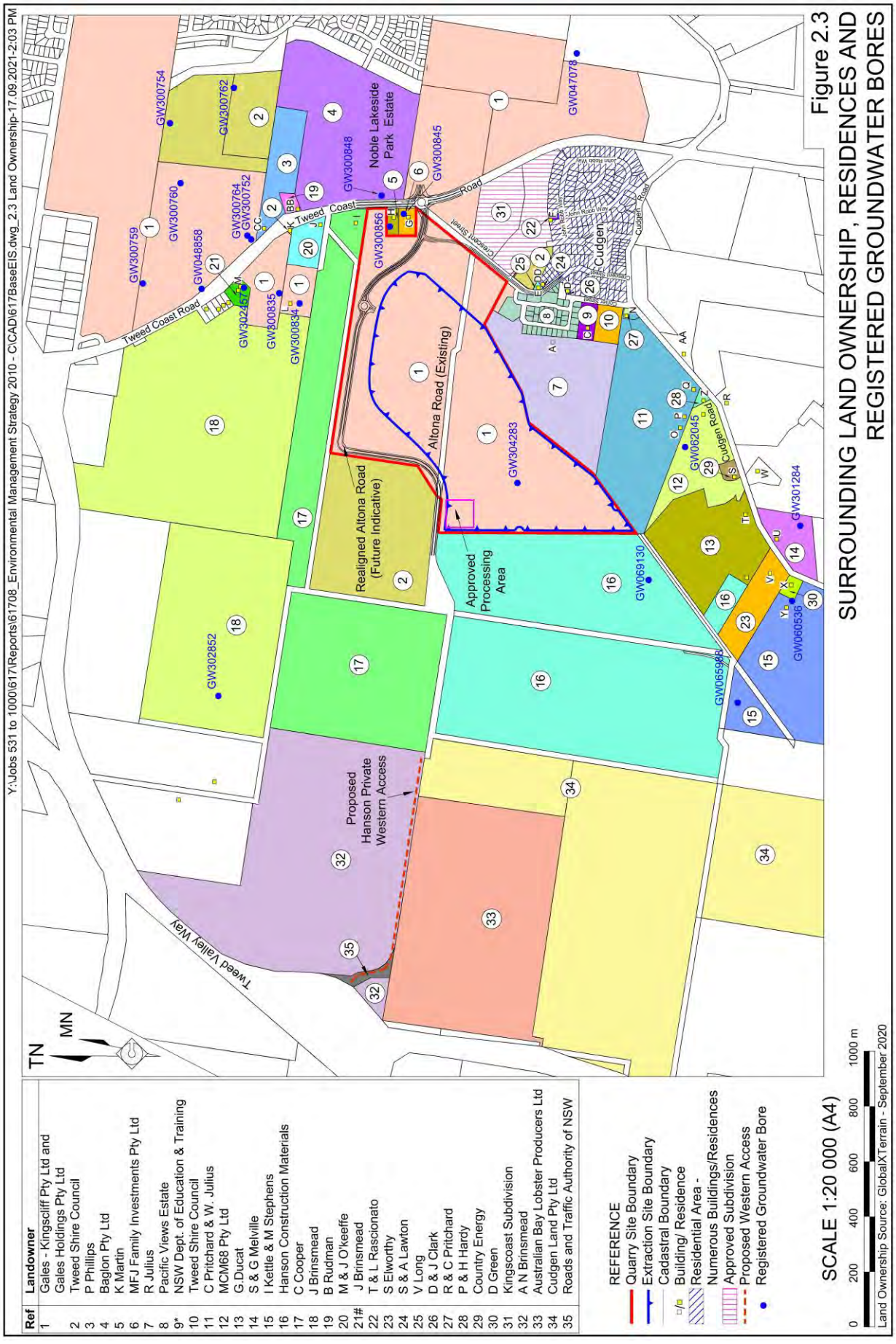


Figure 2.2
QUARRY SITE LAYOUT AND INDICATIVE FILL SITES
TN
MN
Y:\Jobs 531 to 1000\617\Reports\61708_Environmental Management Strategy 2010 - C\CAD\617BaseEIS.dwg_2 Project Site (EMS)-30.04.2021-3:11 PM
REFERENCE
Quarry Site Boundary
Cadastral Boundary
Approved Extraction Area Boundary
Pipeline Corridor
Alternative Pipeline Corridor
Internal Pipeline Route
Proposed Fill Site - Indicative
Fill Site Reference Number
Processing Area Boundary
Project Component
SCALE 1:15 000 (A4)
250
0
250
500
750 m
Lot 14 DP871753
Lot 13 DP871753
Lot 12 DP871753
Lot 11 DP871753
Lot 11 DP871753
Lot 10 DP857710
Lot 2 DP1111554
Lot 1 DP1075645
Lot 1 DP611021
Lot 1 DP105009
Lot 4 DP727425
Lot 26D DP10715
Lot 26C DP10715
Lot 3 DP828298
Lot 1 DP828298
Lot 2 DP828298
Lot 21 DP1082482
Lot 51 DP1268405
Eastern Pipeline Corridor
Alternative Eastern Pipeline Corridor
Northern Pipeline Corridor
Altona Road (Realigned)
Altona Road (Existing)
Waste Water Treatment Plant
Approved Processing Area
Approved Extraction Area
Hanson Tweed Sand Quarry
Tweed Coast Road
Pacific Highway
Elrond Drive
Kingfisher CCT
Tunnock Street
Crescent Street
John Robb Way
Collier Street
Cudgen Road
Reserve Road


Y:\Jobs 531 to 1000\617\Reports\61708_Environmental Management Strategy 2010 - C\CAD\617BaseEIS.dwg_2.3 Land Ownership-17.09.2021-2:03 PM
TN
MN
Tweed Coast Road
Tweed Valley Way
Altona Road (Existing)
Realigned Altona Road (Future Indicative)
Approved Processing Area
Proposed Hanson Private Western Access
Noble Lakeside Park Estate
Cudgen
Cudgen Road
Crescent Street
GW300754
GW300762
GW300759
GW300760
GW048858
GW300764
GW300752
GW302852
GW300835
GW300834
GW300848
GW300856
GW300845
GW047078
GW304283
GW062045
GW301284
GW069130
GW065988
GW060536
Ref
Landowner
1 Gales - Kingscliff Pty Ltd and
Gales Holdings Pty Ltd
2 Tweed Shire Council
3 P Phillips
4 Baglon Pty Ltd
5 K Martin
6 MFJ Family Investments Pty Ltd
7 R Julius
8 Pacific Views Estate
9* NSW Dept. of Education & Training
10 Tweed Shire Council
11 C Pritchard & W. Julius
12 MCM68 Pty Ltd
13 G.Ducat
14 S & G Melville
15 I Kettle & M Stephens
16 Hanson Construction Materials
17 C Cooper
18 J Brinsmead
19 B Rudman
20 M & J O'keeffe
21# J Brinsmead
22 T & L Rascionato
23 S Elworthy
24 S & A Lawton
25 V Long
26 D & J Clark
27 R & C Pritchard
28 P & H Hardy
29 Country Energy
30 D Green
31 Kingscoast Subdivision
32 A N Brinsmead
33 Australian Bay Lobster Producers Ltd
34 Cudgen Land Pty Ltd
35 Roads and Traffic Authority of NSW
REFERENCE
Quarry Site Boundary
Extraction Site Boundary
Cadastral Boundary
Building/ Residence
Residential Area - Numerous Buildings/Residences
Approved Subdivision
Proposed Western Access
Registered Groundwater Bore
SCALE 1:20 000 (A4)
0 200 400 600 800 1000 m
Land Ownership Source: GlobalXTerrain - September 2020
Figure 2.3
SURROUNDING LAND OWNERSHIP, RESIDENCES AND REGISTERED GROUNDWATER BORES

This is the eleventh (11th) Annual Review submitted for the Quarry, following one Annual Environmental Management Report, and is applicable for the period 01 July 2020 to 30 June 2021 ("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, 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	Managing 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 05_0103*	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*	18/11/2005 (licence version dated 11 June 2021)	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	28/02/2021	Issued by Water NSW at commencement of *Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016*.
DA 05/1450	18/08/2006	Not Applicable	Issued by Tweed Shire Council for the realignment of Altona Road.
DA 20/0965	12/05/2021	Not Applicable	Issued by Tweed Shire Council for filling of land within Lot 21 DP1082482.
* A compliance review is included in **Appendix 1** reflecting the conditions relevant as at the end of this reporting period.			

During the reporting period, the was a minor variation to EPL12385 to update the land parcel reference for Lot 2 DP216705 to Lot 51 DP1268405. The parcel reference for Lot 2 was updated by NSW Land and Property Information following the inclusion of additional land to Lot 2 DP216705, immediately adjacent the southeastern Quarry Site boundary (see **Figure 2.2** and **Figure 2.3**). As discussed in Section 2.1, DA 20/0965 was also determined by Tweed Shire Council on 12 May 2021 and provides for filling to raise the level of land within Lot 21 DP1082482. Activities associated with DA 20/0965 are not directly related to the Quarry and will be managed separately to activities undertaken under Project Approval 05_0103.

There were no other modifications or variations to any approvals or licences.

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. Confirmation from NRAR on this matter has previously been sought and is awaited.

4. OPERATIONS SUMMARY

4.1 EXTRACTION OPERATIONS

During the reporting period extraction activities principally involved dredging and, to a lesser extent, recovery of previously stockpiled soil material utilising an excavator and front-end loader. Dredging was undertaken on a campaign basis, operating for a total of 34 days during the reporting period.

A total of approximately[1] 22 250m^3 of sand and soil was extracted / recovered 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[1]	NA	0	0	0
ROM[1]	NA	0	0	0
Coarse Reject[2]	NA	150m^3	445m^3 #	700m^3 #
Fine Reject [2]	NA	0	668m^3 ^	1 050m^3 ^
Saleable Product[3] (transported by road)	300 000t [MP 05_0103B *Condition 2(9)*]	1 196t	28 794t	50 000t
Total Extraction	650 000m^3 [MP 05_0103B *Condition 2(8)*]	3 000m^3	22 250m^3	35 000m^3
Imported VENM	45 000t [MP 05_0103B *Condition 2(10)*]	0	3 000t	0

1. The Quarry does not generate waste rock / overburden or 'Run of Mine' material.
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.
3. 300 000t is equivalent to approximately 200 000m^3 of in-situ sand.

\# Estimate based upon average of 2% of raw material comprising shells (stockpiled as a raw material).

^ Estimate based upon average of 3% silt content washed and returned to the Silt Retention Pond.

4.2 PROCESSING AND ROAD TRANSPORTATION

During the reporting period Gales ordered and installed a state of the art CDE sand wash plant, including an EvoWash and radial stacker. Testing of the plant was undertaken during February 2021 and final commissioning and hand over completed in March 2021. A total of approximately 3 000m^3 of sand was processed through the new wash plant during the reporting period.

Prior to the commissioning of the new sand wash plant, the mobile screening plant continued to be utilised with water pumped to wash material over the screens. The wet screening process was used to separate coarse material (principally vegetative matter, rocks and shells) from loamy sand in order to produce a general use sand and a 'top dressing' product.

[1] Bulk density testing indicates a loose density of 1.36t/m^3 and 'tight' (in-situ) density of 1.5t/m^3.

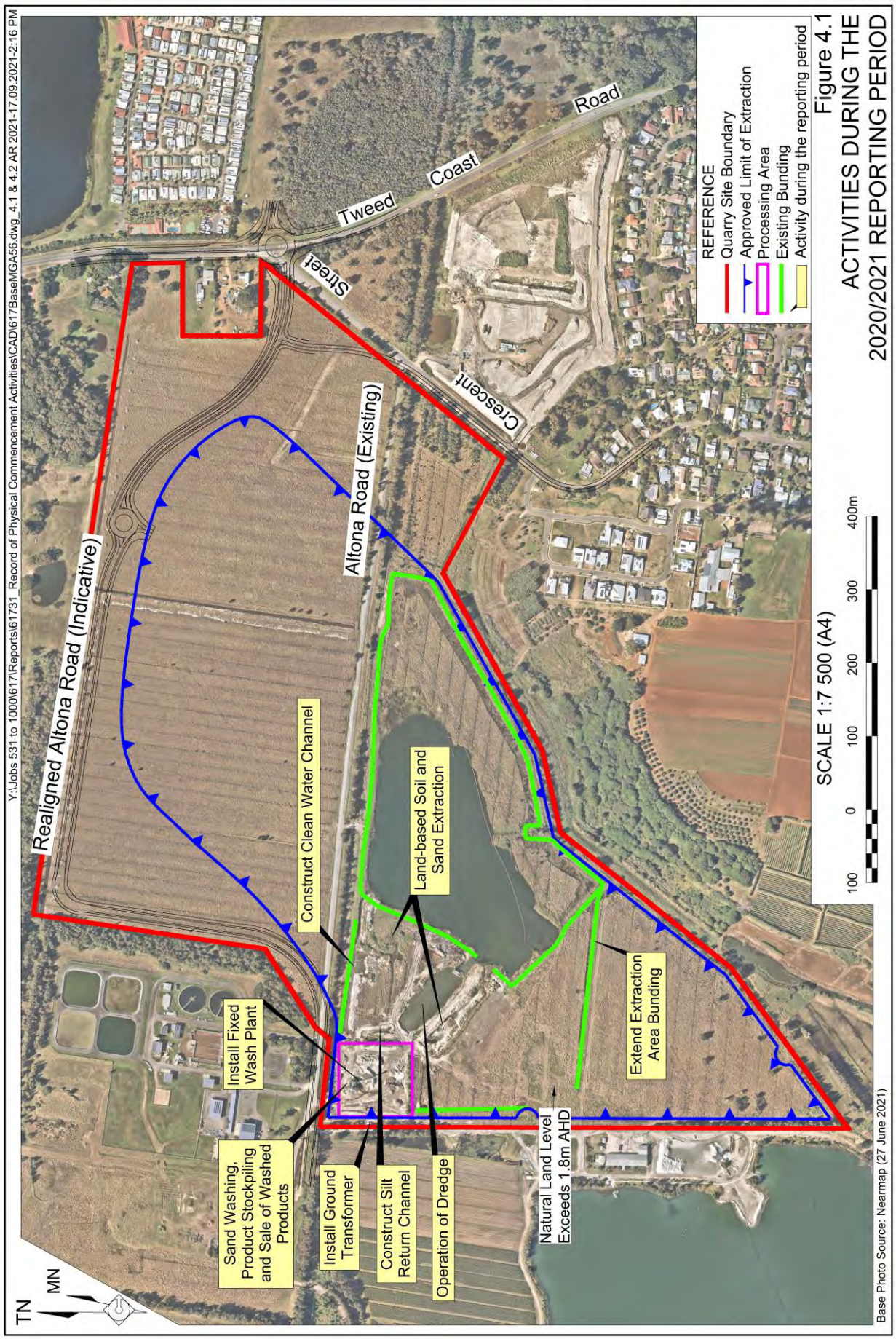


Figure 4.1
ACTIVITIES DURING THE 2020/2021 REPORTING PERIOD

Soil material was also recovered from previously limed stockpiles and did not require further testing or processing.

During the reporting period a total of 28 794t of products were transported from the Quarry by road. The highest daily number of truck loads occurred on 27 October 2021 with 92 laden-trucks dispatched, however, truck transport was highly variable, with the total truck loads for the entire week 2 weeks earlier and two weeks later being 29 and 16 respectively.

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 activities during the reporting period provided as follows.

Site Establishment and Construction Activities

During the reporting period the following key site establishment and construction activities were undertaken see also **Figure 4.1**).

- The fixed wash plant was installed, including pouring of concrete footings and electrical switch board.
- A ground-based transformer was installed to provide a connection to the electricity grid. This included formation of an elevated pad per requirements from Essential Energy. The transformer pad was formed utilising purchased VENM with suitable compaction properties. All necessary certifications and geotechnical tests were completed to ensure the required design specifications were met.
- The Silt Retention pond continued to be developed with a depth of 10m reached for the storage of returned fines.
- An above-ground return channel with end pipe was installed from the processing pad to the existing dredge pond in order to provide adequate head pressure to discharge the returned fines into the Silt Retention Pond at least 3m below the water.
- A clean water channel was created between the existing pond and the processing area to provide for supply of water to the new wash plant. The connection point to the existing dredge pond is removed from the fines return area so as to minimise the reintroduction of fines to the washed product.

Monitoring

Environmental monitoring, including noise, air quality, and water monitoring, continued throughout the reporting period. Results of this monitoring are summarised in Sections 6 and 7.

Other Activities

During the reporting period the further updated Soil and Water Management Plan was submitted 12 May 2021 and subsequently approved on 20 July 2021 (just beyond this reporting period).

Maintenance of agricultural drains was also undertaken during the reporting period and included cleaning out of the drains and removal of blockages. This was undertaken as part of general land management practices due poor drainage affecting cattle grazing and was not associated with and did not affect Quarry activities.

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 excavator/front-end loader for the production of saleable products within the processing area. These products would be transported via road. The volume of products will be dependent upon customer demand but has nominally been estimated at 50 000t (approximately 35 000m^3 minus 5% for coarse shells and fines). Based on the predicted volumes, extraction would remain within the bunded area created during the current reporting period.

Further dredging and hydraulic transfer of sand to fill sites is currently not considered likely during the next reporting period and is dependent upon finalisation of approvals and development plans for those fill sites.

Monitoring

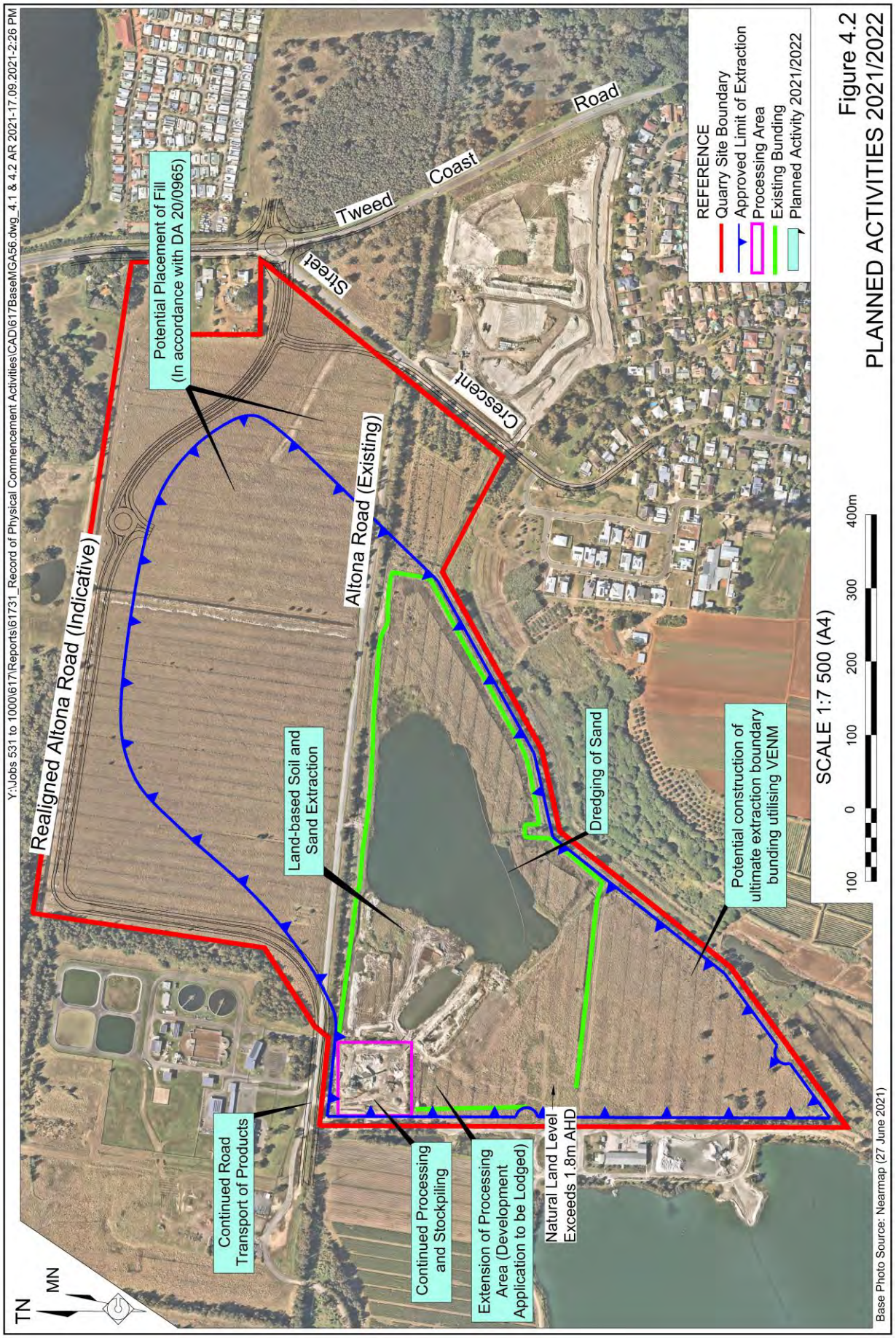
Noise, air quality, and water monitoring will continue to be undertaken as applicable and in accordance with the conditional requirements of Project Approval MP 05_0103B and the approved management plans. Acid sulfate soil testing will also be undertaken as required for products which are not washed through the wash plant.

Other Activities

A further updated version of the SWMP and updated RMP are expected to be submitted second half of 2021. Within 6 months of approval of the RMP a review of the rehabilitation bond will also be completed and submitted.

It has become apparent that the existing processing area is too small to allow adequate separation between sand and soil operations, with the risk of soil contaminating the sand necessitating cessation of soil processing and sales. A modification application is currently being prepared to increase the size of the processing area.

The formal finalising of agreements concerning maintenance of Altona Road will continue to be sought with the operator of the adjacent Tweed Sand Quarry via the resolution process with DPIE.


Y:\Jobs 531 to 1000\617\Reports\61731_Record of Physical Commencement Activities\CAD\617BaseMGA56.dwg 4.1 & 4.2 AR 2021-17.09.2021-2:26 PM
Realigned Altona Road (Indicative)
Potential Placement of Fill
(In accordance with DA 20/0965)
Tweed
Coast
Road
Street
Crescent
Altona Road (Existing)
Land-based Soil and
Sand Extraction
Dredging of Sand
Potential construction of
ultimate extraction boundary
bunding utilising VENM
Continued Road
Transport of Products
Continued Processing
and Stockpiling
Extension of Processing
Area (Development
Application to be Lodged)
Natural Land Level
Exceeds 1.8m AHD
REFERENCE
Quarry Site Boundary
Approved Limit of Extraction
Processing Area
Existing Bunding
Planned Activity 2021/2022
SCALE 1:7 500 (A4)
100 0 100 200 300 400m
TN
MN
Base Photo Source: Nearmap (27 June 2021)
Figure 4.2
PLANNED ACTIVITIES 2021/2022

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2019/2020 Annual Review was submitted to the DPIE, Tweed Shire Council, Water NSW, NRAR, and EPA on 30 September 2020. The 2019/2020 Annual Review was receipted by DPIE on 13 October 2020, however, no further follow up or actions were provided.

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. However, a new procedure was implemented to ensure that the need for noise monitoring is checked at the beginning of each quarter and organised as appropriate.
Blasting	Blasting is not an approved activity.	No blasting undertaken.	Nil.	Nil.
Air Quality	PM_{10} 24hr = 50ug/m^3 PM_{10} Annual = 30ug/m^3 TSP Annual = 90ug/m^3 Dep Dust Annual = 4g/m^2/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 rehabilitation bond for $163,375 was lodged and accepted by DPE 12/04/17. A review of the rehabilitation bond will be undertaken with 6 months of approval of the updated Rehabilitation Management Plan in accordance with *Condition 3(35)*.
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.	Processed product confirmed to have net acid neutralising capacity or not exceed threshold for classification as acid sulfate soil.	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 October 2017) and the Bureau of Meteorology's Tweed Heads Gold Club Station No. 58056. 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

	Average Monthly Rainfall (mm)												
Period	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
2017	142.8	55.6	444	28.6	100.2	211.8	15.6	6.2	1.0	212.4	142	77.2	1437.4
2018	60.8	239	147	51.6	42.6	40.2	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	***214.2***	***20.0***	***42.8***	***137.2***	***18.2***	***558.0***	2345.0
2021	***159.2***	***210.6***	***781.2***	***238.6***	***107.8***	***56.2***							
Bold italics = values relevant to this reporting period.													

Total rainfall during the 2020/2021 reporting year was 2 544.0mm, 852.7mm above the long-term average rainfall of 1 691.3mm recorded at the Tweed Heads Gold Club Station No. 58056.

6.3 NOISE

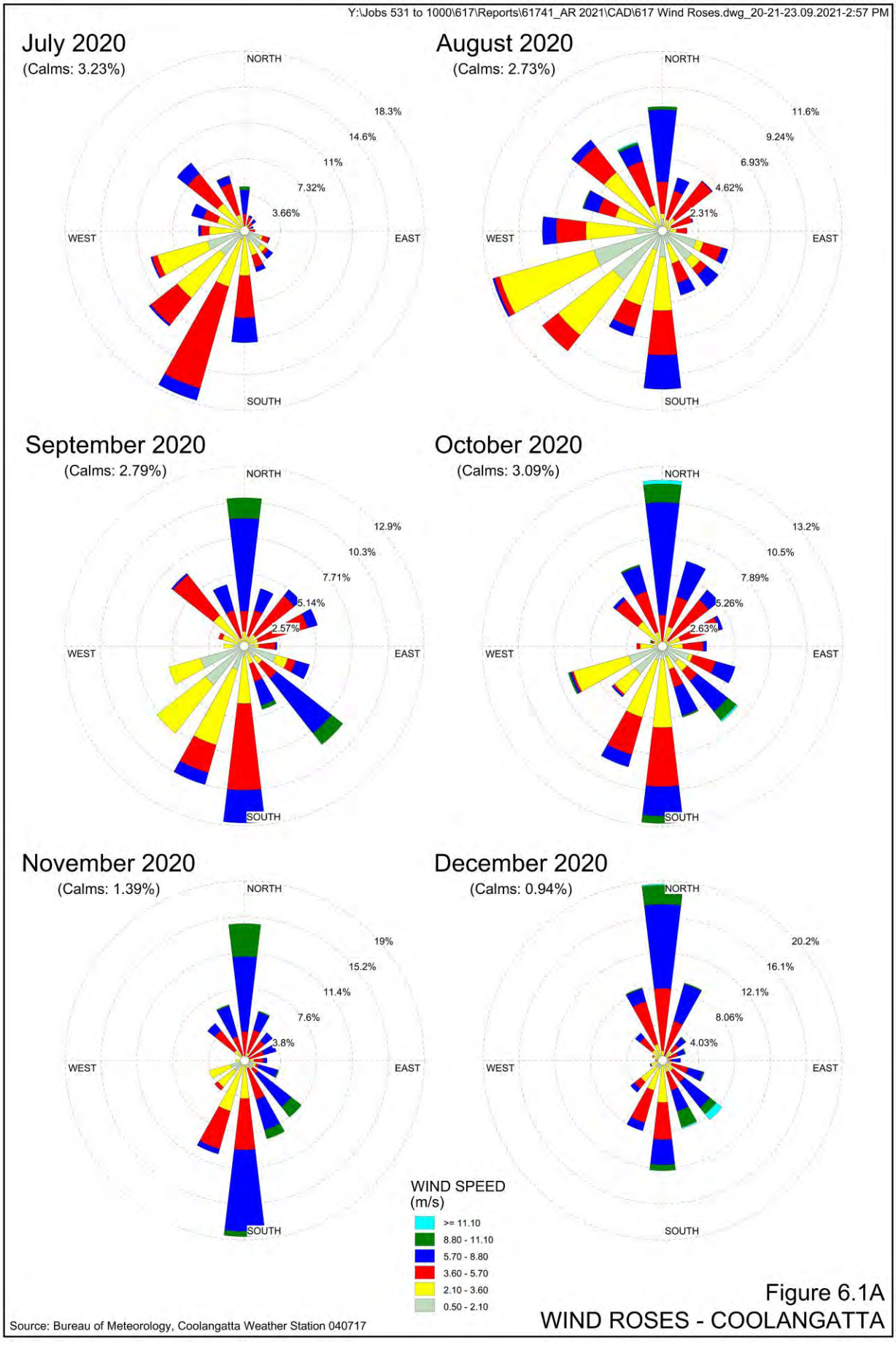
Environmental Management

Noise management was undertaken in accordance with the approved Noise Management Plan as relevant. The principal noise management measures during the reporting period included use of broadband reversing alarms, proper maintenance of equipment and adherence to hours of operation.

Environmental Performance

During the reporting period noise monitoring was undertaken 10 July and 10 December 2020 and 18 June 2021. An overview of the monitoring results for the reporting period is provided in **Table 6.3** and a copy of the monitoring reports are provided as **Appendix 2**. In summary, total noise levels at all monitoring locations exceeded the project-specific criteria (47 dB(A) $LA_{eq(15\ min)}$) during all monitoring events. 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.

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 during July 2020.



Source: Bureau of Meteorology, Coolangatta Weather Station 040717

Figure 6.1A
WIND ROSES - COOLANGATTA

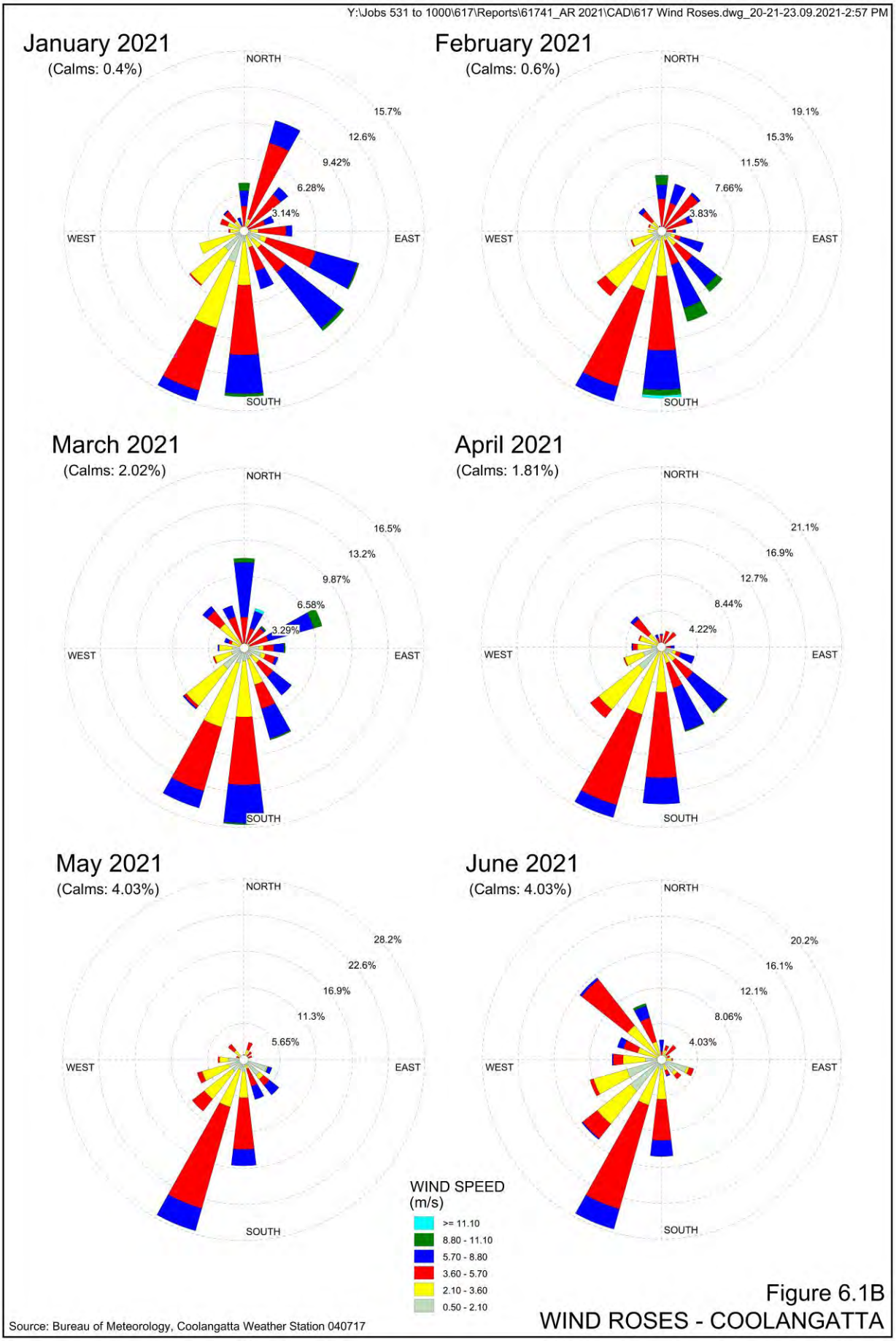


Figure 6.1B
WIND ROSES - COOLANGATTA

Table 6.3
Summary of Attended Noise Monitoring Results

Location[1]	Criteria	Attended Monitoring	Calculated Contribution[2]	Comments
	dB(A) $LA_{eq(15\ min)}$			
G *216 Tweed Coast Rd*	47	56 *(July 2020)*	42	For all monitoring events, noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
		57 *(Dec 2020)*	42	
		55 *(June 2021)*	42	
O *607 Cudgen Rd*	47	52 *(July 2020)*	45	For all monitoring events, noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible / distinguishable above background for July 2020 and was occasionally audible but not measurable above background during December 2020 and June 2021.
		47 *(Dec 2020)*	45	
		52 *(June 2021)*	45	
Pacific Views Estate *Via Collier St*	47	53 *(July 2020)*	46	For all monitoring events, noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
		52 *(Dec 2020)*	45	
		51 *(June 2021)*	45	
DD *34A Crescent St*	47	53 *(July 2020)*	43 (33)	For all monitoring events, noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
		52 *(Dec 2020)*	43 (33)	
		50 *(June 2021)*	43 (33)	
F *64 John Robb Way*	47	55 *(July 2020)*	42 (32)	For all monitoring events, noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not audible / distinguishable above background.
		53 *(Dec 2020)*	42 (32)	
		50 *(June 2021)*	42 (32)	
Note 1: See **Figure 6.2**.				
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.				

No Quarry-related noise complaints or enquiries were received during the reporting period.

Reportable Incidents and Further Improvements

Whilst no exceedances of noise criteria were recorded, the 2021 Quarter 1 noise monitoring was inadvertently not undertaken due to a miscommunication. This was identified during the review of the 2021 Quarter 2 noise monitoring report and was reported as an incident. This is further discussed in Section 11. As a result, a procedure has been put in place to ensure that the need for noise monitoring is reviewed and organised as required at the beginning of each quarter. No further improvements relating to noise management are currently planned.

6.4 AIR QUALITY

Environmental Management

During the reporting period loading and transportation of products occurred regularly, however, extraction and processing activities occurred on an infrequent basis. Deposited dust monitoring occurred throughout the entire reporting period.

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 was extracted / recovered from stockpiles by excavator, the material was moist and only transported a short distance. As such, no additional dust suppression was required.

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**.

Table 6.4
Summary of Deposited Dust Monitoring Results – 2020/2021

			Deposited Dust (g/m^2/month)					
			DG1		DG2		DG3	
Samples On	Samples Off	Month	Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average
13/07/20	13/08/20	Jul-20	2.66	ID	2.11	ID	0.17	ID
13/08/20	11/09/20	Aug-20	2.6	ID	2.70	ID	0.40	ID
11/09/20	13/10/20	Sep-20	10.0	ID	2.10	ID	0.20	ID
13/10/20	10/11/20	Oct-20	3.34	ID	1.66	ID	0.34	ID
10/11/20	10/12/20	Nov-20	0.33	ID	0.75	ID	0.37	ID
01/12/20	11/01/21	Dec-21	0.02	ID	0.04	ID	0.32	ID
11/01/21	08/02/21	Jan-21	0.87	ID	0.76	ID	0.00*	ID
08/02/21	09/03/21	Feb-21	1.44	ID	0.64	ID	2.07	ID
09/03/21	09/04/21	Mar-21	NT	ID	0.83	1.11	0.80	0.50
09/04/21	10/05/21	Apr-21	0.74	2.10	0.07	1.06	0.69	0.49
10/05/21	07/06/21	May-21	3.08	2.30	0.12	0.99	0.08	0.46
07/06/21	07/07/21	Jun-21	2.62	2.52	0.75	1.04	NT	0.49
Average			**2.52**	**-**	***1.04***	**-**	***0.49***	**-**
Monthly Maximum			***10.00***	**-**	***2.70***	**-**	***2.07***	**-**
Monthly Minimum			***0.02***	**-**	***0.04***	**-**	***0.00***	**-**

ID – Insufficient data to calculate *NT – Not Tested (sample broken in transit)* ** Suspected spurious laboratory result*

As can be seen from the results, the average monthly deposited dust levels were substantially below the criteria of 4g/m^2/month which is consistent with the low intensity of activities and the significant rainfall throughout the reporting period. The highest single monthly result of 10g/m^2 was recorded at location DG1 during the September 2020 monitoring period. However, elevated levels were not recorded at either DG2 or DG3, both of which were recorded to be either milky or clear in colour whilst DG1 was noted to be dark grey to black in colour and

containing a dead frog. As such is likely that the DG1 sample was contaminated and not representative. A review of wind conditions (see **Figure 6.1B**) during September 2020 confirms that the wind was significantly dominant from the north and south, indicating that contributions from the Quarry activities will have been minimal.

No air quality complaints were received during the reporting period.

Reportable Incidents and Further Improvements

No reportable air quality incidents occurred during the reporting period and no further improvements relating to air quality management are currently planned. In accordance with the AQMP, air quality monitoring will continue during the next reporting period whilst operational activities continue.

6.5 BIODIVERSITY

The rehabilitation bond for $163,375 was previously lodged and accepted by the (then) DPE on 12 April 2017. 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, it is noted that, in accordance with *Condition 3(35)* of MP 05_0103B the rehabilitation bond will be reviewed during the next reporting period, within 6 months of the approval of the Rehabilitation Management Plan (see Section 4.4).

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 additional topsoil stripping was undertaken with extracted soil recovered from previous soil stockpiles which were limed. As such, no soil testing was required. It is noted that, based upon the updated SWMP dated May 2021, testing of soil material (the upper 250mm of profile) is no longer required.

Validation testing was undertaken of the processed sand products as the screening process only removed coarse materials with fines retained in the product. A total of 25 validation tests were undertaken with 18 results recording a net acid neutralising capacity and the remaining 7 results remaining below thresholds. As such, validation testing confirmed none of the product is classified as acid sulfate soil and no lime was required to be applied. This is consistent with the results from all previous validation testing.

Environmental Performance, Reportable Incidents, and Further Improvements

No reportable acid sulfate soil incidents occurred during the reporting period.

As discussed in Section 4.2, the Acid Sulfate Soil and Sediment Management Plan, included within the Soil and Water Management Plan, was previously reviewed and revised with the updated plan approved 20 July 2201 (i.e. just beyond the current reporting period). Currently no further improvements or updates to acid sulfate soil management are planned.

6.8 OTHER ENVIRONMENTAL MANAGEMENT ASPECTS

In accordance with MP 05_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 with considerations currently been given to potential 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, all lunch, domestic style and consumable wastes were removed from site and disposed of either at off-site waste skips, managed by a licenced waste contractor, or taken directly to the Stotts Creek Resource Recovery Centre. The site portaloo continued to be serviced on an as required basis by Raptor Waste Management, a licenced service provider.

Non-production wastes were also generated during the installation of the fixed wash plant. These works and all associated waste management was undertaken by CDE and their contractors.

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 17.94ML and is estimated to be comprised of the following components.

- Removal of 22 250m^3 sand from below the water table (conservatively assume 100% of material extracted was below the water table) = 15.58ML.
- A 10% water loss through incorporation into products = 2.23ML.
- Water utilised for dust suppression = 0.13ML.

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 the extraction pond 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). Stripped topsoil and disturbed areas not required for ongoing operations have previously been temporarily rehabilitated through the re-establishment of pasture grass.

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

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

Environmental Performance

Water monitoring during the reporting period was undertaken within the extraction pond and surrounding groundwater bores during both non-operational periods and operational periods. Operational periods consisted of intermittent dredge operation and processing of extracted material over a total of 34 days during the reporting period, with a maximum continuous operating period of five 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 extraction pond including two edge locations (DP2 and DP3) as well as one in the approximate centre of the pond (DP1) (see **Figure 7.1**). Monitoring at 1m or 2m depth intervals to the bottom of the extraction pond also occurs at monitoring location DP1.

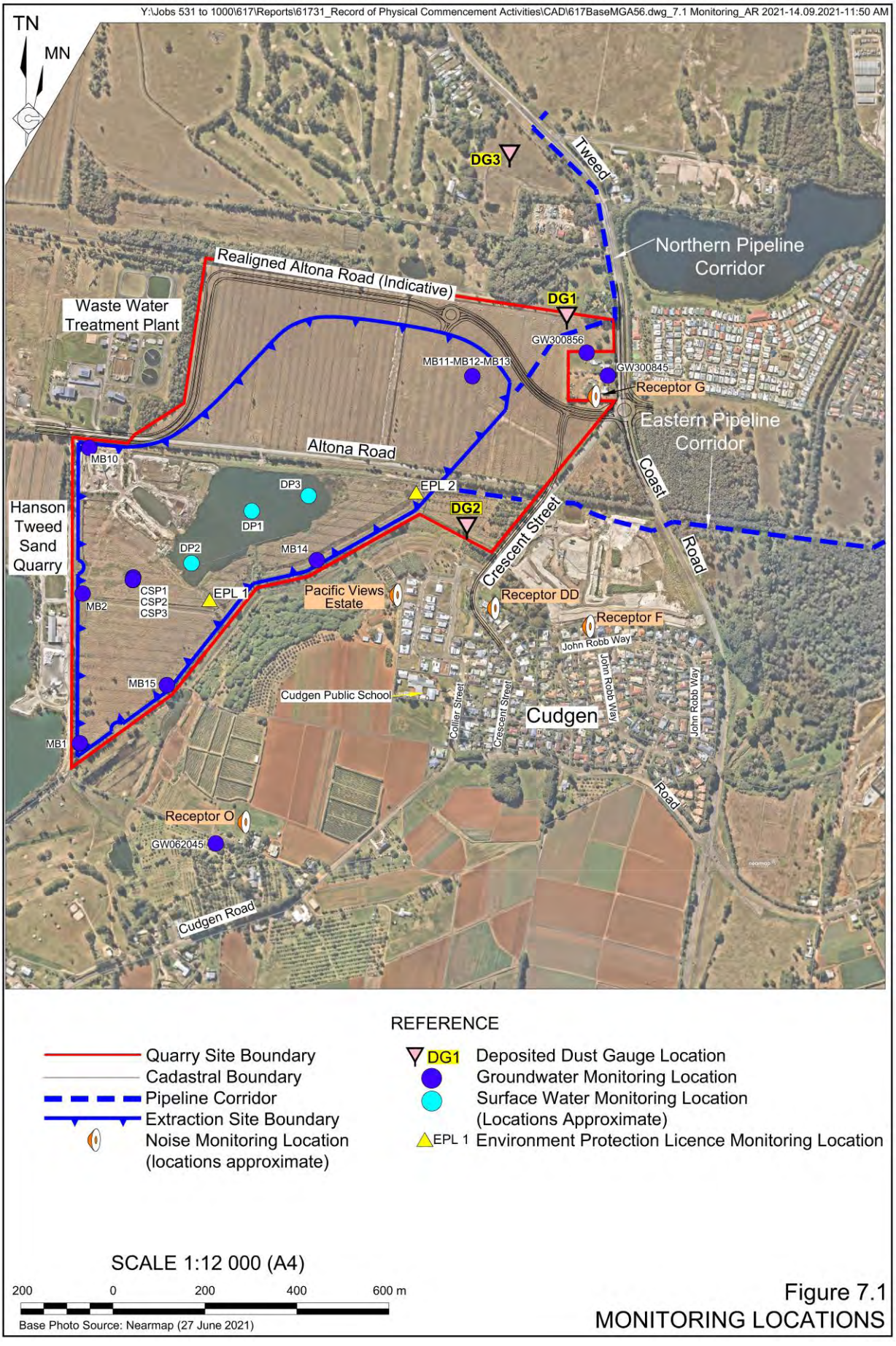


Figure 7.1
MONITORING LOCATIONS

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 non-summarised results 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**).

Figure 7.2a Surface Water Quality Parameters – Electrical Conductivity

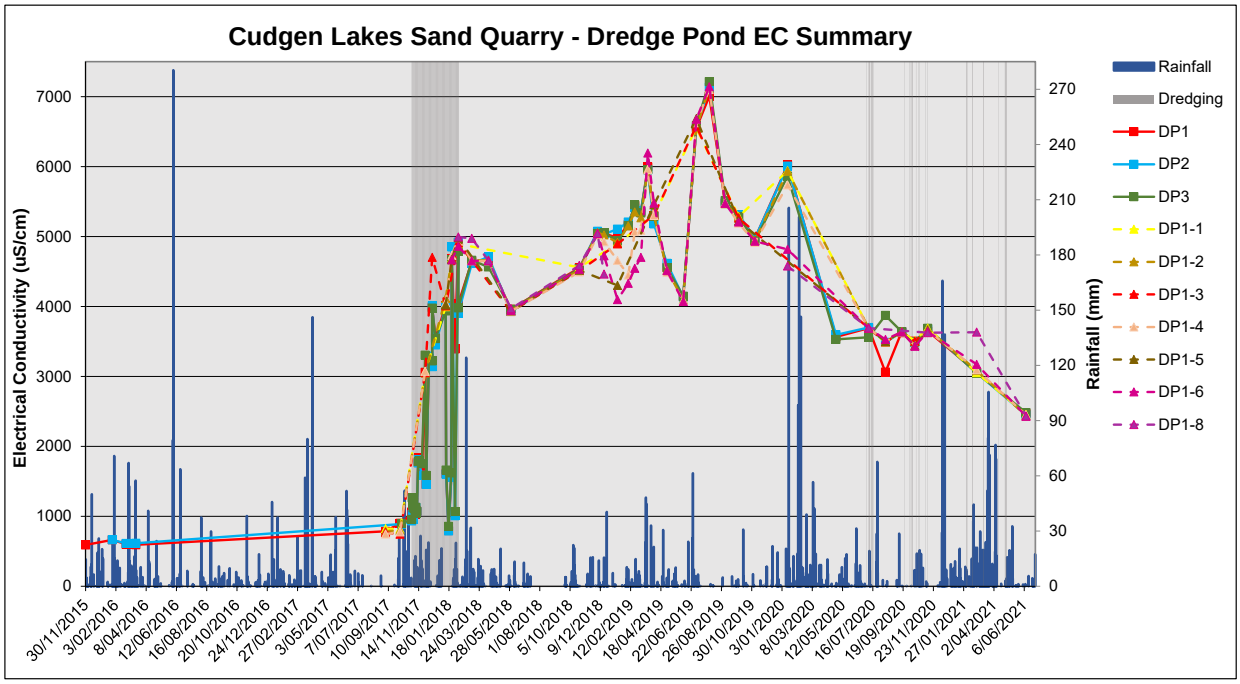


Figure 7.2b Surface Water Quality Parameters – pH

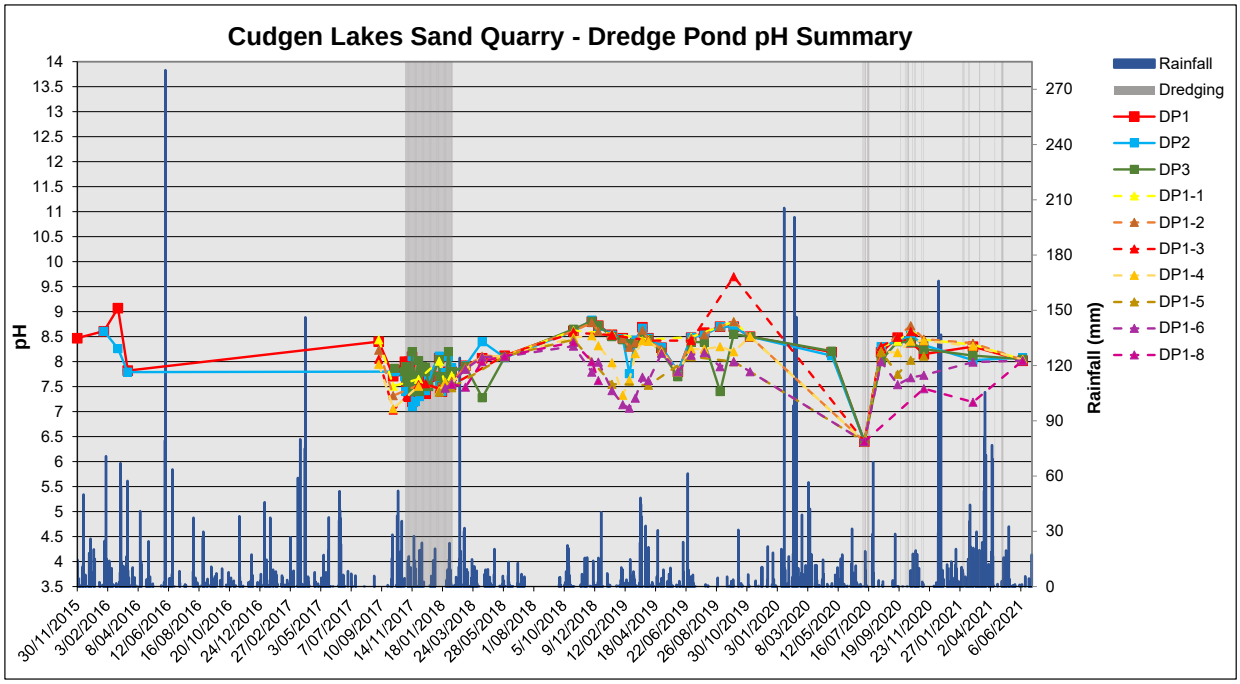
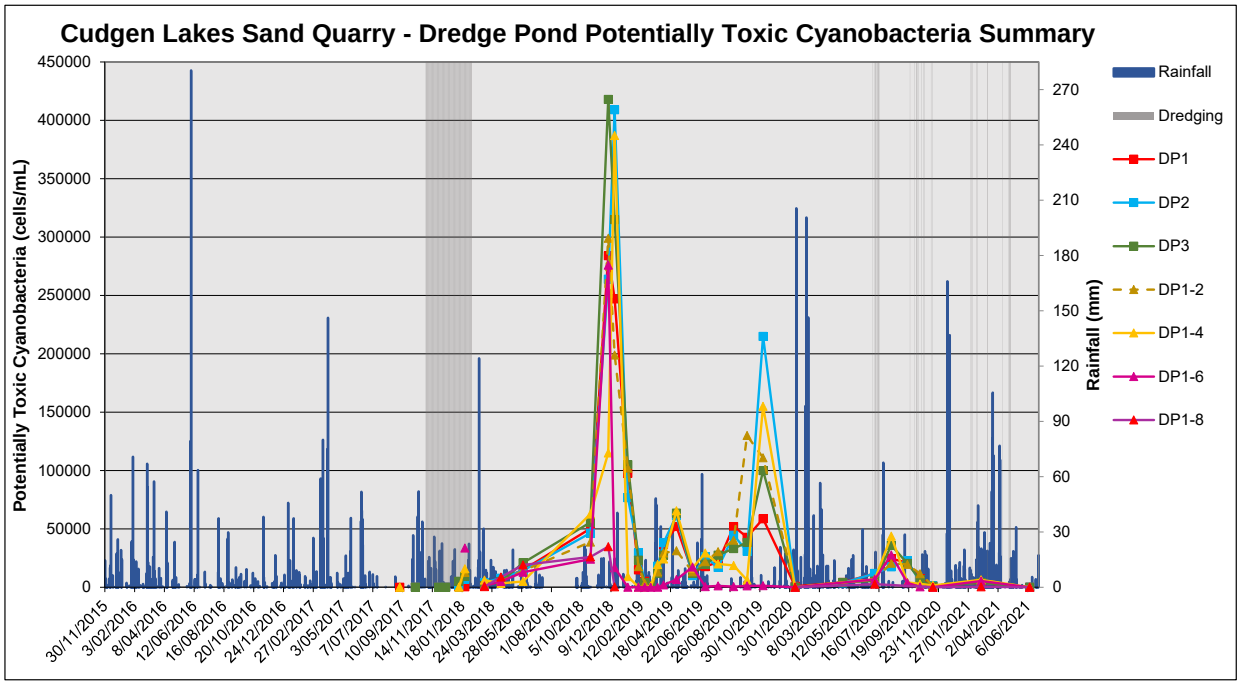


Figure 7.2c Surface Water Quality Parameters – Potentially Toxic Cyanobacteria



Physical Parameters and Major Cations and Anions

To date, extraction has reached a depth of approximately -12m AHD and, as expected, the EC levels within the extraction pond rapidly increased as the deeper water was encountered. Since cessation of the first dredging campaign in February 2018, the EC within the extraction pond has fluctuated. During the reporting period, measured EC values ranged from 2 431µS/cm to 3 871µS/cm. The highest ECs at all monitoring locations were generally recorded during July 2020 with an overall downward trend throughout the reporting period (see **Figure 7.2a**). The EC levels recorded in June 2021 (2 431µS/cm to 2 483µS/cm) are the lowest EC levels since the cessation of the first dredging campaign. This decrease followed substantial rainfall during 2020, with additional significant rainfall recorded in March 2021 and April 2021 following the 24 February 2021 sampling round.

Declining cations and anions were similarly recorded during the reporting period, consistent with long term EC value trends since the cessation of the first dredging campaign. As extraction depth increases, EC values (and major cations and anions) within the extraction pond are expected to increase for a period of time as deeper groundwater is encountered and prior to further lateral expansion mixing this with the additional fresh upper layers.

Consistent with the majority of surrounding groundwater monitoring bores, the pH within the extraction pond has largely remained slightly alkaline both prior to, during and following intermittent dredging operations during the reporting period.

Table 7.1
Surface Water Monitoring Data Summary

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae									
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		-	6.5-8.5	<3000	>6	-	-	5-20	10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	0.01	<0.005	0.35	-	-	-	<20	0.01	<1000/100	<230/100	<50000	<10
DP1																															
Pre-Extraction	**Average**	26.6	8.27	717	6.78	108.0	16	**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**	**1070**	**567**	5	6
	Maximum	28.3	**9.07**	901	9.24	192.0	68	**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**	**4800**	**1180**	5	10
	Minimum	24.5	7.71	591	**5.87**	48.7	2	**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**	40	10	5	2
Reporting Period (2020/2021)	**Average**	21.4	7.99	**3296**	9.53	79.8	7	13.0	5	**518**	84	77	18	985	200	149	0.019	0.002	0.05	**0.017**	0.001	**0.81**	0.01	0.02	0.79	0.07	**0.03**	137	105	9984	6
	Maximum	26.8	8.48	**3691**	10.67	124.0	15	**55.4**	5	**581**	96	88	20	**1080**	233	180	0.030	0.002	0.05	**0.030**	0.002	**1.00**	0.02	0.04	0.90	0.20	**0.06**	640	**280**	24600	**13**
	Minimum	16.7	**6.40**	2465	8.35	50.6	5	**2.5**	5	392	70	56	14	762	165	126	0.010	0.002	0.05	0.010	0.001	**0.60**	0.01	0.01	0.60	0.01	0.01	10	10	5	1
All Results (2015-2021)	**Average**	23.6	8.02	**3125**	**5.97**	102.2	10	**21.8**	5	**576**	99	85	20	**1036**	238	175	0.032	0.002	0.05	**0.034**	**0.007**	**1.05**	0.01	0.02	1.03	0.06	**0.03**	394	**403**	32592	**12**
	Maximum	30.9	**9.07**	**7007**	10.67	224.0	68	**156.0**	5	**833**	137	**125**	28	**1400**	364	270	0.190	0.005	0.07	**0.150**	**0.020**	**1.60**	0.02	0.12	1.60	0.37	**0.13**	**4800**	**2160**	**284000**	**51**
	80th Percentile	27.0	8.48	**4992**	8.56	168.8	11	**20.7**	5	**736**	126	**111**	24	**1350**	315	226	0.040	0.002	0.05	**0.050**	**0.010**	**1.30**	0.01	0.04	1.30	0.10	**0.04**	444	**828**	**50300**	**15**
	Median	23.0	8.00	**3391**	**5.68**	107.0	5	7.1	5	**639**	110	98	22	**1180**	292	180	0.020	0.002	0.05	**0.030**	0.005	**1.00**	0.01	0.01	1.00	0.02	0.01	110	120	12250	10
	20th Percentile	20.9	7.65	1055	**4.02**	44.0	5	**2.9**	4	450	70	67	15	874	182	134	0.010	0.001	0.05	0.010	0.001	**0.80**	0.01	0.01	0.80	0.01	0.01	20	18	825	5
	Minimum	16.7	**6.40**	591	**0.20**	-110.0	2	**-9.7**	2	64	24	11	7	110	14	57	0.010	0.001	0.01	0.010	0.001	**0.50**	0.01	0.01	0.50	0.01	0.01	10	10	5	1
DP2																															
Pre-Extraction	**Average**	26.3	8.12	695	**4.87**	114.7	6	**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**	139	188	5	9
	Maximum	27.5	**8.61**	890	6.41	194.0	9	**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**	150	**340**	5	9
	Minimum	23.7	7.79	613	**3.43**	58.8	4	**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**	128	50	5	9
Reporting Period (2020/2021)	**Average**	21.5	8.01	**3356**	9.45	66.5	5	11.9	5	**524**	85	77	18	986	202	148	0.019	0.002	0.05	**0.02**	0.002	**0.82**	0.01	0.02	0.8	0.09	**0.03**	123	75	8819	6
	Maximum	26.7	**8.53**	**3700**	10.60	116.0	5	**45.8**	5	**602**	96	90	20	**1080**	236	174	0.040	0.002	0.05	**0.03**	**0.006**	**1.00**	0.02	0.04	0.9	0.20	**0.06**	620	180	22600	**11**
	Minimum	17.1	**6.40**	2451	8.15	-21.7	5	**3.0**	5	392	69	56	14	782	163	127	0.010	0.001	0.05	0.01	0.001	**0.70**	0.01	0.01	0.6	0.01	0.01	10	10	5	2
All Results (2015-2021)	**Average**	23.5	7.99	**3215**	6.05	131.0	7	19.1	5	**602**	103	91.14	21	**1107**	252	179	0.02	0.002	0.05	**0.03**	**0.006**	**1.04**	0.01	0.02	1.0	0.06	**0.03**	160	208	42169	**12**
	Maximum	32	**8.83**	**7136**	10.60	1322.0	38	**143**	5	**844**	137	**126**	28	**1420**	335	270	0.10	0.005	0.07	**0.1**	**0.020**	**1.40**	0.02	0.11	1.4	0.36	**0.13**	820	**1180**	**409000**	**40**
	80th Percentile	27	8.49	**5076**	8.71	204.0	9	**24.46**	5	**741**	126	**113**	25	**1348**	316	226	0.04	0.002	0.05	**0.048**	**0.010**	**1.20**	0.01	0.04	1.2	0.13	**0.04**	180	**340**	44980	**15**
	Median	22.7	7.91	**3489**	**5.65**	116.0	5	7.2	5	**674**	112	99	23	**1250**	294	178	0.02	0.002	0.05	**0.02**	0.004	**1.00**	0.01	0.01	1	0.02	0.01	100	120	11900	9
	20th Percentile	21.2	7.60	1069	**3.98**	41.5	5	**3.58**	4.6	**530**	86	77.8	18	996.8	190	137	0.01	0.001	0.05	0.01	0.001	**0.80**	0.01	0.01	0.8	0.01	0.01	30	20	1095	6
	Minimum	17.1	**6.40**	613	**0.19**	-109.0	4.3	**-9.9**	2	64	25	12	7	110	14	94	0.01	0.001	0.01	0.01	0.001	**0.60**	0.01	0.01	0.6	0.01	0.01	10	10	5	2
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	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	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	ND	ND	ND	5	7
Reporting Period (2020/2021)	**Average**	21.2	7.95	**3398**	9.50	57.9	5	**22.6**	5	**524**	85	78	18	983	202	147	0.020	0.002	0.05	**0.016**	0.002	**0.81**	0.01	0.02	0.80	0.08	**0.02**	33	40	10451	7
	Maximum	26.6	8.40	**3871**	10.50	137.0	8	**95.0**	5	**590**	97	89	20	**1080**	235	174	0.030	0.002	0.05	**0.030**	0.005	**1.00**	0.02	0.04	1.00	0.20	**0.06**	80	130	36000	**11**
	Minimum	16.7	**6.40**	2483	8.35	-180.1	5	**2.1**	5	393	70	57	14	779	164	126	0.010	0.002	0.05	0.010	0.001	**0.60**	0.01	0.01	0.60	0.01	0.01	10	10	5	2
All Results (2015-2021)	**Average**	23.4	7.95	**3368**	6.01	105.3	9	16.1	5	**646**	111	98	22	**1187**	272	189	0.020	0.002	0.05	**0.028**	0.005	**1.06**	0.01	0.02	1.04	0.07	**0.03**	89	182	41667	**12**
	Maximum	30.8	**8.81**	**7215**	10.50	225.0	54	**139.0**	5	**846**	136	**126**	28	**1400**	333	273	0.050	0.005	0.10	**0.120**	**0.010**	**1.50**	0.02	0.14	1.50	0.36	**0.16**	330	**1620**	**418000**	**48**
	80th Percentile	26.9	8.39	**5047**	8.81	195.8	11	**25.7**	5	**741**	127	**111**	24	**1334**	317	231	0.030	0.002	0.05	**0.042**	**0.010**	**1.22**	0.01	0.04	1.20	0.14	**0.05**	126	216	41840	**16**
	Median	22.6	7.90	**3560**	**5.30**	116.4	5	7.9	5	**668**	115	100	23	**1250**	300	184	0.020	0.002	0.05	**0.020**	0.002	**1.10**	0.01	0.01	1.10	0.04	0.01	65	65	11900	10
	20th Percentile	20.8	7.60	1189	**3.92**	40.8	5	**2.7**	5	**558**	89	85	19	**1026**	208	146	0.010	0.001	0.05	0.010	0.001	**0.80**	0.01	0.01	0.80	0.01	0.01	14	24	1015	6
	Minimum	16.7	**6.40**	857	**0.19**	-180.1	5	**-9.7**	5	393	64	57	14	779	164	126	0.010	0.001	0.05	0.010	0.001	**0.60**	0.01	0.01	0.60	0.01	0.01	10	10	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

This page has intentionally been left blank

This page has intentionally been left blank

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

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae									
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		*-*	*6.5-8.5*	*<3000*	*>6*	*-*	*-*	*5-20*	*10*	*<500*	*-*	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	*-*	*-*	*-*	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
DP1-1																															
Pre-Extraction	**Average**	22.8	7.98	822	**5.76**	87.7	34	**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**	245	**425**	5	1
	Maximum	24.0	8.44	824	7.01	121.0	62	**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**	480	**840**	5	1
	Minimum	21.5	7.51	819	**4.51**	54.4	5	**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	10	10	5	1
Reporting Period (2020/2021)	**Average**	21.4	8.08	**3362**	9.56	74.9	5	13.7	5	**523**	86	78	18	983	200	149	0.021	0.002	0.05	**0.054**	0.003	**0.81**	0.011	0.02	0.80	0.05	**0.03**	77	82	ND	ID
	Maximum	26.7	**8.63**	**3694**	10.71	121.0	6	**60.1**	5	**602**	98	90	20	**1080**	238	183	0.030	0.002	0.05	**0.290**	**0.007**	**1.00**	0.02	0.04	1.00	0.18	**0.06**	220	**240**	ND	ID
	Minimum	16.8	**6.40**	2456	8.56	20.5	5	**2.4**	5	400	72	58	14	767	166	126	0.010	0.001	0.05	0.010	0.001	**0.70**	0.01	0.01	0.60	0.01	0.01	10	10	ND	ID
All Results (2015-2021)	**Average**	24.0	8.13	**3914**	6.72	63.5	12	**24.8**	5	**565**	100	85	20	**1026**	228	171	0.024	0.002	0.05	**0.050**	**0.005**	**0.97**	0.011	0.02	0.96	0.07	**0.02**	139	155	5	3.5
	Maximum	30.6	**8.80**	**6553**	10.71	121.0	62	**149.0**	5	**838**	153	**121**	28	**1410**	334	263	0.070	0.005	0.06	**0.290**	**0.010**	**1.40**	0.02	0.12	1.40	0.29	**0.13**	480	**840**	5	6
	80th Percentile	27.5	**8.57**	**5286**	9.50	94.5	9	**53.6**	5	**740**	126	**112**	24	**1326**	309	224	0.034	0.002	0.05	**0.080**	**0.010**	**1.20**	0.01	0.04	1.20	0.14	**0.04**	268	**252**	ID	ID
	Median	24.6	8.38	**3694**	6.50	67.6	5	7.7	5	**584**	98	88	20	**1065**	234	163	0.020	0.002	0.05	**0.020**	0.005	**1.00**	0.01	0.01	1.00	0.04	0.01	90	100	5	3.5
	20th Percentile	18.7	7.62	**3053**	**4.51**	20.5	5	**3.8**	5	431	77	64	16	855	181	134	0.010	0.001	0.05	0.010	0.001	**0.70**	0.01	0.01	0.70	0.01	0.01	16	10	ID	ID
	Minimum	16.8	**6.40**	819	**2.16**	-2.0	5	**2.4**	5	98	33	17	7	179	39	98	0.010	0.001	0.05	0.010	0.001	**0.40**	0.01	0.01	0.40	0.01	0.01	10	10	5	1
DP1-2																															
Pre-Extraction	**Average**	21.6	7.78	793	**5.09**	94.9	26	**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**	245	**510**	5	2
	Maximum	23.0	8.23	798	6.86	126.0	46	**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**	450	**1010**	5	2
	Minimum	20.1	7.32	787	**3.32**	63.8	5	**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**	40	10	5	2
Reporting Period (2020/2021)	**Average**	20.8	8.11	**3359**	9.60	77.4	5	9.9	5	**524**	85	78	18	988	203	149	0.017	0.002	0.05	**0.027**	0.001	**0.83**	0.01	0.02	0.80	0.07	**0.03**	52	48	9498	7
	Maximum	26.6	**8.72**	**3692**	10.72	119.0	5	**33.5**	5	**586**	100	88	20	**1080**	236	175	0.030	0.002	0.05	**0.110**	0.004	**1.20**	0.02	0.04	1.10	0.24	**0.06**	120	120	20600	**12**
	Minimum	16.8	**6.40**	2438	8.77	35.2	5	**2.9**	5	397	71	58	14	787	164	126	0.010	0.001	0.05	0.010	0.001	**0.60**	0.01	0.01	0.60	0.01	0.01	10	10	5	2
All Results (2015-2021)	**Average**	23.5	8.20	**4412**	6.97	52.8	10	17.9	5	**626**	108	95	22	**1145**	261	183	0.023	0.002	0.05	**0.031**	0.005	**1.03**	0.011	0.02	1.01	0.08	**0.02**	104	139	39417	**11**
	Maximum	29.0	**8.80**	**7123**	10.72	127.0	53	**166.0**	5	**831**	146	**123**	28	**1410**	345	270	0.110	0.005	0.10	**0.110**	**0.010**	**1.40**	0.02	0.11	1.40	0.36	**0.13**	450	**1010**	**299000**	**32**
	80th Percentile	27.3	**8.61**	**5318**	8.93	98.4	13	**22.6**	5	**734**	128	**113**	25	**1344**	314	224	0.030	0.002	0.05	**0.050**	**0.010**	**1.24**	0.01	0.04	1.20	0.15	**0.04**	132	138	40000	**13**
	Median	24.0	8.38	**4663**	7.26	63.8	5	7.3	5	**686**	112	**101**	24	**1255**	289	179	0.020	0.002	0.05	**0.020**	0.003	**1.00**	0.01	0.01	1.00	0.04	0.01	50	60	13700	9
	20th Percentile	19.2	7.72	**3496**	**5.37**	1.3	5	**3.2**	5	**548**	88	82	19	**1022**	198	143	0.010	0.001	0.05	0.010	0.001	**0.80**	0.01	0.01	0.80	0.01	0.01	38	10	1480	6
	Minimum	16.8	**6.40**	787	**2.17**	-106.0	5	**-9.8**	5	96	33	17	7	176	44	97	0.010	0.001	0.05	0.010	0.001	**0.40**	0.01	0.01	0.40	0.01	0.01	10	10	5	2
DP1-3																															
Pre-Extraction	**Average**	21.0	7.54	756	**4.57**	100.8	27	**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**	210	**395**	5	2
	Maximum	22.8	8.05	769	6.02	125.0	48	**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**	400	**770**	5	2
	Minimum	19.1	7.03	743	**3.12**	76.6	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**	20	20	5	2
Reporting Period (2020/2021)	**Average**	20.2	8.04	**3594**	9.70	94.9	5	11.1	5	**566**	90	85	19	**1046**	207	156	0.020	0.002	0.05	**0.020**	0.003	**0.86**	0.01	0.02	0.86	0.05	**0.02**	80	**255**	**ND**	**ND**
	Maximum	23.4	**8.60**	**3691**	10.78	117.0	5	**27.6**	5	**609**	92	91	21	**1090**	236	178	0.030	0.002	0.05	**0.040**	0.005	**1.00**	0.02	0.04	1.00	0.19	**0.05**	170	**910**	**ND**	**ND**
	Minimum	16.7	**6.40**	**3494**	9.00	81.8	5	**3.0**	5	**537**	88	82	18	**1020**	182	140	0.010	0.001	0.05	0.010	0.001	**0.80**	0.01	0.01	0.80	0.01	0.01	40	10	**ND**	**ND**
All Results (2015-2021)	**Average**	23.0	8.07	**3920**	6.18	66.7	15	29.2	5	**568**	102	86	20	**1043**	231	186	0.021	0.002	0.05	**0.035**	**0.006**	**1.01**	0.012	0.03	0.99	0.10	**0.03**	99	167	12753	5
	Maximum	28.8	**9.70**	**6577**	10.78	125.0	88	163.0	5	**765**	133	**115**	25	**1380**	330	270	0.050	0.005	0.05	**0.140**	**0.010**	**1.60**	0.02	0.11	1.50	0.30	**0.13**	400	**910**	25500	8
	80th Percentile	27.6	**8.55**	**5054**	9.15	92.7	12	37.1	5	**712**	130	**108**	24	**1294**	304	249	0.030	0.002	0.05	**0.058**	**0.010**	**1.26**	0.016	0.04	1.26	0.20	**0.05**	186	180	ID	ID
	Median	23.2	8.30	**3927**	6.00	81.8	6	9.8	5	**622**	104	94	22	**1105**	244	180	0.015	0.002	0.05	**0.020**	**0.008**	**1.00**	0.01	0.01	1.00	0.05	**0.02**	40	80	12753	5
	20th Percentile	18.7	7.50	**3318**	**3.11**	25.2	5	**3.8**	5	488	88	76	18	937	186	139	0.010	0.001	0.05	0.010	0.001	**0.80**	0.01	0.01	0.80	0.01	0.01	22	10	ID	ID
	Minimum	16.7	6.40	743	**1.07**	-14.0	5	**3.0**	5	96	33	17	7	174	43	96	0.010	0.001	0.05	0.010	0.001	**0.50**	0.01	0.01	0.50	0.01	0.01	10	10	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

This page has intentionally been left blank

This page has intentionally been left blank

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

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae									
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		*-*	*6.5-8.5*	*<3000*	*>6*	*-*	*-*	*5-20*	*10*	*<500*	*-*	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	*-*	*-*	*-*	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
DP1-4																														
Pre-Extraction	**Average**	20.3	7.51	762	**3.68**	103.1	34	**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**	290	**850**	5	2
	Maximum	22.7	7.95	777	**5.57**	125.0	61	**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**	290	**850**	5	2
	Minimum	17.9	7.06	746	**1.79**	81.1	7	**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**	290	**850**	5	2
Reporting Period (2020/2021)	**Average**	20.0	7.99	**3352**	8.34	85.1	6	8.7	5	**520**	85	77	18	981	198	157	0.016	0.002	0.05	**0.014**	0.002	**0.79**	0.01	0.02	0.76	0.09	**0.03**	47	50	9389	7
	Maximum	25.7	8.42	**3695**	9.60	115.0	12	**23.4**	5	**605**	94	91	20	**1080**	232	175	0.030	0.002	0.05	**0.020**	0.004	**1.00**	0.02	0.04	0.90	0.23	**0.06**	140	80	43800	**11**
	Minimum	16.6	**6.40**	2448	**5.64**	50.6	5	**2.8**	5	390	69	56	14	758	163	128	0.010	0.001	0.05	0.010	0.001	**0.60**	0.01	0.01	0.60	0.01	0.01	10	10	5	3
All Results (2015-2021)	**Average**	22.6	8.00	**4353**	**5.17**	33.4	106	**20.6**	5	**623**	109	94	22	**1140**	260	195	0.018	0.002	0.05	**0.081**	**0.005**	**1.15**	0.01	0.02	1.14	0.09	**0.03**	86	133	34219	**14**
	Maximum	28.1	**8.52**	**7103**	9.60	137.6	2660	**166.0**	5	**833**	146	**124**	28	**1410**	333	264	0.050	0.005	0.19	**1.810**	**0.010**	**7.30**	0.02	0.14	7.30	0.37	**0.14**	420	**850**	**387000**	**89**
	80th Percentile	26.0	8.41	**5214**	8.14	100.1	8	**25.4**	5	**744**	128	**112**	25	**1334**	309	233	0.030	0.002	0.05	**0.040**	**0.010**	**1.20**	0.01	0.03	1.20	0.20	**0.04**	122	172	40920	**15**
	Median	22.9	8.17	**4651**	**5.15**	60.3	5	5.9	5	**683**	112	**102**	24	**1250**	287	190	0.010	0.002	0.05	**0.020**	0.004	**1.00**	0.01	0.01	0.95	0.05	0.01	40	70	6625	9
	20th Percentile	18.1	7.58	**3486**	**2.78**	-22.8	5	**3.2**	5	**540**	88	82	19	**1020**	198	165	0.010	0.001	0.05	0.010	0.001	**0.76**	0.01	0.01	0.70	0.02	0.01	10	10	352	6
	Minimum	16.6	**6.40**	746	**0.33**	-219.7	5	**-9.8**	5	90	33	17	6	173	43	97	0.010	0.001	0.05	0.010	0.001	**0.40**	0.01	0.01	0.40	0.01	0.01	10	10	5	2
DP1-5																														
Reporting Period (2020/2021)	**Average**	18.6	7.70	**3585**	6.27	91.0	5	11.7	5	**558**	88	83	19	**1038**	205	171	0.022	0.002	0.05	**0.014**	0.002	**0.82**	0.01	0.02	0.80	0.05	**0.03**	28	40	**ND**	**ND**
	Maximum	22.1	8.20	**3693**	9.50	120.0	5	**24.6**	5	**587**	95	88	20	**1080**	231	177	0.060	0.002	0.05	**0.020**	0.004	**1.00**	0.02	0.04	1.00	0.14	**0.05**	50	100	**ND**	**ND**
	Minimum	16.7	**6.40**	**3442**	**2.56**	47.8	5	**2.6**	5	**540**	85	81	18	**1020**	185	159	0.010	0.001	0.05	0.010	0.001	**0.70**	0.01	0.01	0.70	0.01	0.01	10	20	**ND**	**ND**
All Results (2015-2021)	**Average**	21.3	7.76	**4408**	**3.84**	32.3	6	**21.9**	5	**640**	113	96	22	**1185**	256	210	0.027	0.002	0.07	**0.023**	0.005	**0.93**	0.01	0.02	0.92	0.10	**0.03**	67	87	22300	8
	Maximum	28.2	8.44	**6687**	9.50	120.0	19	**112.0**	5	**764**	146	**117**	26	**1370**	338	270	0.110	0.005	0.30	**0.090**	**0.010**	**1.40**	0.02	0.10	1.40	0.35	**0.12**	330	**360**	22300	8
	80th Percentile	25.5	8.11	**5221**	**5.86**	89.0	6	**26.1**	5	**731**	133	**110**	24	**1328**	304	250	0.052	0.002	0.06	**0.026**	**0.010**	**1.22**	0.01	0.03	1.20	0.20	**0.04**	96	120	**ID**	**ID**
	Median	20.0	7.88	**4161**	**3.41**	53.6	5	6.0	5	**645**	121	99	22	**1240**	257	214	0.010	0.002	0.05	**0.020**	0.001	**0.80**	0.01	0.01	0.80	0.05	0.01	35	55	22300	8
	20th Percentile	17.9	7.48	**3635**	**0.59**	-4.9	5	**2.6**	5	**549**	87	82	19	**1028**	195	172	0.010	0.002	0.05	0.010	0.001	**0.70**	0.01	0.01	0.70	0.02	0.01	16	20	**ID**	**ID**
	Minimum	16.7	**6.40**	**3442**	**0.36**	-220.0	5	**2.2**	5	**540**	85	81	18	**1020**	185	159	0.010	0.001	0.05	0.010	0.001	**0.70**	0.01	0.01	0.70	0.01	0.01	10	20	22300	8
DP1-6																														
Reporting Period (2020/2021)	**Average**	18.7	7.62	**3361**	**5.30**	34.1	5	9.4	5	**518**	84.4	77	18	984	197	162	0.014	0.002	0.07	**0.013**	0.001	**0.83**	0.02	0.02	0.81	0.14	**0.03**	33	47	6309	5
	Maximum	25.1	8.02	**3691**	9.00	122.1	5	**20.9**	5	**596**	90	90	20	**1080**	219	177	0.020	0.002	0.22	**0.020**	0.002	**1.00**	0.03	0.04	1.00	0.25	**0.06**	60	160	27700	8
	Minimum	16.7	**6.40**	2431	**1.19**	-109.5	5	**2.7**	5	403	72	58	15	774	168	134	0.010	0.001	0.05	0.010	0.001	**0.70**	0.01	0.01	0.70	0.02	0.01	10	10	5	1
All Results (2015-2021)	**Average**	20.8	7.74	**4578**	**3.11**	-24.3	6	9.1	5	**653**	116	99	22	**1208**	262	224	0.015	0.002	0.08	**0.025**	0.005	**1.09**	0.01	0.02	1.07	0.22	**0.03**	59	62	15891	**14**
	Maximum	27.4	8.31	**7141**	9.00	153.0	19	**95.0**	5	**791**	148	**119**	27	**1360**	344	342	0.050	0.005	0.22	**0.150**	**0.025**	**2.60**	0.03	0.12	2.60	1.43	**0.12**	260	210	**276000**	**149**
	80th Percentile	24.3	8.09	**5207**	6.34	93.0	5	12.9	5	**732**	131	**113**	25	**1320**	302	267	0.020	0.002	0.13	**0.032**	**0.010**	**1.34**	0.01	0.03	1.30	0.35	**0.04**	74	104	17000	**12**
	Median	20.2	7.80	**4651**	**2.31**	23.1	5	**4.3**	5	**672**	123	**102**	23	**1270**	278	220	0.010	0.002	0.05	**0.020**	0.002	**1.00**	0.01	0.01	1.00	0.14	0.01	50	40	1270	6
	20th Percentile	17.7	7.46	**3638**	**0.64**	-154.9	5	**2.3**	5	**556**	88.2	83	19	**1032**	198	176	0.010	0.001	0.05	0.010	0.001	**0.80**	0.01	0.01	0.80	0.03	0.01	10	18	5	4
	Minimum	16.7	**6.40**	2431	**0.11**	-313.0	5	**-9.7**	5	403	72	58	15	774	168	134	0.010	0.001	0.05	0.010	0.001	**0.70**	0.01	0.01	0.70	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

This page has intentionally been left blank

This page has intentionally been left blank

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

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae									
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		*-*	*6.5-8.5*	*<3000*	*>6*	*-*	*-*	*5-20*	*10*	*<500*	*-*	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	*-*	*-*	*-*	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
DP1-7																															
Reporting Period (2020/2021)	**Average**	17.5	7.36	**3463**	**4.83**	11.7	5.4	18.3	5	**551**	87	82	19	**1040**	202	182	0.014	0.0016	0.084	**0.016**	0.005	**0.96**	0.018	0.02	1.0	4.208	**0.026**	25	45	ND	ND
	Maximum	18.4	7.85	**3705**	8.90	117.0	7	**52.41**	5	**606**	95	92	20	**1080**	215	202	0.020	0.002	0.17	**0.02**	**0.017**	**1.10**	0.04	0.04	1.1	20	**0.05**	40	140	ND	ND
	Minimum	16.7	**6.4**	**3025**	**2.15**	-140.3	5	**2.8**	5	486	80	72	17	**1020**	190	173	0.010	0.001	0.05	0.01	0.001	**0.80**	0.01	0.01	0.8	0.1	0.01	10	10	ND	ND
All Results (2015-2021)	**Average**	19.0	7.67	**4311**	**3.58**	-21.8	5.2	10.29	5	**630**	111	95	21	**1175**	248	225	0.015	0.002	0.081	**0.015**	**0.006**	**1.10**	0.01	0.02	1.091	2.135	**0.03**	69	104	16400	8
	Maximum	22.2	8.40	**6713**	8.90	117.0	7	**52.41**	5	**736**	145	**112**	24	**1360**	342	326	0.050	0.005	0.17	**0.02**	**0.017**	**2.70**	0.04	0.11	2.7	20	**0.13**	230	**270**	16400	8
	80th Percentile	21.3	8.2	**5320**	7.19	105.8	5	17.74	5	**727**	130	**111**	24	**1300**	304	276	0.020	0.002	0.136	**0.02**	**0.011**	**1.16**	0.02	0.04	1.1	1.178	**0.046**	164	190	ID	ID
	Median	18.4	7.57	**3971**	**2.70**	55.0	5	**3.1**	5	**630**	127	96	22	**1250**	240	221	0.010	0.002	0.05	**0.02**	0.005	**1.00**	0.01	0.01	1	0.22	0.01	40	85	16400	8
	20th Percentile	17.1	7.35	**3471**	**1.12**	-172.5	5	**2.46**	5	**543**	86	80	18.4	**1030**	194	177	0.010	0.001	0.05	0.01	0.001	**0.80**	0.01	0.01	0.8	0.082	0.01	20	12	ID	ID
	Minimum	16.7	**6.4**	**3025**	**0.31**	-273.6	5	**2.2**	5	486	80	72	17	**1020**	190	173	0.010	0.001	0.05	0.01	0.001	**0.70**	0.01	0.01	0.7	0.03	0.01	10	10	16400	8
DP1-8																															
Reporting Period (2020/2021)	**Average**	18.2	7.27	**3346**	**5.02**	-60.1	5	6.2	5	**512**	83	77	18	976	189	185	0.013	0.003	0.07	**0.02**	0.002	**1.30**	0.01	0.03	1.28	0.45	**0.03**	55	125	770	**12**
	Maximum	20.9	8.02	**3692**	8.80	116.0	5	14.6	5	**608**	91	91	20	**1060**	212	218	0.020	0.004	0.11	**0.03**	0.003	**2.20**	0.02	0.04	2.20	1.30	**0.06**	120	**280**	2680	**34**
	Minimum	16.7	**6.40**	2434	**0.90**	-233.7	5	**3.1**	5	402	71	58	15	774	170	139	0.010	0.002	0.05	0.01	0.001	**0.70**	0.01	0.01	0.60	0.13	0.01	10	10	5	1
All Results (2015-2021)	**Average**	21.5	7.66	**4220**	**3.96**	-40.8	5	17.9	5	**602**	108	90	21	**1141**	235	230	0.020	0.002	0.08	**0.02**	**0.007**	**1.26**	0.01	0.02	1.25	0.37	**0.02**	55	139	8429	11
	Maximum	26.1	8.39	**5042**	8.80	116.0	8	**153.0**	5	**759**	134	**111**	25	**1330**	333	294	0.050	0.005	0.13	**0.04**	**0.015**	**2.40**	0.02	0.04	2.40	1.30	**0.06**	120	280	34800	34
	80th Percentile	25.3	8.07	**4981**	7.05	87.6	6	10.5	IS	**670**	131	**101**	23	**1286**	302	269	0.036	0.004	0.12	**0.03**	**0.010**	**2.06**	0.01	0.04	2.06	1.09	**0.04**	112	272	23240	23
	Median	21.1	7.62	**4520**	**4.33**	16.7	5	**4.9**	5	**633**	117	94	22	**1180**	221	240	0.015	0.002	0.06	0.01	**0.010**	**1.05**	0.01	0.01	1.05	0.15	0.01	45	130	540	7
	20th Percentile	17.7	7.30	**3629**	**0.83**	-204.7	5	**3.2**	IS	**518**	84	79	18	**1026**	176	181	0.010	0.001	0.05	0.01	0.001	**0.72**	0.01	0.01	0.72	0.02	0.01	10	18	5	2
	Minimum	16.7	**6.40**	2434	**0.64**	-246.3	5	**1.4**	5	402	71	58	15	774	170	139	0.010	0.001	0.05	0.01	0.001	**0.70**	0.01	0.01	0.60	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

This page has intentionally been left blank

This page has intentionally been left blank

Total suspended solids (TSS) during the reporting period ranged from 5mg/L to 15mg/L with an average TSS value of 7.8mg/L, whilst turbidity ranged from 2.1NTU to 95.0NTU with an average turbidity of 24NTU. These levels were generally well below levels typically recorded during operational periods and did not exceed maximum values recorded during the 2017 dredging campaign. These value ranges are consistent with the non-operational status during the majority of the reporting period. As can be seen from the raw data (see **Appendix 4**), during the September 2020 monitoring round elevated turbidity was recorded at all sites. Whilst a moderate rainfall event (28.6mm) did occur on 11 September 2021, the Quarry had not been operational since July 2020 and these elevated turbidity levels are therefore not associated with Quarry operations.

The average dissolved oxygen levels at surface monitoring locations DP1, DP2 and DP3 during the reporting period were 9.53mg/L, 9.45mg/L and 9.50.mg/L respectively. Consistent with expectations for the pond which experienced only intermittent mixing for relatively brief periods as a result of the action of dredging during the reporting period, the average dissolved oxygen level decreased with depth down to an average of 4.83mg/L and 5.02mg/L at 7m and 8m depth respectively.

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.

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. Total nitrogen remained consistently elevated throughout the reporting period. However, total phosphorous decreased to the limit of detection from November 2020 to the end of the reporting period.

Faecal coliforms remained within the quality objectives at all monitoring locations throughout the reporting period. However, elevated levels of Enterococci were recorded at DP1-3 in September 2020, at DP1-1 in November 2020, at DP1-8 in February 2021 and at DP1 in November 2020 and February 2021. The highest level recorded was 910cells/mL at DP1-3 during September 2021, which remains below the previously recorded maximum of 2 160cells/mL (DP1 – November 2017). Similar to nutrients, elevated levels of Enterococci have regularly been recorded in both surface water and groundwater within the area and is again reflective of previous and ongoing agricultural practices within the area, particularly cattle grazing and possibly off-site poultry and on-site water birds.

Blue-Green Algae

Potentially toxic cyanobacteria levels recorded in the extraction pond remained below the relevant water quality objective during the reporting period.

The maximum cell count recorded for potentially toxic cyanobacteria during the reporting period was 43 800cells/mL, significantly below the maximum cell count of 215 000cells/mL recorded during the previous reporting period. 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.

Reportable Incidents

No reportable incidents related to surface water were recorded during the reporting period.

Further Improvements

Further review and update of the SWMP is planned during the second half of 2021 to further rationalise water monitoring. No further improvements are currently planned.

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 only intermittent dredging occurred during the reporting period for relatively brief periods, no specific measures were required to manage drawdown during the reporting period. Monitoring also did not indicate the need for any 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

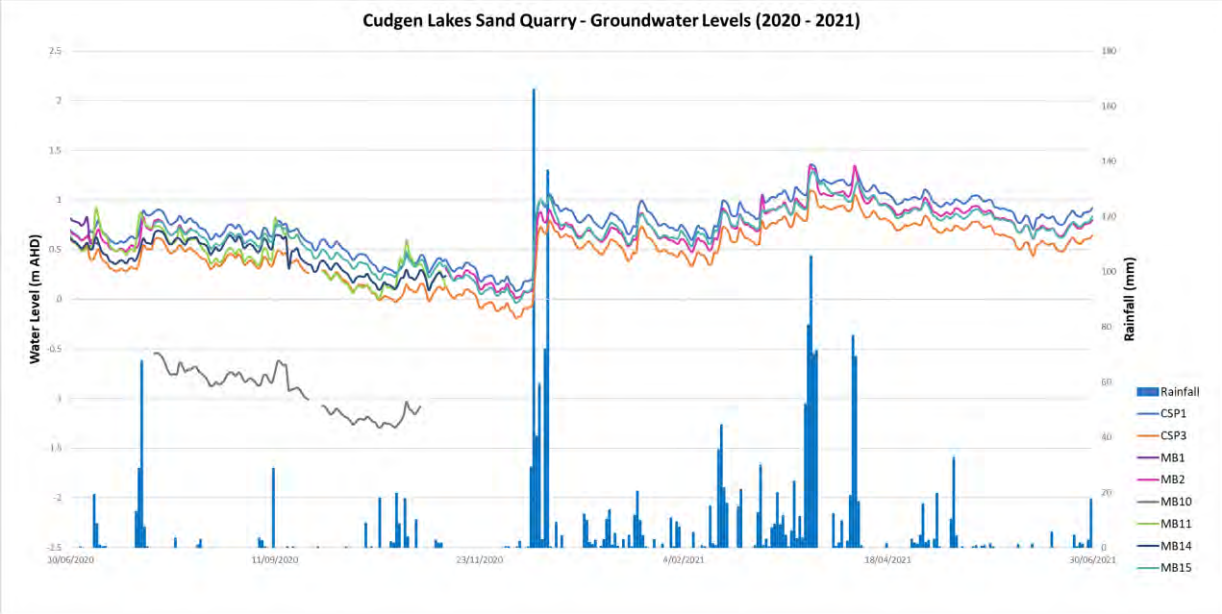
The groundwater resources within the local area are located within two aquifers, namely the Quaternary sands beneath the Tweed River floodplain and the Tertiary basalts of the Cudgen Plateau. It is expected that freshwater from the Tertiary basalts flows northwards into the Quaternary sands resulting 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 ten dedicated monitoring bores, and at two regional private bores, throughout the reporting period (see **Figure 7.1**). In addition to manual sampling, the monitoring network includes seven continuous groundwater level loggers. It is noted that monitoring bore MB10 was damaged and unable to be sampled during the June 2021 sampling round.

Groundwater Levels

During the reporting period, extraction occurred intermittently for relative short periods with 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 recorded during the reporting period.

Figure 7.3 Groundwater Levels – 2020/2021 Reporting Period



The lowest water level recorded during the reporting period was -0.19m AHD at CSP3 on 6 December 2020 and the highest water level was 1.34m AHD at MB2 on 6 April 2021. It is noted that a water level of 1.34m AHD is above ground level and represents localised flooding following significant rainfall events in late March and early April 2021 (see **Figure 7.3**).

As expected, groundwater levels throughout the period generally display an attenuated response to rainfall events. However, rapid rises in groundwater levels were observed almost immediately following the substantive rainfall event on 13 December 2020. Groundwater levels following this rainfall event gradually declined to levels consistent with the first quarter of the reporting period until subsequent substantive rainfall events in March and April 2021 once again resulted in temporarily elevated groundwater levels.

Groundwater Quality

A summary of groundwater monitoring results is provided in **Table 7.2** and key analytes are displayed graphically in **Figure 7.4** whilst 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

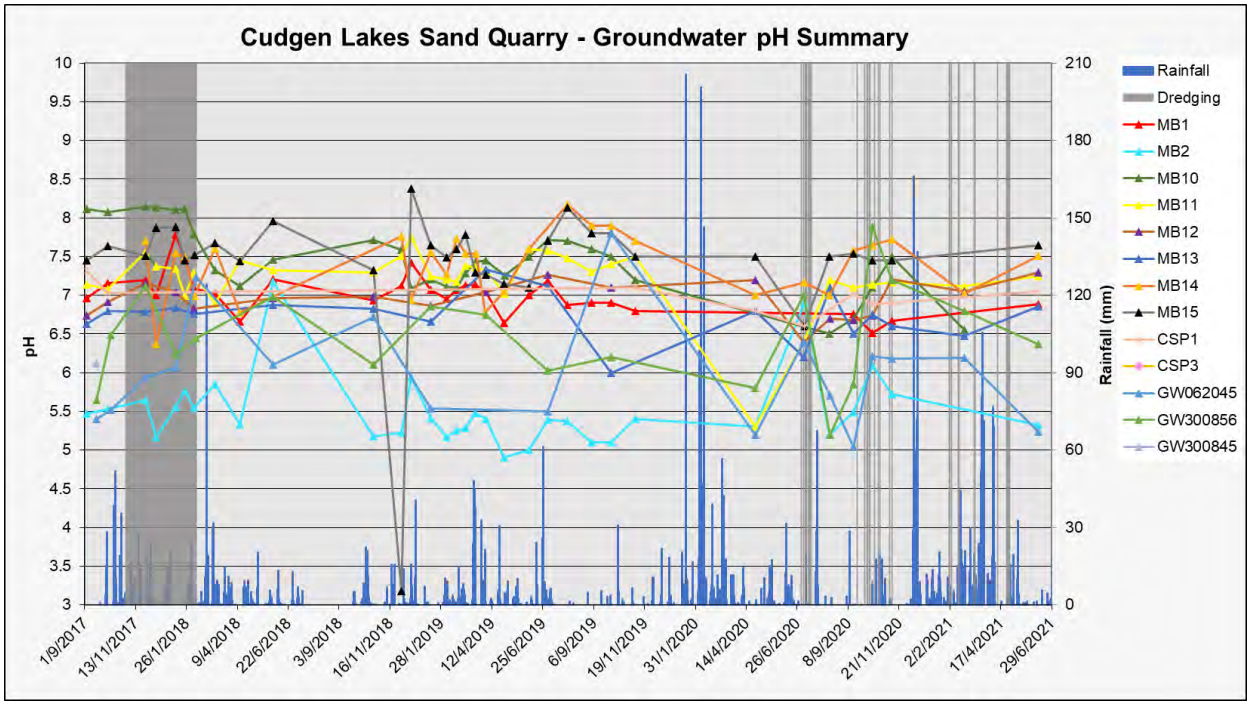


Figure 7.4b Groundwater Quality Parameters – Electric Conductivity (Shallow Bores)

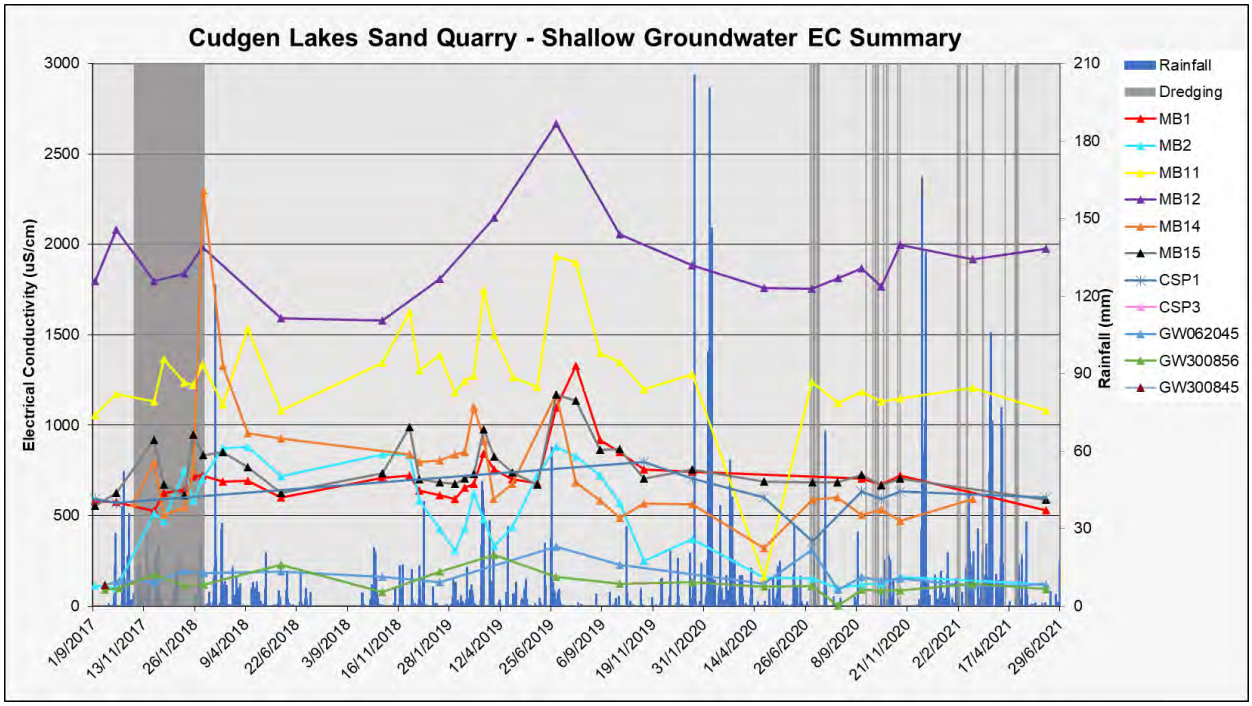


Figure 7.4c Groundwater Quality Parameters – Electric Conductivity (Deep Bores)

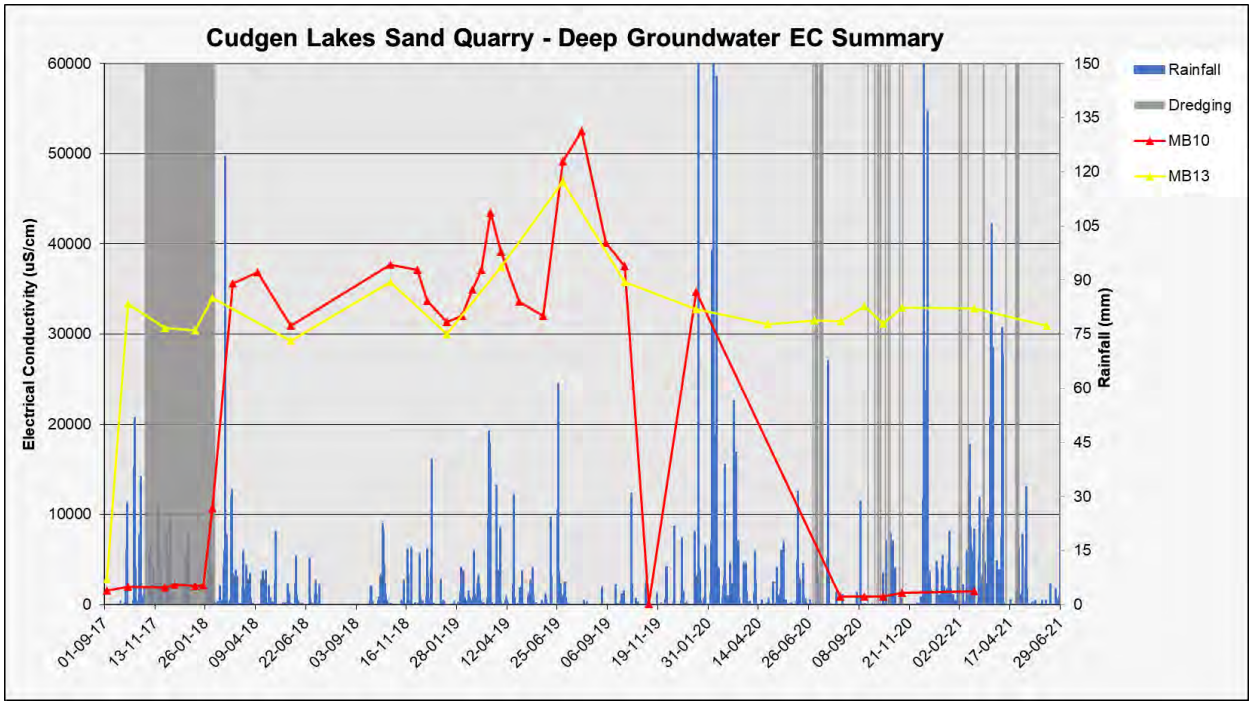


Figure 7.5a Long Term Groundwater Quality Parameters – pH

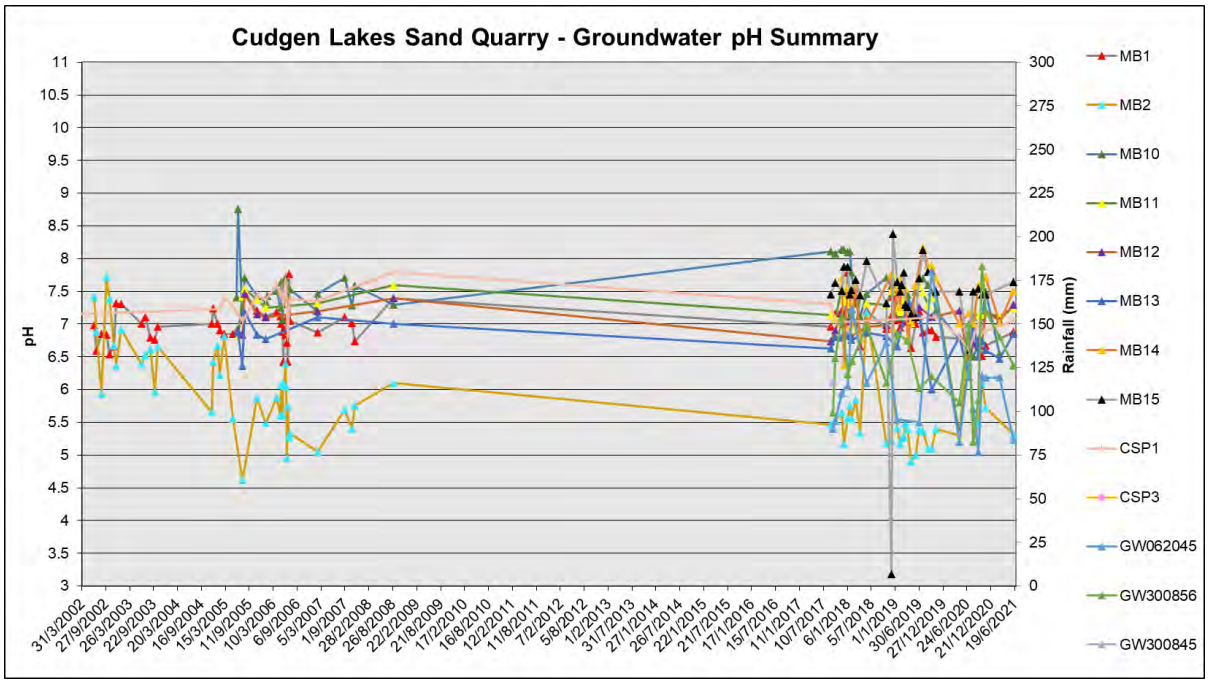


Figure 7.5b Long Term Groundwater Quality Parameters – Electrical Conductivity (Shallow Bores)

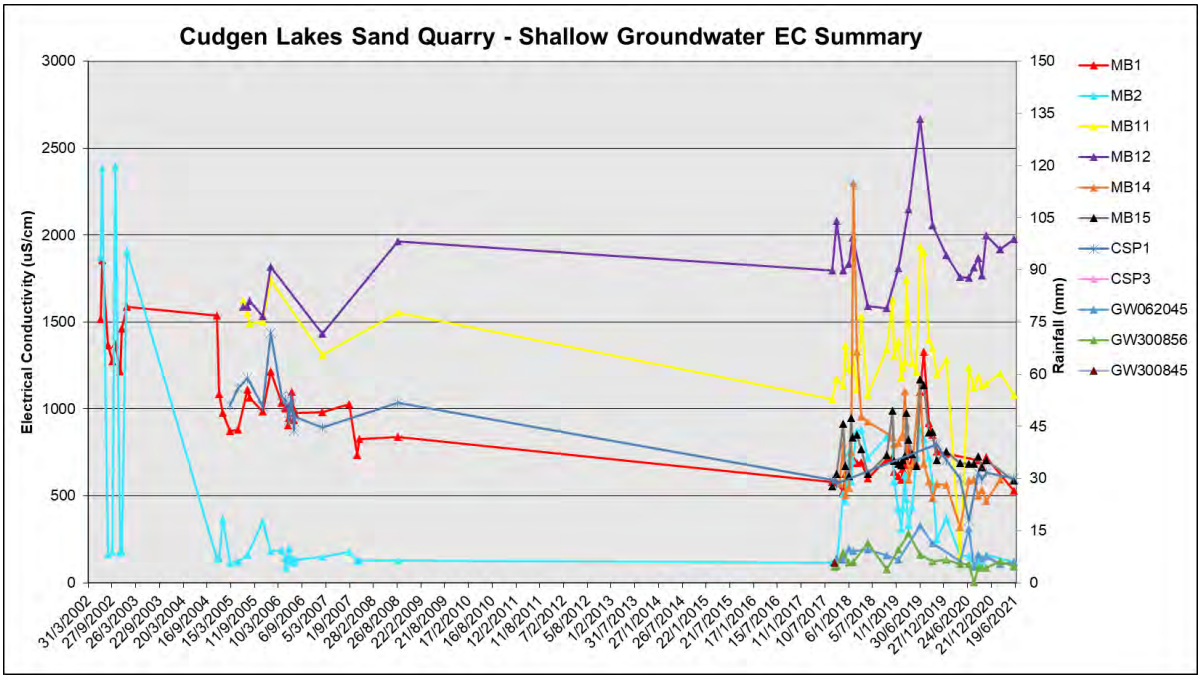


Figure 7.5c Long Term Groundwater Quality Parameters – Electrical Conductivity (Deep Bores)

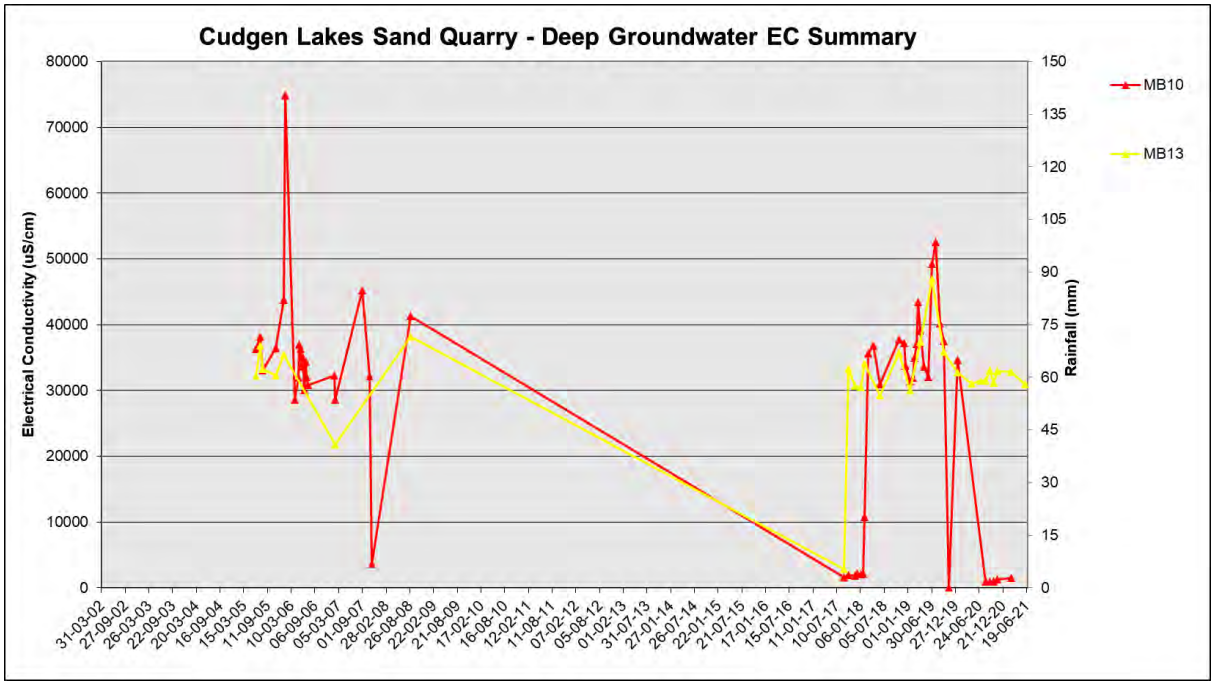


Table 7.2
Groundwater Monitoring Data Summary

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		*-*	*6.5-8.5*	*<3000*	*>6*	*-*	*-*	*5-20*	*10*	*<500*	*-*	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	*-*	*-*	*-*	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
MB1																															
Pre-Extraction	**Average**	20.8	6.98	1081	**0.96**	-233.0	32	18.2	5	39	131	21	5	64	220	186	0.047	0.001	9.18	**0.285**	**0.010**	**0.65**	0.01	0.01	0.65	0.34	0.01	10	10	NS	NS
	Maximum	21.8	7.76	1854	7.66	23.0	32	**35.0**	5	58	193	36	5	124	492	292	0.140	0.001	**22.00**	**0.460**	**0.010**	**0.70**	0.01	0.01	0.70	0.39	0.01	10	10	NS	NS
	Minimum	19.8	**6.43**	576	**0.05**	-1398.0	32	**1.4**	5	31	77	13	4	35	10	110	0.010	0.001	0.24	**0.110**	**0.010**	**0.60**	0.01	0.01	0.60	0.28	0.01	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	20.6	6.71	656	**1.89**	-73.3	32	**656.4**	5	26	110	11	4	27	3	334	0.010	0.001	8.54	**0.155**	**0.016**	0.12	0.01	0.03	0.93	0.42	**0.03**	18	13	5	1
	Maximum	22.0	6.88	722	**2.40**	7.5	47	**2546.8**	5	28	119	11	4	28	5	368	0.010	0.001	13.00	**0.220**	**0.044**	**0.40**	0.01	0.05	1.20	0.62	**0.05**	40	20	5	1
	Minimum	18.9	6.51	528	**1.39**	-113.3	20	**4.9**	5	23	93	9	3	26	1	280	0.010	0.001	0.05	**0.040**	0.001	0.01	0.01	0.01	0.30	0.01	0.01	10	10	5	1
All Results (2002-2021)	**Average**	22.5	6.99	923	**0.96**	-126.0	30	**90.7**	5	33	111	14	4	46	91	282	0.026	0.001	8.46	**0.178**	**0.019**	**0.89**	0.01	0.02	0.96	0.52	**0.02**	11	11	5	1
	Maximum	26.0	7.78	1854	7.66	23.0	86	**2546.8**	5	58	193	36	5	124	492	**596**	0.140	0.005	**22.00**	**0.460**	**0.108**	**2.60**	0.01	0.21	2.60	1.44	**0.22**	40	20	5	1
	80th Percentile	24.5	7.18	1100	**1.30**	-56.3	34	15.4	5	39	125.4	18	5	58	196	335	0.028	0.001	12.88	**0.226**	**0.018**	**1.32**	0.01	0.02	1.32	0.72	**0.02**	10	10	5	1
	Median (50th Percentile)	22.1	7.00	880	**0.54**	-95.2	29	**4.9**	5	32	105	11	4	39	10	301	0.010	0.001	9.97	**0.170**	**0.010**	**0.70**	0.01	0.01	0.80	0.44	0.01	10	10	5	1
	20th Percentile	20.7	6.79	675	**0.21**	-142.6	22	**0.4**	5	28	91.2	10	3	27	4	181	0.010	0.001	0.93	**0.114**	**0.006**	**0.54**	0.01	0.01	0.60	0.32	0.01	10	10	5	1
	Minimum	18.9	**6.43**	526	**0.05**	-1398.0	5	**-8.6**	5	21	77	8	3	23	1	110	0.010	0.001	0.05	**0.040**	0.001	0.01	0.01	0.01	0.09	0.01	0.01	2	8	5	1
MB2																															
Pre-Extraction	**Average**	21.3	**6.07**	383	**0.74**	5.1	9	10.9	5	16	1	1	15	26	15	16	**2.033**	0.010	6.60	**0.075**	**0.050**	**0.70**	0.01	0.01	0.70	0.24	0.01	10	10	NS	NS
	Maximum	21.7	7.72	2394	**5.09**	216.0	9	14.4	5	23	1.8	2	20	45	27	60	**6.370**	0.011	9.50	**0.080**	**0.070**	**0.80**	0.01	0.01	0.80	0.29	0.01	10	10	NS	NS
	Minimum	20.8	**4.62**	88	**0.16**	-130.0	9	7.3	5	12	0.2	0	4	10	1	7	0.430	0.009	3.12	**0.070**	**0.030**	**0.60**	0.01	0.01	0.60	0.19	0.01	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	21.0	**5.79**	129	**1.42**	4.7	9	**910.8**	5	17	2	1	4	21	9	11	0.477	0.043	4.00	**0.173**	**0.049**	**0.87**	0.01	0.01	1.75	0.25	0.01	10	10	5	3
	Maximum	21.8	6.90	160	**2.01**	80.3	16	**4009.2**	5	19	2	1	4	31	10	17	**0.620**	0.071	7.44	**0.260**	**0.220**	**2.00**	0.01	0.01	2.00	0.31	0.01	10	10	5	5
	Minimum	20.2	**5.20**	98	**0.77**	-47.0	5	13.5	5	14	1	1	3	8	7	5	0.320	0.001	0.05	**0.070**	0.002	0.01	0.01	0.01	1.30	0.15	0.01	10	10	5	1
All Results (2002-2021)	**Average**	22.8	**5.83**	440	**0.88**	2.3	15	**181.6**	5	49	6	3	11	75	49	12	**0.928**	0.039	14.39	**0.081**	**0.022**	**0.89**	0.01	0.01	1.03	0.32	**0.01**	67	62	5	2
	Maximum	26.1	7.72	2394	**5.09**	216.0	62	**4009.2**	5	119	25	9	26	189	159	60	**6.370**	0.116	**37.40**	**0.260**	**0.220**	**2.00**	0.01	0.01	2.00	0.77	**0.10**	930	**560**	5	5
	80th Percentile	24.5	**6.41**	720	**1.15**	63.1	27	**70.6**	5	87	10	7	15	140	95	17	**1.438**	0.065	**23.28**	**0.080**	**0.026**	**1.30**	0.01	0.01	1.50	0.41	0.01	10	10	5	2
	Median (50th Percentile)	22.7	**5.40**	474	**0.70**	3.4	8	8.4	5	69	7	5	9	109	72	11	0.170	0.028	19.50	**0.060**	**0.014**	**0.80**	0.01	0.01	0.90	0.30	0.01	10	10	5	1
	20th Percentile	21.0	**5.18**	153	**0.37**	-47.0	5	**1.5**	5	17	2	1	4	25	10	3	0.128	0.009	4.81	**0.050**	0.005	**0.60**	0.01	0.01	0.70	0.20	0.01	10	10	5	1
	Minimum	20.2	**4.90**	98	**0.17**	-115.0	2	**-8.4**	5	12	0.9	1	3	8	1	1	0.040	0.001	0.05	**0.020**	0.001	0.01	0.01	0.01	0.08	0.14	0.01	1	1	5	1
MB10																															
Pre-Extraction	**Average**	21.8	7.53	**32513**	**2.15**	-72.8	5	9.5	5	**4553**	151	**617**	**202**	**8230**	**1282**	**610**	0.093	0.002	0.62	**3.015**	**2.890**	**157.00**	3.80	0.69	153.00	**147.00**	**4.49**	10	20	NS	NS
	Maximum	23.7	**8.75**	**74900**	**4.11**	107.0	5	13.0	5	**7500**	233	**1150**	**292**	**14750**	**2490**	**852**	0.340	0.002	1.96	**3.320**	**3.220**	**162.00**	4.39	1.20	157.00	**158.00**	**5.59**	10	20	NS	NS
	Minimum	19.9	7.07	1605	**0.38**	-187.0	5	6.0	5	94	30	17	24	194	77	247	0.010	0.002	0.01	**2.710**	**2.560**	**152.00**	3.20	0.18	149.00	**136.00**	**3.38**	10	20	NS	NS
Reporting Period (2020/2021)	**Average**	21.9	6.87	1107	**2.52**	59.0	20	**84.4**	5	47	188	19	7	78	163	374	0.012	0.004	3.20	**0.036**	0.003	**1.30**	0.02	0.45	1.72	0.42	**0.46**	96	52	5	1.2
	Maximum	24.4	7.50	1483	**3.74**	149.0	43	**268.0**	5	81	293	25	8	142	436	**420**	0.020	0.011	15.50	**0.060**	**0.008**	**3.00**	0.04	0.79	2.20	0.88	**0.79**	430	110	5	2
	Minimum	19.5	6.50	885	**1.97**	-89.3	5	18.7	5	27	148	16	6	39	64	342	0.010	0.001	0.05	0.010	0.001	0.34	0.01	0.01	1.30	0.13	0.01	10	10	5	1
All Results (2005-2021)	**Average**	22.8	7.47	**28124**	**1.76**	-83.1	10	18.4	5	**4625**	182	**701**	**168**	**8162**	**1244**	**845**	0.052	0.004	0.64	**1.347**	**1.297**	**50.93**	0.45	0.16	47.81	**43.55**	**0.60**	136	**2637**	5	1.037
	Maximum	26.3	**8.75**	**74900**	**5.40**	149.0	43	**268.0**	5	**7610**	293	**1170**	**292**	**14750**	**2490**	**1170**	0.340	0.011	15.50	**3.350**	**3.860**	**186.00**	4.39	1.20	184.00	**174.00**	**5.59**	**1600**	**39000**	5	2
	80th Percentile	24.5	7.71	**37644**	**2.73**	47.0	12	**24.0**	5	**7104**	234.6	**1100**	**241**	**12280**	**1798**	**1124**	0.050	0.005	0.27	**2.710**	**2.080**	**104.92**	0.75	0.29	68.82	**44.52**	**0.99**	26	**436**	5	1
	Median (50th Percentile)	23.2	7.45	**33600**	**1.81**	-94.7	5	**4.6**	5	**6515**	208.5	**999**	**213**	**11800**	**1675**	**955**	0.050	0.005	0.09	**1.030**	**1.010**	**30.20**	0.02	0.02	30.20	**27.20**	**0.05**	10	60	5	1
	20th Percentile	20.9	7.20	2136	**0.48**	-205.0	5	**0.9**	5	105	140.8	18	26	200	77	**510**	0.010	0.002	0.05	**0.898**	**0.900**	**3.28**	0.01	0.01	16.36	13.79	0.01	10	14	5	1
	Minimum	19.5	6.50	73	**0.00**	-273.0	5	**-11.1**	5	27	30	16	6	39	64	247	0.010	0.001	0.01	0.010	0.001	0.34	0.01	0.01	0.50	0.13	0.01	1	3	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

This page has intentionally been left blank

This page has intentionally been left blank

Table 7.2 (Cont'd)
Groundwater Monitoring Data Summary

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		*-*	*6.5-8.5*	*<3000*	*>6*	*-*	*-*	*5-20*	*10*	*<500*	*-*	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	*-*	*-*	*-*	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
MB11																															
Pre-Extraction	**Average**	20.0	7.28	1446	**1.02**	-107.3	5	**27.2**	5	103	209	58	13	146	416	333	**0.745**	0.001	4.18	**0.530**	**0.140**	**3.70**	0.01	0.01	3.70	1.64	0.01	10	10	NS	NS
	Maximum	20.8	7.60	1743	**2.11**	-74.0	5	**43.1**	5	220	289	72	19	311	520	**432**	**3.130**	0.001	11.00	**0.640**	**0.270**	**4.60**	0.01	0.01	4.60	1.80	0.01	10	10	NS	NS
	Minimum	19.1	6.81	1056	**0.37**	-144.0	5	11.3	5	34	168	45	9	47	328	235	0.010	0.001	0.87	**0.420**	**0.010**	**2.80**	0.01	0.01	2.80	1.48	0.01	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	20.8	7.05	1159	**1.21**	-190.3	46	**46.5**	5	32	170	44	11	44	223	356	0.013	0.001	0.52	**0.517**	**0.416**	**1.93**	0.01	0.01	3.10	2.06	**0.01**	230	**64481**	19	1.143
	Maximum	24.6	7.24	1240	**1.90**	-108.4	140	**178.0**	5	35	184	47	13	52	286	381	0.020	0.001	1.41	**0.790**	**0.653**	**4.20**	0.01	0.03	4.20	3.26	**0.03**	**1120**	**440000**	100	2
	Minimum	19.4	**6.40**	1082	**0.22**	-297.8	7	**1.0**	5	27	151	35	9	40	26	320	0.010	0.001	0.07	**0.220**	**0.200**	0.01	0.01	0.01	1.20	0.83	0.01	10	**260**	5	1
All Results (2005-2021)	**Average**	22.6	7.23	1320	**1.23**	-147.7	24	**30.3**	5	48	170	46	10	66	282	343	0.137	0.003	1.15	**0.421**	**0.348**	**2.57**	0.03	0.07	2.73	1.92	**0.08**	90	**25894**	8	1.042
	Maximum	27.1	7.75	1935	7.07	297.1	140	**452.5**	5	220	289	72	19	311	520	**500**	**3.130**	0.063	11.00	**1.370**	**1.750**	**11.80**	0.33	0.56	11.70	9.71	**0.72**	**1120**	**440000**	100	2
	80th Percentile	24.8	7.49	1539	**2.00**	-52.0	33	**28.3**	5	45	192	52	11	74	338	372	0.050	0.001	1.28	**0.648**	**0.559**	**3.54**	0.03	0.08	3.60	2.75	**0.08**	10	**4200**	5	1
	Median (50th Percentile)	22.0	7.30	1276	**0.94**	-138.7	11	7.8	5	38	176	45	10	49	286	347	0.010	0.001	0.31	**0.320**	**0.261**	**1.80**	0.01	0.01	2.10	1.47	0.01	10	**430**	5	1
	20th Percentile	20.4	7.11	1140	**0.30**	-278.4	5	**0.9**	5	33	164	42	9	43	205	321	0.010	0.001	0.09	**0.220**	**0.104**	**1.40**	0.01	0.01	1.40	0.68	0.01	10	10	5	1
	Minimum	19.1	**5.30**	158	**0.10**	-354.0	5	**-5.5**	5	17	2	1	2	17	11	3	0.010	0.001	0.06	**0.100**	**0.010**	0.01	0.01	0.01	0.20	0.04	0.01	1	1	5	1
MB12																															
Pre-Extraction	**Average**	21.3	7.08	1713	**0.72**	-75.0	15	13.6	5	49	329	54	12	101	609	267	0.202	0.001	6.99	**0.110**	**0.015**	**0.60**	0.01	0.01	0.60	0.34	0.01	10	10	NS	NS
	Maximum	21.9	7.46	2080	**1.65**	-54.0	15	**20.1**	5	66	433	59	13	147	720	329	**0.740**	0.001	**20.40**	**0.110**	**0.020**	**0.60**	0.01	0.01	0.60	0.34	0.01	10	10	NS	NS
	Minimum	20.7	6.74	1433	**0.09**	-98.0	15	7.1	5	39	219	46	10	54	410	223	0.009	0.001	1.31	**0.110**	**0.010**	**0.60**	0.01	0.01	0.60	0.33	0.01	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	20.9	6.87	1870	**2.91**	-22.9	42	**67.5**	5	81	314	38	11	69	772	311	0.010	0.001	8.37	**0.086**	**0.005**	**0.42**	0.01	0.13	0.50	0.24	**0.13**	12	**10737**	ND	ND
	Maximum	23.7	7.29	1995	**5.83**	172.0	155	**197.6**	5	98	331	42	12	86	**814**	378	0.010	0.001	17.70	**0.220**	**0.026**	**0.90**	0.01	0.43	0.80	0.38	**0.43**	20	**57000**	ND	ND
	Minimum	19.7	**6.40**	1755	**0.52**	-177.9	5	5.5	5	34	302	36	10	59	699	285	0.010	0.001	0.05	0.010	0.001	0.01	0.01	0.01	0.10	0.02	0.01	10	10	ND	ND
All Results (2005-2021)	**Average**	22.1	7.01	1837	**2.04**	-36.8	29	**39.4**	5	60	329	44	11	92	689	299	0.062	0.001	6.06	**0.053**	**0.007**	**0.53**	0.01	0.12	0.49	0.26	**0.12**	10	**5407**	ND	ND
	Maximum	26.5	7.46	2667	6.78	172.0	155	**197.6**	5	98	433	59	13	147	**814**	378	**0.740**	0.005	**20.40**	**0.220**	**0.026**	**0.90**	0.02	0.44	0.80	0.38	**0.46**	20	**57000**	ND	ND
	80th Percentile	24.3	7.21	1988	**3.49**	38.2	38	**67.0**	5	82	363	52	12	122	771	320	0.064	0.001	13.72	**0.110**	**0.010**	**0.78**	0.01	0.29	0.60	0.38	**0.29**	10	**1856**	ND	ND
	Median (50th Percentile)	20.9	7.04	1814	**1.64**	-69.0	25	**22.9**	5	55	327.5	42	11	87	693	306	0.010	0.001	2.98	**0.030**	**0.009**	**0.60**	0.01	0.05	0.55	0.32	**0.05**	10	15	ND	ND
	20th Percentile	20.3	6.77	1591	**0.58**	-109.5	5	7.2	5	42	308	38	10	64	646	276	0.010	0.001	0.05	0.010	0.001	0.27	0.01	0.01	0.22	0.06	**0.01**	10	10	ND	ND
	Minimum	19.7	**6.40**	1433	**0.09**	-177.9	5	**1.1**	5	29	219	35	10	54	410	223	0.009	0.001	0.05	0.010	0.001	0.01	0.01	0.01	0.10	0.01	0.01	1	5	ND	ND
MB13																															
Pre-Extraction	**Average**	21.3	7.08	1713	**0.72**	-75.0	15	13.6	5	49	329	54	12	101	609	267	0.202	0.001	6.99	**0.110**	**0.015**	**0.60**	0.01	0.01	0.60	0.34	0.01	10	10	NS	NS
	Maximum	21.9	7.46	2080	**1.65**	-54.0	15	**20.1**	5	66	433	59	13	147	720	329	**0.740**	0.001	**20.40**	**0.110**	**0.020**	**0.60**	0.01	0.01	0.60	0.34	0.01	10	10	NS	NS
	Minimum	20.7	6.74	1433	**0.09**	-98.0	15	7.1	5	39	219	46	10	54	410	223	0.009	0.001	1.31	**0.110**	**0.010**	**0.60**	0.01	0.01	0.60	0.33	0.01	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	20.9	6.87	1870	**2.91**	-22.9	42	**67.5**	5	81	314	38	11	69	772	311	0.010	0.001	8.37	**0.086**	**0.005**	**0.42**	0.01	0.13	0.50	0.24	**0.13**	12	**10737**	ND	ND
	Maximum	23.7	7.29	1995	**5.83**	172.0	155	**197.6**	5	98	331	42	12	86	**814**	378	0.010	0.001	17.70	**0.220**	**0.026**	**0.90**	0.01	0.43	0.80	0.38	**0.43**	20	**57000**	ND	ND
	Minimum	19.7	**6.40**	1755	**0.52**	-177.9	5	5.5	5	34	302	36	10	59	699	285	0.010	0.001	0.05	0.010	0.001	0.01	0.01	0.01	0.10	0.02	0.01	10	10	ND	ND
All Results (2005-2021)	**Average**	22.1	7.01	1837	**2.04**	-36.8	29	**39.4**	5	60	329	44	11	92	689	299	0.062	0.001	6.06	**0.053**	**0.007**	**0.53**	0.01	0.12	0.49	0.26	**0.12**	10	**5407**	ND	ND
	Maximum	26.5	7.46	2667	6.78	172.0	155	**197.6**	5	98	433	59	13	147	**814**	378	**0.740**	0.005	**20.40**	**0.220**	**0.026**	**0.90**	0.02	0.44	0.80	0.38	**0.46**	20	**57000**	ND	ND
	80th Percentile	24.3	7.21	1988	**3.49**	38.2	38	**67.0**	5	82	363	52	12	122	771	320	0.064	0.001	13.72	**0.110**	**0.010**	**0.78**	0.01	0.29	0.60	0.38	**0.29**	10	**1856**	ND	ND
	Median (50th Percentile)	20.9	7.04	1814	**1.64**	-69.0	25	**22.9**	5	55	327.5	42	11	87	693	306	0.010	0.001	2.98	**0.030**	**0.009**	**0.60**	0.01	0.05	0.55	0.32	**0.05**	10	15	ND	ND
	20th Percentile	20.3	6.77	1591	**0.58**	-109.5	5	7.2	5	42	308	38	10	64	646	276	0.010	0.001	0.05	0.010	0.001	0.27	0.01	0.01	0.22	0.06	**0.01**	10	10	ND	ND
	Minimum	19.7	**6.40**	1433	**0.09**	-177.9	5	**1.1**	5	29	219	35	10	54	410	223	0.009	0.001	0.05	0.010	0.001	0.01	0.01	0.01	0.10	0.01	0.01	1	5	ND	ND

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

This page has intentionally been left blank

This page has intentionally been left blank

Table 7.2 (Cont'd)
Groundwater Monitoring Data Summary

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		*-*	*6.5-8.5*	*<3000*	*>6*	*-*	*-*	*5-20*	*10*	*<500*	*-*	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	*-*	*-*	*-*	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
MB14																															
Reporting Period (2020/2021)	**Average**	21.5	7.38	514	**1.46**	-50.2	11	**61.2**	5	47	56	17	5	59	38	186	0.010	0.002	1.48	**0.163**	**0.091**	**0.56**	0.01	0.01	0.61	0.50	**0.01**	11	**274**	5	1.143
	Maximum	23.5	7.72	598	**2.57**	59.2	19	**203.6**	5	72	62	22	6	83	43	207	0.010	0.006	6.60	**0.300**	**0.470**	**3.20**	0.01	0.02	3.20	3.29	**0.02**	20	**1450**	5	2
	Minimum	20.7	7.00	319	**0.69**	-156.1	5	10.3	5	27	52	16	5	46	31	168	0.010	0.001	0.07	**0.110**	**0.007**	0.01	0.01	0.01	0.10	0.01	0.01	10	10	5	1
All Results (2017-2021)	**Average**	22.5	7.39	766	**1.68**	-71.4	25	**39.6**	5	70	63	19	5	108	50	187	0.012	0.001	2.30	**0.168**	**0.039**	**0.39**	0.01	0.02	0.40	0.16	**0.02**	10	153	6	1.037
	Maximum	28.3	8.17	2296	10.30	210.7	195	**217.4**	5	182	154	39	8	491	181	284	0.050	0.006	**22.90**	**0.430**	**0.470**	**3.20**	0.10	0.15	3.20	3.29	**0.16**	20	**1450**	35	2
	80th Percentile	23.5	7.72	920	**2.21**	17.5	30	**45.6**	5	99	64.2	23	7	150	70	200	0.010	0.001	3.88	**0.266**	**0.048**	**0.40**	0.01	0.01	0.40	0.10	0.01	10	212	5	1
	Median (50th Percentile)	22.1	7.54	675	**1.04**	-105.0	15	19.0	5	68	58	17	5	83	42	190	0.010	0.001	0.94	**0.120**	**0.010**	0.30	0.01	0.01	0.30	0.06	0.01	10	15	5	1
	20th Percentile	21.3	6.99	538	**0.55**	-139.8	6	9.1	5	36	49.2	14	5	44	29	168	0.010	0.001	0.20	**0.100**	**0.010**	0.20	0.01	0.01	0.20	0.03	0.01	10	10	5	1
	Minimum	20.7	**6.37**	319	**-0.30**	-244.0	5	**0.6**	5	20	33	8	2	17	21	98	0.010	0.001	0.05	**0.080**	0.004	0.01	0.01	0.01	0.10	0.01	0.01	1	10	5	1
MB15																															
Pre-Extraction	**Average**	21.1	7.54	590	**0.33**	-119.8	14	**36.5**	5	101	33	12	7	79	43	213	0.275	0.002	0.74	**0.275**	**0.215**	**0.45**	0.01	0.01	0.45	0.19	0.01	10	**1900**	NS	NS
	Maximum	21.6	7.63	625	**0.65**	-87.0	14	**62.0**	5	116	40	14	8	83	48	217	**0.520**	0.002	1.35	**0.330**	**0.220**	**0.60**	0.01	0.01	0.60	0.26	0.01	10	**1900**	NS	NS
	Minimum	20.6	7.45	555	**0.01**	-152.6	14	10.9	5	86	25	10	6	74	37	208	0.030	0.001	0.13	**0.220**	**0.210**	0.30	0.01	0.01	0.30	0.12	0.01	10	**1900**	NS	NS
Reporting Period (2020/2021)	**Average**	20.5	7.36	675	**1.43**	-154.5	6	15.2	5	65	60	16	9	91	39	198	0.010	0.001	0.09	**0.193**	**0.140**	**0.46**	0.01	0.01	0.80	0.19	**0.02**	62	42	291	1
	Maximum	21.2	7.64	727	**1.86**	-142.0	8	**69.9**	5	74	67	18	9	98	52	210	0.010	0.001	0.13	**0.310**	**0.173**	**1.80**	0.02	0.02	1.80	0.22	**0.02**	310	180	1720	1
	Minimum	19.4	6.60	587	**0.90**	-180.6	5	**1.9**	5	44	55	15	8	69	24	188	0.010	0.001	0.05	**0.130**	**0.077**	0.01	0.01	0.01	0.30	0.15	0.01	10	10	5	1
All Results (2017-2021)	**Average**	22.5	7.43	767	**1.13**	-100.7	10	11.8	5	82	49	16	10	89	52	200	0.028	0.001	0.24	**0.199**	**0.146**	**0.67**	0.01	0.03	0.71	0.30	**0.03**	53	**2543**	75	1
	Maximum	25.1	8.38	1170	6.45	203.7	24	**69.9**	5	144	83	20	14	121	138	228	**0.520**	0.005	1.35	**0.330**	**0.220**	**4.80**	0.10	0.34	4.80	0.66	**0.34**	490	**43000**	1720	2
	80th Percentile	24.6	7.80	868	**1.80**	-31.3	15	**20.8**	5	97	60	17	11	98	68	210	0.010	0.001	0.33	**0.230**	**0.173**	**0.80**	0.01	0.02	0.80	0.46	**0.02**	20	212	5	1
	Median (50th Percentile)	22.6	7.51	716	**0.70**	-142.5	7	**4.3**	5	76	48.5	16	9	88	48	200	0.010	0.001	0.13	**0.190**	**0.143**	**0.40**	0.01	0.01	0.50	0.27	0.01	10	10	5	1
	20th Percentile	20.8	7.31	670	**0.48**	-175.0	5	**0.9**	5	67	41	15	8	83	35	189	0.010	0.001	0.06	**0.160**	**0.113**	0.30	0.01	0.01	0.30	0.18	0.01	10	10	5	1
	Minimum	19.4	**3.18**	555	**0.01**	-224.4	5	**-7.1**	5	44	25	10	6	60	4	176	0.010	0.001	0.05	**0.120**	**0.077**	0.01	0.01	0.01	0.20	0.04	0.01	1	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

This page has intentionally been left blank

This page has intentionally been left blank

Table 7.2 (Cont'd)
Groundwater Monitoring Data Summary

		Physical Parameters								Major Cations & Anions							Metals			Nutrients / Bacteria / Algae									
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria	Chlorophyll a
Objectives		-	6.5-8.5	<3000	>6	-	-	5-20	10	<500	-	<100	<40	<1000	<800	<400	<0.5	<0.42	<20	0.01	<0.005	0.35	-	-	-	<20	0.01	<1000/100	<230/100	<50000	<10
CSP3																															
Pre-Extraction	**Average**	20.9	7.13	608	**0.40**	-118.5	5	**4.6**	5	25	89	8	9	53	32	196	0.081	0.001	4.12	**0.260**	**0.080**	**1.30**	0.01	1.56	1.30	0.44	0.01	10	30	NS	NS
	Maximum	21.3	8.09	1007	**2.61**	27.7	5	7.4	5	83	148	19	28	123	182	271	0.260	0.001	9.82	**0.280**	**0.100**	**2.00**	0.01	3.10	2.00	0.60	0.01	10	30	NS	NS
	Minimum	20.5	**6.34**	300	**0.04**	-160.1	5	**1.7**	5	9	50	5	5	8	5	135	0.010	0.001	0.59	**0.240**	**0.060**	**0.60**	0.01	0.01	0.60	0.28	0.01	10	30	NS	NS
Reporting Period (2020/2021)	**Average**	20.1	6.99	1035	**1.79**	-39.4	8	7.2	5	19	189	24	14	27	223	349	0.010	0.001	0.07	**0.275**	**0.186**	**0.83**	0.01	0.02	1.14	0.73	**0.02**	10	18	5	1
	Maximum	20.9	7.31	1075	**2.59**	144.7	20	**27.8**	5	23	200	25	14	30	294	**485**	0.010	0.001	0.08	**0.730**	**0.525**	**4.00**	0.01	0.03	4.00	3.03	**0.03**	10	40	5	1
	Minimum	19.2	6.50	964	**1.21**	-193.2	5	**0.0**	5	5	183	22	13	23	108	243	0.010	0.001	0.05	**0.110**	**0.066**	0.01	0.01	0.01	0.02	0.04	0.01	10	10	5	1
All Results (1991-2021)	**Average**	21.8	7.17	783	**0.82**	-114.6	6	5.0	5	27	133	16	12	49	121	276	0.044	0.001	2.12	**0.388**	**0.290**	**1.87**	0.01	0.23	1.94	1.42	**0.03**	31	**2414**	5	1
	Maximum	24.3	8.09	1643	7.17	144.7	20	**27.8**	5	83	211	27	28	123	294	**485**	0.260	0.005	9.82	**0.960**	**0.810**	**4.70**	0.02	3.10	4.70	4.42	**0.37**	370	**41000**	5	1
	80th Percentile	23.3	7.49	1060	**1.48**	15.6	6	10.8	5	27	188	25	15	90	235	359	0.058	0.001	3.99	**0.640**	**0.525**	**3.80**	0.01	0.03	3.80	3.03	**0.02**	12	180	ID	ID
	Median (50th Percentile)	21.4	7.21	647	**0.30**	-140.0	5	**1.6**	5	22	119	14	14	33	114	268	0.010	0.001	0.67	**0.280**	**0.164**	**1.60**	0.01	0.01	1.60	0.60	0.01	10	15	5	1
	20th Percentile	20.5	6.86	561	**0.15**	-192.8	5	**0.4**	5	16	88	7	5	26	8	188	0.010	0.001	0.05	**0.210**	**0.100**	**0.40**	0.01	0.01	0.50	0.25	0.01	10	10	ID	ID
	Minimum	19.2	**6.34**	300	**0.04**	-290.0	5	**-3.3**	5	5	50	5	5	8	5	135	0.010	0.001	0.05	**0.110**	**0.060**	0.01	0.01	0.01	0.02	0.01	0.01	1	1	5	1
GW062045																															
Pre-Extraction	**Average**	22.6	**5.46**	129	**1.31**	146.0	0	**2.1**	5	16	3	5	1	23	5	8	0.110	0.001	0.05	**0.025**	**0.010**	**5.65**	0.01	5.22	0.45	0.04	**5.22**	10	10	NS	NS
	Maximum	23.5	**5.52**	140	**1.34**	150.0	0	**2.4**	5	16	3	5	1	23	5	10	0.210	0.001	0.05	**0.030**	**0.010**	**5.90**	0.01	5.41	0.50	0.06	**5.41**	10	10	NS	NS
	Minimum	21.6	**5.40**	117	**1.27**	142.0	0	**1.8**	5	15	2	4	1	22	4	6	0.010	0.001	0.05	**0.020**	**0.010**	**5.40**	0.01	5.02	0.40	0.01	**5.02**	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	21.1	**5.85**	155	7.34	50.2	5	**21.8**	5	13	2	4	1	19	5	7	0.013	0.001	0.05	**0.024**	**0.007**	**4.56**	0.02	4.32	0.46	0.01	**4.33**	276	**507**	ND	ND
	Maximum	25.5	**6.40**	313	8.41	251.8	5	**44.0**	5	19	3	5	1	21	6	12	0.020	0.001	0.06	**0.060**	**0.012**	**5.12**	0.07	5.12	0.70	0.04	**5.12**	**1400**	**1800**	ND	ND
	Minimum	17.6	**5.04**	89	**5.94**	-165.9	5	**1.1**	5	5	2	4	1	17	5	4	0.010	0.001	0.05	0.010	0.004	**4.01**	0.01	3.75	0.20	0.01	**3.75**	10	10	ND	ND
All Results (2017-2021)	**Average**	22.2	**6.00**	167	**5.86**	92.6	5	10.6	5	14	2	4	1	21	5	9	0.056	0.002	0.29	**0.038**	**0.036**	**4.52**	0.01	4.26	0.53	0.04	**4.21**	137	**471**	10	ND
	Maximum	25.5	7.80	328	8.43	251.8	6	**44.0**	5	19	5	5	2	24	6	34	**0.560**	0.015	4.40	**0.270**	**0.316**	**6.00**	0.07	5.60	1.00	0.19	**5.60**	**1400**	**3700**	10	ND
	80th Percentile	23.1	**6.46**	201	8.04	159.6	6	**27.4**	5	16	3	5	1	23	5	10	0.026	0.001	0.05	**0.050**	**0.010**	**5.54**	0.01	5.39	0.70	0.05	**5.39**	73	**1060**	ND	ND
	Median (50th Percentile)	22.7	**6.00**	147	6.19	125.7	5	**2.5**	5	15	2	4	1	21	5	8	0.010	0.001	0.05	**0.020**	**0.010**	**4.86**	0.01	4.63	0.50	0.01	**4.63**	10	20	10	ND
	20th Percentile	21.0	**5.37**	118	**4.09**	-3.7	5	**1.0**	5	10	2	4	1	18	4	6	0.010	0.001	0.05	0.010	0.005	**4.16**	0.01	3.65	0.40	0.01	**3.65**	10	10	ND	ND
	Minimum	17.6	**5.04**	89	**1.27**	-165.9	5	**0.0**	5	1	2	2	1	17	3	4	0.010	0.001	0.05	0.010	0.003	**0.70**	0.01	0.87	0.20	0.01	**0.02**	2	1	10	0
GW300856																															
Pre-Extraction	**Average**	21.8	**6.06**	95	**3.34**	36.0		16.7	5	8	4	2	2	17	5	9	**1.995**	0.018	5.78	**0.360**	**0.285**	**0.95**	0.01	0.01	0.95	0.18	0.01	10	10	NS	NS
	Maximum	22.9	**6.48**	100	**4.36**	41.0	0	17.3	5	8	4	2	2	17	6	10	**3.270**	0.019	6.19	**0.410**	**0.320**	**1.10**	0.01	0.01	1.10	0.20	0.01	10	10	NS	NS
	Minimum	20.7	**5.64**	89	**2.31**	31.0	0	16.0	5	8	4	2	2	17	4	7	**0.720**	0.016	5.36	**0.310**	**0.250**	**0.80**	0.01	0.01	0.80	0.16	0.01	10	10	NS	NS
Reporting Period (2020/2021)	**Average**	21.6	6.62	84	7.30	81.8	8	**77.9**	5	10	4	2	2	13	7	9	0.351	0.015	3.52	**0.249**	**0.028**	**0.57**	0.01	0.03	0.90	0.17	**0.03**	23	11	ND	ND
	Maximum	22.4	7.89	124	7.86	253.2	15	**391.6**	5	14	4	2	2	16	12	15	0.370	0.020	4.15	**0.310**	**0.042**	**1.10**	0.02	0.10	1.10	0.22	**0.12**	100	20	ND	ND
	Minimum	20.3	**5.20**	2	6.90	-33.6	5	**2.3**	5	5	4	1	1	10	6	4	0.330	0.011	2.79	**0.200**	**0.006**	0.01	0.01	0.01	0.80	0.13	0.01	10	10	ND	ND
All Results (2017-2021)	**Average**	22.1	**6.47**	125	**5.51**	17.8	6	**39.2**	5	9	4	2	2	17	6	8	**0.565**	0.014	3.87	**0.271**	**0.104**	**0.75**	0.01	0.02	0.82	0.16	**0.07**	15	13	ND	ND
	Maximum	25.9	7.89	281	7.86	253.2	15	**391.6**	5	16	5	4	2	23	12	15	**3.270**	0.020	6.19	**0.410**	**0.320**	**1.40**	0.02	0.10	1.10	0.28	**0.95**	100	60	ND	ND
	80th Percentile	24.6	7.00	171	7.27	40.4	7	**26.7**	5	10	4	2	2	20	7	11	**0.580**	0.019	4.88	**0.318**	**0.228**	**1.08**	0.01	0.02	1.00	0.20	**0.02**	10	10	ND	ND
	Median (50th Percentile)	22.5	**6.44**	113	**5.02**	0.0	5	17.5	5	9	4	2	2	17	6	8	0.370	0.013	4.04	**0.285**	**0.038**	**0.80**	0.01	0.01	0.80	0.17	0.01	10	10	ND	ND
	20th Percentile	21.0	**5.85**	88	**4.01**	-39.5	5	8.3	5	8	4	2	1	13	5	5	0.320	0.010	3.10	**0.230**	**0.012**	**0.44**	0.01	0.01	0.70	0.12	0.01	10	10	ND	ND
	Minimum	5.8	**5.20**	2	**2.31**	-99.0	5	**0.1**	5	1	2	1	1	10	4	3	0.010	0.001	0.05	0.010	**0.006**	0.01	0.01	0.01	0.40	0.06	0.01	2	5	ND	ND

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

This page has intentionally been left blank

This page has intentionally been left blank

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 and becoming saline at depth with increasing salinity within the water profile towards the Tweed River.

During the reporting period the EC for all shallow groundwater bore sites remained within the water quality objective of 3,000uS/cm. With the exception of MB12 and MB14 which displayed a variable although generally consistent EC level, all shallow groundwater bores displayed a steady decline in EC during the reporting period consistent with the decreasing trend within the extraction pond attributed to elevated rainfall throughout the reporting period. EC levels recorded during the June 2021 monitoring were either to lowest recorded EC or close to the lowest recorded EC for bores MB1, MB2, MB11, MB15, CSP1, CSP3, GW062045, GW300858 and GW300845. Deep groundwater bore MB13 recorded a relative steady elevated EC throughout the reporting period while deep groundwater bore MB10 displayed consistently low EC values.

The cause of the increase in EC observed in both the deep and shallow bores during previous reporting periods remains unknown and may be attributable to natural fluctuations within the groundwater system. Given the 'global' nature of the change and the fact that, prior to April 2020, no extraction operations had occurred since February 2018, these changes are not considered to be related to the Quarry.

As expected, and consistent with previous measurements, most major cations and anions also exceed the current objective values at the deep groundwater bores and bore M13 in particular, consistent with and the cause of the higher electrical conductivity.

During the reporting period the pH generally remained near neutral to slightly alkaline with the exception of bores MB2 and GW062045 which remained slightly acidic but consistent within pre-extraction levels

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

Metals

During the reporting period slightly elevated aluminium levels continued to be regularly recorded at MB2 (maximum 0.62mg/L in August 2020). These slightly elevated aluminium levels are indicative of the low pH which has been regularly recorded at MB2 and is likely due to acid sulfate soils in the vicinity of this bore. These effects were similarly evident in pre-extraction monitoring.

At all other monitoring locations, the monitored metals (filterable iron, aluminium and arsenic) remained well below the quality objectives with no discernible trends. This is consistent with the near neutral to slightly alkaline pH recorded at these locations.

Nutrients and Bacteria

As for the extraction pond, nutrient levels (both phosphorus and particularly nitrogen / nitrogen containing species) were consistently low throughout the reporting period until elevated levels were again recorded during the June 2021 monitoring event. 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. Elevated ammonia levels which have previously been recorded at bore MB10 were not identified during the reporting period. Given that MB10 is located immediately adjacent the Kingscliff Wastewater Treatment Plant, previously elevated ammonia levels could be originating from the treatment plant.

Enterococci were observed to be elevated in MB11, MB12, MB13, MB 14 and GW062045 on several occasions during the reporting period. The presence of Enterococci is likely attributed to previous stocking of the property with cattle and possibly off-site poultry and has been recorded within surrounding groundwater bores, prior to, during and post dredging. Elevated enterococci levels are therefore not considered to be related to Quarry dredging activities.

In summary, analysis of the groundwater quality parameters shows that the intermittent dredging operations have had little direct impact on groundwater quality.

Reportable Incidents

There were no reportable groundwater incidents during the reporting period with all levels remaining within objective limits, historic or expected levels.

Further Improvements

Further review and update of the SWMP is planned during the second half of 2021 to further rationalise water monitoring. A replacement bore will also be resolved for MB10 with the potential use of other existing bores within bores in the adjacent Kingscliff WWTP being investigated.

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

Quarry Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	Year 11 (ha)	Year 12 (ha)	Year 13 (ha)
Total Quarry footprint[1]	12.6	13.5	15.5
Total active disturbance[1]	12.6	13.5	15.5
Land being prepared for rehabilitation	0	0	0
Land under active rehabilitation	0	0	0
Completed rehabilitation	0	0	0
Notes: 1. Includes areas of temporary rehabilitation.			

The total active disturbance area increased slightly during the reporting period with the formation of silt return and clean water channels and operation of mobile equipment to recover previously stockpiled soil material. The current active disturbance area of 13.5ha includes an approximately 5.5ha pond area and approximately 2.5ha which is considered to have been previously temporarily rehabilitated.

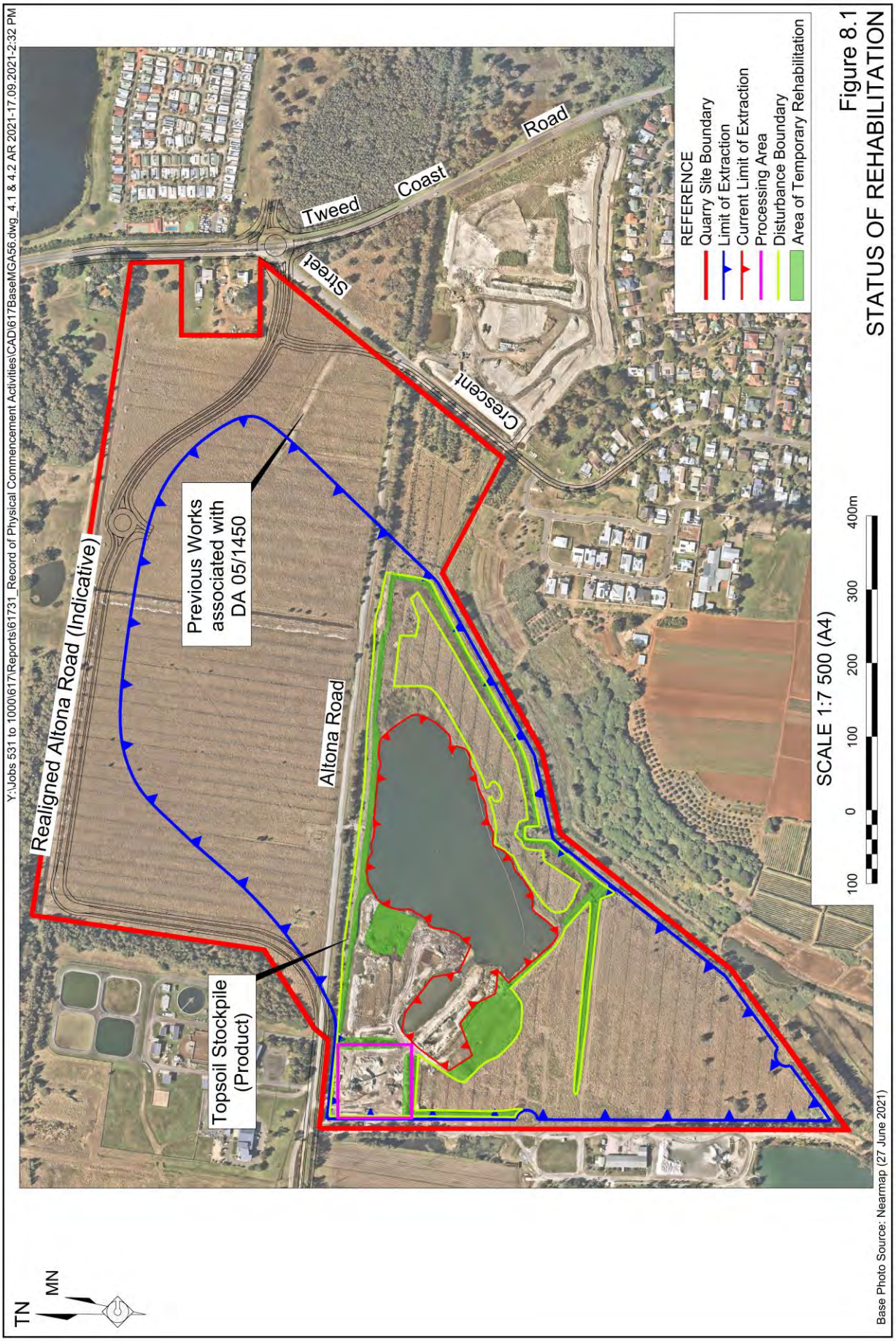
A small area (approximately 0.5ha) of disturbance is also present in relation to the previous physical commencement of DA 05/1450 for the realignment of Altona Road. No rehabilitation works for this area are planned until following the realignment of Altona Road. As these works are managed under separate approval, these areas are not included in **Table 8.1**.

Maintenance activities mainly consisted of slashing along fence lines and spot spraying of grass around the plants within the vegetative screens and for landscaping on the processing area bunds. Fence repairs were also undertaken as required to exclude cattle from the vegetative screen.

8.2 ACTIONS FOR THE NEXT REPORTING PERIOD

Rehabilitation activities during the next reporting period are expected to be confined to temporary rehabilitation of 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.

No other specific rehabilitation actions or trials are planned during the next reporting period and no areas will become available for final rehabilitation.


Y:\Jobs 531 to 1000\617\Reports\61731_Record of Physical Commencement Activities\CAD\617BaseMGA56.dwg_4.1 & 4.2 AR 2021-17.09.2021-2:32 PM
Figure 8.1
STATUS OF REHABILITATION
REFERENCE
Quarry Site Boundary
Limit of Extraction
Current Limit of Extraction
Processing Area
Disturbance Boundary
Area of Temporary Rehabilitation
Tweed Coast Road
Street
Crescent
Realigned Altona Road (Indicative)
Previous Works associated with DA 05/1450
Altona Road
Topsoil Stockpile (Product)
SCALE 1:7 500 (A4)
100 0 100 200 300 400m
TN
MN
Base Photo Source: Nearmap (27 June 2021)

9. COMMUNITY

9.1 COMMUNITY COMPLAINTS

One complaint was received during the current reporting period and is the first complaint receive to date for the Quarry. The complaint is summarised in **Table 9.1**.

Table 9.1
Community Complaints Summary

Complaint No.	Date	Complainant	Nature of Complaint (Air, Noise, Traffic, etc.) and Status
CLSQ001	24/07/2020	Tweed Shire Council	Exit from processing area had excessive dirt build up. Material swept from road and photographs sent to Council within 2 hrs to demonstrate road cleaned. No further action required.

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 John Griffin who was approved as the chairperson by (then) DPE on 8 July 2016.
- Community members – Ms Felicia Cecil and Mr Barrie Green who were approved by (then) DPE on 14 November 2016.
- Company representatives – Dr Stephen Segal of Gales-Kingscliff and Mr Jeff and Mr Brad Holloway of Kingscliff Sands Pty Limited/JBM Developments.
- Tweed Shire Council representatives – Ms Denise Galle, Team Leader Development Assessment, Mr Ray Clark, Traffic Engineer, and Mr Mark Longbottom, Environmental Health Officer.

During the reporting period, in agreeance with the chairperson, a report was prepared 20 December 2020 in lieu of a meeting due to Covid concerns / restrictions at that time. A meeting was also convened on 4 June 2021 with a site inspection undertaken following the meeting. Officers from the DPIE compliance unit also attended the 4 June 2021 meeting.

The report / minutes were prepared by Gales and provided an overview of activities during the current reporting period. No specific issues or enquires were raised during the reporting period by CCC members in relation to the Quarry.

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

No independent audit was required during this reporting period. The last an independent audit was undertaken by AQUAS on 18 November 2019, in accordance with *Condition 5(14)* of MP 05_0103B. As a result of the audit, five recommendations were provided and four opportunities for improvement were identified. The independent audit report was finalised and submitted to the Department on 2 March 2020[2] together with a response plan for the recommendations.

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 2022.

[2] An extension was provided by DPIE on 7 February 2020 for submission of the audit report and response by 2 March 2020.

Table 10.1
2019 Independent Audit – Action Response Plan Status

No.	Audit Recommendation	Action / Response	Proposed Timing	Status Update
NC-01	It is recommended to address all the non-compliances to be compliant to this condition.	Implement actions as outlined within this response.	As specified below.	Actions required to address non-compliance have been completed. **Status: Complete**
NC-02	It is recommended to ensure that documents required by DPIE are submitted within the required timeframe. A regular compliance tracking review (e.g. quarterly) is recommended to ensure compliances with the Conditions of Approval are met.	A quarterly compliance meeting will be held and will focus upon and record regular and upcoming compliance actions/matters as contained within PA 05_0103, EPL 12385 and WAL 40902.	Quarterly.	A compliance planner has been prepared and meetings have commenced. **Status: Complete**
NC-03	It is recommended that the requirements of the approved AQMP and SWMP are implemented until the approval of the modified plans under the Modification 2 has been acquired.	This matter has previously been reported to DPIE. Approval of the updated management plans is pending a response from NRAR. Further formal follow up of NRAR will be undertaken. Should no response be received prior to end March 2020, final management plans will be submitted to DPIE with a request for approval in lieu of NRAR comments.	28 February 2020 28 May 2020 (subject to NRAR response)	The updated AQMP was approved 22 June 2020 and deposited dust monitoring continued throughout the reporting period (see Section 6.4) and will continue in accordance with the approved AQMP. Operational monitoring has been undertaken in accordance with the 2017 SWMP and will now continue in accordance with the updated SWMP approved 20 July 2021 following receipt of NRAR response received January 2021 and resubmission of updated plan in May 2021. **Status: Complete**
NC-04	It is recommended that the requirements of the approved SWMP be implemented until the approval of the modified plans under the Modification 2 has been acquired.			
NC-05	It is recommended that the requirements of the approved AQMP are implemented until the approval of the modified plans under the Modification 2 has been acquired.			
OFI-01	Opportunity for Improvement to ensure that the compliance with the Conditions of Approval are included in the induction package / presentation that will be given to all employees/workers on site prior to commencing to their work.	All operators will be required to include as part of their induction process a clear requirement that all employees and contractors undertaking works on site must comply with the requirements of PA 05_0103, EPL 12385 and WAL 40902 as relevant and directed by the Quarry Manager. Copies of each approval will also be accessible to all employees / contractors.	At recommencement of operations and during operations.	Kingscliff Sands Pty Limited have inducted all employees/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. **Status: Complete**

Table 10.1 (Cont'd)
2019 Independent Audit – Action Response Plan Status

No.	Audit Recommendation	Action / Response	Proposed Timing	Status Update
OFI-02	Opportunity for improvement to develop drawings showing erosion and sedimentation controls to be implemented at the site and progressive update and maintenance during operations be implemented.	Applicable standard erosion and sediment control drawings will be included as part of the final update of the SWMP.	Second half 2021	These drawings will be included in a further planned update to the SWMP as no further changes were made as a result of NRAR comments. Further updates would have triggered further agency consultation. In discussion with DPIE a further update to the SWMP is planned.
OFI-03	An opportunity for improvement to develop the traffic control plan to ensure that all heavy vehicle access to and from the site is via the Tweed Coast Road/Crescent Street/Altona Road route and heavy vehicles must not travel via Crescent Street through Cudgen Village, except for local deliveries to Cudgen Village.	A Transport Management Plan will be prepared prior to the dispatch of trucks from the Quarry and which addresses these matters and the requirements of PA 05_0103 Schedule 3 Condition 31.	Prior to dispatch of trucks from the Quarry.	An updated Transport Management Plan was prepared in consultation with Council and RMS/TfNSW and subsequently approved by DPIE 21 May 2020. Commencement of road transportation was delayed until 22 May 2020 (i.e. following receipt of approval for the Transport Management Plan). **Status: Complete**
OFI-04	Opportunity for Improvement to ensure that the Traffic Management Plan will be reviewed and updated accordingly to cover the requirements of Conditions of Approval under Modification 2 prior resuming operations.			

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. There was one reportable incident relating to noise monitoring. As discussed in Section 6.3, whilst no exceedances of noise criteria (or noise complaints) were recorded, the 2021 Quarter 1 noise monitoring was inadvertently not undertaken, despite operational activities occurring, due to a miscommunication. This was identified during the review of the 2021 Quarter 2 noise monitoring report and was reported as an incident (a copy of the incident report is provided as **Appendix 6**).

The incident report concluded the missed noise monitoring during Q1 2021 is not expected to have resulted in any adverse environmental impacts based on the following.

- The low intensity nature of the activities, which remained at a much lower intensity than the approved operations.
- The previous monitoring results which have demonstrated compliance with the noise criteria.
- The absence of any complaints relating to noise.

Notwithstanding, a procedure and has been put in place to ensure that the need for noise monitoring is reviewed and, if required, organised directly by the Quarry operator at the beginning of each quarter. A scheduled reminder has also been set up for relevant personnel with contact details and summary of the procedure.

As part of the compliance review undertaken for the Annual Review, a total of 6 non-compliances with PA 05_0103B have been identified (see Section 1). All non-compliances are considered administrative non-compliances with no environmental or community impacts.

Noise Monitoring

Due to noise monitoring being inadvertently not undertaken during Q1 2021, this is considered to be a non-compliance with MP 05_0103B *Condition 3(3) and Condition 3(4)* which require 3 monthly noise monitoring and implementation of the Noise Management Plan. Implementation of the procedure and scheduling outlined above will avoid future non-compliance.

Altona Road Maintenance Agreement

MP 05_0103B *Condition 3(28)* requires that, 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. Whilst 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 (i.e. beyond the required date for the agreement and therefore resulting in non-compliance with the required timeframe). 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 September 2019. As at the drafting of this Annual Review, the final agreement had not been resolved and remained with DPIE for resolution.

Rain Gauge

EPL 12385 *Conditions M4.1 and M4.2* requires that an rainfall depth monitoring device be installed and maintained on site. A automatic rain gauge and logger was previously installed, however the gauge failed. The gauge has subsequently been replaced. Missing data was supplemented from the Bureau of Meteorology Tweed Heads Gold Club Station No. 58056 which is located ~6km north of the Quarry. As such, the supplementary data is considered highly representative.

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 both processed and unprocessed products by road.
- Continued environmental monitoring.
- Continued community consultation, principally through the CCC, to inform the community about Quarry activities.

Key environmental improvements planned during the next reporting period include further review and update of the Soil and Water Management Plan to further rationalise environmental monitoring requirements.

This page has intentionally been left blank

Appendices

(Total No. of pages including blank pages = 178)

This page has intentionally been left blank

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)

This page has intentionally been left blank

Table A
Compliance Review – Project Approval 05_0103B

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 2 ADMINISTRATIVE CONDITIONS				
OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT				
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
TERMS OF APPROVAL				
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.	**Administrative Non-Compliance**	Non-compliance has been recorded against other conditions of this approval.	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. *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.*	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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)				
LIMITS ON APPROVAL				
Quarrying Operations				
6.	The Proponent may carry out quarrying operations on the site until 31 December 2047. *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.*	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 -12m AHD.	D
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 22 250m^3 of sand was extracted during the reporting period.	A
Quarry Product Transport				
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 28 794t 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	Approximately 3000t VENM was purchased and imported during the reporting period for the purpose of creating a pad for the ground-based transformer. VENM certificates were retained which confirm the material contained no waste.	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 reporting period road upgrade works were also 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

<table>
<tr><th>Cond. No.</th><th>Conditional Requirement</th><th>Compliance</th><th>Comments</th><th>Basis*</th></tr>
<tr><td colspan="5">SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)</td></tr>
<tr><td colspan="5">LIMITS ON APPROVAL (Cont'd)</td></tr>
<tr><td colspan="5">Hours of Operation</td></tr>
<tr><td>13.</td><td>The Proponent shall comply with the operating hours in Table 1.
Table 1: Operating Hours
<table>
<tr><th>Activity</th><th>Permissible Hours</th></tr>
<tr><td>Site establishment, dry processing, product transport by road, VENM receipts, other quarrying operations not specified in this table</td><td>• 7.00 am to 6.00 pm Monday to Friday
• 7.00 am to 1.00 pm Saturday
• At no time on Sundays or public holidays</td></tr>
<tr><td>Sand extraction by dredging and pumping to the processing plant, wet processing.</td><td>• 7.00 am to 10.00 pm Monday to Friday
• 7.00 am to 4.00 pm Saturday
• At no time on Sundays or public holidays</td></tr>
<tr><td>Sand extraction by dredging and pumping to fill sites.</td><td>• 7.00 am to 6.30 pm Monday to Friday
• 7.00 am to 1.00 pm Saturday
• At no time on Sundays or public holidays</td></tr>
<tr><td>Operation of dredge to fill pipeline with water or pipeline flushing</td><td>• 6.30 am to 7.00 pm Monday to Friday
• 6.30 am to 1.30 pm Saturday
• At no time on Sundays or public holidays</td></tr>
<tr><td>Maintenance (if inaudible at neighbouring residences)</td><td>Any day</td></tr>
</table></td><td>Compliant</td><td>Site records confirm activities undertaken within approved hours of operation.</td><td>A, D</td></tr>
<tr><td>14.</td><td>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.</td><td>Not Applicable</td><td>No such requests or emergency works have been received / required to date.</td><td>A</td></tr>
<tr><td colspan="5">STRUCTURAL ADEQUACY</td></tr>
<tr><td>15.</td><td>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.
Notes:
• Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works; and
• Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.</td><td>Compliant</td><td>No buildings or structures on site require certification or assessment against the Building Code of Australia.</td><td>A, D</td></tr>
<tr><td colspan="5">DEMOLITION</td></tr>
<tr><td>16.</td><td>The Proponent shall ensure that all demolition work is carried out in accordance with AS 2601-2001: The Demolition of Structures, or its latest version.</td><td>Not Yet Applicable</td><td>No demolition work has been required to date.</td><td>A</td></tr>
<tr><td colspan="5">* D = Documentation sighted A = Advised by Company O = On-site Observation</td></tr>
</table>

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)				
PROTECTION OF PUBLIC INFRASTRUCTURE				
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. *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.*	Compliant	No repair works or relocation of public infrastructure was required during the reporting period. The previous installation of a culvert beneath Crescent Street for placement of pipelines required repair of the road surface which were completed at the cost of the Company.	A, D
OPERATION OF PLANT AND EQUIPMENT				
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 was undertaken during the reporting period to ensure proper and efficient equipment condition. No issues with equipment operation arose during the reporting period.	A
CONTRIBUTIONS				
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. *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.*	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
COMPLIANCE				
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)
Compliance Review – Project Approval 05_0103B

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 2 ADMINISTRATIVE CONDITIONS (Cont'd)				
PRODUCTION DATA				
21.	The Proponent must: a) from the commencement of quarrying operations provide annual quarry production data to DRG using the standard form for that purpose; and b) include a copy of this data in the Annual Review.	Not Determined Compliant	It is advised that the 2020/21 Extractive Material Return form has not yet been received from DRNSW. Kingscliff Sands is following up with DRNSW. Production data is presented in Section 4.1 of this Annual Review.	A, D
LIMITS OF EXTRACTION				
22.	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. *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.*	Compliant	The modified extraction boundary (per MOD2) has been surveyed by registered surveyors (B&P Surveys) and star pickets placed with ~2m high orange electrical conduit to enhance the visibility of the markers.	A, D
PIPELINE CORRIDOR				
23.	Prior to commencing work to install pipeline corridors (shown conceptually in Appendix 1), the Proponent must submit for the approval of the Secretary: a) a survey plan of the route of the pipeline; b) evidence that this route does not require native vegetation clearing; c) evidence that the fill sites have approval for filling; and d) in relation to the eastern pipeline: (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; (ii) details of proposed measures to protect vegetation during pipeline installation, operation and removal; and (iii) details of measures, developed in consultation with OEH, to provide opportunities for the Wallum Froglet to cross the eastern pipeline.	Compliant	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. No additional sections of pipeline were placed during the reporting period.	A, D
24.	The Proponent must maintain the pipelines, ensuring that any leak or maintenance issues are detected and repaired to the satisfaction of the Secretary.	Not Applicable	The pipelines during the previous 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.	A, D

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

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

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.	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. *Table 2: Noise criteria dB(A)* **Receiver Location** / **Day & Evening $LA_{eq(15\ min)}$ dB(A)** / **Shoulder $LA_{eq(15\ min)}$ dB(A)** Residences on privately owned land / 47 / 44 Noise generated by the project is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 3 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria. 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.	Compliant	Noise monitoring during the reporting period confirmed noise contributions from the Quarry remained below the criteria.	D
Cumulative Noise Criteria				
2.	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: • $L_{Aeq\ (11\ hour)}$ 50 dB(A) – Day; • $L_{Aeq\ (4\ hour)}$ 45 dB(A) – Evening; and • $L_{Aeq(9\ hour)}$ 40 dB(A) – Night.	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)
Compliance Review – Project Approval 05_0103B

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
NOISE (Cont'd)				
Operating Conditions				
3.	The Proponent must: a) implement best practice management to minimise the construction, operational and road transportation noise of the project; b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this approval do not apply (see Appendix 3); 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 d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this approval, to the satisfaction of the Secretary. *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.*	**Administrative Non-Compliance**	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 Noise monitoring was undertaken during the reporting period. However, the Q1 2021 noise monitoring was inadvertently not undertaken (see Section 4.3 and 11). No modification to operations has been deemed necessary to date. Noise monitoring and management is further discussed in Section 6.3.	A, D
Noise Management Plan				
4.	The Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:	**Administrative Non-Compliance**		
	a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;		The Department confirmed by letter 18 April 2019 that R.W. Corkery & Co Pty Limited was suitably qualified to prepare the noise management plan.	D
	b) be submitted to the Secretary for approval within three months of the determination of Modification 2;		The updated management plan was submitted to the Department on 22 April 2019, resubmitted 30 April 2020 and approved 22 June 2020.	D
	c) be prepared in consultation with the EPA;		EPA confirmed via email on 18 April 2019 that they would not be providing comments on the updated plan.	D
	d) describe the measures to be implemented to ensure: - compliance with the noise criteria and operating conditions of this approval; - best practice management is being employed; and - 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);		Section 3 of the 2020 Noise Management Plan outlines the noise management measures.	D
	e) describe the proposed noise management system; and		Section 5 of the 2020 Noise Management Plan outlines the noise management system.	D

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

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

<table>
<tr><th>Cond. No.</th><th>Conditional Requirement</th><th>Compliance</th><th>Comments</th><th>Basis*</th></tr>
<tr><td colspan="5">SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</td></tr>
<tr><td colspan="5">NOISE (Cont'd)</td></tr>
<tr><td colspan="5">Noise Management Plan (Cont'd)</td></tr>
<tr><td>4.
(Cont'd)</td><td>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.
The Proponent must implement the Noise Management Plan as approved from time to time by the Secretary.</td><td></td><td>Section 5 of the 2020 Noise Management Plan outlines the noise monitoring program.

As the Q1 2021 noise monitoring was inadvertently not undertaken, the 2020 Noise Management Plan was not fully implemented during the reporting period.</td><td>D

A, D</td></tr>
<tr><td colspan="5">AIR QUALITY</td></tr>
<tr><td colspan="5">Air Quality Impact Assessment Criteria</td></tr>
<tr><td>8.</td><td>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.
Table 3
<table>
<tr><th>Pollutant</th><th>Averaging period</th><th colspan="2">Criterion</th></tr>
<tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td colspan="2">[a,c] 25 µg/m^3</td></tr>
<tr><td></td><td>24-hour</td><td colspan="2">[b] 50 µg/m^3</td></tr>
<tr><td>Particulate matter < 2.5 ($PM_{2.5}$)</td><td>Annual</td><td colspan="2">[a, c] 8 µg/m^3</td></tr>
<tr><td></td><td>24-hour</td><td colspan="2">[b] 25 µg/m^3</td></tr>
<tr><td>Total suspended particulate (TSP)</td><td>Annual</td><td colspan="2">[a,c] 90 µg/m^3</td></tr>
<tr><td>[d] Deposited dust</td><td>Annual</td><td>[b] 2 g/m^2/month</td><td>[a] 4 g/m^2/month</td></tr>
</table>
Notes:
a Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources).
b Incremental impact (i.e. incremental increase in concentrations due to the project on its own).
c Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.
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.</td><td>Compliant</td><td>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.</td><td>A, D</td></tr>
<tr><td colspan="5">Operating Conditions</td></tr>
<tr><td>6.</td><td>The Proponent must:
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;</td><td>Compliant</td><td>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.</td><td>A, D</td></tr>
</table>

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

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

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 re-commenced April 2020 and is reports in Section 6.4 of this report.	A, D
	e) minimise surface disturbance of the site, other than as permitted under this approval, to the satisfaction of the Secretary.	Compliant	All areas of disturbance not required for immediate operation and which can feasibly be revegetated have been stabilised with pasture cover.	A, D
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:	Compliant		
	a) be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;		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.	D
	b) be prepared in consultation with the EPA;		EPA confirmed via email on 18 April 2019 that they would not be providing comments on the updated Air Quality Management Plan	D
	c) be submitted to the Secretary within three months of the determination of Modification 2;		The updated management plan was submitted to the Department on 22 April 2019, resubmitted 30 April 2020 and approved 22 June 2020.	D
	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;		Section 3 of the 2020 Air Quality Management Plan outlines the air quality management measures.	D
	e) describe the air quality management system in detail; and		Section 7 of the updated Air Quality Management Plan outlines the air quality management system.	D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
AIR QUALITY (Cont'd)				
Air Quality Management Plan (Cont'd)				
7. (Cont'd)	f) include an air quality monitoring program that: - is capable of evaluating the performance of the project against the air quality criteria; - adequately supports the air quality management system; and - includes a protocol for determining any exceedances of the air quality criteria. 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
Meteorological Monitoring				
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 *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* 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
Greenhouse Gas Emissions				
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
SOIL AND WATER				
Water Supply				
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. *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.*	Compliant	Gales holds Water Access Licence 40902 which provides for 'take' of up to 700ML per year.	D
Water Discharges				
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 discharges occurred during the reporting period.	A
Fines Management				
12.	The Proponent must ensure that: 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);	Compliant	Validation testing of products confirm the material is not potentially acid sulfate soil.	A, D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
SOIL AND WATER (Cont'd)				
Fines Management (Cont'd)				
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.	Compliant	All fines previously generated have been deposited at a depth of approximately -12m below water surface. Fines deposited during the reporting period will also ultimately settle at the base of the dredge pond.	A, D
	Note: Acid sulfate soils are as defined in the NSW Acid Sulfate Soils Manual.			
Flood Management				
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 floods or overflows of the dredge pond bunding occurred during the reporting period.	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. *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.*	Compliant	Based on previous survey and the volume of material imported to create the transformer pad, net flood storage capacity has increased by at least ~4 000m^3 (4ML).	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 extraction area has been constructed in accordance with these requirements.	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 have been retained to 1.8m AHD (excluding the transformer pad which 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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
SOIL AND WATER (Cont'd)				
Soil and Water Management Plan				
18.	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:	Compliant	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, AGEC and HMC as being suitably qualified to prepare the SWMP on 31 May 2019.	A, D
	a) a Site Water Balance;		Section 3 of the SWMP.	
	b) an Erosion and Sediment Control Plan;		Section 4 of the SWMP.	
	c) a Surface Water Monitoring Program		Section 7 of the SWMP.	
	d) a Groundwater Monitoring Program;		Section 6 of the SWMP.	
	e) a Blue-Green Algae Management Plan;		Section 8 of the SWMP.	
	The Proponent must implement the approved plan as approved from time to time by the Secretary		The updated SWMP is currently pending approval.	
19.	The Site Water Balance must include details of:	Compliant		D
	a) sources and security of water supply;		Section 3.2 of the SWMP.	
	b) water use and management on site;		Section 3.3 of the SWMP.	
	c) any off-site water transfers;		Section 3.3 of the SWMP.	
	d) reporting procedures; and		Section 9 of the SWMP.	
	e) measures to be implemented to minimise clean water use on site.		Section 3.5 of the SWMP.	
20.	The Erosion and Sediment Control Plan must:	Compliant		D
	a) be consistent with the relevant requirements of Department of Housing's *Managing Urban Stormwater: Soil and Construction,* the NSW Acid Sulfate Soil Advisory Committee's *Acid Sulfate Soil Manual*, and relevant Council codes, or most recent versions of these documents;		Sections 4.1 and 5.1 of SWMP.	
	b) describe construction and operational activities that could cause soil erosion, sedimentation or generation of acid sulfate soils;		Sections 4.2 and 5.2 of the SWMP.	
	c) describe the location, function, and capacity of soil and water management and control structures during construction, stabilisation and operational stages;		Section 4.3 of the SWMP.	

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
SOIL AND WATER (Cont'd)				
Soil and Water Management Plan (Cont'd)				
20 (Cont'd)	d) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;		Section 4.3 of the SWMP.	
	e) define procedures for managing the potential acid sulfate soils on the site;		Sections 5.3 and 5.4 of the SWMP.	
	f) define procedures for managing water releases from the site; and		Section 7.8 of the SWMP.	
	g) define procedures for the maintenance of soil and water management structures on the site during the life of the project.		Section 4.4 of the SWMP.	
21.	The Surface Water Monitoring Program must include:	Compliant		D
	a) a detailed description of the surface water management system;		Section 7.2 of the SWMP.	
	b) surface water impact assessment criteria;		Section 7.4 of the SWMP.	
	c) a program to monitor bank and bed stability; and		Section 4.4 of the SWMP.	
	d) a program to monitor and manage pH in the dredge pond;		Section 7.5 of the SWMP.	
	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		Sections 7.7 and 7.8 of the SWMP.	
	f) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water impact assessment criteria.		Section 7.7 of the SWMP.	
22.	The Groundwater Monitoring Program must include:	Compliant		D
	a) detailed baseline data on groundwater levels and quality, based on statistical analysis;		Section 6.2 of the SWMP.	
	b) groundwater impact assessment criteria;		Section 6.3 of the SWMP.	
	c) a program to monitor and report on adverse impacts of the project on groundwater flows and quality;		Sections 6.4 and 6.5 of the SWMP.	
	d) a program to monitor groundwater level effects on vegetation, and on groundwater supply to adjoining properties; and		Section 6.4 of the SWMP.	
	e) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.		Section 6.5 of the SWMP.	

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
SOIL AND WATER (Cont'd)				
Soil and Water Management Plan (Cont'd)				
23.	The Blue-Green Algae Management Plan must: 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; b) describe the measures that would be implemented to prevent and control the sources of algal blooms over the short, medium and long term; c) include a detailed recovery plan that aims to reduce algae levels to meet the water quality completion criteria in the Rehabilitation Management Plan; 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 e) define procedures for the management and notification of identified algal blooms.	Compliant	Section 8.2 of the SWMP. Section 8.5 of the SWMP. Section 8.5 of the SWMP. Sections 8.5 and 8.6 of the SWMP. Section 8.8 of the SWMP.	D
Additional Groundwater Requirements				
24.	Within six months of the determination of Modification 2, the Proponent must: a) review the site's existing groundwater monitoring data (including water quality data) and groundwater management and mitigation measures; 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 c) prepare an amended Groundwater Monitoring Program to reflect any additional measures, to the satisfaction of the Secretary.	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 yet encroached upon the previously proposed Altona Road.	A, D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
SOIL AND WATER (Cont'd)				
Additional Groundwater Requirements (Cont'd)				
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.			
TRANSPORT				
Site Access				
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
Upgrade and Maintenance of Altona Road				
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	**Administrative Non-compliance**	Whilst 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 (i.e. beyond the required date for the agreement and therefore resulting in non-compliance with the required timeframe). 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. As at the drafting of this Annual Review, the final agreement remained with DPIE for resolution.	D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
TRANSPORT (Cont'd)				
Upgrade and Maintenance of Altona Road (Cont'd)				
28. (Cont'd)	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). 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.			
29	The Proponent must upgrade the intersection of Crescent Street and Tweed Coast Road. This upgrade must: 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); b) provide for channelised right turn treatment (line marking only) on Tweed Coast Road for vehicles turning right into Crescent Street; c) be designed and constructed in accordance with Austroads Guidelines, Australian Standards and RMS Supplements; and 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; 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. *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.*	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
Operating Conditions				
30.	The Proponent must: 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.	Compliant	No on-street parking occurred during the reporting period. On-site parking is available within the Processing Area.	A

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
TRANSPORT (Cont'd)				
Operating Conditions (Cont'd)				
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 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
Transport Management Plan				
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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
TRANSPORT (Cont'd)				
Transport Management Plan (Cont'd)				
31. (Cont'd)	- a map of the primary haulage route; - safety initiatives for haulage through residential areas, school zones and along school bus routes; - an induction process for vehicle operators and regular toolbox meetings; - complaints resolution and disciplinary procedures; and - details of community consultation - measures for peak haulage periods. f) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct; 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 (h) propose measures to minimise the transmission of dust and tracking of material onto the surface of public roads from vehicles leaving the quarry. The Proponent must not dispatch any trucks from the site until the Traffic Management Plan is approved by the Secretary. The Proponent must implement the approved Traffic Management Plan as approved from time to time by the Secretary.			
REHABILITATION				
Rehabilitation Objectives				
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

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

<table>
<tr><th>Cond. No.</th><th>Conditional Requirement</th><th>Compliance</th><th>Comments</th><th>Basis*</th></tr>
<tr><td colspan="5">SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)</td></tr>
<tr><td colspan="5">REHABILITATION (Cont'd)</td></tr>
<tr><td colspan="5">Rehabilitation Objectives (Cont'd)</td></tr>
<tr><td>32. (Cont'd)</td><td colspan="4">Table 4: Rehabilitation Objectives
<table><tr><th>Feature</th><th>Objective</th></tr><tr><td>All areas of the site affected by the project</td><td>• Safe
• Hydraulically and geotechnically stable, including the dredge pond margins (particularly where subject to regular wind and wave action)
• Non-polluting
• Fit for the intended post-extraction land use(s)
• Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land</td></tr><tr><td>Surface Infrastructure</td><td>• Decommissioned and removed, unless otherwise agreed by the Secretary</td></tr><tr><td>Dredge Pond</td><td>• 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
• Natural looking bank design with curved lake boundaries, with a variety of bank treatments (e.g. beaches, wetlands) providing a variety of habitats.
• Minimise the extent and persistence of algae blooms
• Water quality fit for the intended post-extraction land use(s)</td></tr></table></td></tr>
<tr><td colspan="5">Progressive Rehabilitation</td></tr>
<tr><td>33.</td><td>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.</td><td>Compliant</td><td>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.</td><td>A, O</td></tr>
<tr><td colspan="5">Rehabilitation Management Plan</td></tr>
<tr><td>34.</td><td>The Proponent must prepare a Rehabilitation Management Plan for the project to the satisfaction of the Secretary. This plan must:</td><td>Compliant</td><td></td><td></td></tr>
<tr><td></td><td>a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;</td><td></td><td>RWC was approved as being suitably qualified to prepare the Rehabilitation Management Plan (RMP) on 31 May 2019.</td><td>D</td></tr>
<tr><td></td><td>b) be prepared in consultation with Council, Water NSW, DoI and OEH;</td><td></td><td>The RMP was supplied to these agencies for review on 1 July 2019.</td><td>D</td></tr>
<tr><td></td><td>c) be submitted to the Secretary within three months of the determination of Modification 2, unless the Secretary agrees otherwise;</td><td></td><td>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 SWMP was submitted to the Department on 8 July 2019.</td><td></td></tr>
<tr><td></td><td>d) describe how the rehabilitation of the site and pipeline corridors would achieve the objectives identified in Table 4;</td><td></td><td>Sections 3.2 and 3.3 of the RMP.</td><td>D</td></tr>
<tr><td colspan="5">* D = Documentation sighted A = Advised by Company O = On-site Observation</td></tr>
</table>

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
REHABILITATION (Cont'd)				
Rehabilitation Management Plan (Cont'd)				
34. (Cont'd)	e) describe the short, medium, and long term measures that would be implemented to: - rehabilitate and stabilise the site and pipeline corridors; and - manage the restored vegetation and wetland habitat established on the site;		Section 3.2 of the RMP.	D
	f) include detailed performance and completion criteria for the rehabilitation and stabilisation of the site (including appropriate water quality criteria);		Sections 3.4 and 4.3 of the RMP.	D
	g) include a detailed description of the measures to be implemented to: - enhance existing vegetation and increase littoral and terrestrial habitat potential; - protect areas outside the disturbance areas, including vegetation adjoining pipelines; - manage impacts on fauna, including measures to enable Wallum Froglet to cross the eastern pipeline; - control terrestrial and aquatic weeds and pests; - control access; and - reduce the visual impacts of the project;		Section 3.2 of the RMP.	D
	h) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (g) above, and progress against the detailed performance and completion criteria in paragraph (f);		Section 3.5 of the RMP.	D
	i) include a vegetation clearance protocol;		Section 3.3.8 of the RMP.	D
	j) include a Long-Term Management Strategy, which: - defines the objectives and criteria for quarry closure and post-extraction management; - investigates options for the future use of the site; - describes the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and - describes how the performance of these measures would be monitored over time;		Section 4 of the RMP.	D
	k) describe the potential risks to successful rehabilitation and/or revegetation, including a description of the contingency measures that would be implemented to mitigate these risks; and		Section 3.6 of the RMP.	D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
REHABILITATION (Cont'd)				
Rehabilitation Management Plan (Cont'd)				
34. (Cont'd)	l) detail who is responsible for monitoring, reviewing, and implementing the plan. The Proponent must implement the approved Rehabilitation Management Plan as approved from time to time by the Secretary.		Section 3.7 of the RMP. Approval of the updated RMP remains pending.	D
Rehabilitation Bond				
35.	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: 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 b) employing a suitably, independent and experienced person to verify the calculated costs. 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	Not Yet Applicable	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). The review of the bond is required within 6 months of the approval of the RMP. Approval of the RMP remains pending.	A, D
36.	The Rehabilitation Bond must be reviewed and if required, an updated bond must be lodged with the Department within 3 months following: a) any update or revision to the Rehabilitation Management Plan; b) the completion of an Independent Environmental Audit; or c) in response to a request by the Secretary. *Notes:* • *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.* • *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.*	Not Yet Applicable	Approval of the updated RMP remains pending. An Independent Environmental Audit has not yet been undertaken and no request has been received from the Secretary.	A, D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
ABORIGINAL CULTURAL HERITAGE				
Aboriginal Cultural Heritage Management Plan				
37.	The Proponent must prepare an Aboriginal Cultural Heritage Management Plan to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with the relevant Aboriginal communities; b) be submitted to the Secretary for approval prior to carrying out any development; and c) include a description of the: • Aboriginal cultural heritage induction protocol for employees; • process for Aboriginal inspection of excavations for the northern pipeline corridor; • 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 • process for identifying a long-term storage location should Aboriginal relics be discovered within the project site requiring salvage. The Proponent must implement the approved Aboriginal Cultural Heritage Management Plan as approved from time to time by the Secretary.	Compliant	The Aboriginal Cultural Heritage Management Plan (ACHMP) was implemented as applicable during the reporting period. Prepared in consultation with Tweed-Byron LALC (correspondence dated 01/03/11) The ACHMP was submitted to the then DoP 09/02/11 and approved 14/05/14. An updated version was approved 05/07/17. Section 7 of the ACHMP. Section 8 of the ACHMP. Section 10 and Appendix 1 of the ACHMP. Section 12 of the ACHMP. 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.	A, D
VISUAL				
38.	The Proponent must establish and subsequently maintain the vegetation screen around the extraction area within 12 months of the date of this approval. *Note: The vegetation screen must be detailed in the Rehabilitation Management Plan required under Schedule 3.*.	Compliant	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.	A, D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS (Cont'd)				
VISUAL (Cont'd)				
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
WASTE				
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 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
LIQUID STORAGE				
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
Dangerous Goods				
43.	The Proponent must ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.	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
SCHEDULE 4 ADDITIONAL PROCEDURES				
Notification of Landowners				
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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 4 ADDITIONAL PROCEDURES (Cont'd)				
Notification of Landowners (Cont'd)				
1. (Cont'd)	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 b) publish on its website the full details of the exceedance. 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. 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).			
Independent Review				
2.	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. 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. 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: a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to: - consult with the landowner to determine their concerns; - conduct monitoring to determine whether the project is complying with the relevant criteria in Schedule 3; and - if the project is not complying with that criteria, identify measures that could be implemented to ensure compliance with the relevant criteria; b) give the Secretary and landowner a copy of the independent review. c) comply with any written requests made by the Secretary to implement any findings of the review.	Not Yet Applicable	Request for independent review has not been received to date.	A

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS				
Environmental Management Strategy				
1.	The Proponent must prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must:	Compliant		A, D
	a) be submitted to the Secretary for approval within three months of the determination of Modification 2;		The updated EMS was submitted to the Department on 22 April 2019.	
	b) provide the strategic framework for environmental management of the project;		Section 1.2 of the EMS.	
	c) identify the statutory requirements that apply to the project;		Section 3.0 of the EMS.	
	d) describe the role, responsibility, authority, and accountability of the key personnel involved in the environmental management of the project.		Section 4.0 of the EMS.	
	e) describe the procedures that would be implemented to:			
	• keep the local community and relevant agencies informed about the construction, operation and environmental performance of the project;		Section 6.1 of the EMS.	
	• receive, record, handle and respond to complaints;		Section 6.2 of the EMS.	
	• resolve any disputes that may arise during the life of the project;		Section 6.3 of the EMS.	
	• respond to any non-compliance;		Section 7 of the EMS.	
	• respond to emergencies; and		Section 9 of the EMS.	
	d) include:			
	• reference to any strategies, plans and programs approved under the conditions of this approval; and		Section 5 of the EMS.	
	• a clear plan depicting all the monitoring to be carried out under the conditions of this approval.		Section 5 of the EMS.	
	The Proponent must implement the Environmental Management Strategy as approved from time to time by the Secretary.		Approval of the updated EMS remains pending.	
Management Plan Requirements				
2.	The Proponent must ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	Compliant	Each management plan includes these components as relevant to each plan.	D
	a) a summary of relevant background or baseline data;			

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
Management Plan Requirements (Cont'd)				
2. (Cont'd)	a) a summary of relevant background or baseline data; b) a description of: - the relevant statutory requirements (including any relevant approval, licence or lease conditions); - any relevant limits or performance measures/criteria; and - 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; c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; d) a program to monitor and report on the: - impacts and environmental performance of the project; and - effectiveness of any management measures (see (c) above); 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; f) a program to investigate and implement ways to improve the environmental performance of the project over time; (g) a protocol for managing and reporting any: - incidents; - complaints; and - non-compliances with statutory requirements; h) a protocol for periodic review of the plan; and 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. *Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*			

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
Application of Existing Management Plans				
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
COMMUNITY CONSULTATIVE COMMITTEE				
8.	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 *Community Consultative Committee Guidelines: State Significant Projects (2016),* for the duration of quarrying operations and for at least 6 months following the completion of quarrying operations. *Notes:* • *The CCC is an advisory committee.* • *In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Proponent, Council and the local community.*	Compliant	The CCC was established in July 2017 with the approval of the Independent Chairperson by DPE 8 July 2017. Community and Council members of the CCC were approved by DPE 14 November 2016. The inaugural CCC meeting was held 07/04/17. The CCC continued to operate during the reporting period (see Section 9.2).	A, D
Revision of Strategies, Plans & Programs				
4.	Within 3 months of: a) the submission of an incident report under condition 10 of this Schedule; b) the submission of an Annual Review under condition 13 of this Schedule; c) the submission of an Independent Environmental Audit under condition 14 of this Schedule; or d) the approval of any modification to the conditions of this approval. 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. *Notes:* *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.*	Compliant	The Noise Management Plan was reviewed as part of the preparation of the incident report submitted 8 July 2021 and no further revision was required.	A, D D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
COMMUNITY CONSULTATIVE COMMITTEE (Cont'd)				
Staging, Combining and Updating Strategies, Plans or Programs				
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
Evidence of Consultation				
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 (approved 20 July 2021) was included as an appendix. 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)
Compliance Review – Project Approval 05_0103B

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
REPORTING				
Incident Notification, Reporting and Response				
9.	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Proponent becomes aware of an incident.	Compliant	The Department was notified by email 2 July 2021 following identification that the Q1 2021 noise monitoring was not undertaken.	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.	Compliant	An incident report addressing the required detail was submitted via the Major Projects Planning Portal on 8 July 2021 (i.e. within the required 7 days).	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 specific requirements were received following submission of the incident report.	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
Annual Review				
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 2019/2020 Annual Review (this report) was submitted to DPIE, Council, Water NSW, NRAR, EPA and the CCC on 30/09/20 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)
Compliance Review – Project Approval 05_0103B

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
REPORTING (Cont'd)				
Annual Review (Cont'd)				
13.	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: - relevant statutory requirements, limits or performance measures/criteria; - requirements of any plan or program required under this approval; - monitoring results of years prior; and - relevant predictions in the documents listed in condition 3 of Schedule 2;		Section 6 and 7 provide a review of the results against the relevant limits, requirements and previous / baseline monitoring results.	
	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;		Sections 1 and 11 and Appendix 1 provide details of non-compliances.	
	d) 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;		Section 6 and Table 6.1 provide an evaluation.	
	e) identify any trends in the monitoring data over the life of the project;		Section 6 provides a summary of any discernible trends.	
	f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and		Section 6 would provide discuss any discrepancies. However, none have been identified to date.	
	(g) describe what measures will be implemented over the current financial year to improve the environmental performance of the project.		Section 6 outlines planned / further improvements to environmental management.	
	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.		Copies of the Annual Review has been provided to Council, CCC and other relevant agencies and was made publicly available on the Gales website within 1 month.	
Independent Environmental Audit				
6.	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:	Compliant	Site establishment activities commenced 26 June 2017 with extraction operations commencing 30 October 2017. AQUAS was formally commissioned 27 October 2019 (i.e. within 2 years) to undertaken the first Independent Environmental Audit. The independent audit team held suitable certifications and were endorsed by the Department on 23 October 2019. The next independent audit must be commissioned prior to 30 October 2022.	A, D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
REPORTING (Cont'd)				
Independent Environmental Audit (Cont'd)				
6. (Cont'd)	a) be led and conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Secretary; b) include consultation with the relevant agencies and the CCC; 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); d) review the adequacy of any strategies, plan or programs required under the abovementioned approvals; e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval; and f) be conducted and reported to the satisfaction of the Secretary. *Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Secretary.*		The 2019 audit addressed all required components and was confirmed by the Department as being satisfactory on 1 May 2020.	
Independent Environmental Audit				
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	An extension to the submission of the audit was granted by DPIE on 7 February 2020 for a submission date of 2 March 2020. The final audit and response was submitted 2 March 2020.	A, D
Access to Information				
10.	Within 1 month of the approval of Modification 2, and for the life of the project, the Proponent must: a) make the following information and documents (as they are obtained or approved) publicly available on its website: - the documents listed in conditions 2 and 3 of Schedule 2; - current statutory approvals for the project;	Compliant	Copies of all required documents have been made available on the Gales website.	D

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

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

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
REPORTING (Cont'd)				
Access to Information (Cont'd)				
10. **(Cont'd)**	- all approved strategies, plans and programs required under the conditions of this approval; - 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; - 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; - a summary of the current stage and progress of the project; - contact details to enquire about the project or to make a complaint; - a complaints register, updated monthly; - the Annual Reviews of the project; - any Independent Environmental Audit as described in condition 14 above, and the Proponent's response to the recommendations in any audit; and - any other matter required by the Secretary; and b) keep this information up-to-date, to the satisfaction of the Secretary.			
APPENDIX 3 - NOISE COMPLIANCE ASSESSMENT				
Applicable Meteorological Conditions				
1.	The noise criteria in Table 2 are to apply under all meteorological conditions except the following: a) wind speeds greater than 3 m/s at 10 m above ground level; or 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 c) temperature inversion conditions greater than 3°C/100 m.	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)
Compliance Review – Project Approval 05_0103B

Cond. No.	Conditional Requirement	Compliance	Comments	Basis*
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS (Cont'd)				
APPENDIX 3 - NOISE COMPLIANCE ASSESSMENT (Cont'd)				
Compliance Monitoring				
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)

SoC No.	Commitment	Compliance	Comments	Basis*
1. Sand Extraction and Processing				
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
2. Waste Management				
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 by the operator 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 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
3. Rehabilitation				
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
4. Flooding and Drainage				
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, D
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)

SoC No.	Commitment	Compliance	Comments	Basis*
5. Groundwater				
5.1	Adjust sand extraction rates to ensure that groundwater drawdown levels remain within the predicted limits.	Not Yet Applicable	Only limited dredging occurred during the reporting period. Extraction rates were not required to be adjusted.	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.	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: • deepen the existing bore or install a replacement bore; • pay a cash compensation equal to the assessed cost of deepening the bore; • provide an alternative water supply, such as from the extraction ponds or groundwater bore registered to the Proponent; or • provide an appropriately sized rainwater storage tank to enhance property water storage.	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
6. Surface Water				
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 upon receipt 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)

SoC No.	Commitment	Compliance	Comments	Basis*
7. Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability				
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.	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: • the details of the originating site (name, address, owner and developer, contact details); • the details of the transportee (name, address, contact details, vehicle registration); • date and time of the extraction of the VENM(b); • pH of the VENM(b) at the time of its extraction, and at the time immediately prior to its placement underwater; and • the name of the person (certified practicing soil scientist) who assessed the material and classified it as VENM(b).	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)

SoC No.	Commitment	Compliance	Comments	Basis*
7. Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability (Cont'd)				
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).	Compliant	Validation testing was undertaken of materials washed over a screen (i.e. fines were not separated) (see Section 6.7).	A, D
7.11	Incorporate an alkaline amendment into the excavated acid sulfate material at the calculated rate (based on the results of sampling).	Not Applicable	Validation testing confirmed that material was not classified as acid sulfate soil and did not require addition of lime.	A, D
7.12	Complete the validation sampling of treated material in accordance with the approved Acid Sulfate Soil Management Plan.	Compliant	Validation testing of processed material was undertaken (see Section 6.7)	A, D
7.13	Construct bunding around the extraction and processing areas to control drainage.	Compliant	Bunding has been constructed around the dredge pond.	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 is 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. • Test the acid neutralising capacity of the material. • Incorporate alkaline amendments at the appropriate rate if the measured acid neutralising capacity is insufficient to neutralise the existing and potential acidity. • Undertake validation testing following treatment and apply additional alkaline amendments as required. Repeat process until compliance with action criteria is met.	Not Applicable	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)

SoC No.	Commitment	Compliance	Comments	Basis*
7. Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability (Cont'd)				
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). • Test the acid neutralising capacity of the material. • Incorporate alkaline amendments at the appropriate rate if the measured acid neutralising capacity is insufficient to neutralise the existing and potential acidity. • Undertake validation testing following treatment and apply additional alkaline amendments as required. Repeat process until compliance with action criteria is met.	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. • Notify the EPA in writing. • Remove the material/waste from the premises and dispose of it at a facility licensed to take such waste.	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
8. Flora and Fauna				
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)

SoC No.	Commitment	Compliance	Comments	Basis*
8. Flora and Fauna (Cont'd)				
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
9. Aquatic Ecology				
9.1	During the realignment of the western drainage channel as part of the realignment of Altona Road. • maintain the original connection to other upstream and downstream drainage channels; • avoid stranding native fish and, where possible, relocate them to similar habitat; • ensure fish free passage through the channel is made available where permanent crossings are to be constructed (e.g. access road crossings); and • consult with DPI – Fisheries officers during the realignment process.	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.	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	The approved Blue-Green Algal Management Plan requires monitoring at a central location and two edge locations. This was undertaken during the reporting period.	A, D
10. Traffic and Transport				
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)

SoC No.	Commitment	Compliance	Comments	Basis*
10. Traffic and Transport (Cont'd)				
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
11. Noise				
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 were undertaken during the reporting period.	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
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

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

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

SoC No.	Commitment	Compliance	Comments	Basis*
11. Noise (Cont'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.	D
12. Air Quality				
12.1	Install water sprays or other suitable controls to minimise dusts generated during screening and dry processing.	Compliant	The screening process undertaken was a wet process using water to wash the sand over the screens.	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 have been temporarily rehabilitated to pasture	A, D
12.3	Clean accumulated tracked road mud, dry dusts, sand or spillages on Altona Road using a street sweeper.	Not Yet Applicable	Tracked sand was manually swept from Altona Road during the reporting period (but was swept.	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. No further updates have been required to date or are currently planned.	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)

SoC No.	Commitment	Compliance	Comments	Basis*
13. Aboriginal Heritage				
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
14. Visibility				
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 areas have been temporarily rehabilitated to pasture.	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.	Not Yet Applicable	No floodlights or lighting plant have been utilised during the reporting.	A

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

Table C
Compliance Review – Environmental Protection Licence 12385

<table>
<tr><th>Cond. No.</th><th>Commitment</th><th>Compliance</th><th>Comments</th><th>Basis*</th></tr>
<tr><td colspan="5">1. Administrative Controls</td></tr>
<tr><td colspan="5">A1 What the licence authorises and regulates</td></tr>
<tr><td>A1.1</td><td>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.
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.
<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>> 100000 - 500000 T annual capacity to extract, process or store</td></tr>
</table></td><td>Compliant</td><td>Approximately 33 375t (22 250m^3) of sand and soil was extracted during the reporting period (of which ~1 000t was returned to the pond as fines).</td><td>A, D</td></tr>
<tr><td>A1.2</td><td>The licensee must not carry on any scheduled activities until the scheduled development works are completed, except as elsewhere provided in this licence.</td><td>Compliant</td><td>Scheduled development works related to creation of the initial dredge pond. These works were completed in 2006.</td><td>D</td></tr>
<tr><td colspan="5">A2 Premises or plant to which this licence applies</td></tr>
<tr><td>A2.1</td><td>The licence applies to the following premises:
<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></td><td>Noted</td><td>-</td><td>-</td></tr>
<tr><td colspan="5">A3 Other Activities</td></tr>
<tr><td>A3.1</td><td>This licence applies to all other activities carried on at the premises, including:
<table>
<tr><th>Ancillary Activity</th></tr>
<tr><td>Crushing, grinding or separating</td></tr>
<tr><td>Water-based extractive activity</td></tr>
</table></td><td>Compliant</td><td>Water based extraction and separating (through washing) occurred during the reporting period.</td><td>-</td></tr>
</table>

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

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

Cond. No.	Commitment	Compliance	Comments	Basis*
A4 Information supplied to the EPA				
A4.1	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. In this condition the reference to "the licence application" includes a reference to: 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 b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.	Compliant	Activities during the reporting period were consistent with all relevant application information.	A, D
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

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
2	Water Quality Monitoring Point	Water Quality Monitoring Point	Dredge Pond South Spillway East
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, May 2017 (GKSWMP). Location described in Section 5.2.2 Figure 5.1.
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, May 2017 (GKSWMP). Location described in Section 5.2.2 Figure 5.1.
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, May 2017 (GKSWMP). Location described in Section 5.2.2 Figure 5.1.

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

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

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 a quality limit specified in this licence for the discharge of TSS, pH or Oil and Grease from Point 1, 2 or 3 or a volume limit for discharge from Point 1, 2 or 3 is permitted if the discharge from Point 1, 2 or 3 occurs solely as a result of rainfall at the premises exceeding a total of 82.5millimetres over any consecutive five day period.	Not Applicable	No wet weather discharge 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 wet weather discharge 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 **POINT 1,2** 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.	Compliant	VENM was purchased and imported for the purpose of forming the transformer pad.	A, D

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

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

Cond. No.	Commitment	Compliance	Comments	Basis*
3 Limit Conditions (Cont'd)				
L4 Noise limits				
L4.1	Noise from the premises where extraction is occurring (being Lot 2 DP 216705 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 2 DP 216705 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_0103B dated 16 June 2009, to determine compliance with this condition.	Compliant	As above.	D
L5 Hours of operation				
L5.1	This licence only allows activities to be carried out from the premises where extraction is occurring (being Lot 2 DP 216705 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
4 Operating Conditions				
O1 Activities must be carried out in a competent manner				
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

Cond. No.	Commitment	Compliance	Comments	Basis*
4 Operating Conditions (Cont'd)				
O2 Maintenance of plant and equipment				
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
O3 Dust				
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
O4 Processes and management				
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. No discharges occurred during the reporting period.	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. No discharges occurred.	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 AS1940-2004 Storage and Handling of Flammable and Combustible Liquids.	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

<table>
<tr><th>Cond. No.</th><th>Commitment</th><th>Compliance</th><th>Comments</th><th>Basis*</th></tr>
<tr><td colspan="5">O5 Other operating conditions</td></tr>
<tr><td>O5.1</td><td>The licensee must assess and manage any acid sulfate soil (ASS) and potential acid sulfate soil PASS) in accordance with the 1998 Acid Sulfate Soils Manual published by the NSW Acid Sulfate Soil Management Advisory Committee (ASSMAC).</td><td>Compliant</td><td>Activities to date have been undertaken in accordance with the Acid Sulfate Soil Management Plan.</td><td>A, D</td></tr>
<tr><td colspan="5">5. Monitoring and Recording Conditions</td></tr>
<tr><td colspan="5">M1 Monitoring records</td></tr>
<tr><td>M1.1</td><td>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.</td><td>Compliant</td><td>The monitoring records have been retained as required.</td><td>D</td></tr>
<tr><td>M1.2</td><td>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.</td><td>Compliant</td><td>Monitoring has been retained in a legible form for more than 4 years. No requests from an EPA officer were received.</td><td>A, D</td></tr>
<tr><td>M1.3</td><td>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.</td><td>Compliant</td><td>Monitoring records contain all required information.</td><td>D</td></tr>
<tr><td colspan="5">M2 Requirement to monitor concentration of pollutants discharged</td></tr>
<tr><td>M2.1</td><td>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:</td><td>Compliant</td><td>Monitoring undertaken in accordance with these requirements.</td><td>D</td></tr>
<tr><td>M2.2</td><td>Water and/ or Land Monitoring Requirements.
POINT 1,2
<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>
POINT 4,5,6
<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>Oil and Grease</td><td>milligrams per litre</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>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Yearly</td><td>Grab sample</td></tr>
</table></td><td>Compliant</td><td>All required analytes were sampled at least at the frequency required using in situ methods. It is noted that, as no discharges occurred, no sampling was required from Point 1 or 2.</td><td>D</td></tr>
</table>

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

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

Cond. No.	Commitment	Compliance	Comments	Basis*
M2 Requirement to monitor concentration of pollutants discharged (Cont'd)				
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	-	-
M3 Testing methods - concentration limits				
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.	Not Applicable	No discharges or application of water occurred during the reporting period.	A
M4 Environmental Monitoring				
M4.1	The licensee is required to install and maintain a rainfall depth measuring device.	**Administrative Non-Compliance**	An automatic rain gauge with logger was installed on site but became faulty and will be replaced with a new unit. Rainfall records from a nearby BoM station have been utilised.	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.	**Administrative Non-Compliance**	As above.	A, D
M5 Recording of pollution complaints				
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	One complaint was received during the reporting period (from Council re: tracking onto Altona Road)	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	The complaint record includes all required information.	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.	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

Cond. No.	Commitment	Compliance	Comments	Basis*
M6 Telephone complaints line				
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 Managing Director, 0414 322 455, 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
6 Reporting Conditions				
R1 Annual return documents				
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 18 November 2019 to 17 November 2020 was submitted on 15 January 2021.	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 18 November 2019 to 17 November 2020 was submitted on 15 January 2021.	D
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

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

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

Cond. No.	Commitment	Compliance	Comments	Basis*
6 Reporting Conditions (Cont'd)				
R1 Annual return documents (Cont'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 18 November 2019 to 17 November 2021 was submitted on 15 January 2021.	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
R2 Notification of environmental harm				
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

Cond. No.	Commitment	Compliance	Comments	Basis*
6 Reporting Conditions (Cont'd)				
R3 Written report				
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
7 General Conditions				
G1 Copy of licence kept at the premises or plant				
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

Appendix 2

Noise Monitoring Results

(Total No. of pages including blank pages = 80)

This page has intentionally been left blank

CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS

CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Dredging

Monday, 13 July 2020

CRAIG HILL ACOUSTICS. 7 View Ct . Palm Beach .Qld 4221 .
Phone 07 55763883 Mobile 0418 762968
E: craig@craighillacoustics.com.au

DOCUMENT CONTROL PAGE

Cudgen Lakes Sand Quarry

Reference: 130720/1

Report prepared for	Gales-Kingscliff Pty Limited
Date	Monday, 13 July 2020
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollanby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Phone 07 55763883 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
Signed	Craig Hill (manager) author
Copy	1 □ 2 x3 □ 4 □ 5 □ 6 □

Revision History		
No	Date Issued	Comments
	Monday, 13 July 2020	
DISTRIBUTION RECORD		
Copy		Destination
1		File Controlled copy
2	Scott Hollamby <scott@rwcorkery.com>	

Monday, July 13, 2020©

Contents

1.0 INTRODUCTION

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

Attended monitoring was conducted on 10 July 2020 at noise sensitive receivers identified in the conditions of approval to establish the compliance status.

Activities on the day were related to dredging only.

Table 1.1 Equipment being used at the time of the test

Dredge 8 “

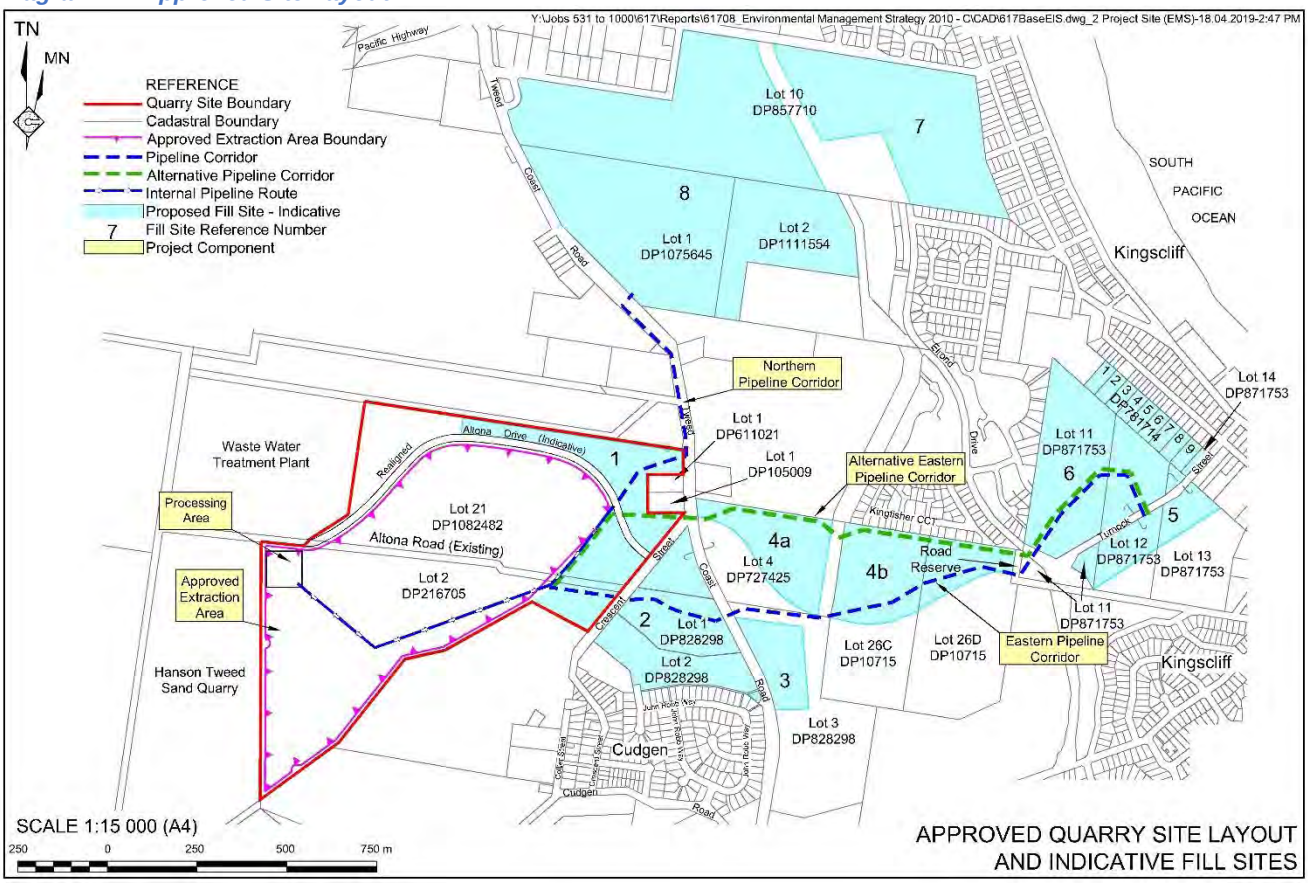
Table 1.2 Equipment on site not in use

Loader (Hyundai HL-770
Excavator (Doosan DX 420 LCA)

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	• 7.00 am to 6.00 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to the processing plant, wet processing.	• 7.00 am to 10.00 pm Monday to Friday • 7.00 am to 4.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to fill sites.	• 7.00 am to 6.30 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Operation of dredge to fill pipeline with water or pipeline flushing	• 6.30 am to 7.00 pm Monday to Friday • 6.30 am to 1.30 pm Saturday • At no time on Sundays or public holidays
Maintenance (if inaudible at neighbouring residences)	Any day

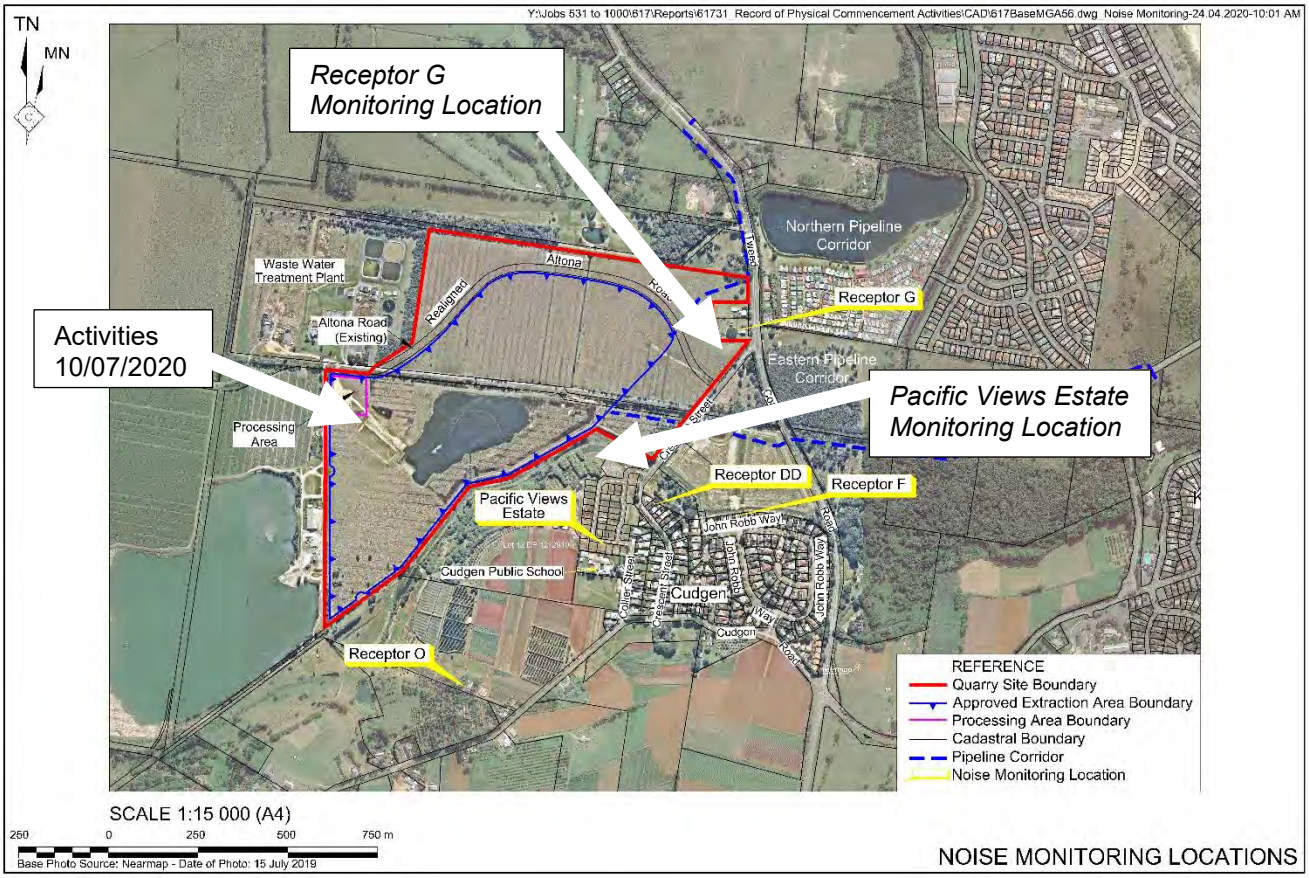
Diagram 1.1 Approved Site Layout



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. (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



3.0 CRITERIA

The relevant impact assessment and cumulative noise criteria as specified in Schedule 3 Conditions 1 and 2 of Project Approval 05_0103 are as follows.

3.1 Impact Assessment Criteria

Table 3.1 Impact Assessment Criteria

Receiver Location	**Day and Evening** **LAeq (15 min)**	**Shoulder*** **LAeq (15 min)**
Residences on privately owned land	47	44

*The period from 6.00 am to 7.00 am

3.2 Cumulative Noise Criteria

The Proponent must 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.

LAeq (11 hour) 50 dB(A) – Day;
LAeq (4 hour) 45 dB(A) - Evening and
LAeq(9 hour) 40 dB(A) - Night

L_{A90} 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.

L_{Aeq} 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 949 Serial No 6023. calibrated June 2019.

BSWA Sound Level Calibrator Serial No 490190. calibrated July 2020.

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	66 %
Wind Speed	0-5kts
Wind Direction	S-SW
Atmospheric Pressure	1010pa
Cloud Cover	100%
Temp	16-20C

5.0 TESTING

The following tests were carried out at locations G, O, DD and F within 30m of affected dwellings where practical and at a representative location for the Pacific Views Estate as indicated on the attached site plan (see **Diagram 2.1**).

Tests were conducted on Friday, 10 July 2020 between 0850 and 1030 hrs.

- *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. (rear boundary of new residences)*
- *Receptor DD – Residence - 34A Crescent Street. (rear boundary)*
- *Receptor F – Residence - 64 John Robb Way. (rear boundary)*

Table 5.1 Equipment being used at the time of the test 10/07/2020

Operating equipment measured at 20m	LAeq 15 min
Dredge 8 "	63

Table 5.2 Equipment on site 10/07/2020 (not in use)

Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66

5.1 Results

The results of the compliance monitoring are presented in **Table 5.3**.

Table 5.3 Attended monitoring

Receptor & Time	Attended Testing LAeq 15 minutes	> Project Criteria (47 LAeq 15 min)	> Cumulative Criteria (50 LAeq 11 hrs)	Comments
G 0850-0905	56	9	6	Noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0950-1010	52	5	2	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible / distinguishable above background.
Pacific Views 1015-1030	53	6	3	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
DD 0910-0925	53	6	3	Noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 0930-0945	55	8	5	Noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not audible / distinguishable above background.

6.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. Therefore, measurements were undertaken at approximately 20m from equipment during operations and distance attenuation applied to establish possible project-related levels at monitoring locations.

Table 6.1 shows compliance to criteria for nominated equipment operations.

Table 6.1 Predicted levels of equipment based on measurements at 20m

Receptor	Distance	Dredge 8" 63LAeq @ 20m	Screener 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts (not in use)	Excavator 66 LAeq @ 20 m (not in use)	Combined 75 LAeq @ 20m	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	30	37	38	33	42	42*	-5	-8
O	600m	33	40	41	36	45	45*	-2	-5
Pacific Views	555m	34	41	42	37	46	46*	-1	-4
DD	780m	31	38	39	34	43	33	-14	-17
F	900m	30	37	38	33	42	32	-15	-18

* Receptor location has full or partial line of sight, therefore no additional attenuation applied.

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

$$Lp(R2) = Lp(R1) - 20 \cdot Log_{10}(R2/R1)$$

Where:
Lp(R1) = Sound Pressure Level at Initial Location
Lp(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

7.0 DISCUSSION AND CONCLUSIONS

Noise from dredging was not audible or measurable at locations G, F, DD and O. Noise from the dredge was occasionally audible at the Pacific Views monitoring location but was not measurable due to other noise in the area.

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 i.e. indicating all reasonable noise measures were in place.

Monitoring for cumulative 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 7.1 Summary All Monitoring Data

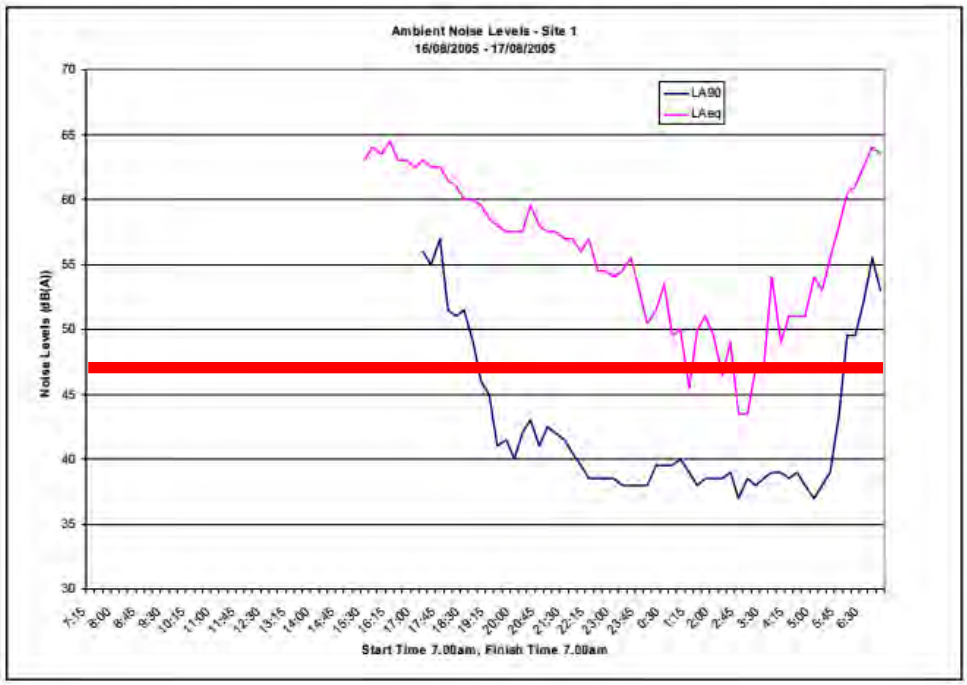
Receptor	Pre-project / Baseline Levels		Compliance Monitoring				Project Criteria	
	LAeq 15 min						LAeq 15 min	LAeq 11 hr
	Unattended logger original report	Attended monitoring 23/08/05	Attended monitoring 10/07/17	Attended monitoring 30/01/18	Attended monitoring 20/04/20	Attended monitoring 10/07/20	Impact Criteria day and evening	Cumulative Criteria Day 50
G	62	63	62.2	56.7	55	56	47	50
O	NM	NM	64.2	46.0	48	52	47	50
B / Pacific Views	55	51	56.8	48.4	55	53	47	50
DD	55	53	58.2	55.7	56	53	47	50
F	58	54	42.7	56.6	59	55	47	50

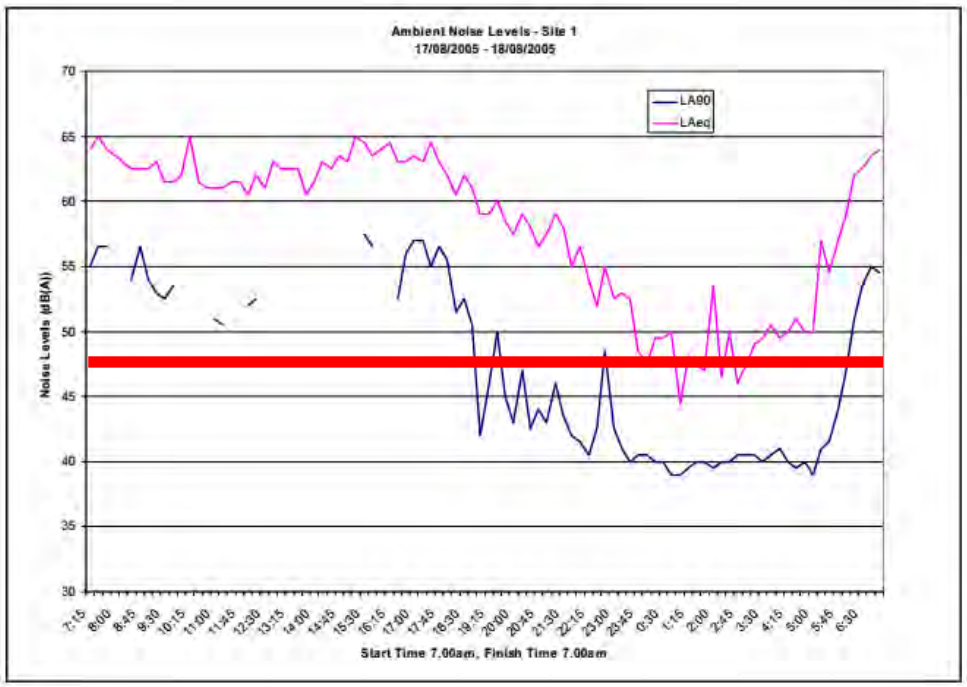
Monitored levels in the area are not unusual for day time compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

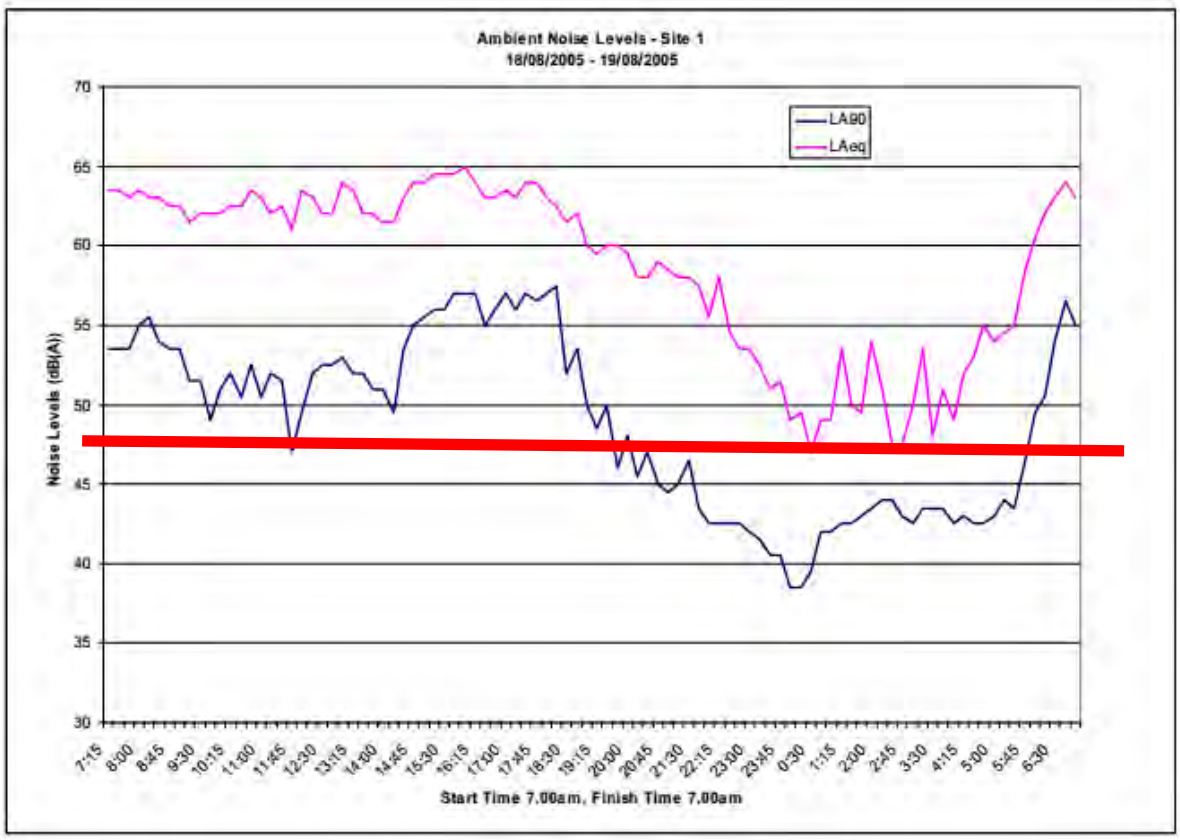
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not fall below the project criteria until the night time period, at which time the Quarry is not approved to operate. Given this issue will likely remain during future monitoring events, near field measurement of equipment and calculation of noise contributions will continue to be used to inform compliance with the relevant criteria.

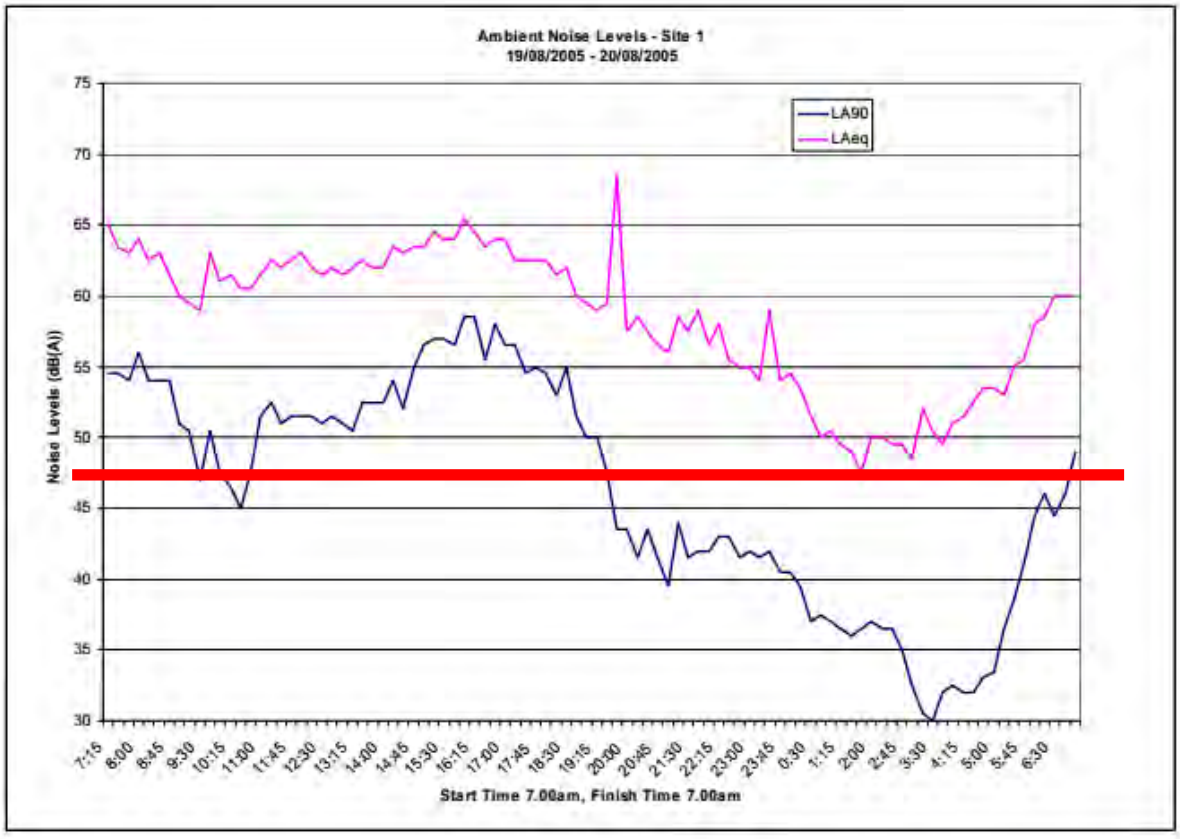
APPENDIX A PRE CONSTRUCTION TESTING

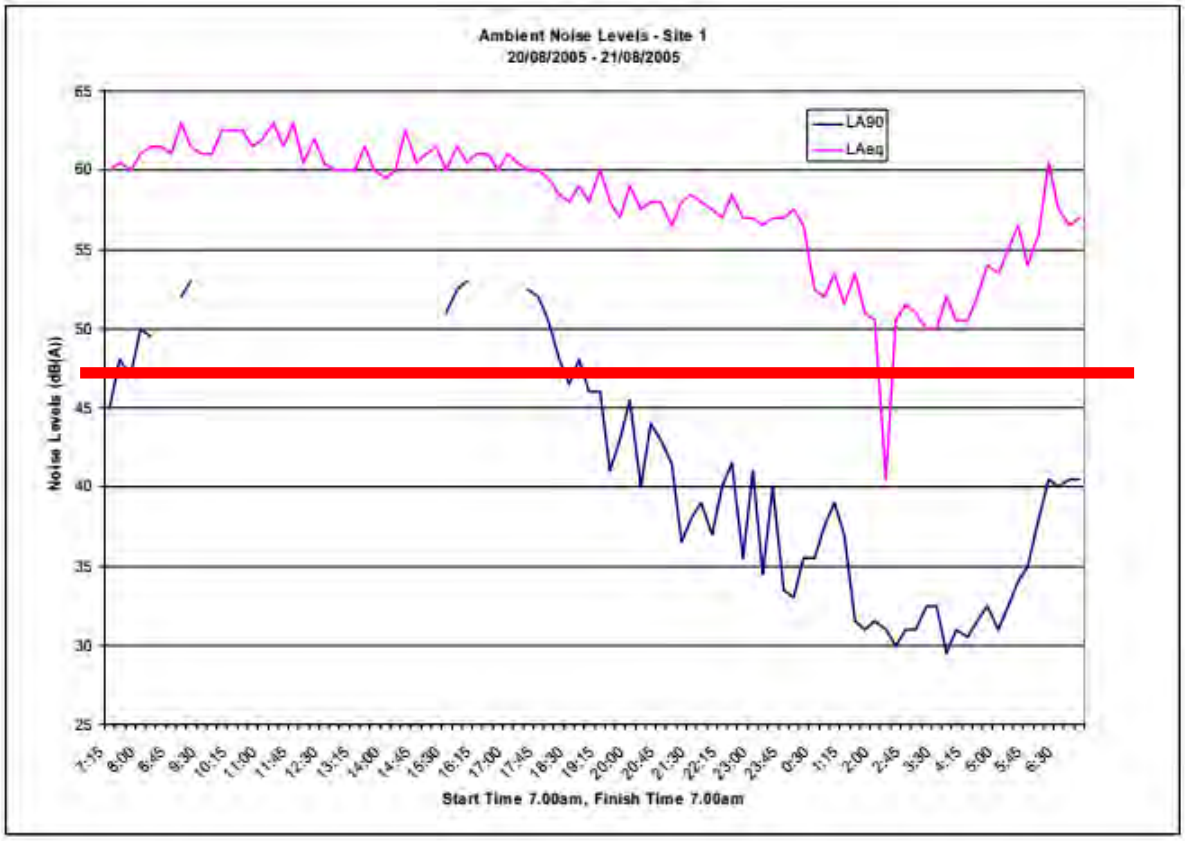
Measurements taken by Ron Rumble Pty Ltd and originally presented in Ron Rumble, (2008). Noise Assessment Report 61704- Part B.

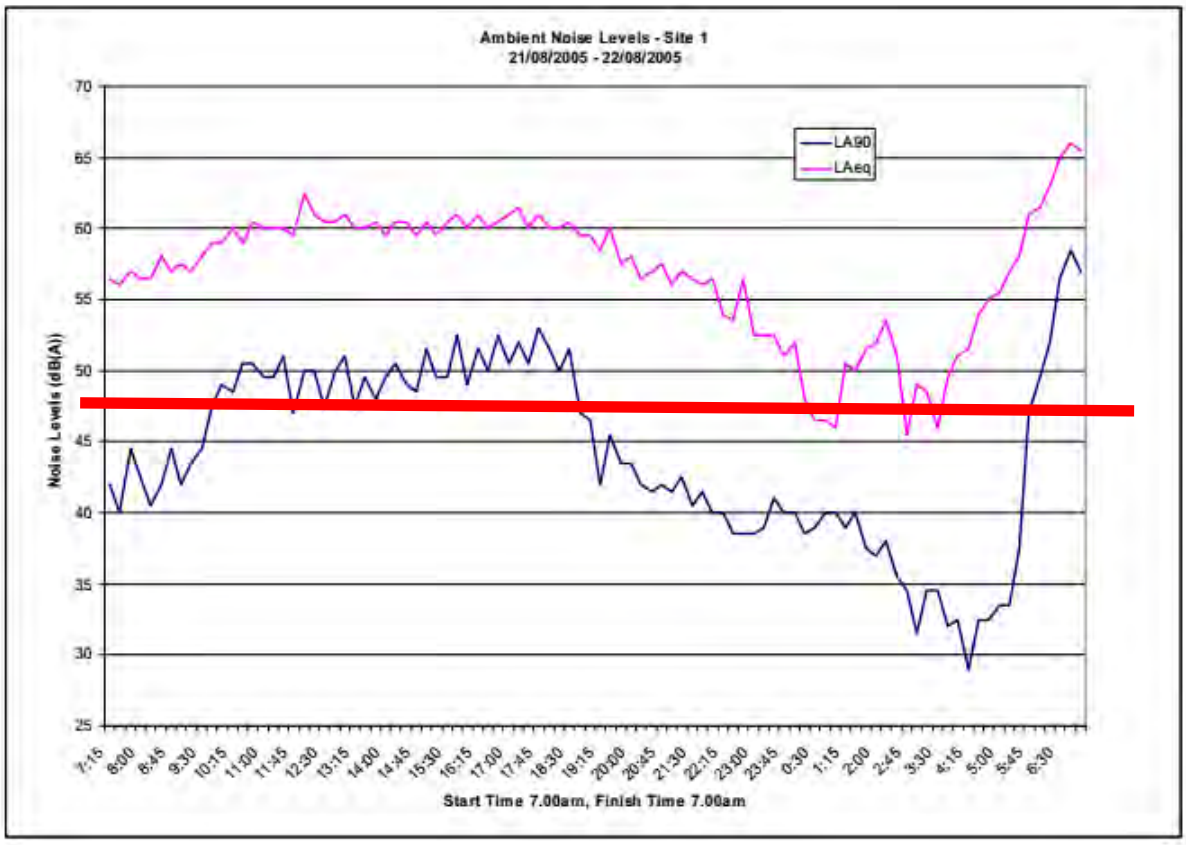


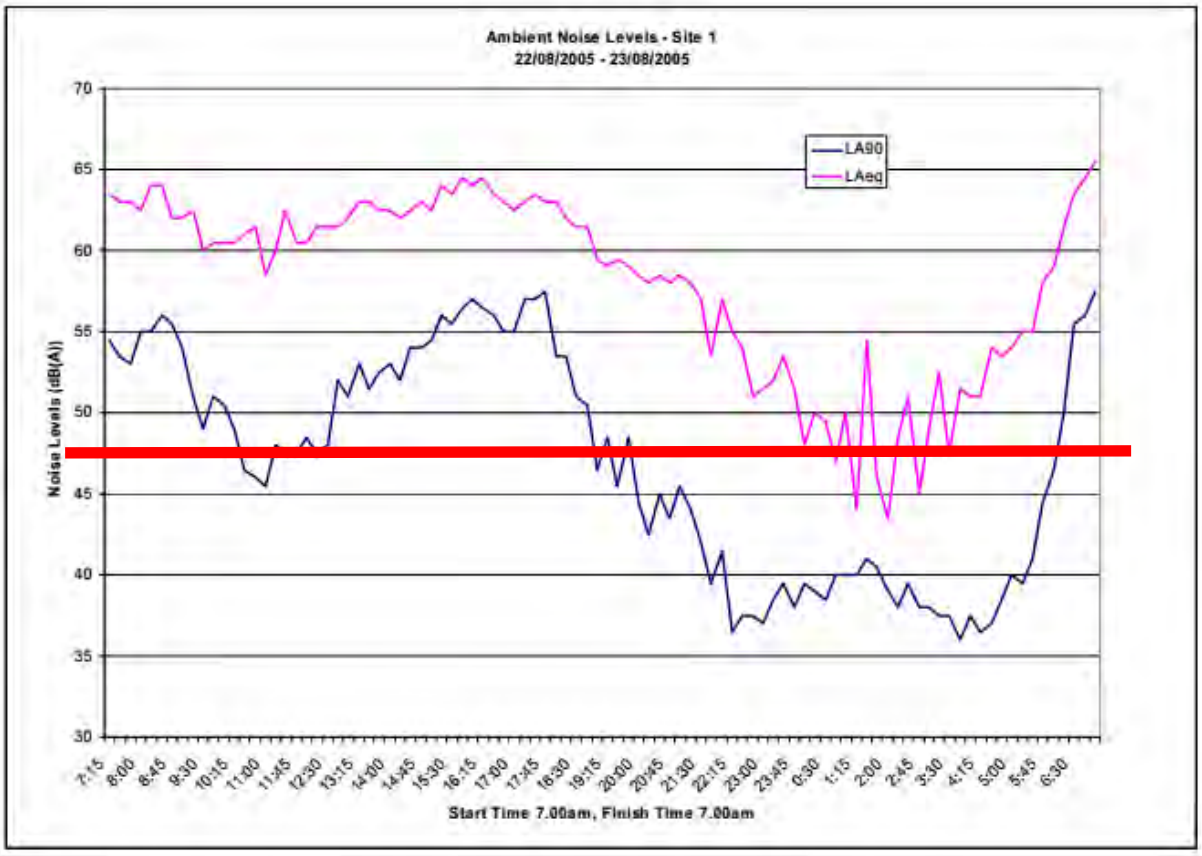


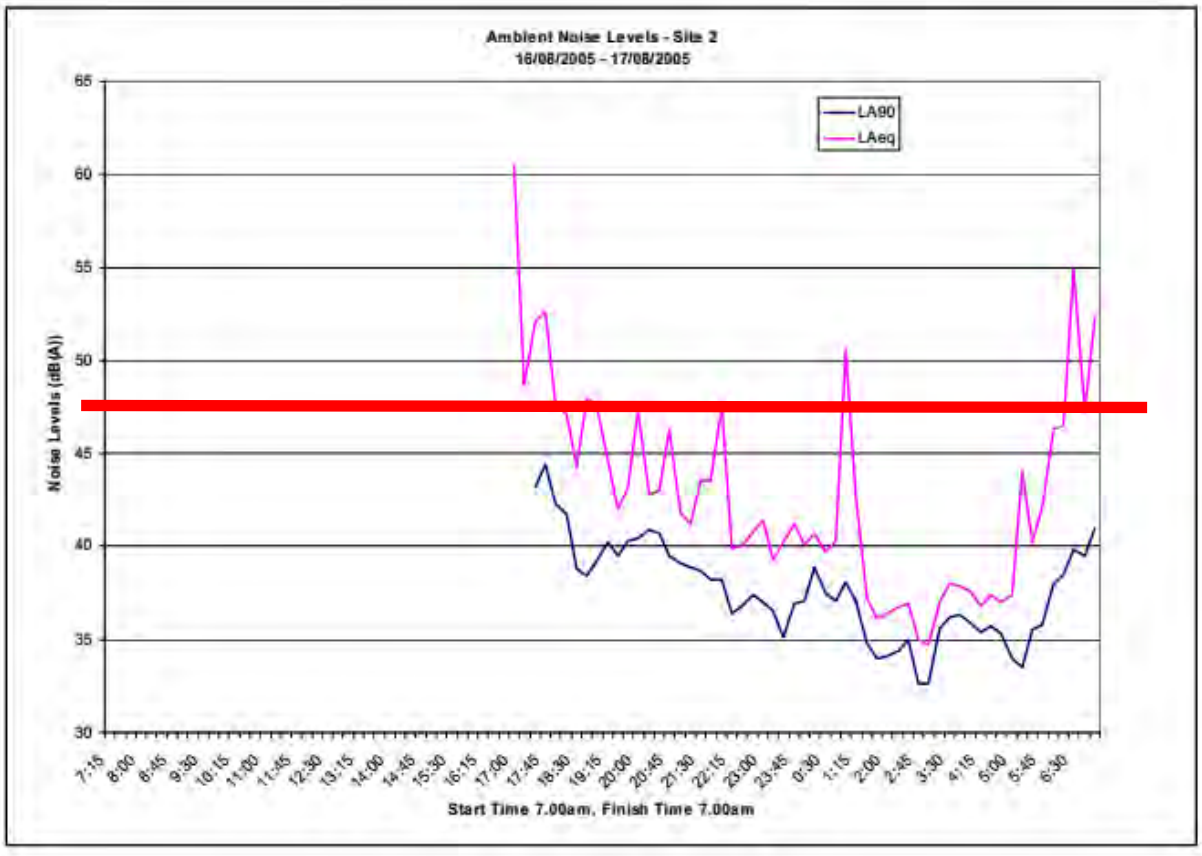

Ambient Noise Levels - Site 1
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

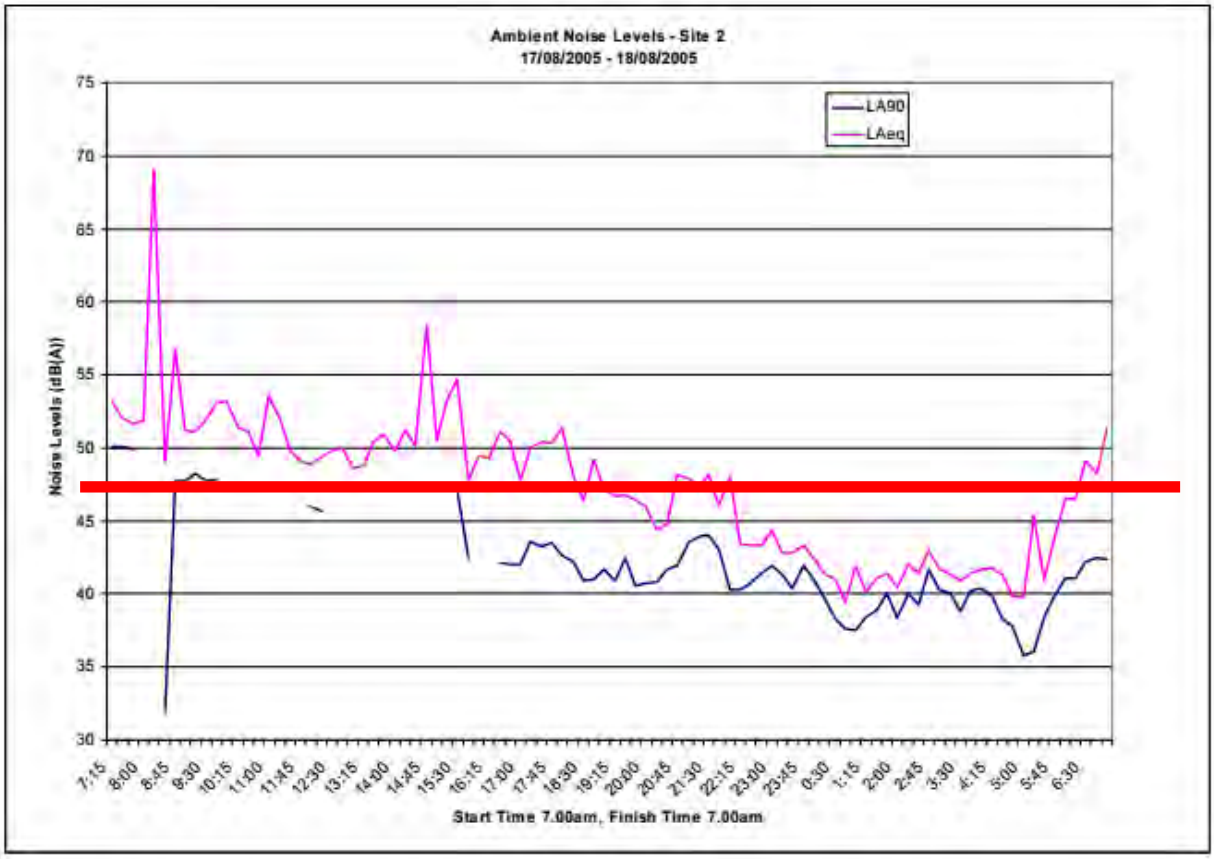

Ambient Noise Levels - Site 1
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

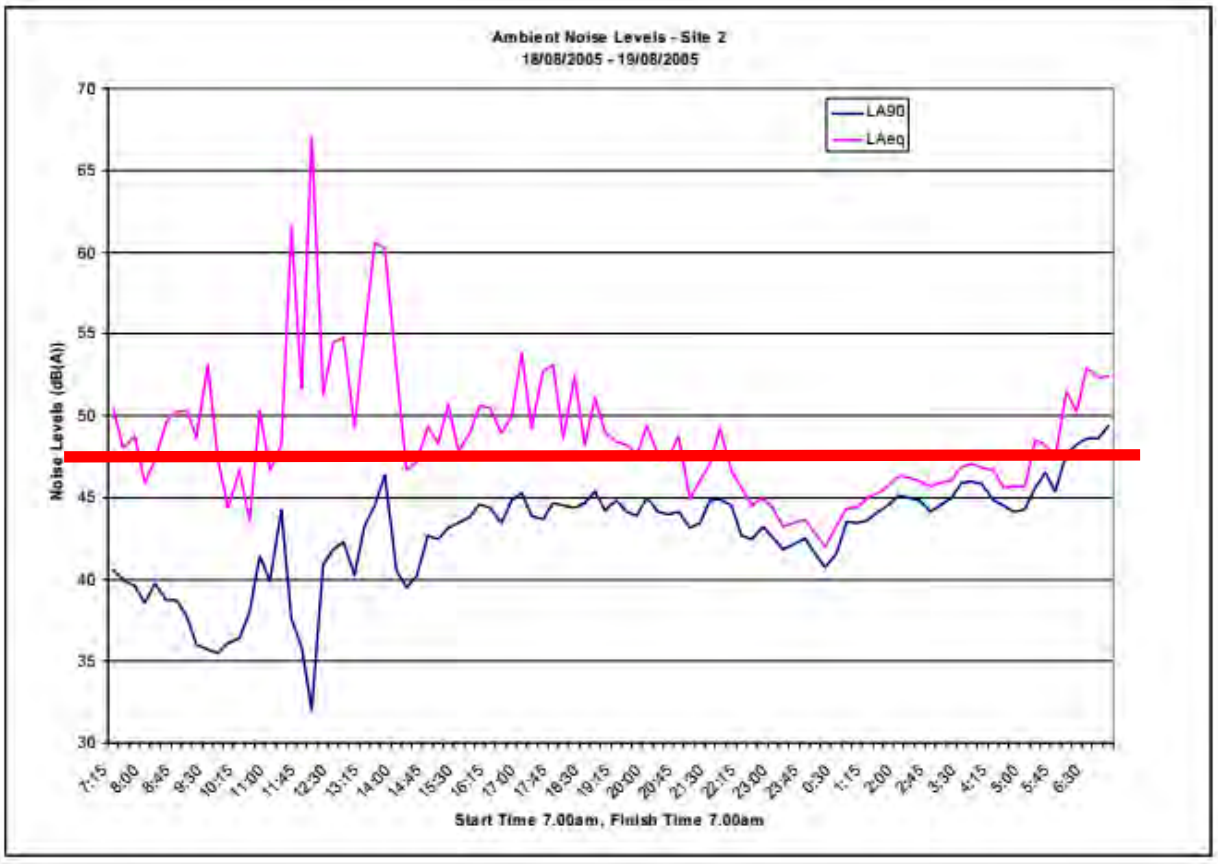

Ambient Noise Levels - Site 1
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
25
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

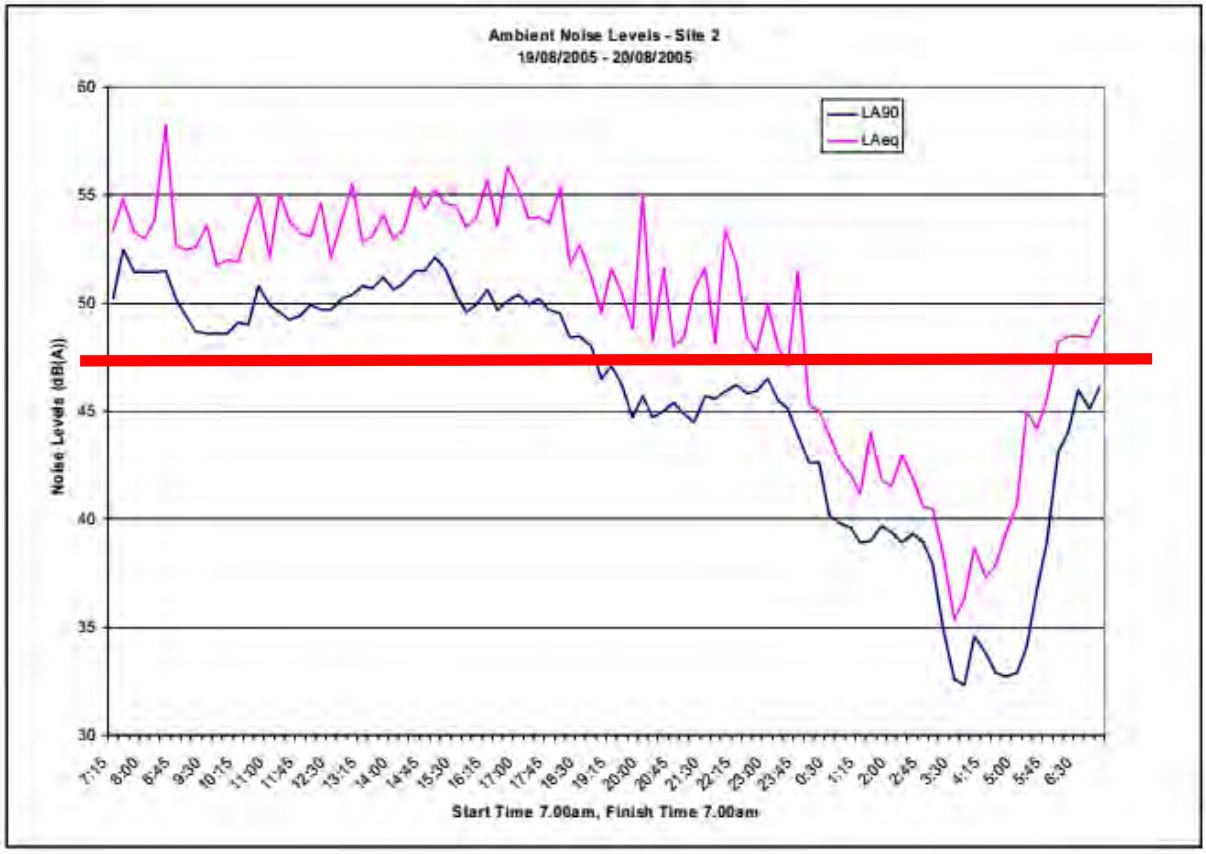

Ambient Noise Levels - Site 1
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
25
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

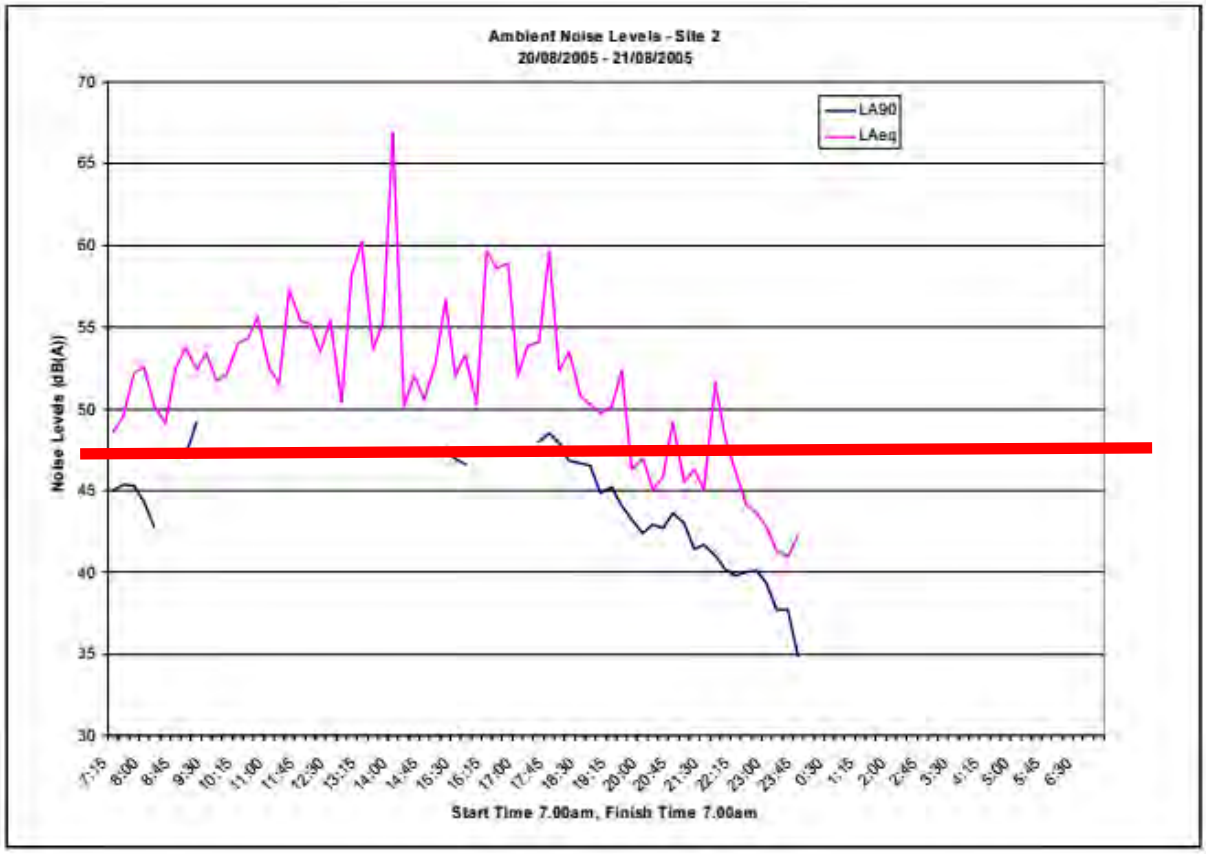

Ambient Noise Levels - Site 1
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

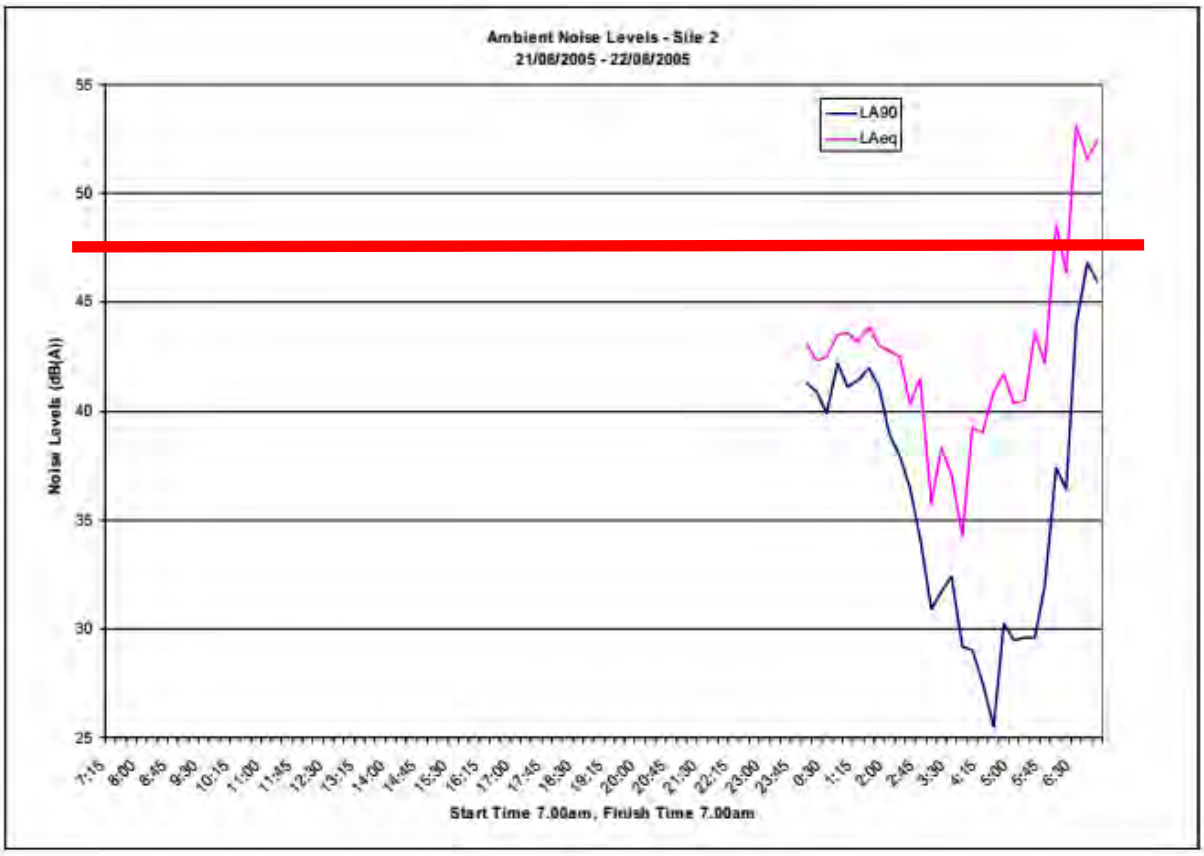

Ambient Noise Levels - Site 2
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

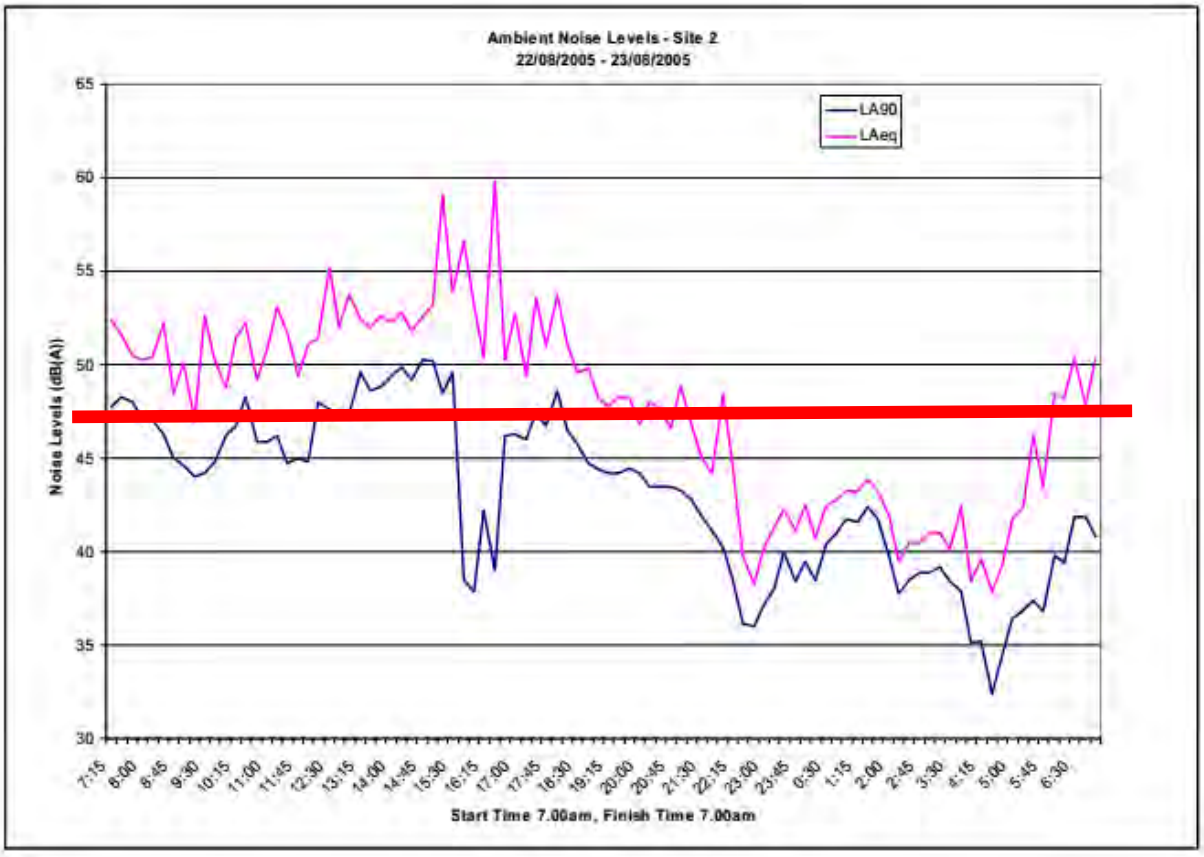

Ambient Noise Levels - Site 2
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

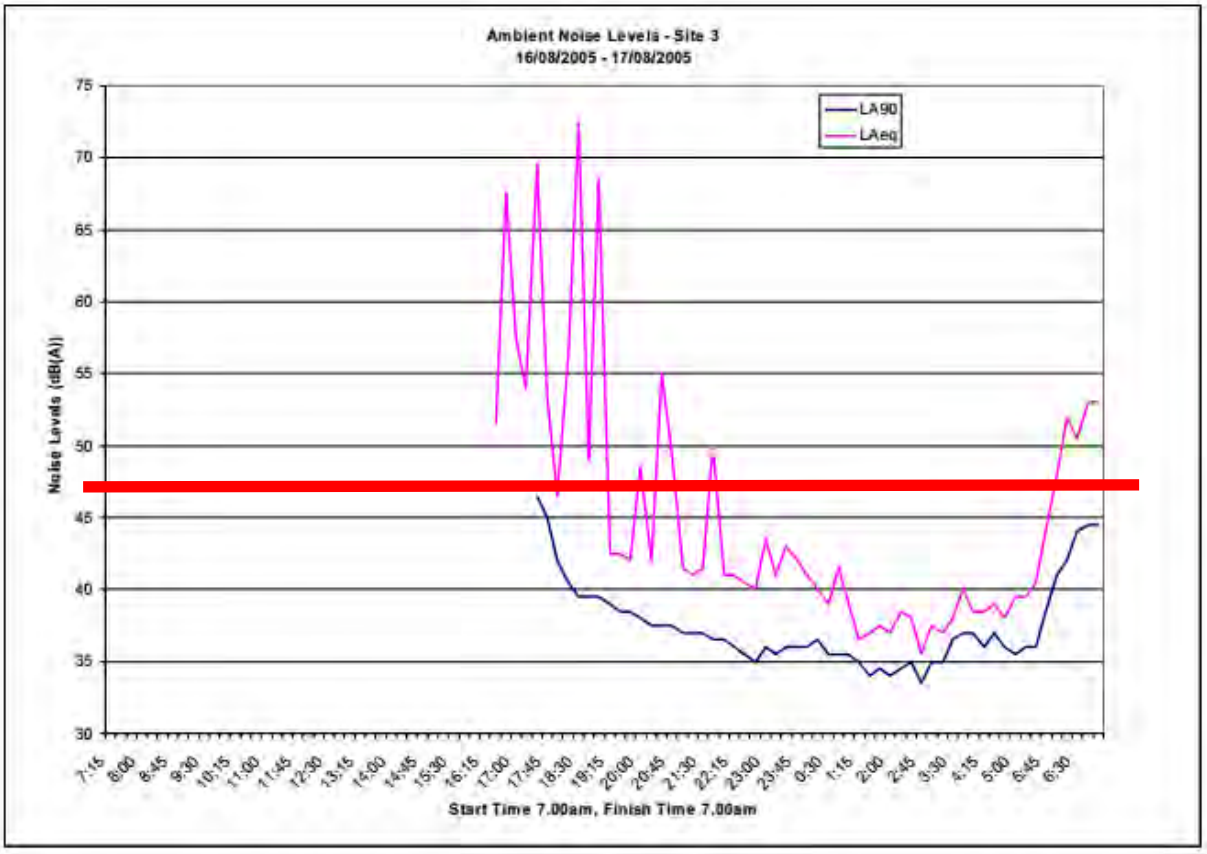

Ambient Noise Levels - Site 2
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

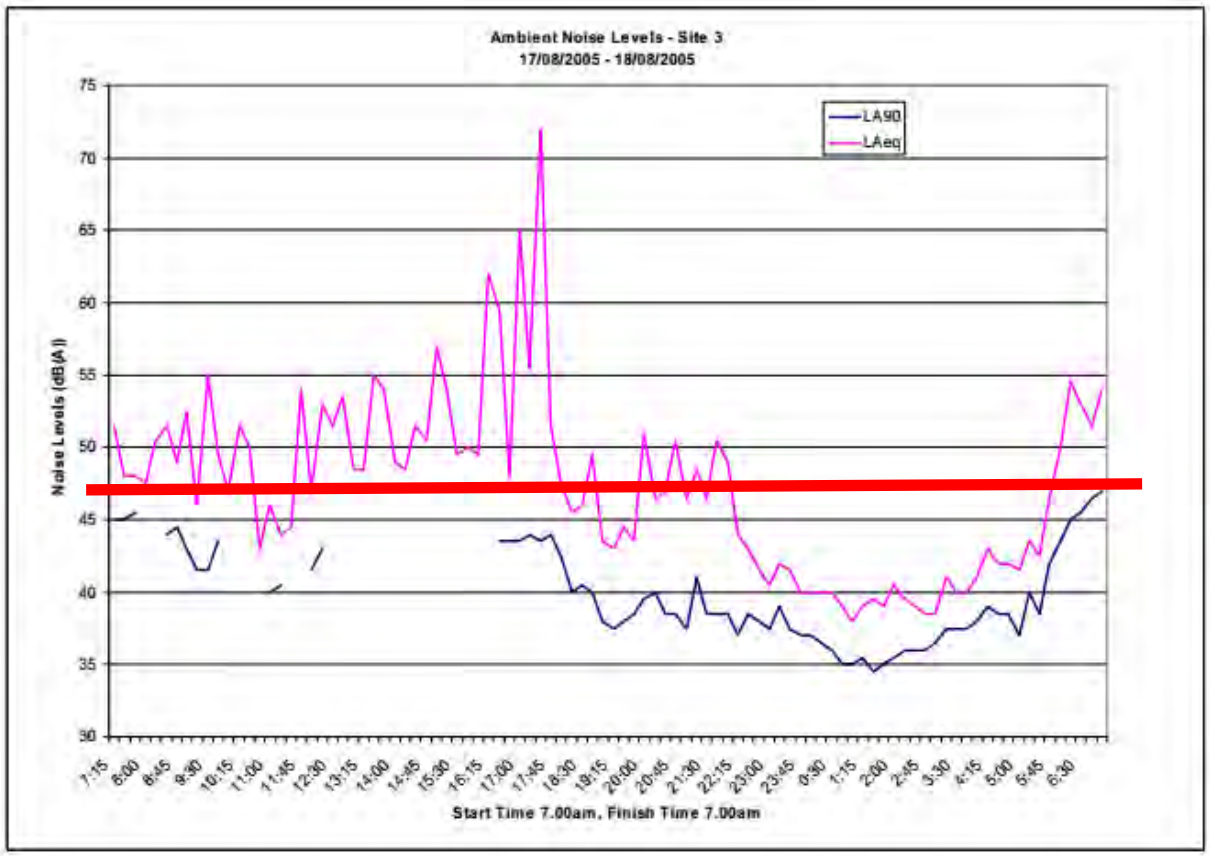

Ambient Noise Levels - Site 2
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

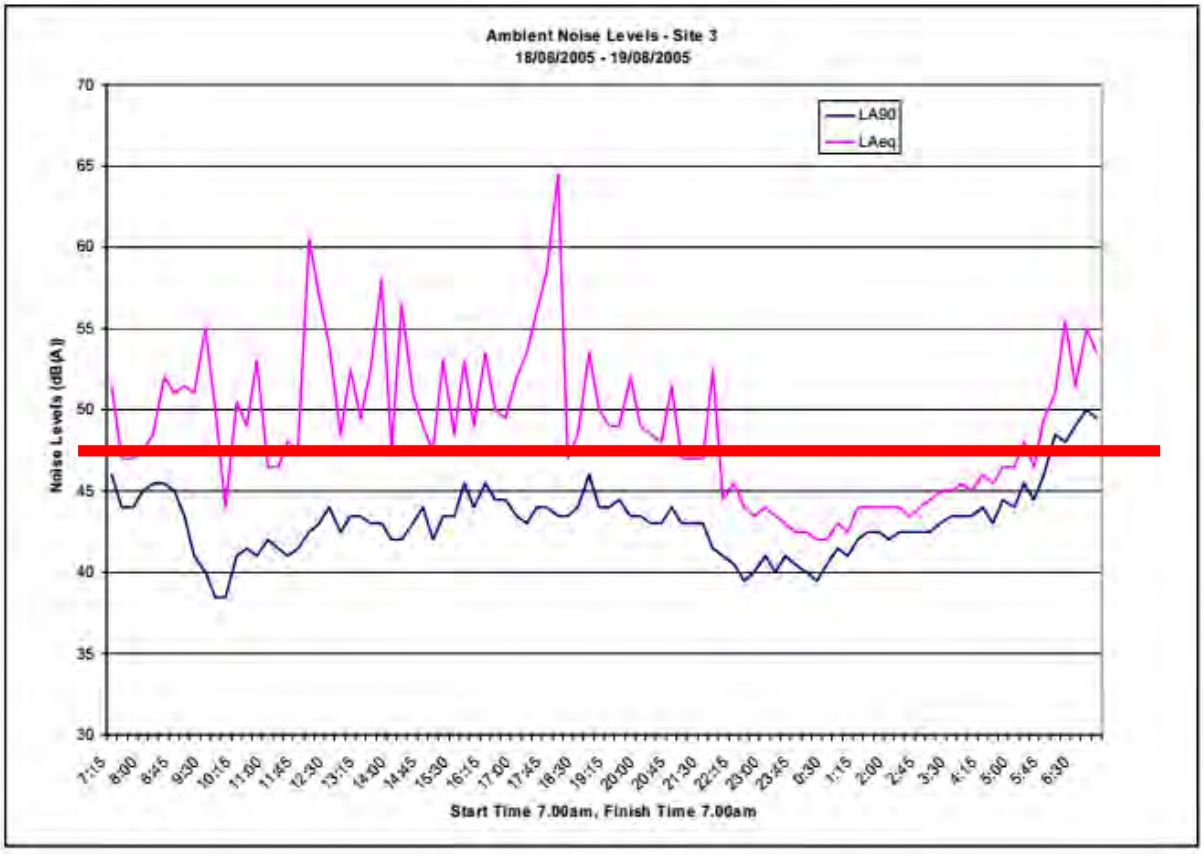

Ambient Noise Levels - Site 2
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

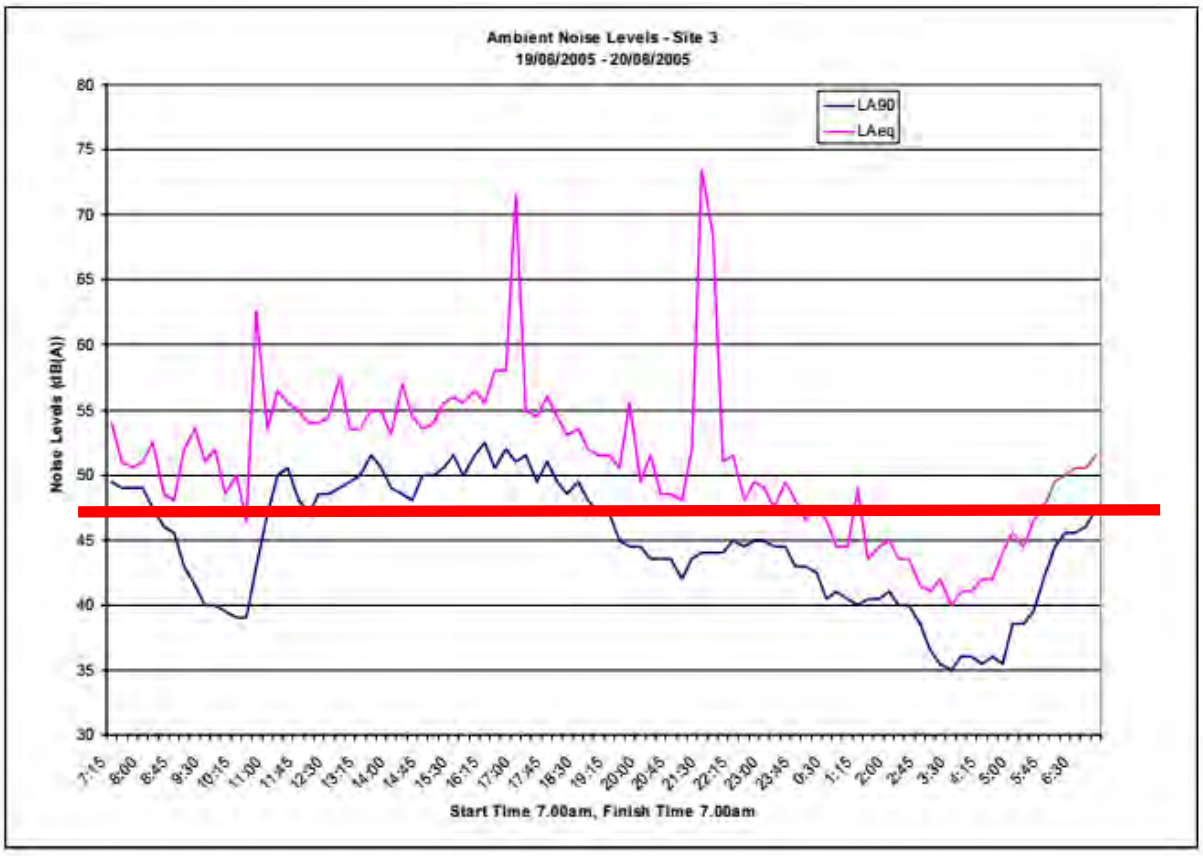

Ambient Noise Levels - Site 2
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

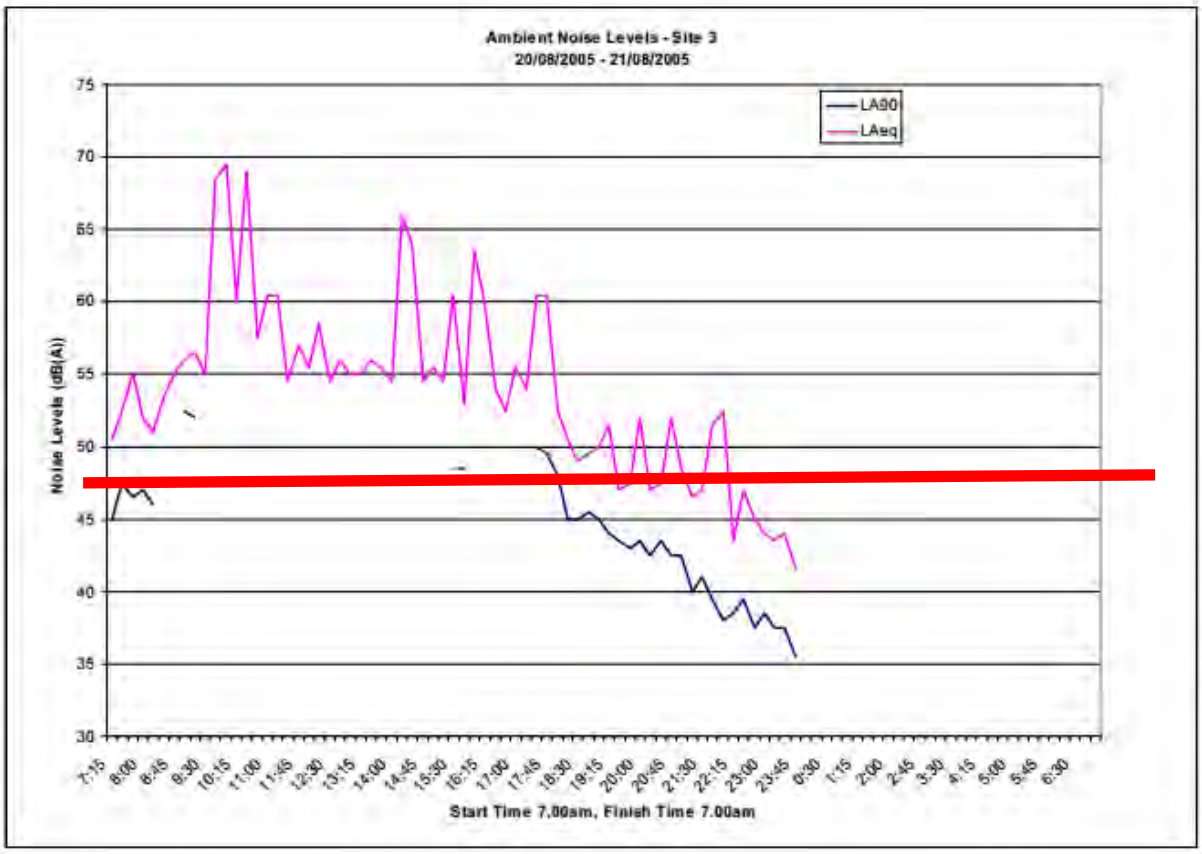

Ambient Noise Levels - Site 2
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

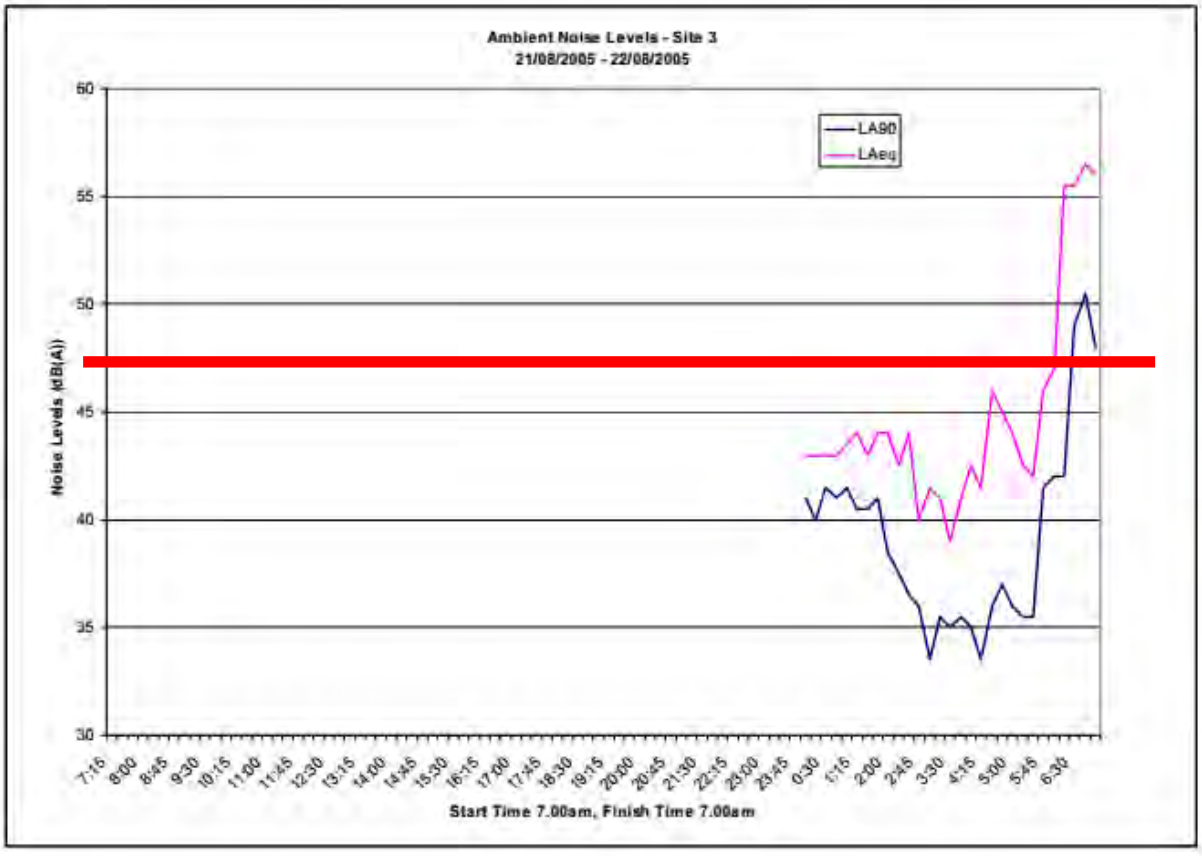

Ambient Noise Levels - Site 3
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

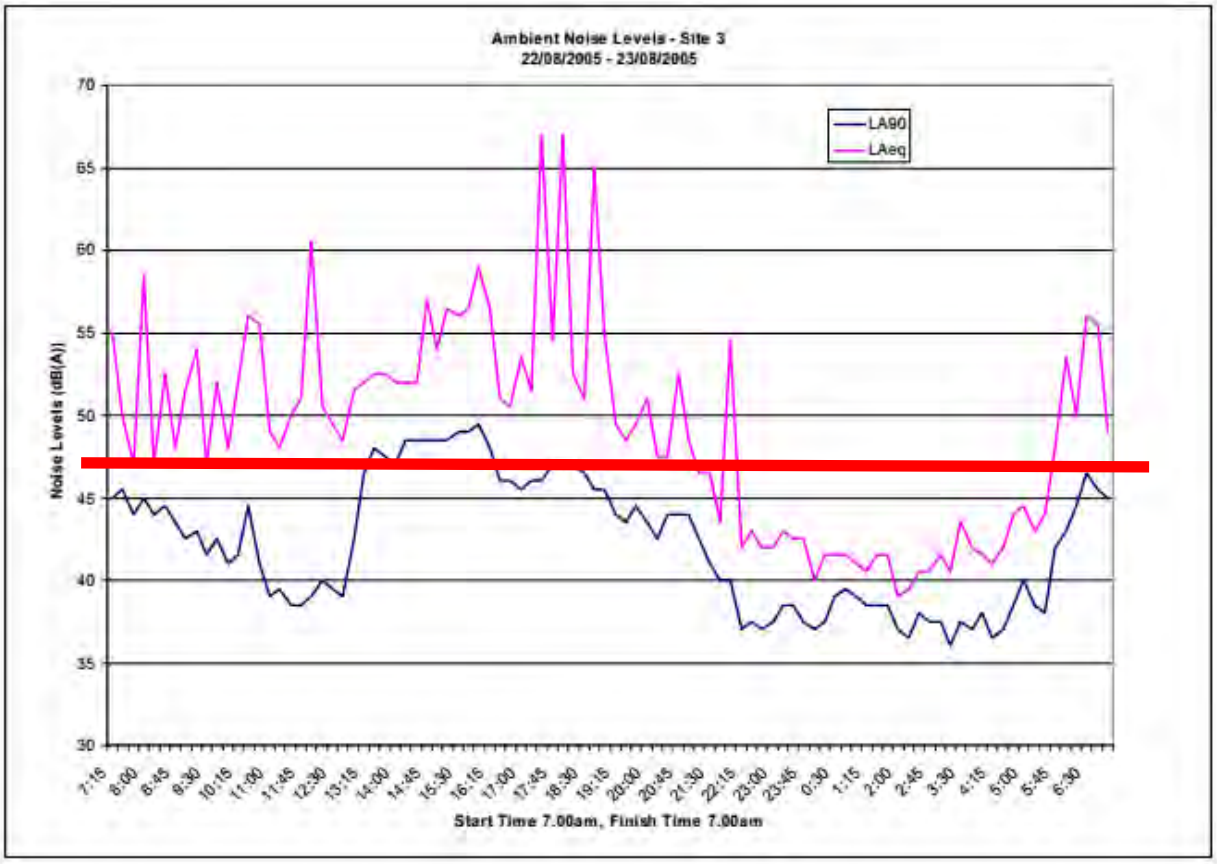

Ambient Noise Levels - Site 3
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

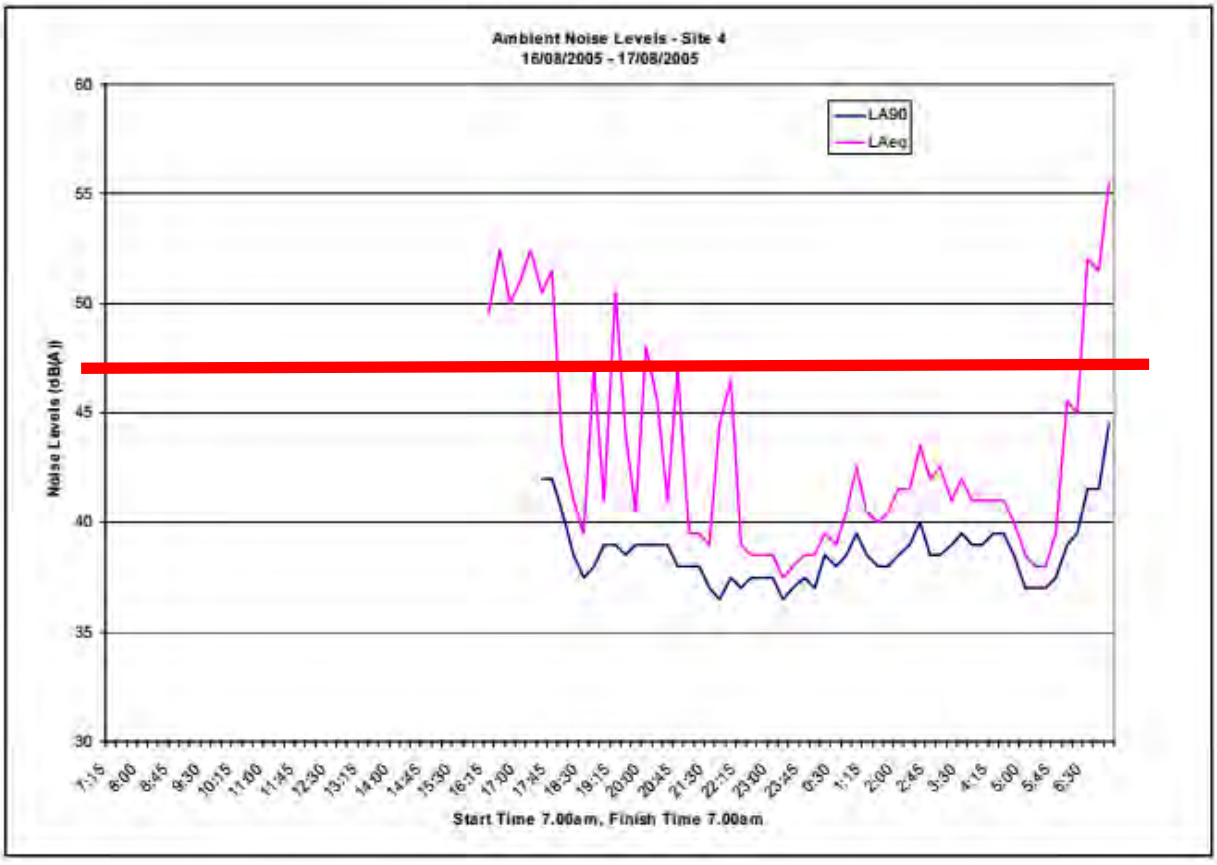

Ambient Noise Levels - Site 3
18/06/2005 - 19/06/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

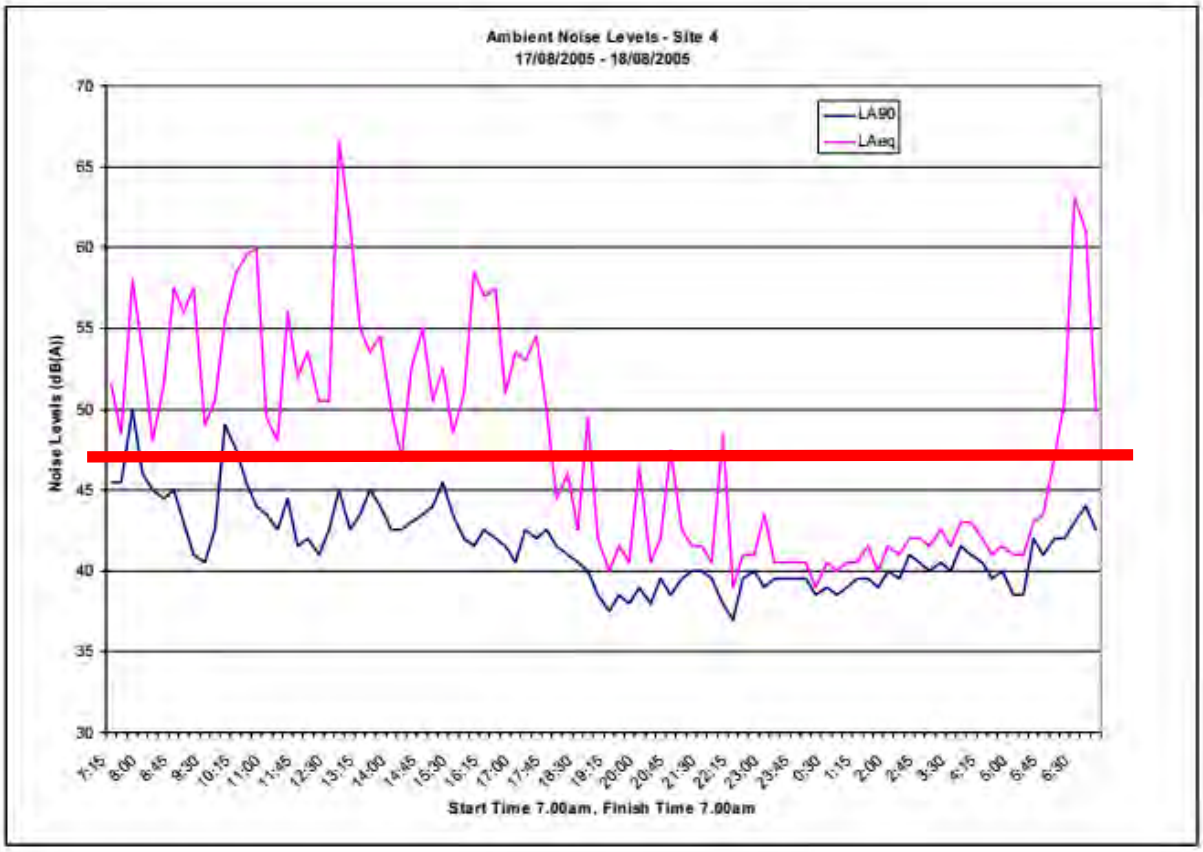

Ambient Noise Levels - Site 3
19/06/2005 - 20/06/2005
LA90
LAeq
Noise Levels (dB(A))
80
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

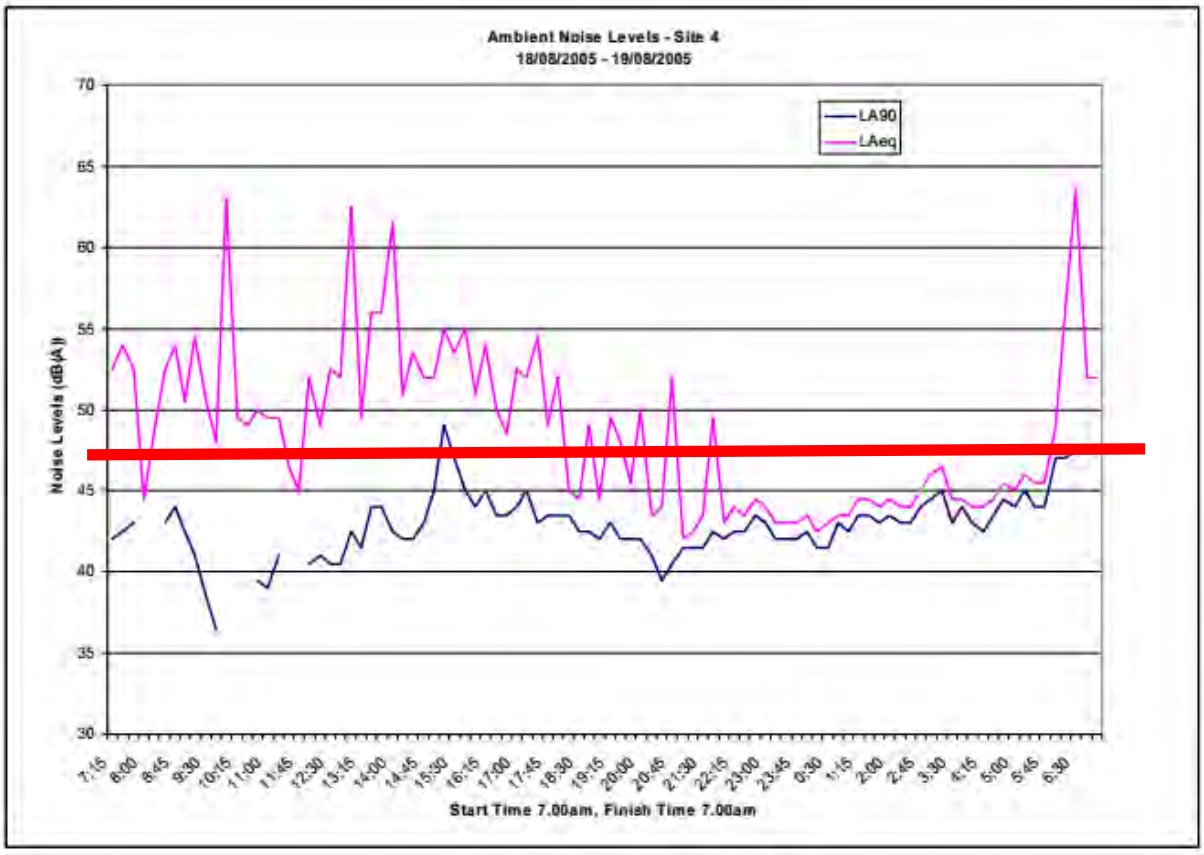

Ambient Noise Levels - Site 3
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

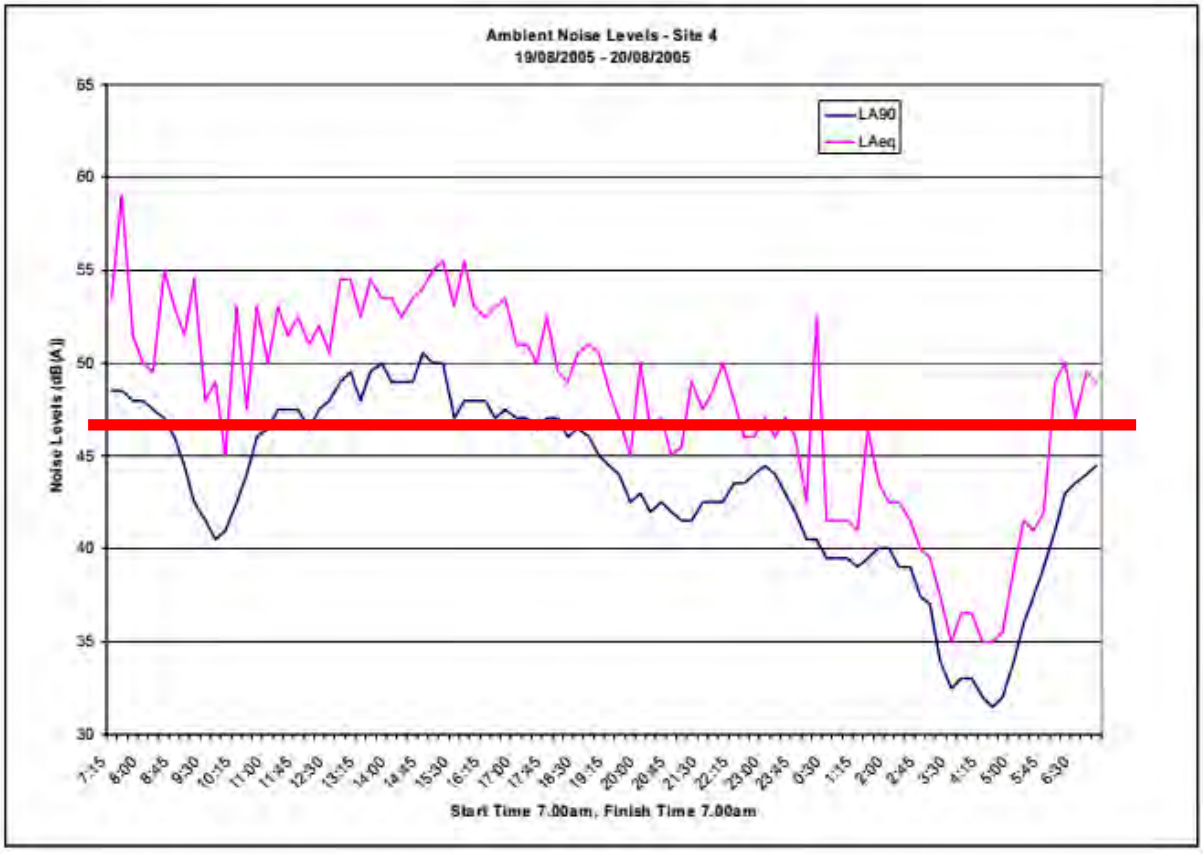

Ambient Noise Levels - Site 3
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

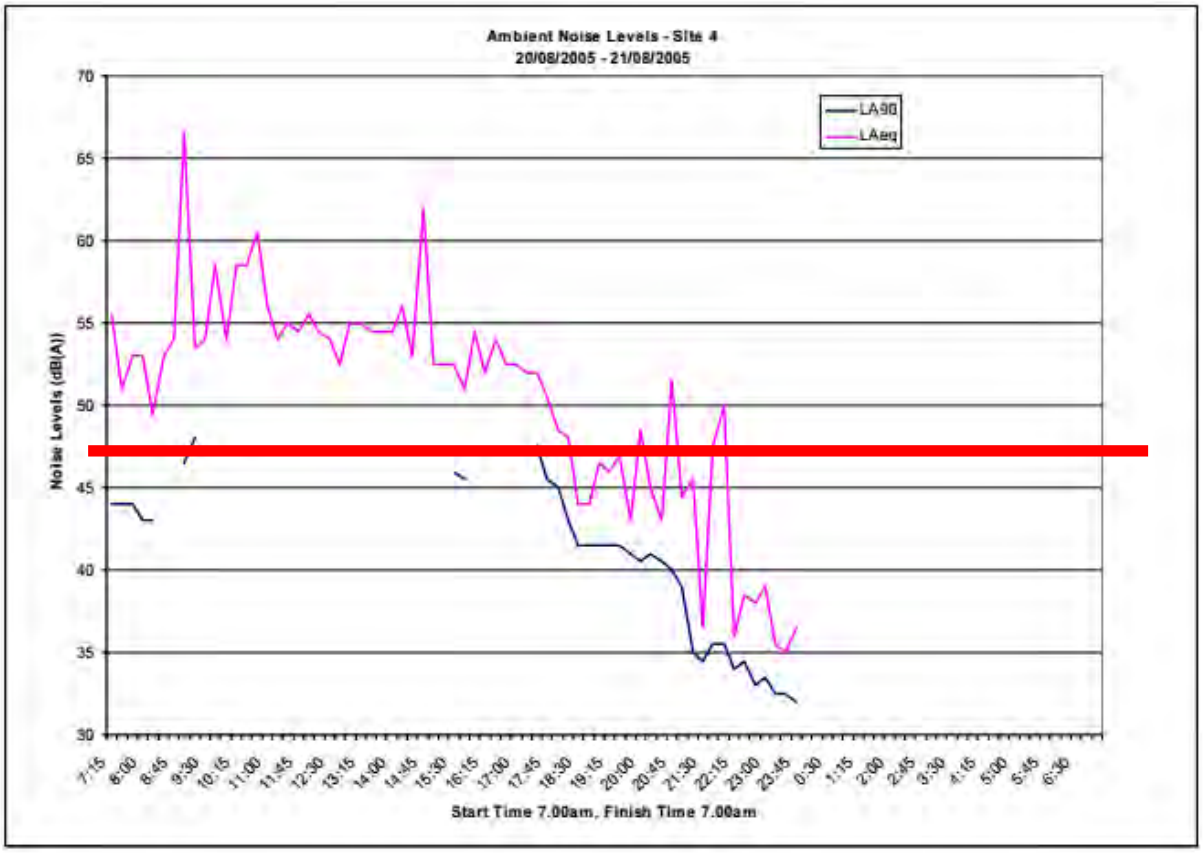

Ambient Noise Levels - Site 3
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

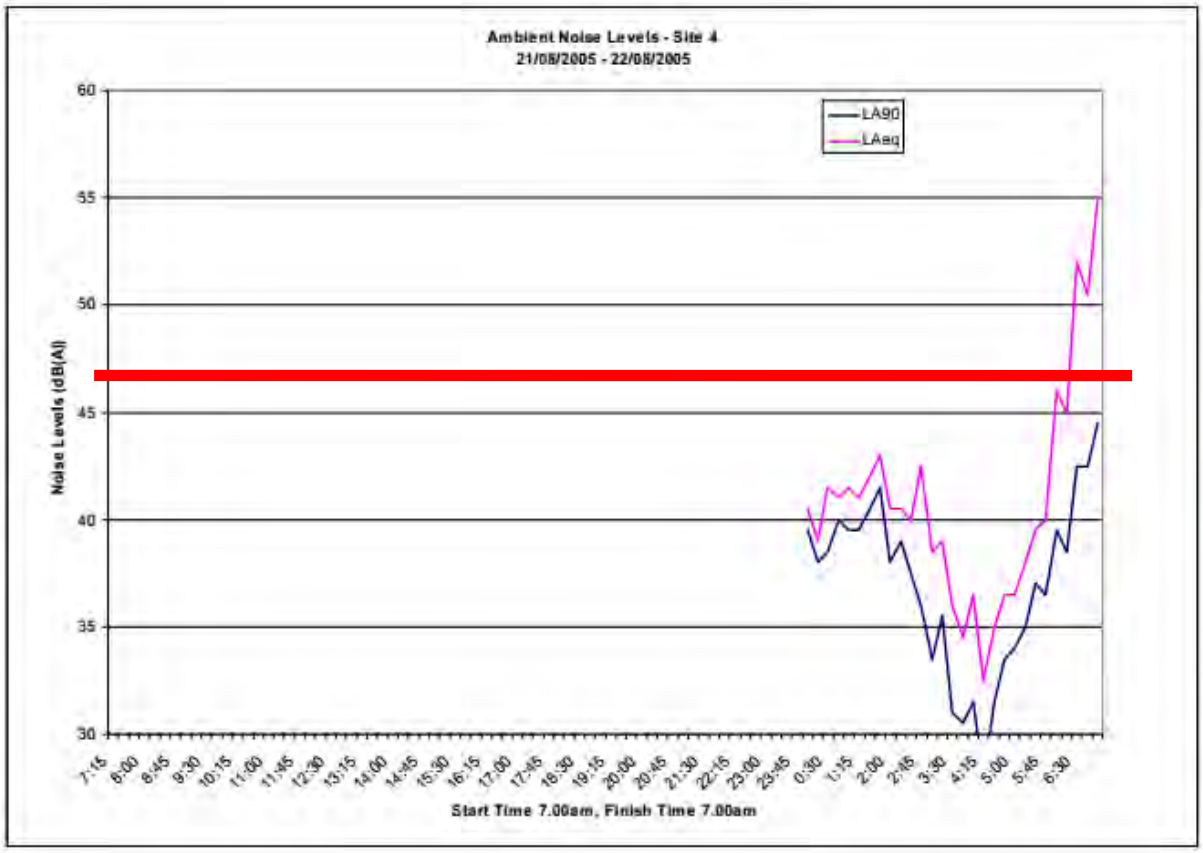

Ambient Noise Levels - Site 4
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

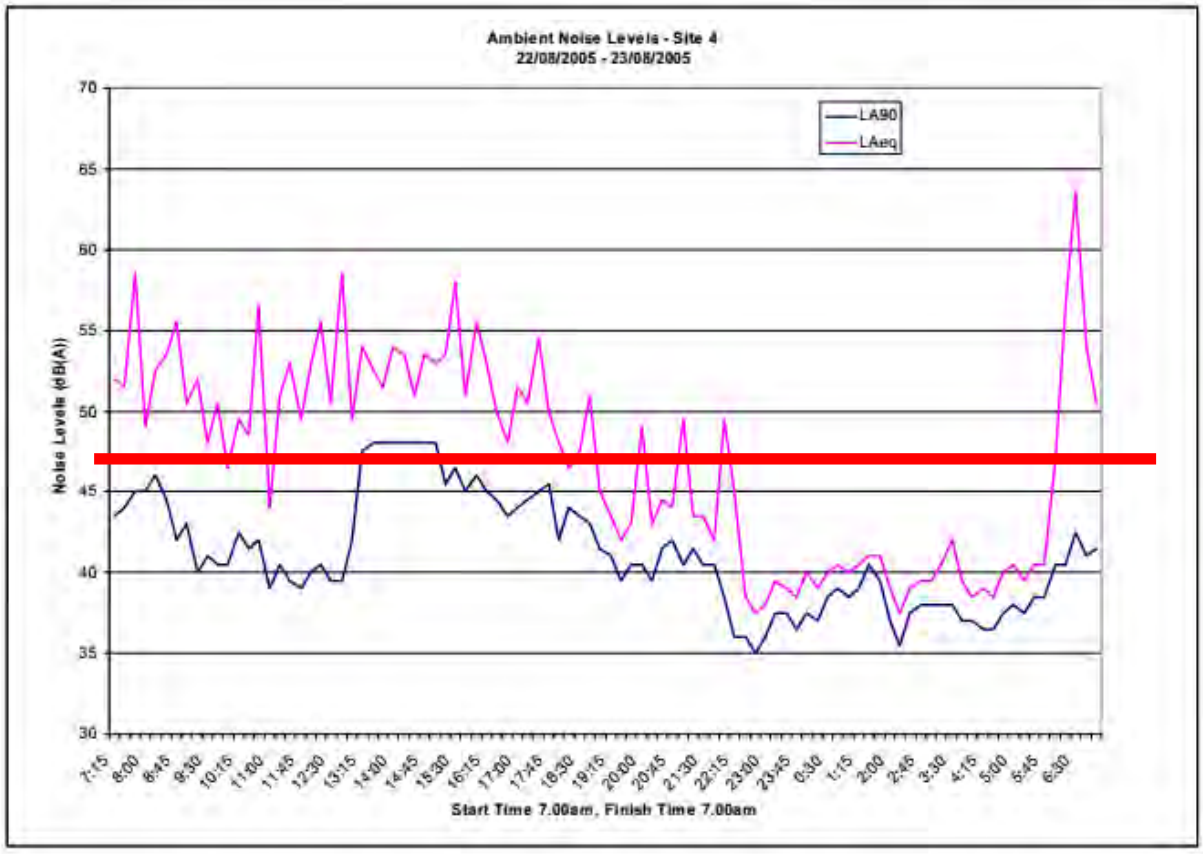

Ambient Noise Levels - Site 4
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS

CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Thursday, 10 December 2020

CRAIG HILL ACOUSTICS. 7 View Ct . Palm Beach .Qld 4221 .
Phone 07 55763883 Mobile 0418 762968
E: craig@craighillacoustics.com.au

DOCUMENT CONTROL PAGE

Cudgen Lakes Sand Quarry

Reference101220/2

Report prepared for	Gales-Kingscliff Pty Limited
Date	
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollanby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Phone 07 55763883 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
Signed	Craig Hill (manager) author
Copy	1 □ 2 x3 □ 4 □ 5 □ 6 □

Revision History		
No	Date Issued	Comments
2	Thursday, 10 December 2020	
DISTRIBUTION RECORD		
Copy		Destination
1		File Controlled copy
2	Scott Hollamby <scott@rwcorkery.com>	

Thursday, December 10, 2020 ©

Contents

1.0 INTRODUCTION

The purpose of this report is to examine noise levels from quarry operations for compliance.
Attended monitoring was conducted on 10 December 2020 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

Road-registered Trucks
Loader (Hyundai HL-770

Table 1.2 Equipment on site not in use

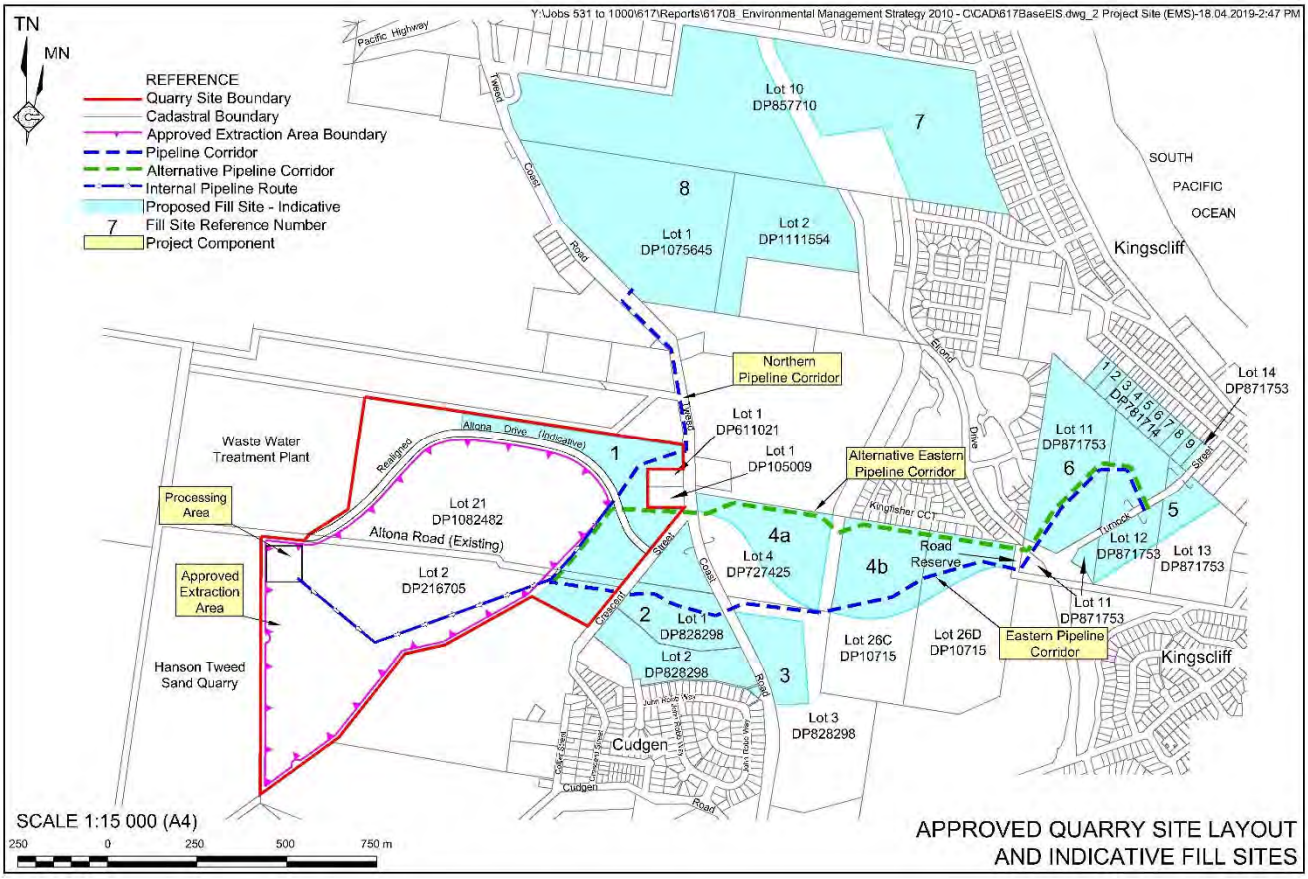
Dredge 8 “
Screener Sandvik
Excavator (Doosan DX 420 LCA)

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	• 7.00 am to 6.00 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to the processing plant, wet processing.	• 7.00 am to 10.00 pm Monday to Friday • 7.00 am to 4.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to fill sites.	• 7.00 am to 6.30 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Operation of dredge to fill pipeline with water or pipeline flushing	• 6.30 am to 7.00 pm Monday to Friday • 6.30 am to 1.30 pm Saturday • At no time on Sundays or public holidays
Maintenance (if inaudible at neighbouring residences)	Any day

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

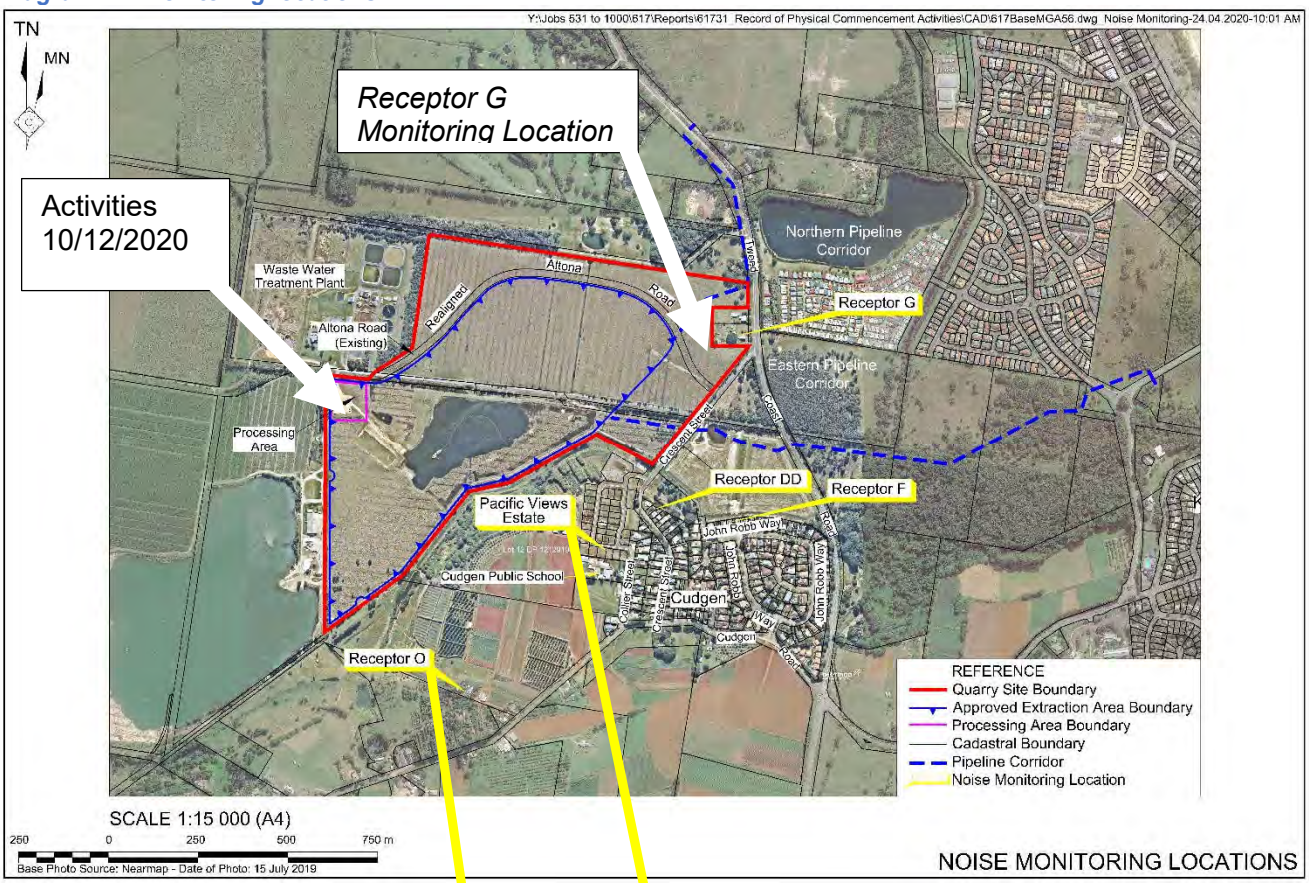
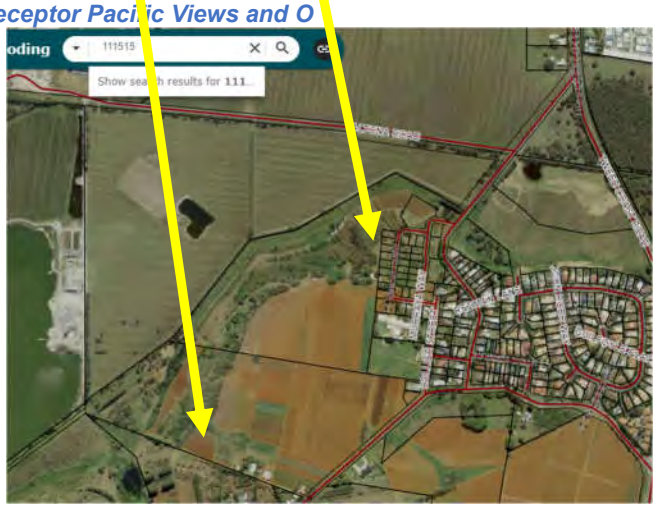


Diagram 2.2 Relocation of Receptor Pacific Views and O



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

L_{A90} 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.

L_{Aeq} 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 949 Serial No 6023. calibrated June 2019.

BSWA Sound Level Calibrator Serial No 490190. calibrated July 2020.

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	0-5kts
Wind Direction	NW
Atmospheric Pressure	1018 hpa
Cloud Cover	20%
Temp	24 C

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 Thursday, 10 December 2020 between 0800 and 1100 hrs.

- *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. (rear boundary of new residences)*
- *Receptor DD – Residence - 34A Crescent Street. (rear boundary)*
- *Receptor F – Residence - 64 John Robb Way. (rear boundary)*

Table 5.1 Equipment being used at the time of the test 10/12/2020

Operating equipment measured at 20m	LAeq 15 min
Loader (Hyundai HL-770	71
Dredge 8 "	63

Table 5.2 Equipment in use 10/07/2020

Operating equipment measured at 20m	LAeq 15 min
Dredge 8 "	63

Table 5.3 Equipment in use 10/07/2020

Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66

Table 5.4 Equipment in use April 2020 test

Operating equipment measured at 20m	LAeq
Screener (QA331)	70
Loader (Cat 926H)	67
Excavator (Cat 329D)	68
End loader and screener	72

Table 5.5 Predicted noise from trucks

	60 kph continuous use over 15 min	
Type	LWA	SPL @ 20m
idle – 20 kph	100	66

5.1 Results

The results of the compliance monitoring are presented in Table 6.1.

Table 5.4 Attended monitoring

Receptor & Time	Attended Testing LAeq 15 minutes	> Project Criteria (47 LAeq 15min)	> Cumulative Criteria (50 LAeq 11 hrs)	Comments
G 0800 - 0815	57	10	7	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0830 - 0845	47	0	-3	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
Pacific Views 0900 - 0915	52	5	2	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
DD 1000 - 1015	52	5	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 1030 - 1030	53	6	3	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

6.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. Measurements were undertaken at approximately 20m from equipment during operations and distance attenuation applied to establish possible levels at monitoring locations.

Table 6.1 shows predicted compliance to the criteria for nominated equipment operations.

Table 6.1 Predicted levels of on site equipment based on measurements at 20m

Receptor	Distance m	Dredge 8" 63LAeq @ 20m	Screener 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m (not in use)	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	30	37	38	33	33	42	42	-5	-8
O	600m	33	40	41	36	36	45	45	-2	-5
Pacific Views	555m	34	41	42	37	37	45	47	-0	-3
DD	780m	31	38	39	34	34	43	33	-14	-17
F	900m	30	37	38	33	33	42	32	-15	-18

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

$$Lp(R2) = Lp(R1) - 20 \cdot Log_{10}(R2/R1)$$

Where:
Lp(R1) = Sound Pressure Level at Initial location.
Lp(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.

Logarithmic addition=10*LOG(SUM(10^(user range/10)))

7.0 DISCUSSION AND CONCLUSIONS

Noise from dredging was not audible or measurable at locations G,F and DD.

Noise from the dredge was occasionally audible at locations O and Pacific Views Estate but not measurable due to other noise in the area.

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 7.1

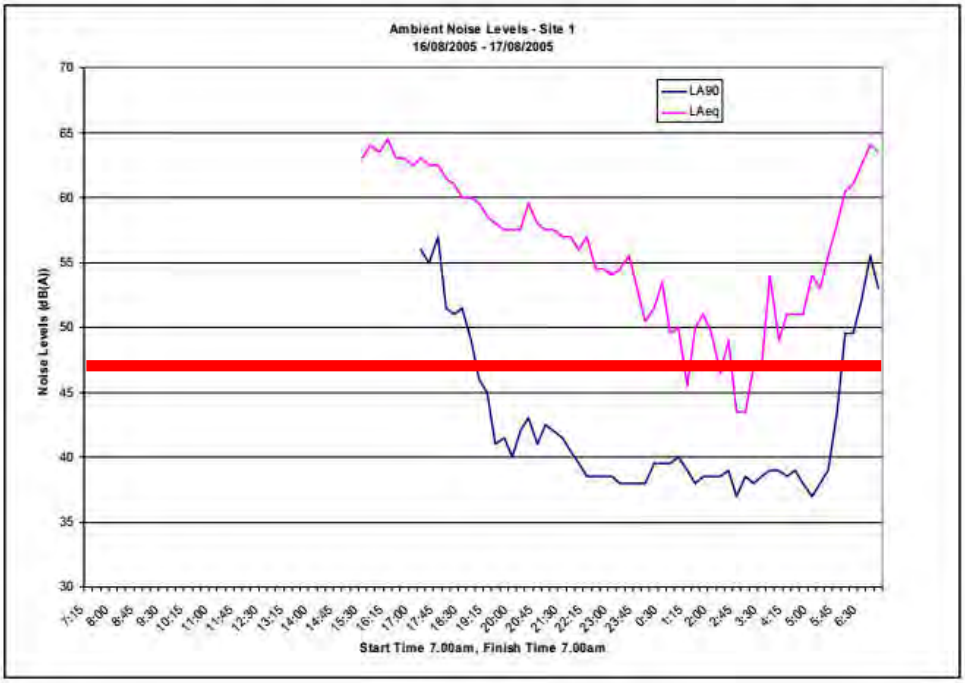
Receptor	**Pre-project / Baseline Levels**	**Compliance Monitoring**						**Project Criteria**	
		LAeq 15 min						LAeq 15 min	LAeq 11 hr
	Unattended logger original report	Attended monitoring 23/08/05	Attended monitoring 10/07/17	Attended monitoring 30/08/18	Attended monitoring 20/04/20	Attended monitoring 20/04/20	Attended monitoring 10/12/20	Impact Criteria day and evening >47LAeq	Cumulative Criteria Day >50LAeq
G	62	63	62.2	56.7	55	56	57	10	7
O	NM	NM	64.2	46.0	48	52	53	6	3
B	55	51	56.8	48.4	55	53	52	5	2
DD	55	53	58.2	55.7	56	53	52	5	2
F	58	54	42.7	56.6	59	55	47	0	-3

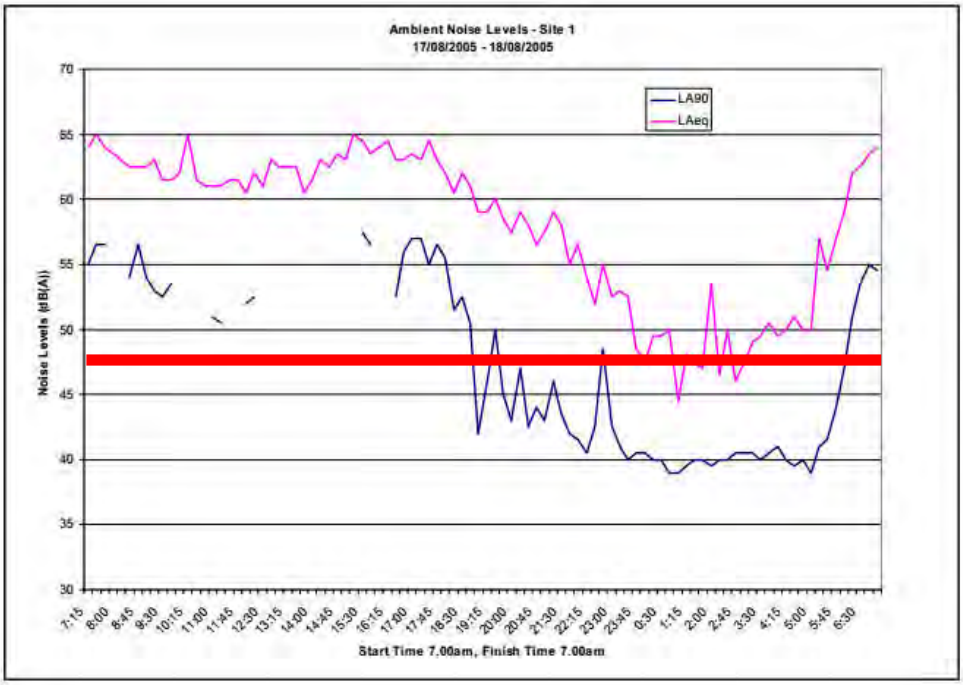
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

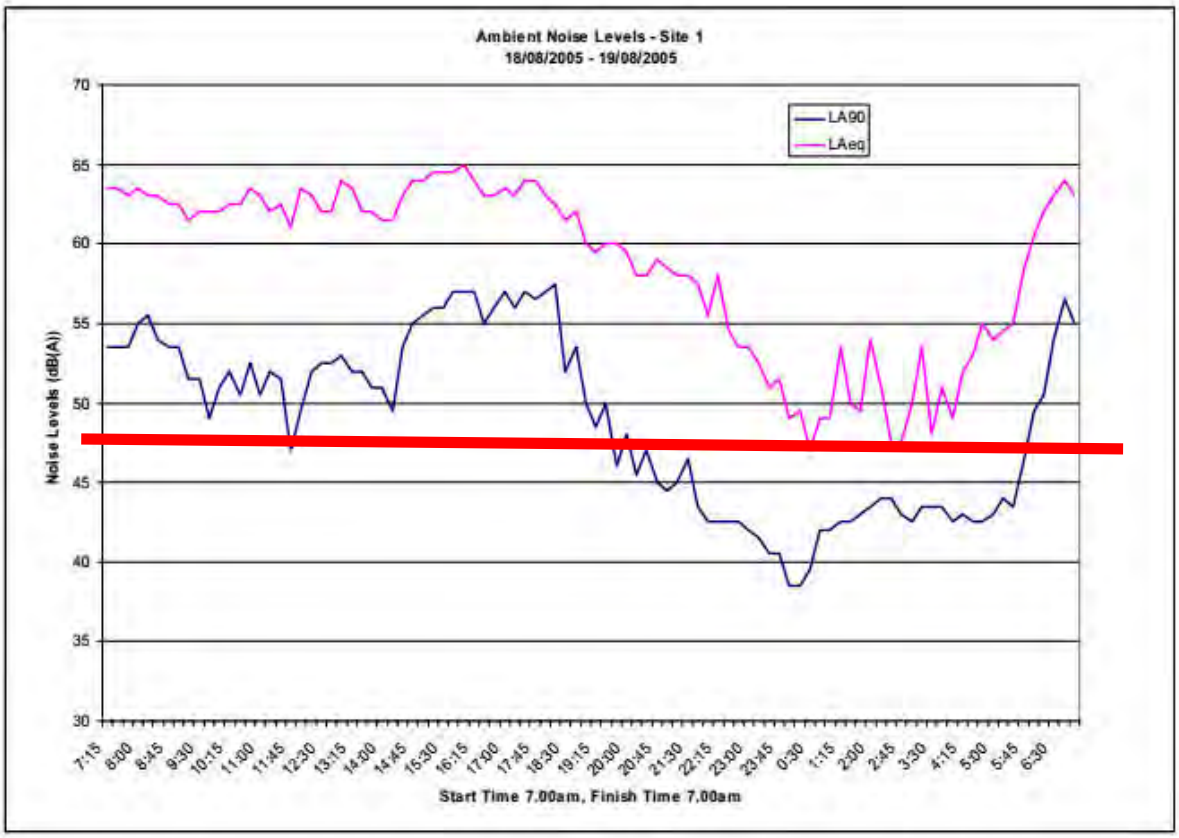
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not 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.

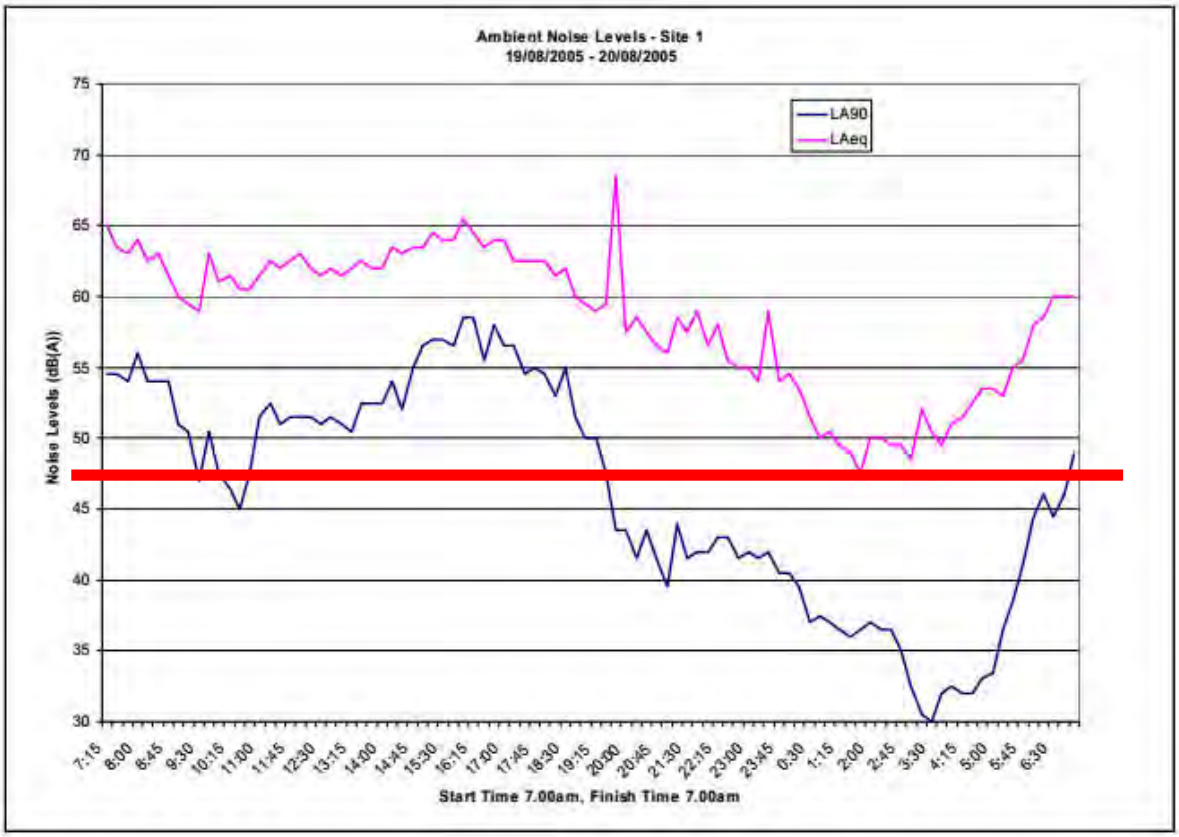
APPENDIX A PRE CONSTRUCTION TESTING

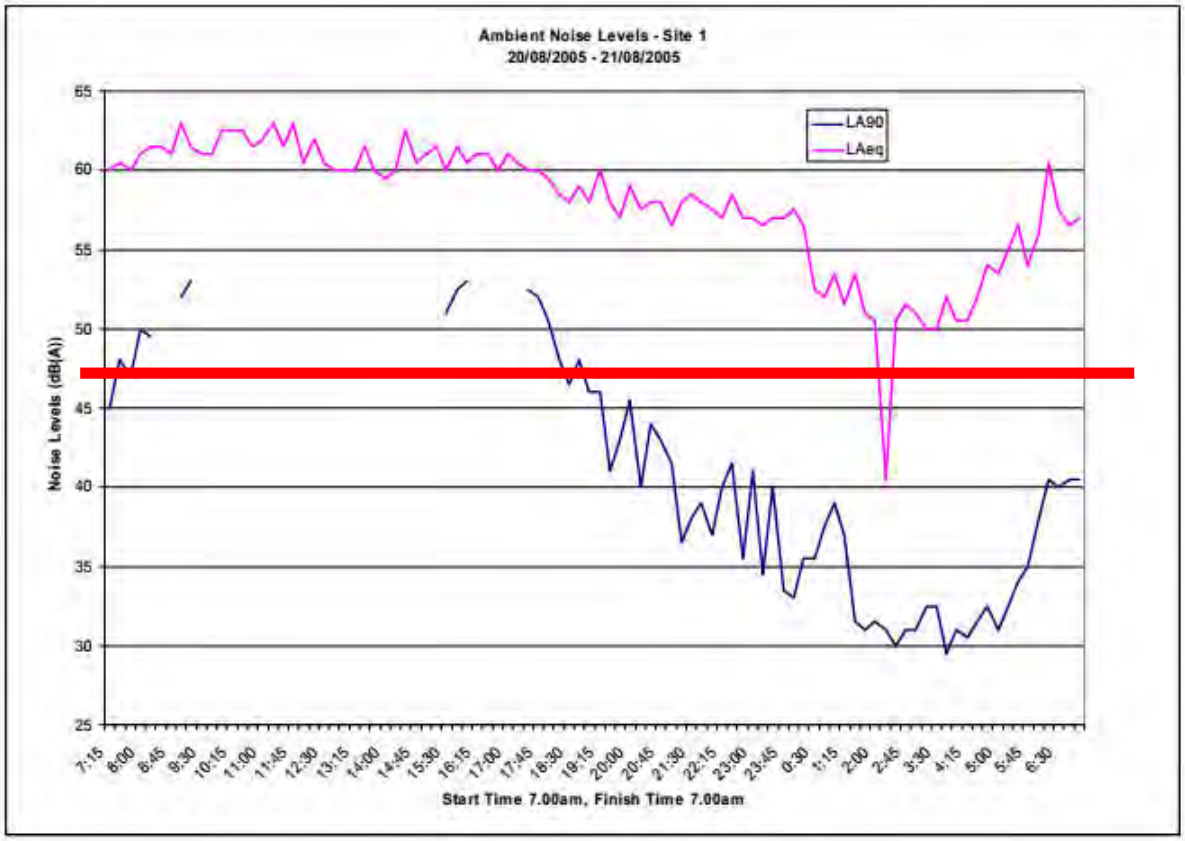
Measurements taken by Ron Rumble Pty Ltd and originally presented in Ron Rumble, (2008). Noise Assessment Report 61704- Part B.

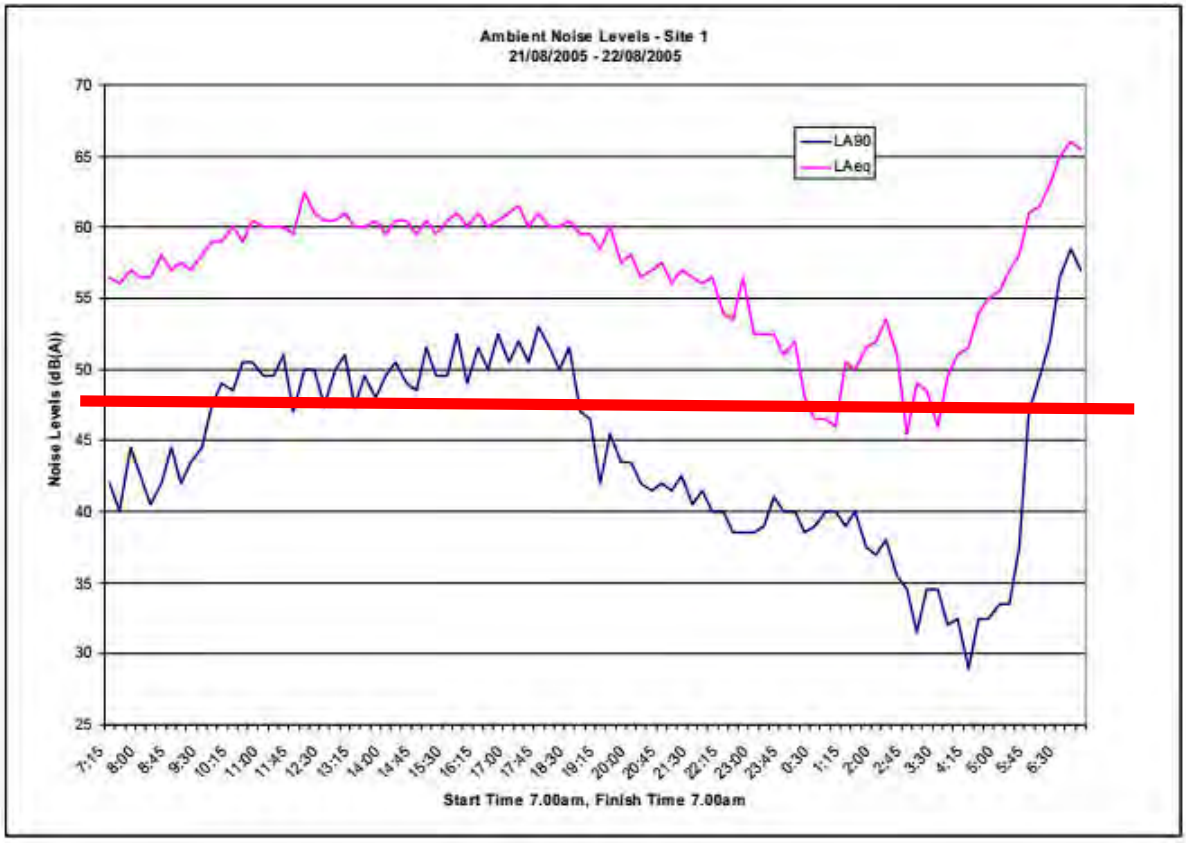


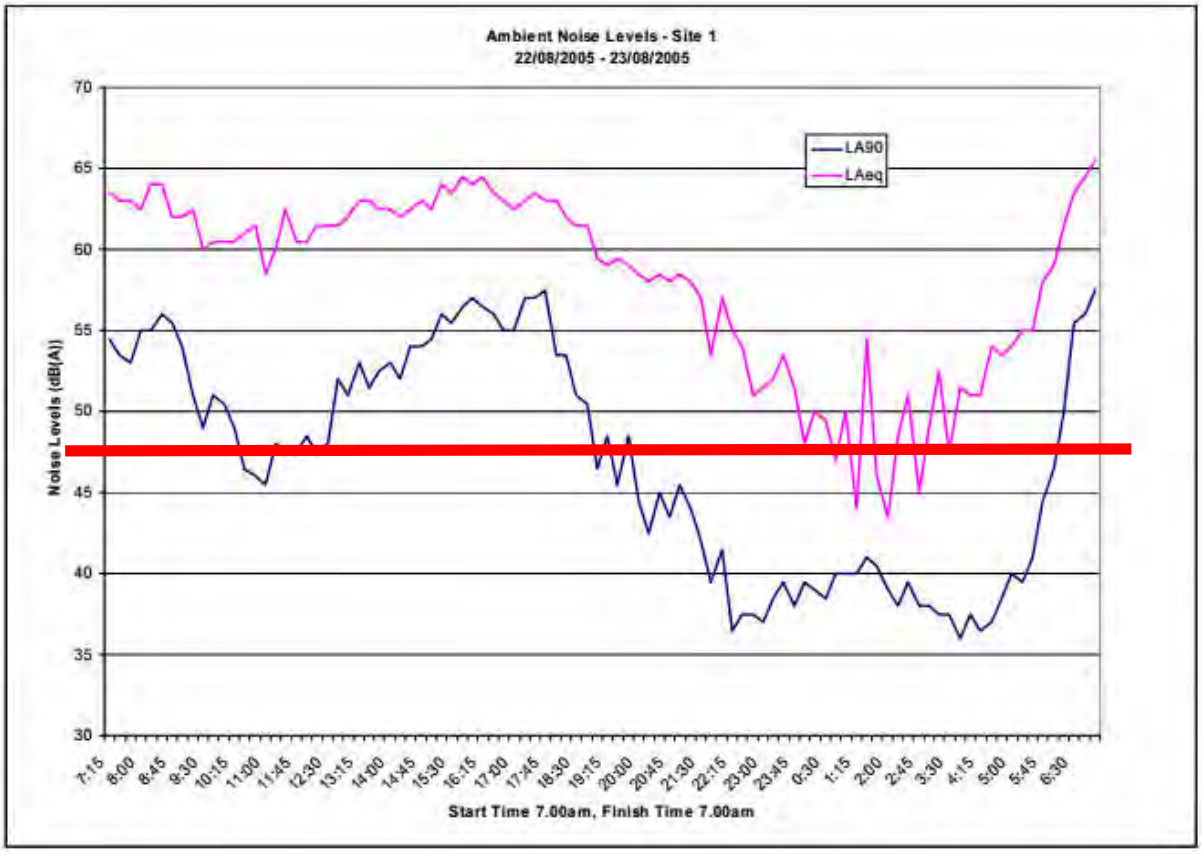


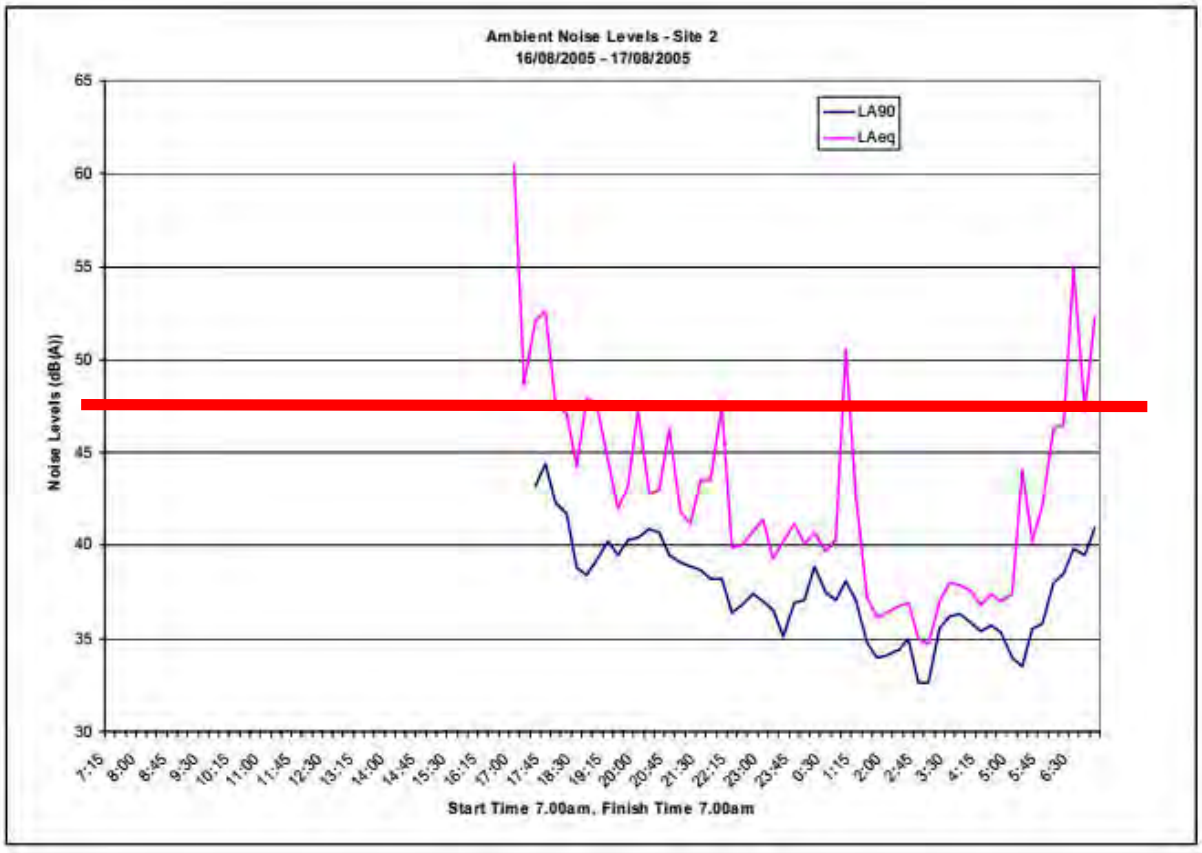

Ambient Noise Levels - Site 1
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

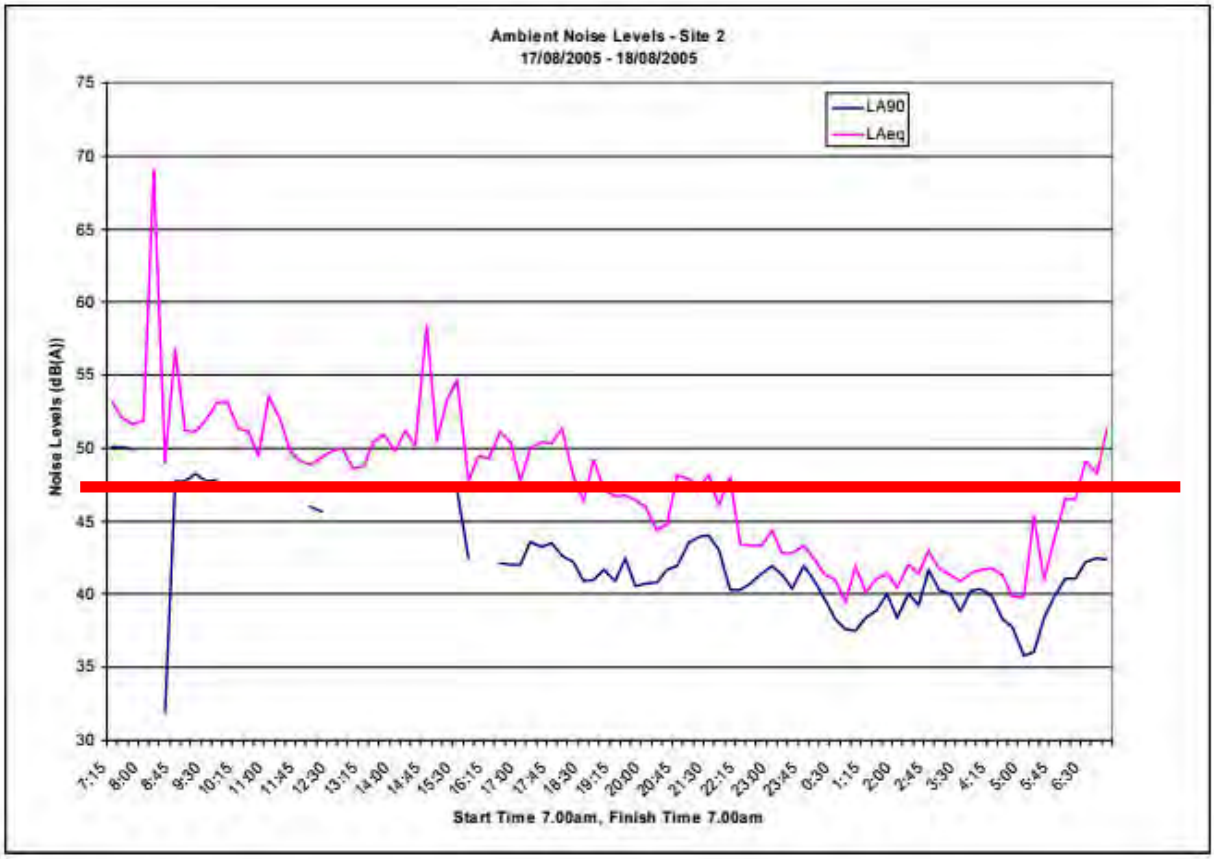

Ambient Noise Levels - Site 1
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

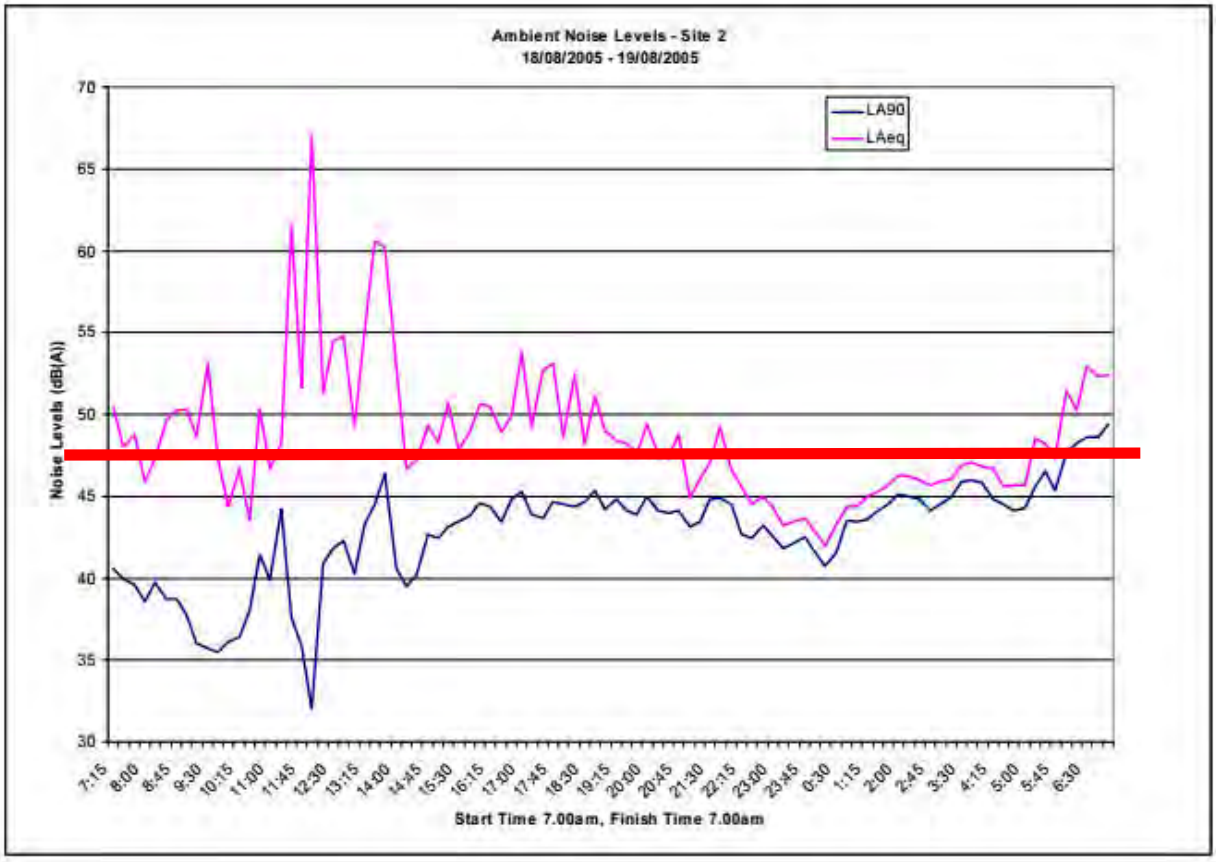

Ambient Noise Levels - Site 1
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

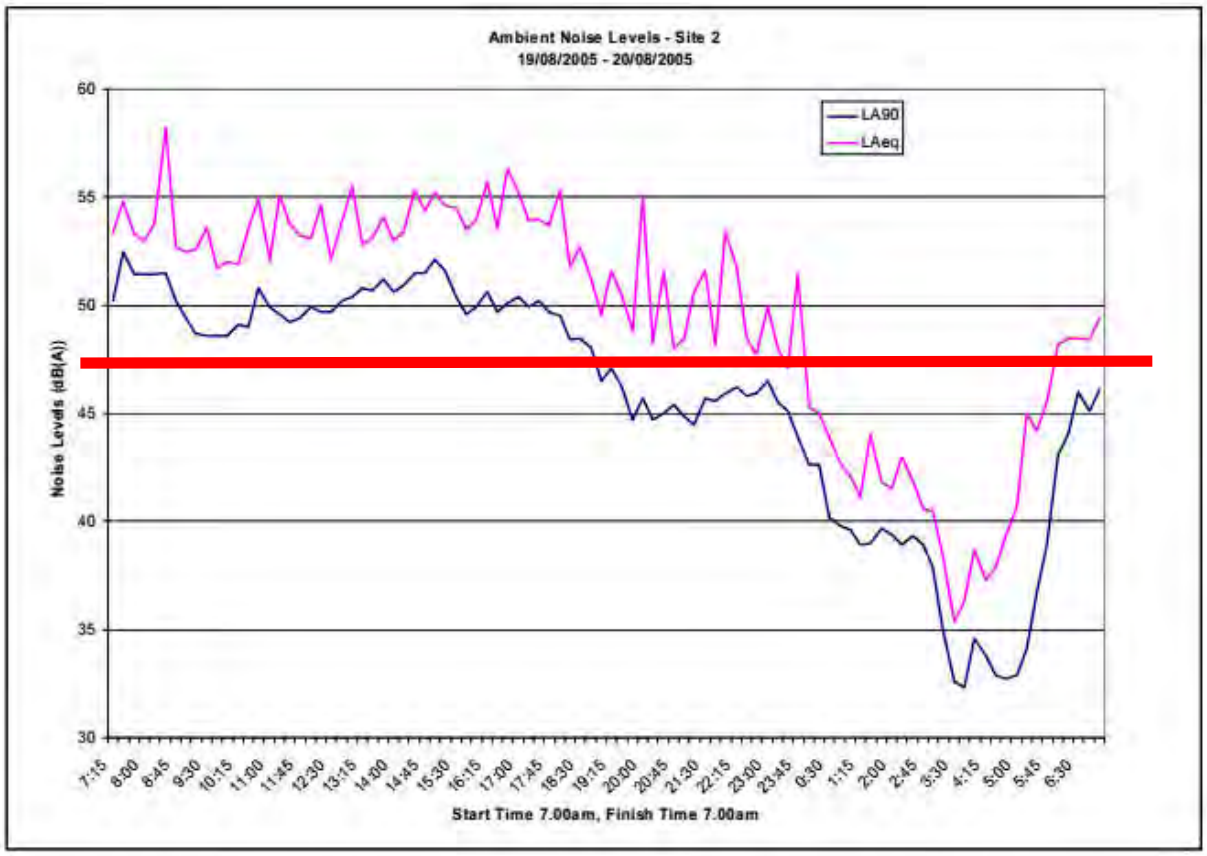

Ambient Noise Levels - Site 1
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

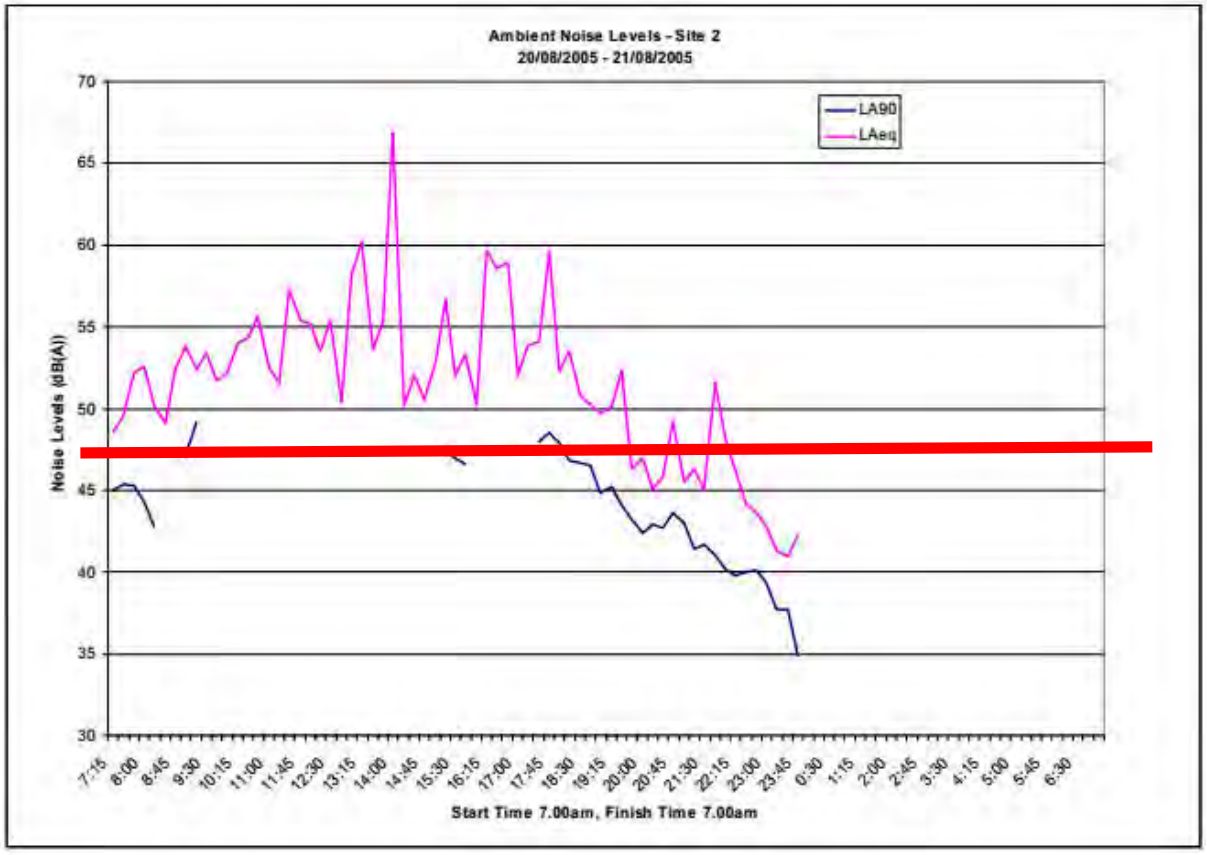

Ambient Noise Levels - Site 1
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

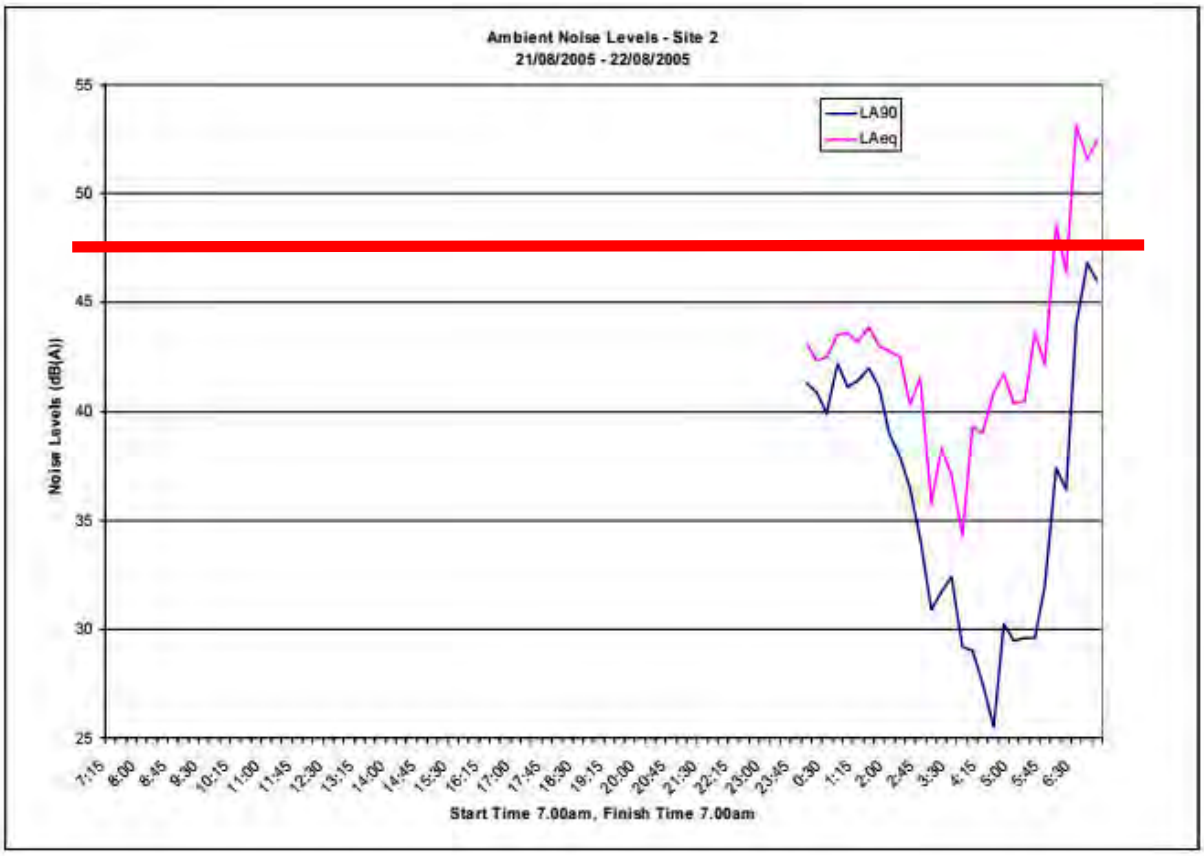

Ambient Noise Levels - Site 2
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

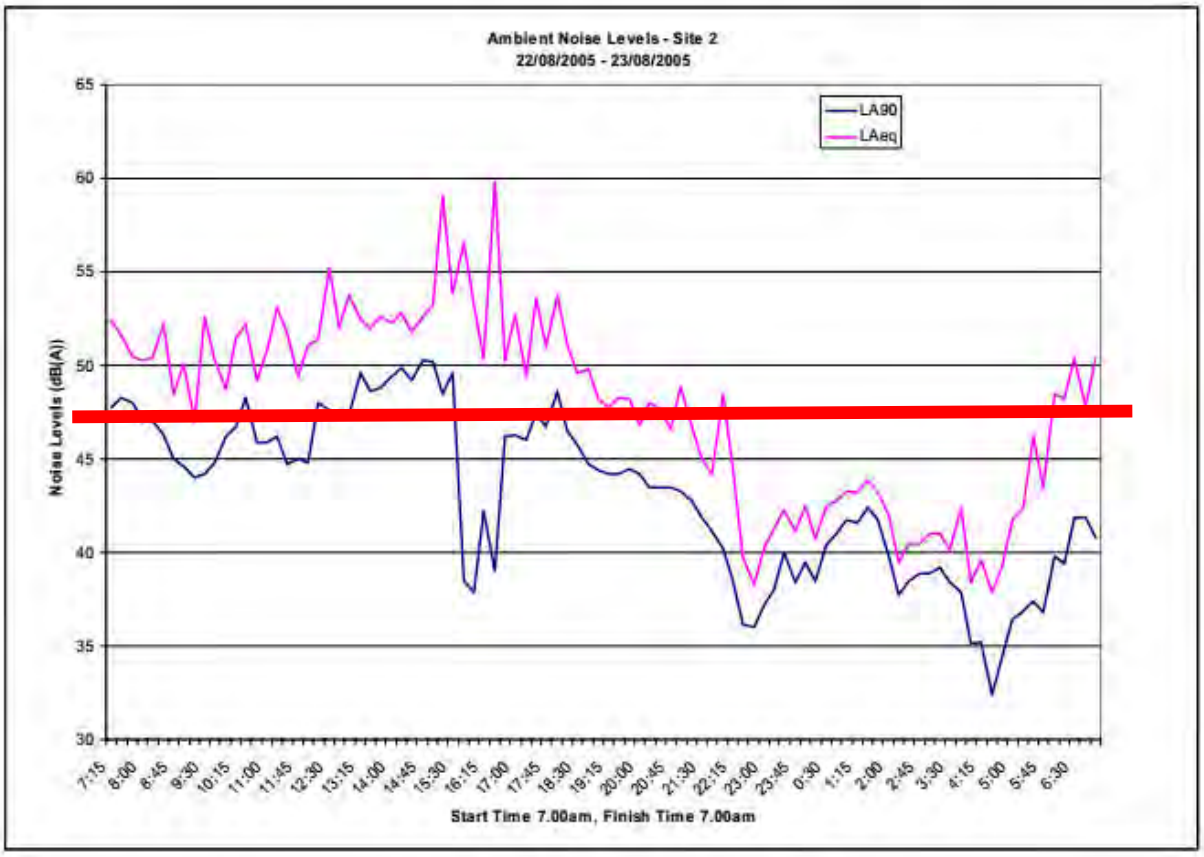

Ambient Noise Levels - Site 2
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

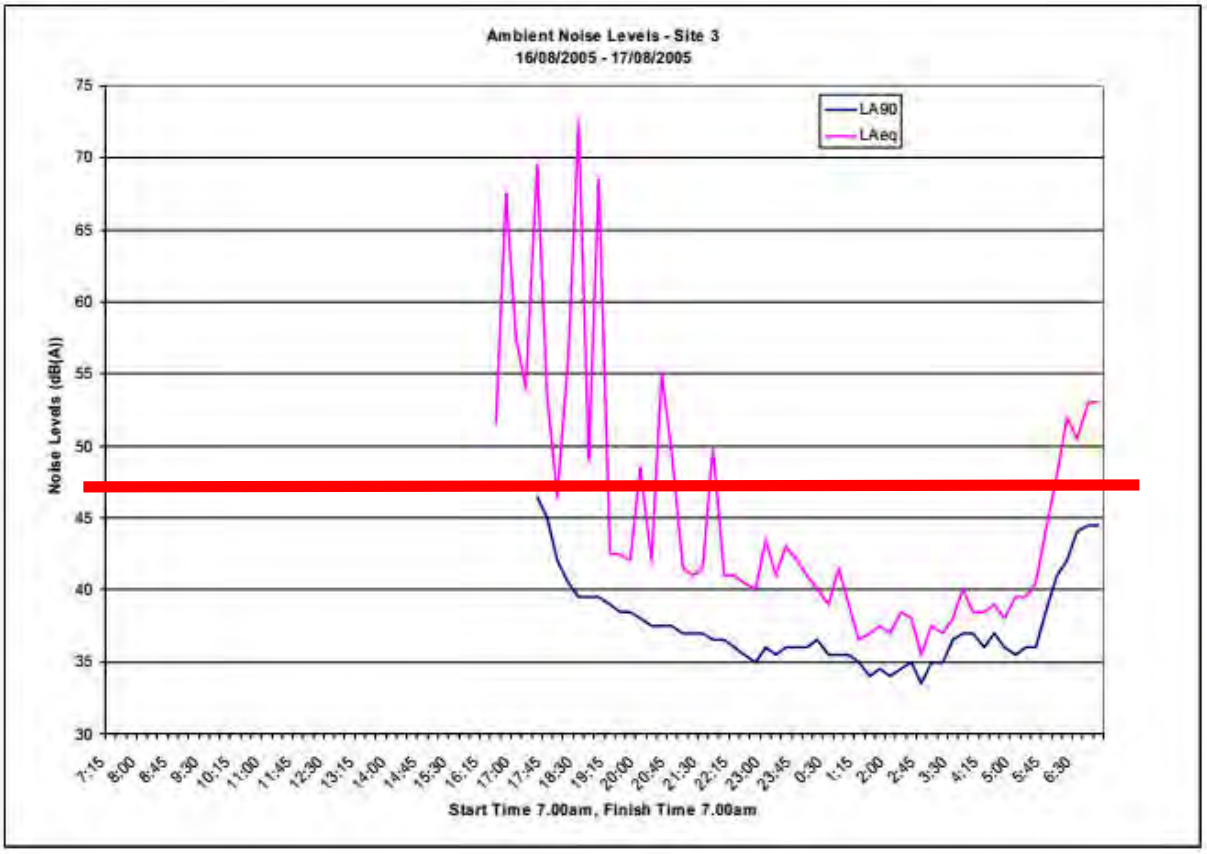

Ambient Noise Levels - Site 2
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

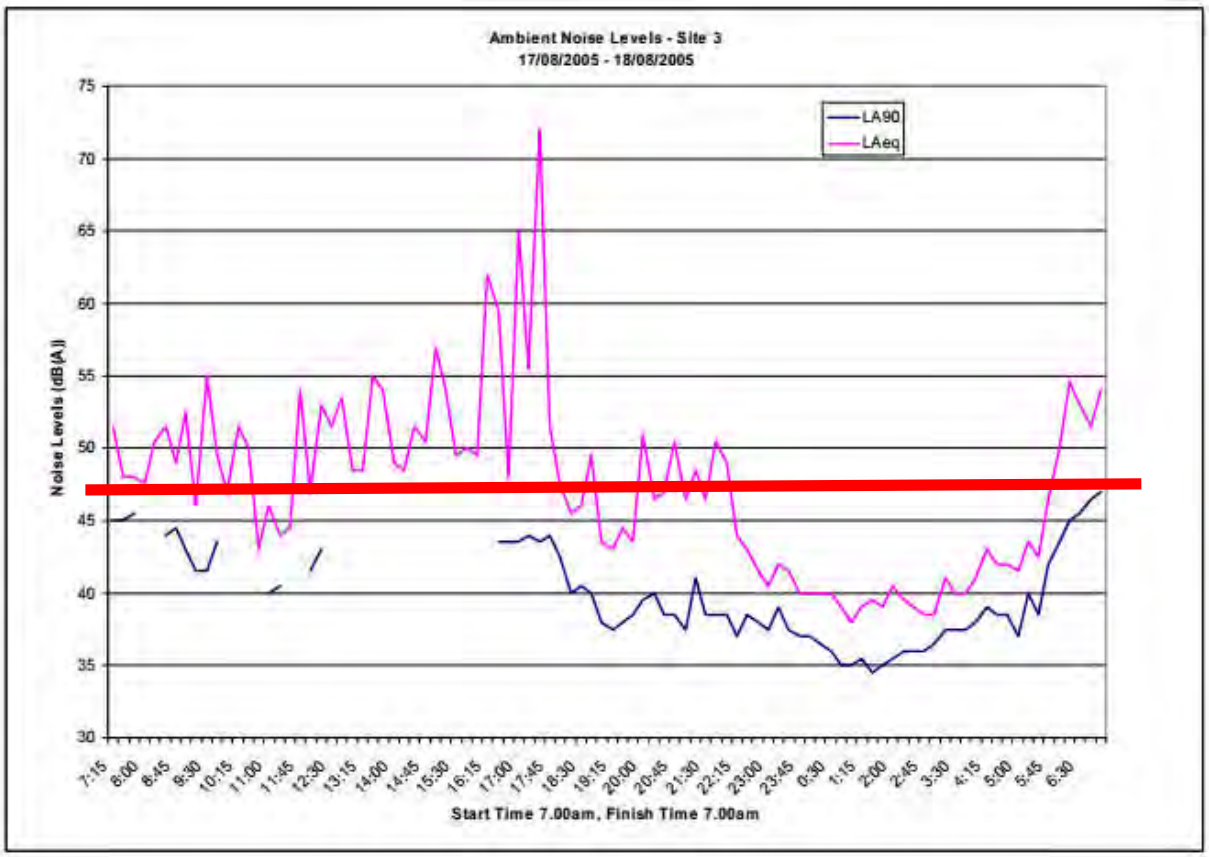

Ambient Noise Levels - Site 2
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

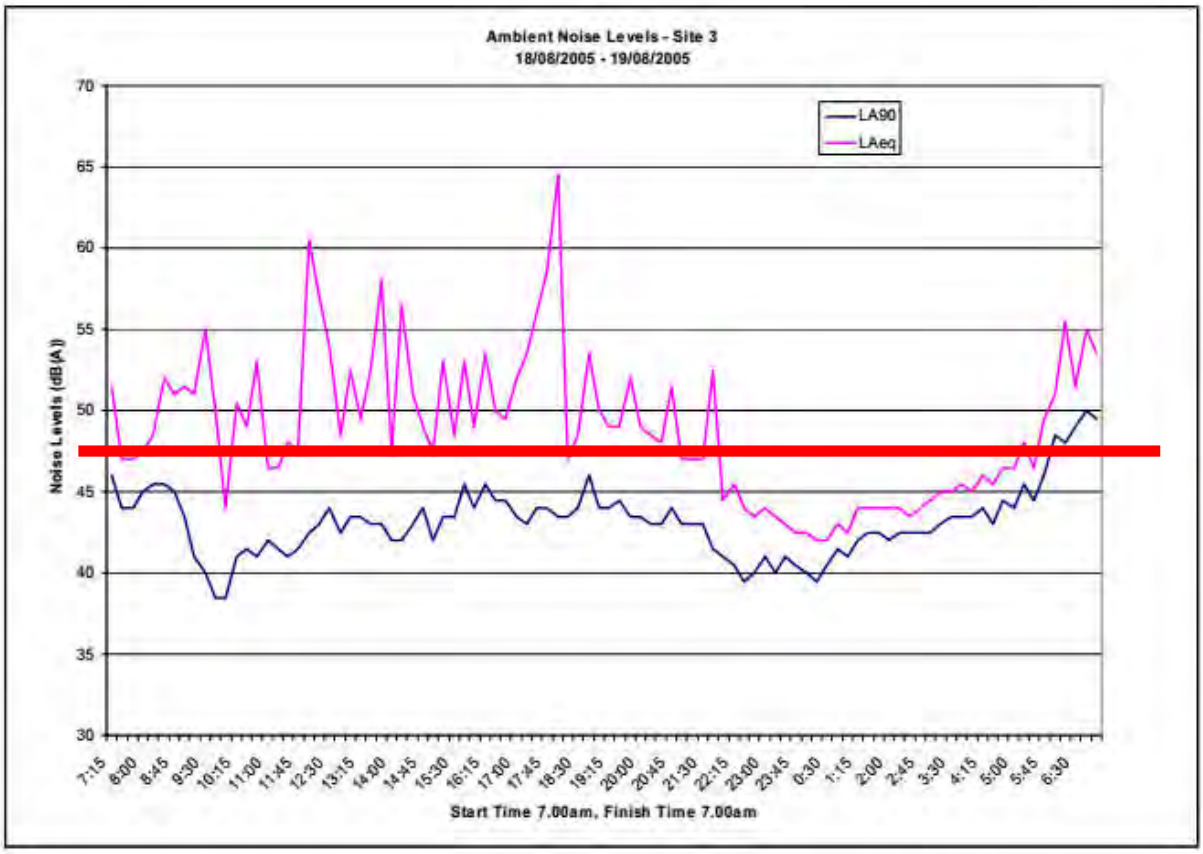

Ambient Noise Levels - Site 2
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

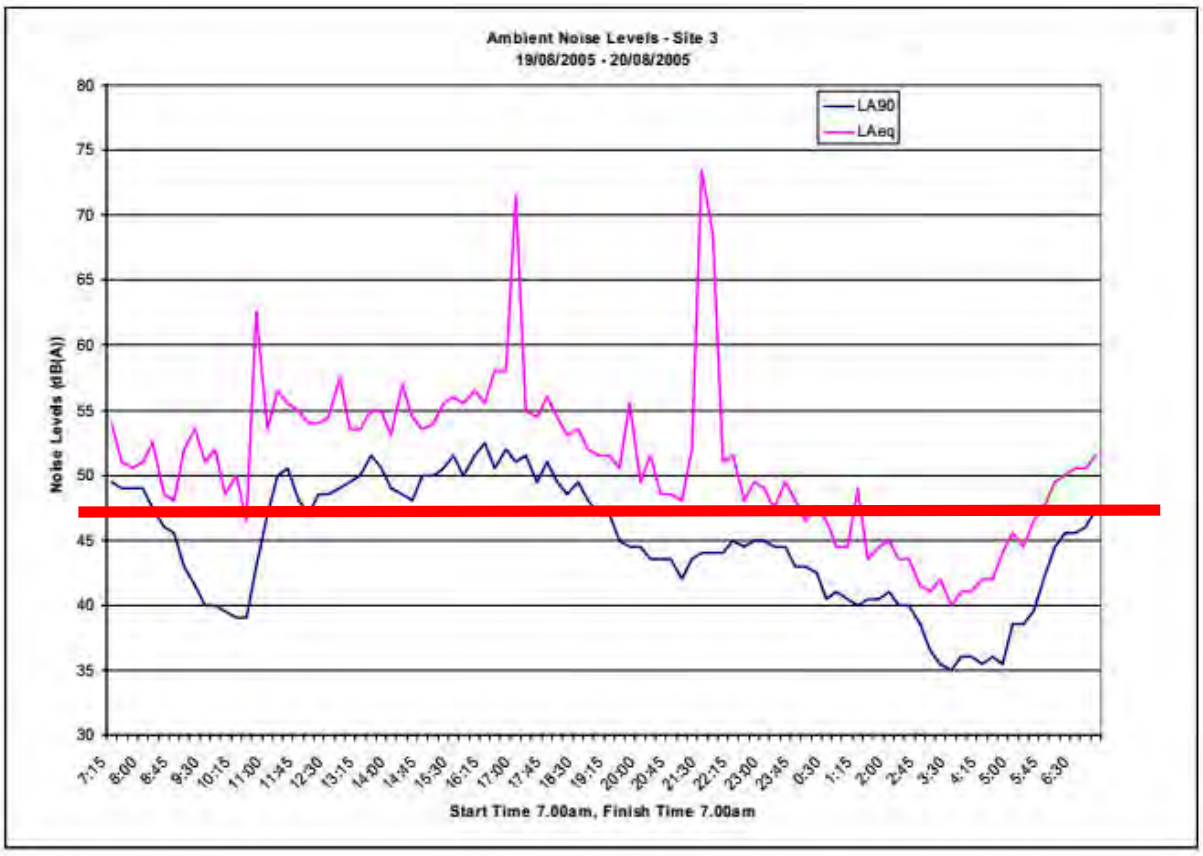

Ambient Noise Levels - Site 2
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

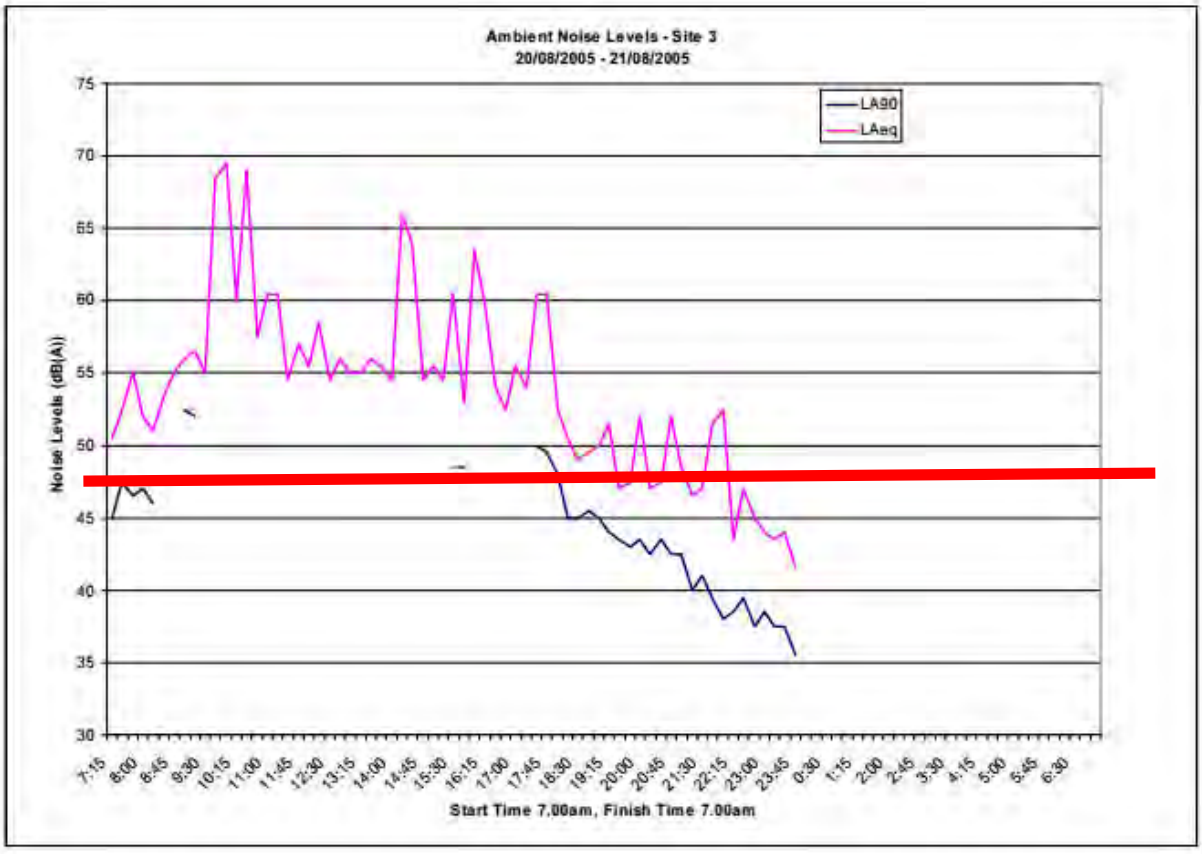

Ambient Noise Levels - Site 2
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

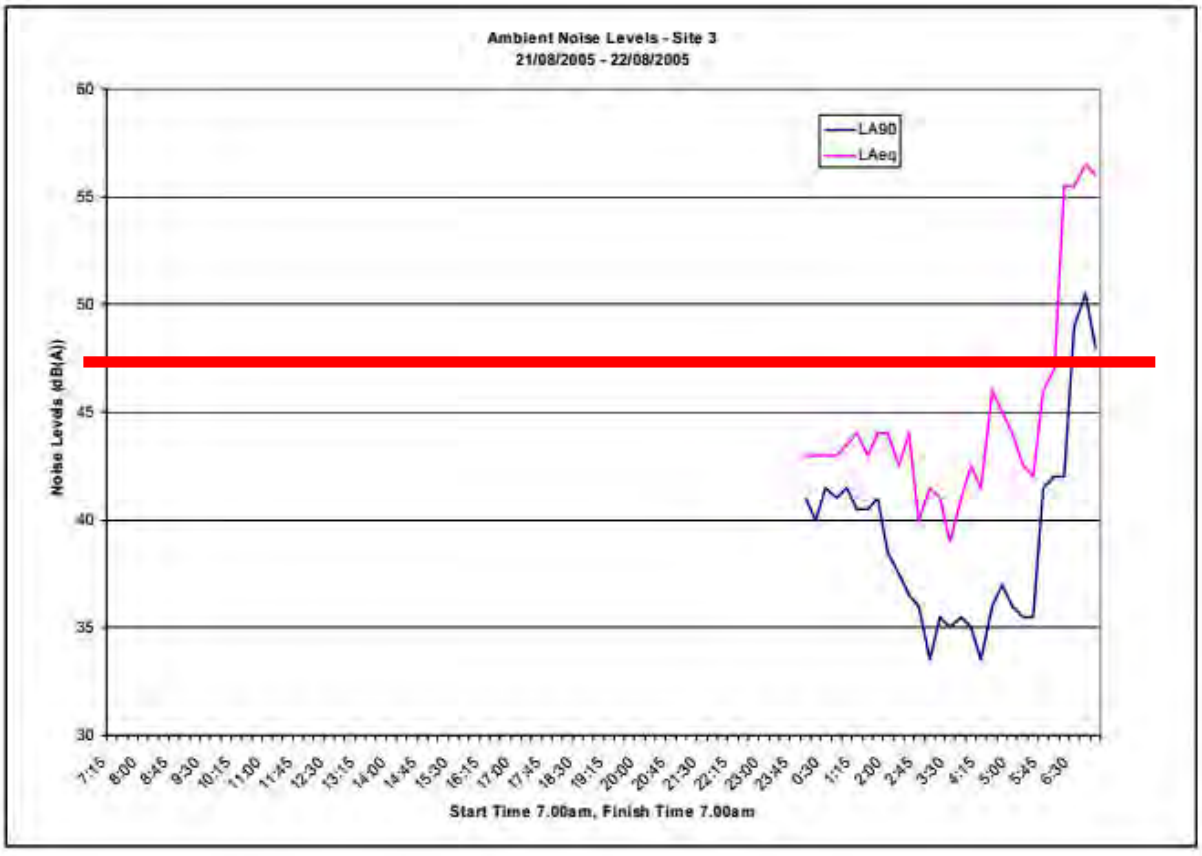

Ambient Noise Levels - Site 3
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

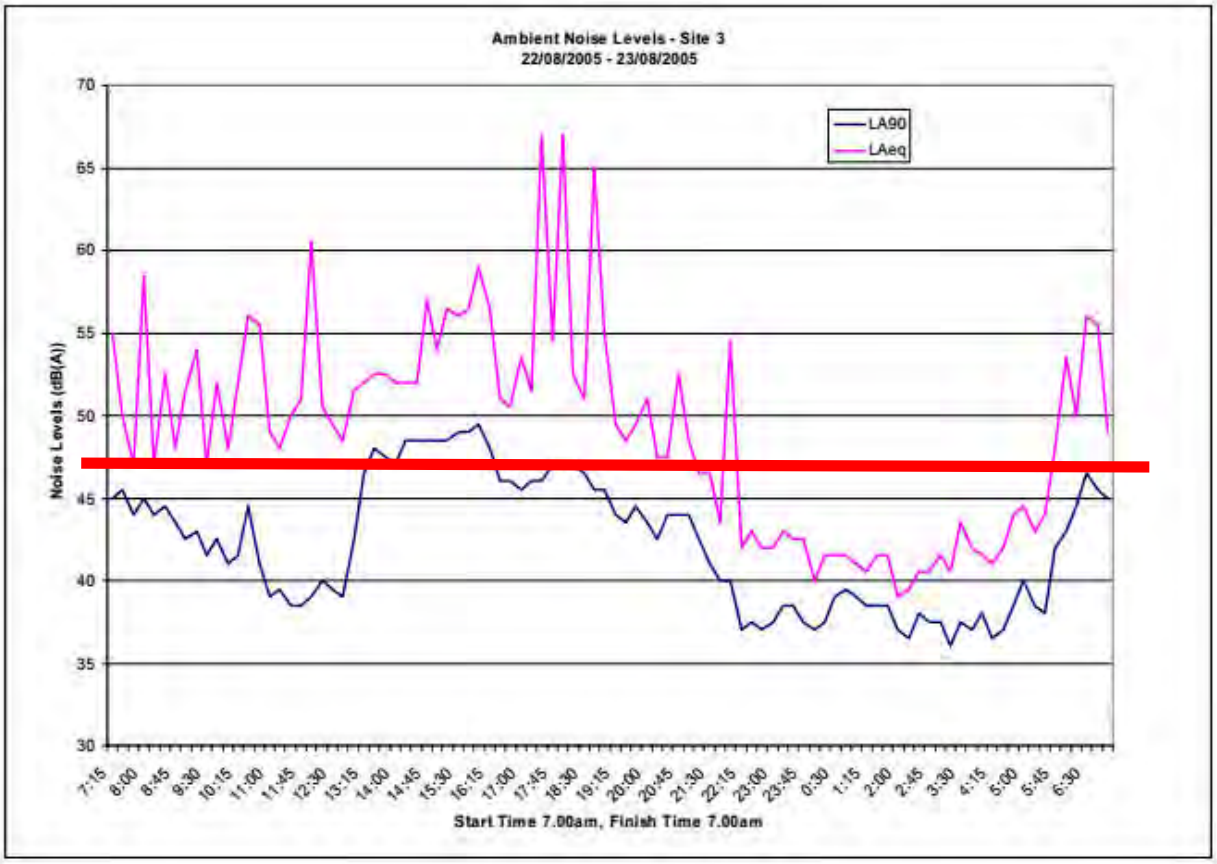

Ambient Noise Levels - Site 3
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

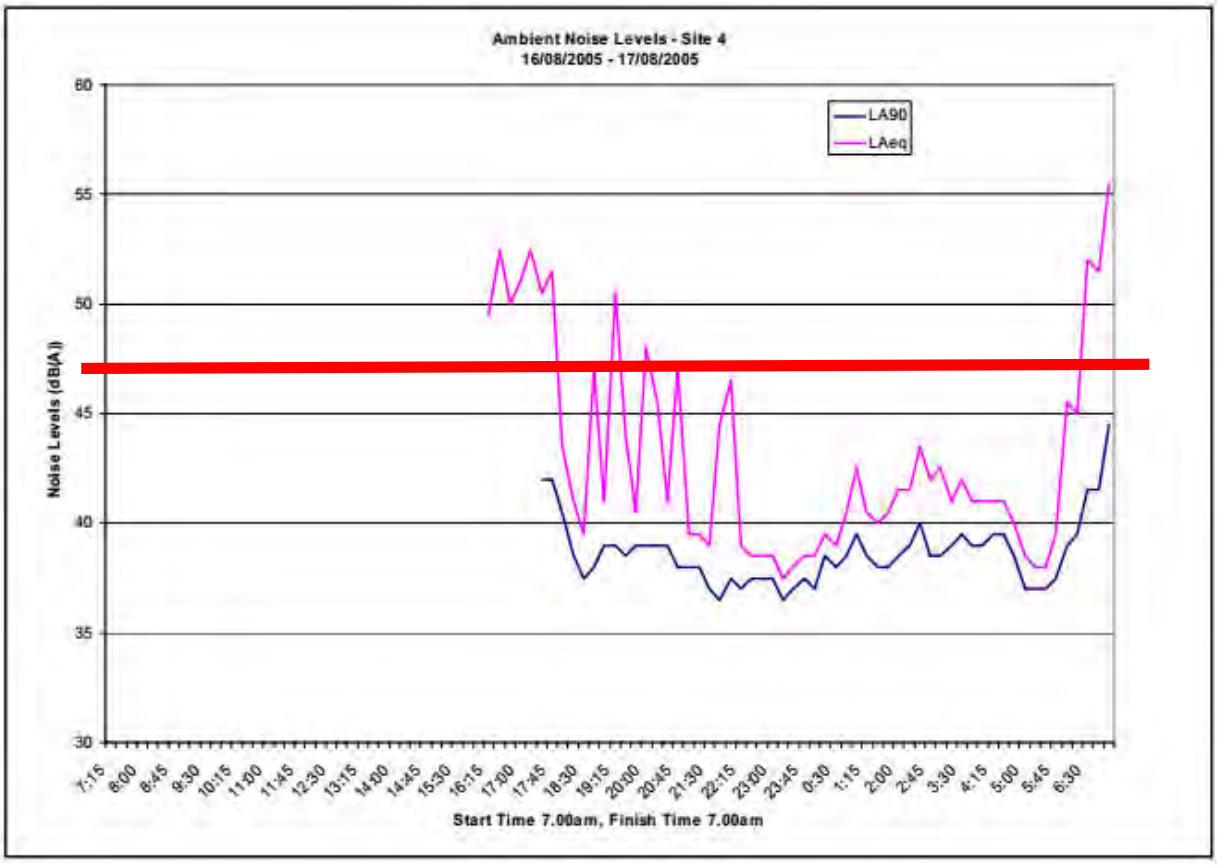

Ambient Noise Levels - Site 3
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

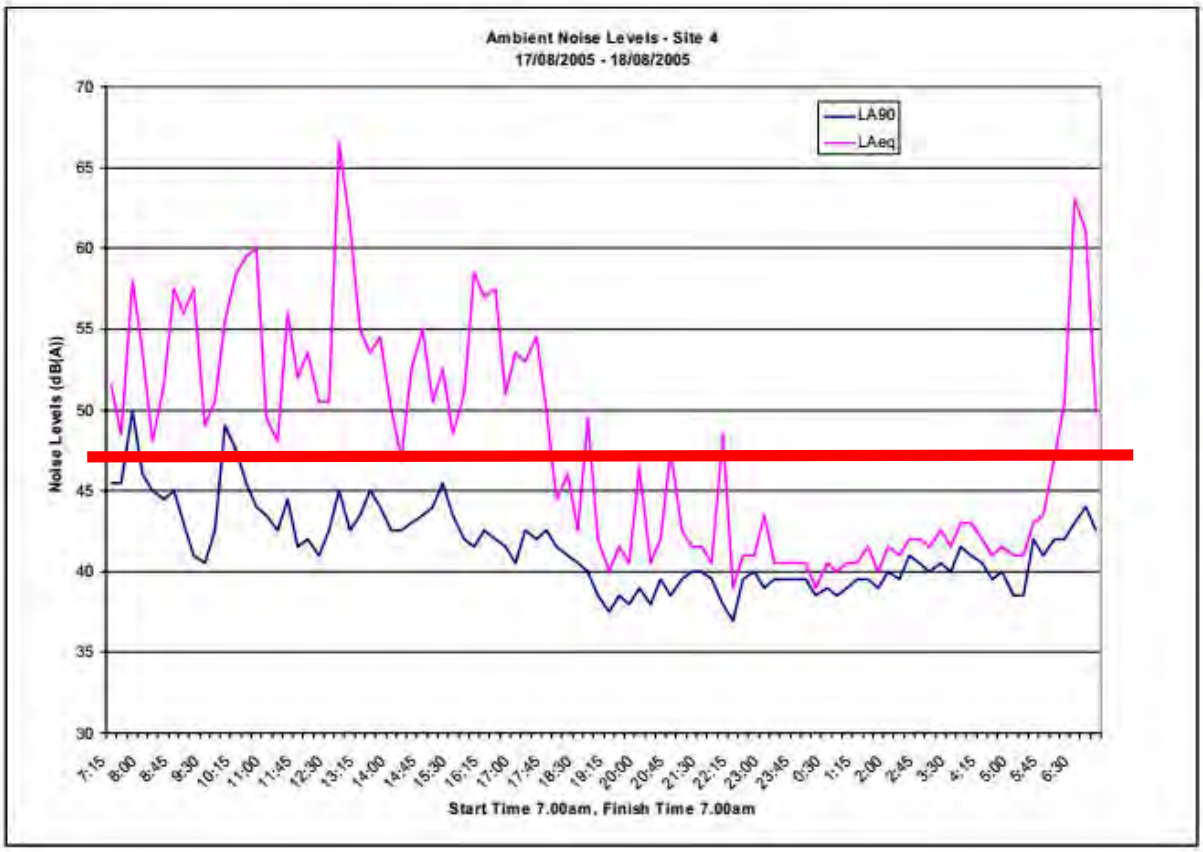

Ambient Noise Levels - Site 3
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
80
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

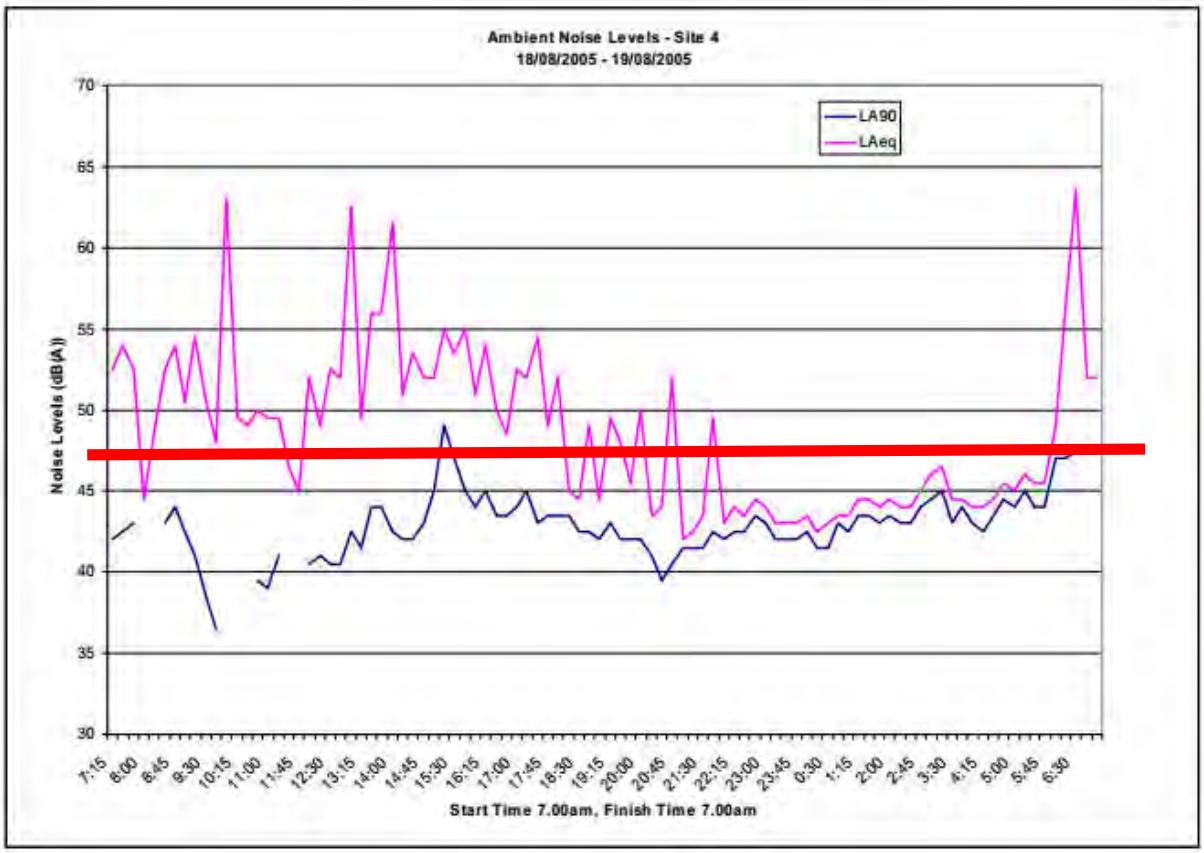

Ambient Noise Levels - Site 3
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

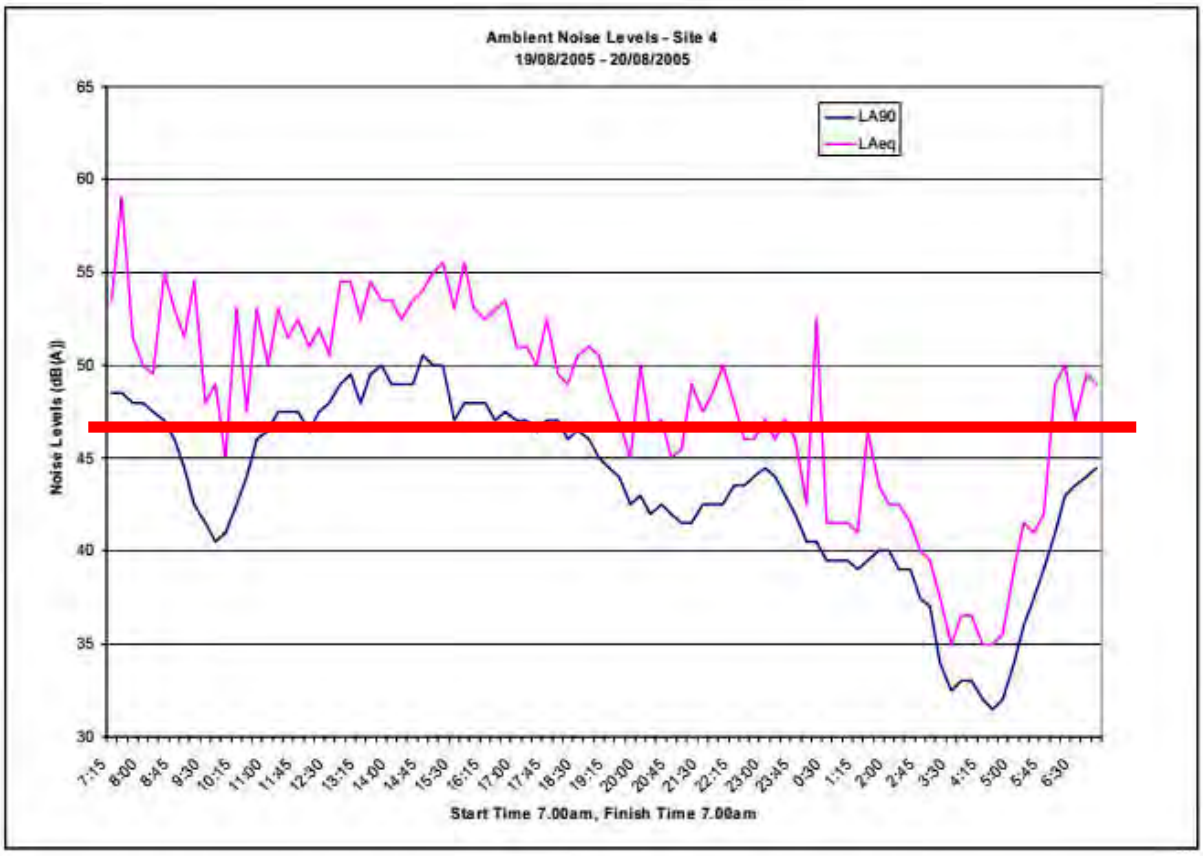

Ambient Noise Levels - Site 3
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

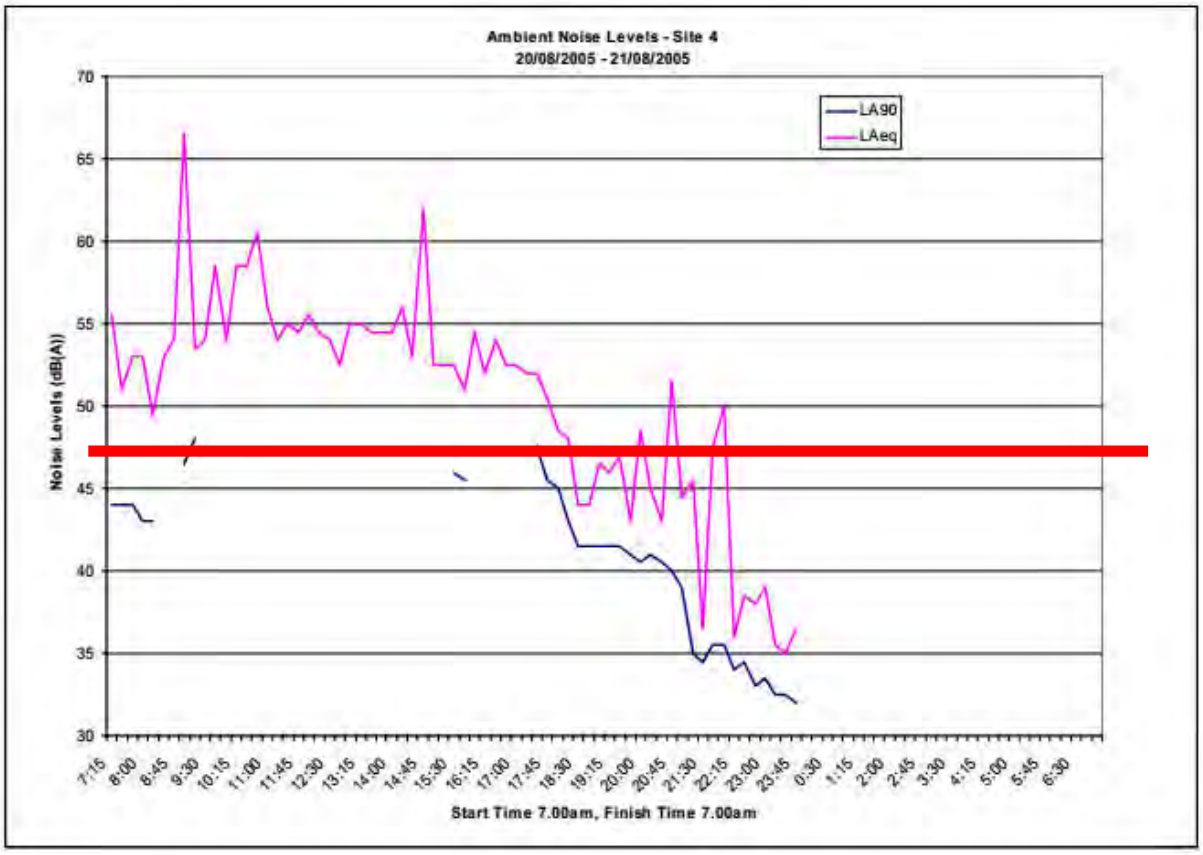

Ambient Noise Levels - Site 3
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

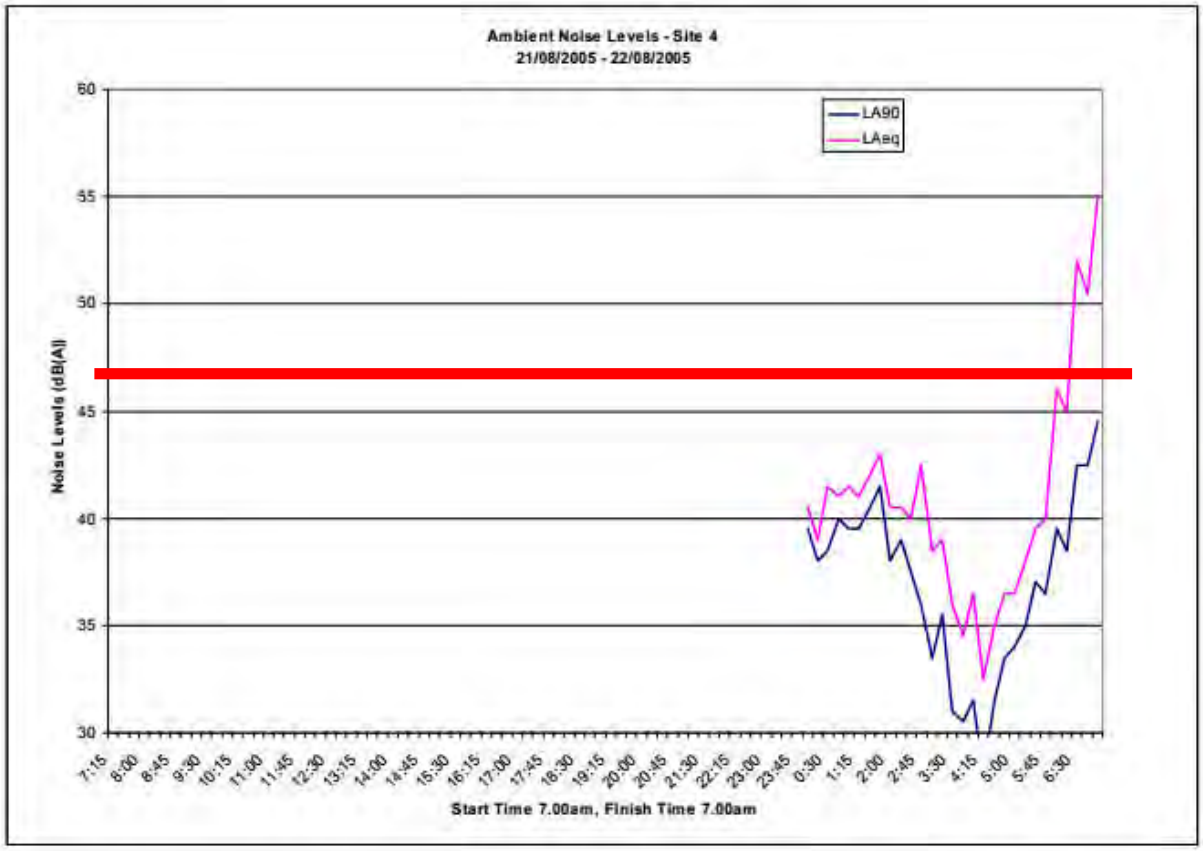

Ambient Noise Levels - Site 4
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

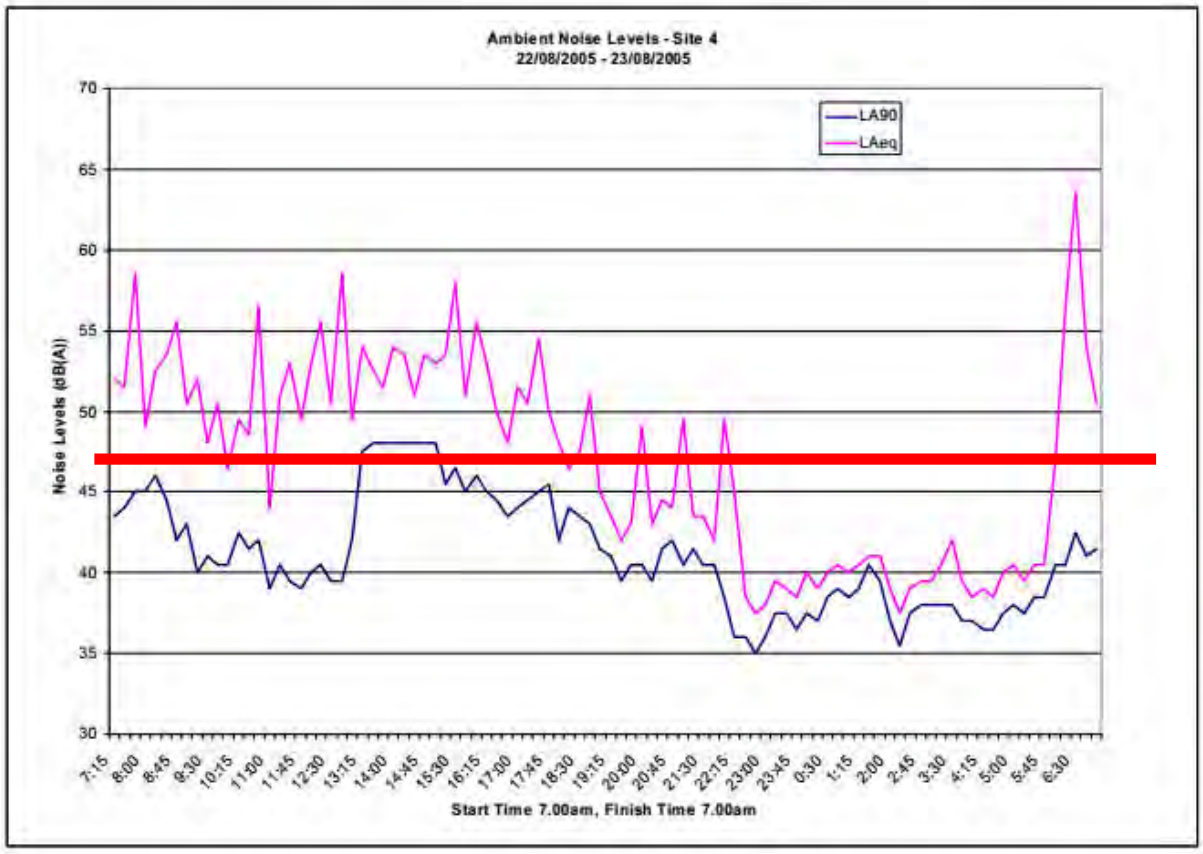

Ambient Noise Levels - Site 4
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS

CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Friday, 18 June 2021

CRAIG HILL ACOUSTICS. 7 View Ct . Palm Beach .Qld 4221 .
Phone 07 55763883 Mobile 0418 762968
E: craig@craighillacoustics.com.au

DOCUMENT CONTROL PAGE

Cudgen Lakes Sand Quarry

Reference186021/2

Report prepared for	Gales-Kingscliff Pty Limited
Date	Friday, 18 June 2021
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollanby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Phone 07 55763883 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
Signed	Craig Hill (manager) author
Copy	1 □ 2 x3 □ 4 □ 5 □ 6 □

Revision History		
No	Date Issued	Comments
2	Friday, 18 June 2021	
DISTRIBUTION RECORD		
Copy		Destination
1		File Controlled copy
2	Scott Hollamby <scott@rwcorkery.com>	

Friday, 18 June 2021©

Contents

1.0 INTRODUCTION

The purpose of this report is to examine noise levels from quarry operations for compliance. Attended monitoring was conducted on Friday, 18 June 2021at 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 (nil product)
Loader (Hyundai HL-770
Road Trucks

Table 1.2 Equipment on site not in use

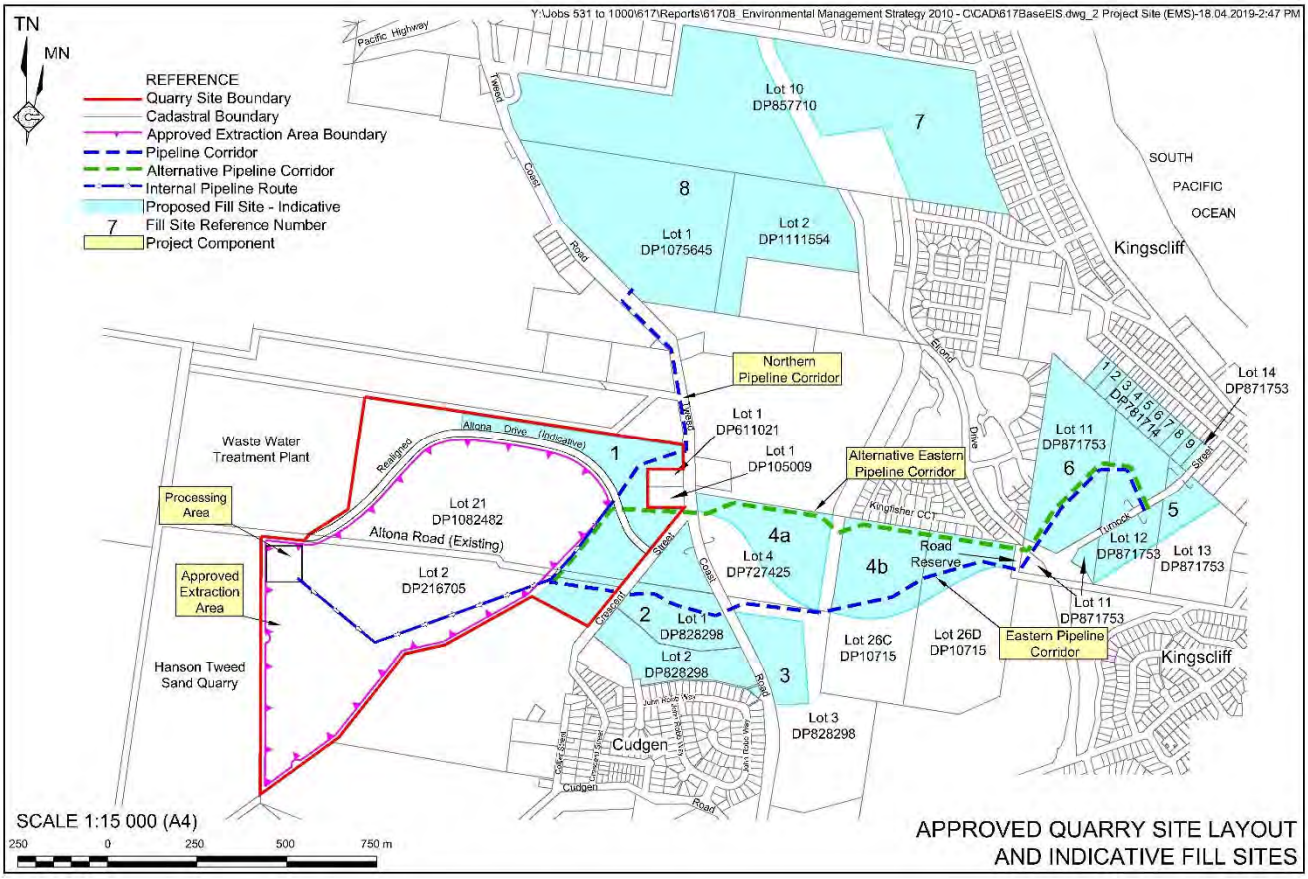
Dredge 8 “
Screener Sandvik
Excavator (Doosan DX 420 LCA)
Haul truck (TerexTA40)

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	• 7.00 am to 6.00 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to the processing plant, wet processing.	• 7.00 am to 10.00 pm Monday to Friday • 7.00 am to 4.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to fill sites.	• 7.00 am to 6.30 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Operation of dredge to fill pipeline with water or pipeline flushing	• 6.30 am to 7.00 pm Monday to Friday • 6.30 am to 1.30 pm Saturday • At no time on Sundays or public holidays
Maintenance (if inaudible at neighbouring residences)	Any day

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

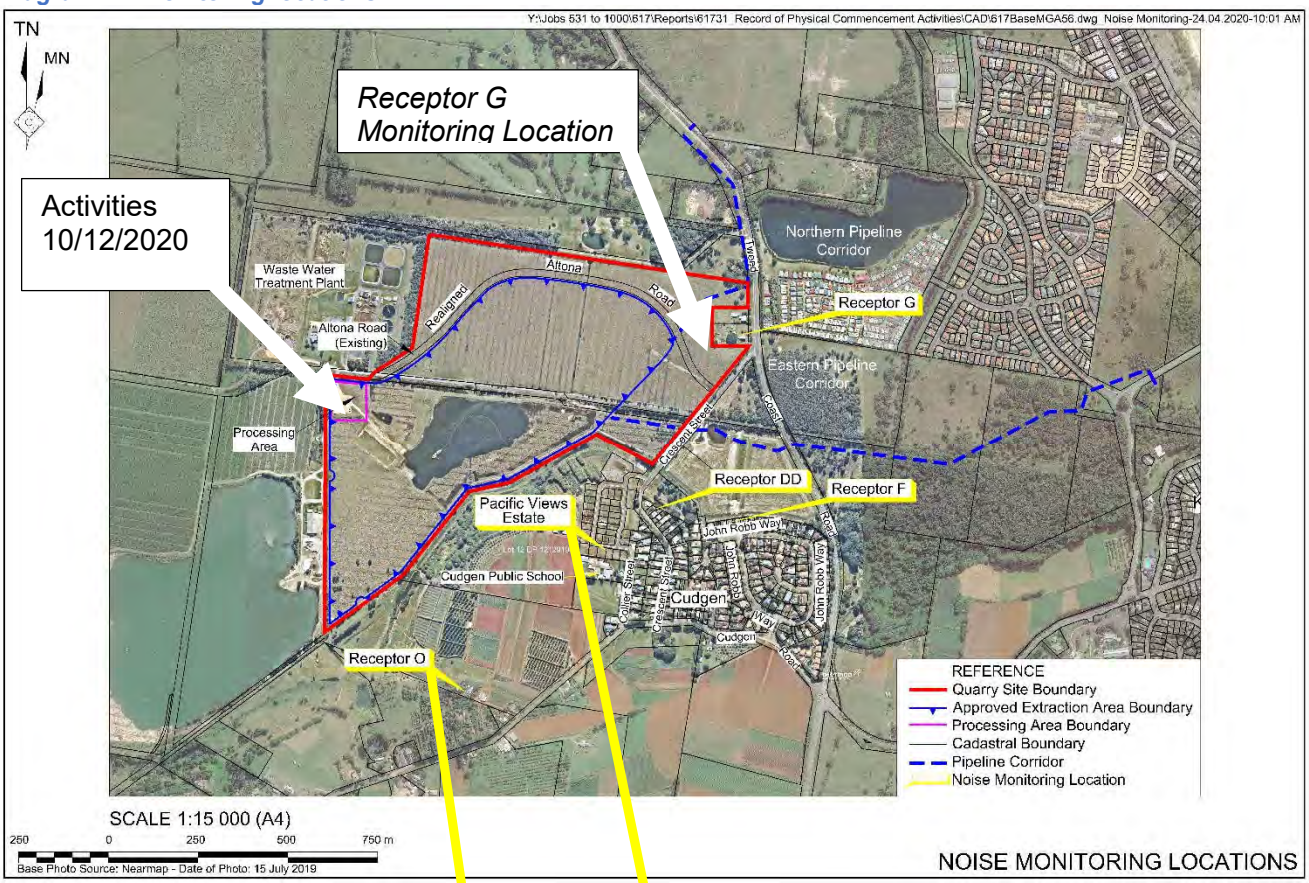
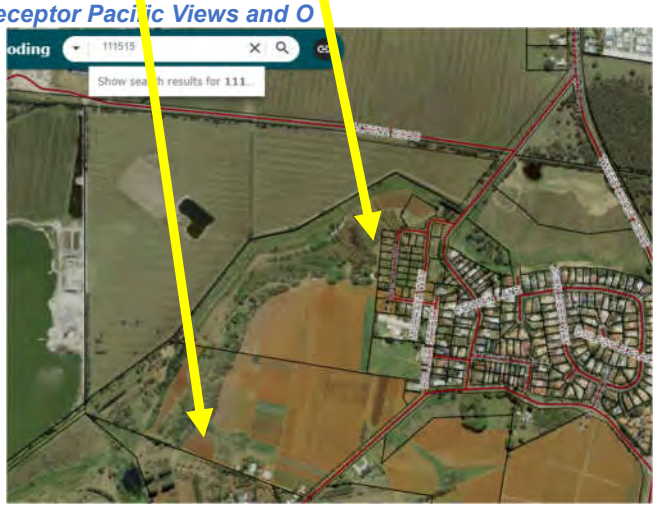


Diagram 2.2 Relocation of Receptor Pacific Views and O



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

L_{A90} 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.

L_{Aeq} 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 949 Serial No 6023. calibrated June 2019.

BSWA Sound Level Calibrator Serial No 490190. calibrated July 2020.

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	0-2kts
Wind Direction	NW
Atmospheric Pressure	1015 hpa
Cloud Cover	0%
Temp	19 C

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 Friday, 18 June 2021 between 0800 and 1100 hrs.

- *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. (rear boundary of new residences)*
- *Receptor DD – Residence - 34A Crescent Street. (rear boundary)*
- *Receptor F – Residence - 64 John Robb Way. (rear boundary)*

Table 5.1 Equipment being used at the time of the test 18/06/2021

Operating equipment measured at 20m	LAeq 15 min
CDE Wash Plant (nil product)	-
Loader (Hyundai HL-770	71
Road Trucks	66

Table 5.2 Equipment in use 10/12/2021

Operating equipment measured at 20m	LAeq 15 min
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Roller compactor CA302	68
Screener Sanvik(QA331)	70

Table 5.3 Equipment in use 10/07/2020

Operating equipment measured at 20m	LAeq 15 min
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66

Table 5.4 Equipment in use April 2020 test

Operating equipment measured at 20m	LAeq
Screener (QA331)	70
Loader (Cat 926H)	67
Excavator (Cat 329D)	68
End loader and screener	72

5.1 Results

The results of the compliance monitoring are presented in Table 6.1.

Table 5.4 Attended monitoring

Receptor & Time	Attended Testing LAeq 15 minutes	> Project Criteria (47 LAeq 15min)	> Cumulative Criteria (50 LAeq 11 hrs)	Comments
G 0800 - 0815	55	8	5	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0830 - 0845	52	5	2	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
Pacific Views 0900 - 0915	51	4	1	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
DD 1000 - 1015	50	3	0	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1030 - 1030	50	3	0	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

6.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. Measurements were undertaken at approximately 20m from equipment during operations and distance attenuation applied to establish possible levels at monitoring locations.

Table 6.1 shows predicted compliance to the criteria for nominated equipment operations.

Table 6.1 Predicted levels of on site equipment based on measurements at 20m

Receptor	Distance m	Dredge 8" 63LAeq @ 20m	CDE wash plant 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m (not in use)	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	30	37	38	33	33	42	42	-5	-8
O	600m	33	40	41	36	36	45	45	-2	-5
Pacific Views	555m	34	41	42	37	37	45	47	-0	3
DD	780m	31	38	39	34	34	43	33	-14	-17
F	900m	30	37	38	33	33	42	32	-15	-18

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

$$Lp(R2) = Lp(R1) - 20 \cdot Log_{10}(R2/R1)$$

Where:
Lp(R1) = Sound Pressure Level at Initial location.
Lp(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.

Logarithmic addition=10*LOG(SUM(10^(user range/10)))

7.0 DISCUSSION AND CONCLUSIONS

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

Noise from the operations were occasionally audible at locations O and Pacific Views Estate but not measurable due to other noise in the area.

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 7.1

Receptor	Pre-project / Baseline Levels	Compliance Monitoring						Project Criteria	
		LAeq 15 min						LAeq 15 min	LAeq 11 hr
	Unattended logger original report	Attended monitoring 23/08/05	Attended monitoring 10/07/17	Attended monitoring 30/08/18	Attended monitoring 20/04/20	Attended monitoring 20/04/20	Attended monitoring 10/12/20	>Impact Criteria day and evening 47LAeq	>Cumulative Criteria Day 50LAeq
G	62	63	62.2	56.7	55	56	55	12	5
O	NM	NM	64.2	46.0	48	52	52	5	2
Pacific Views	55	51	56.8	48.4	55	53	51	4	1
DD	55	53	58.2	55.7	56	53	50	3	0
F	58	54	42.7	56.6	59	55	50	3	0

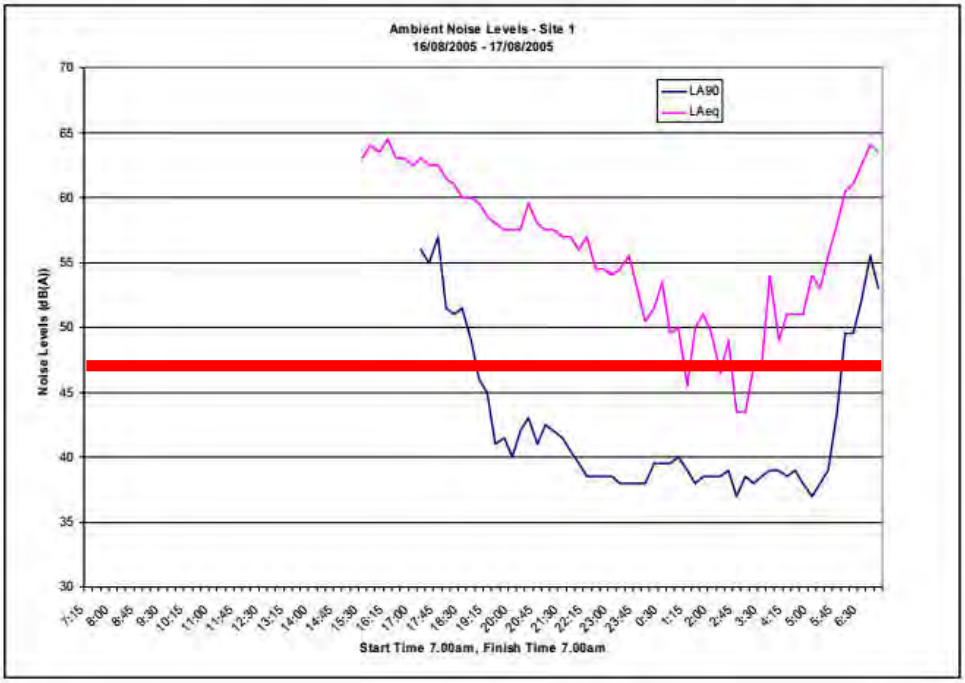
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

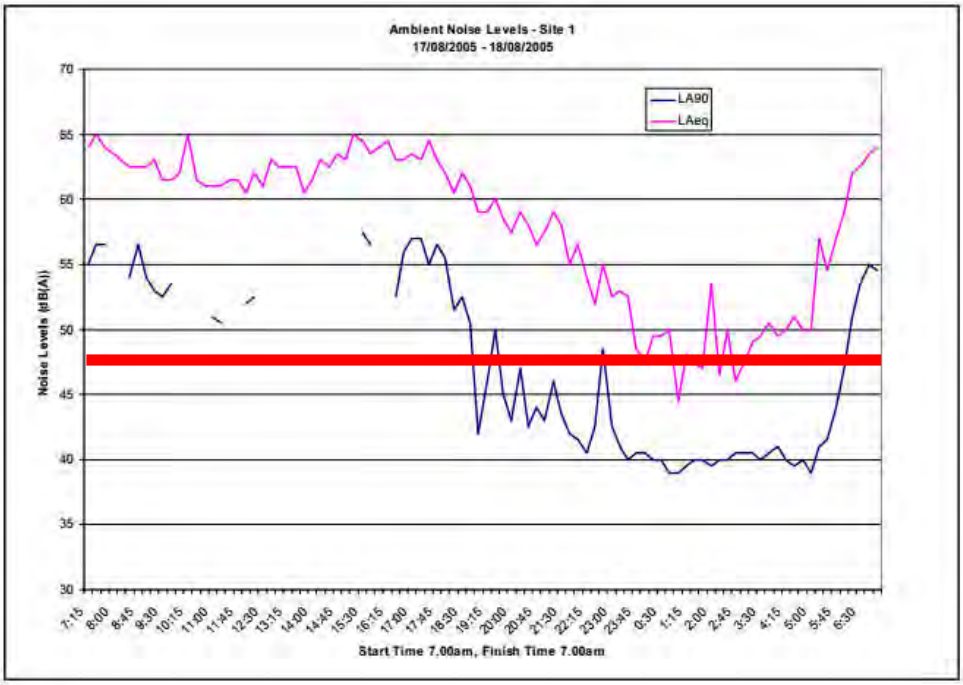
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not 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.

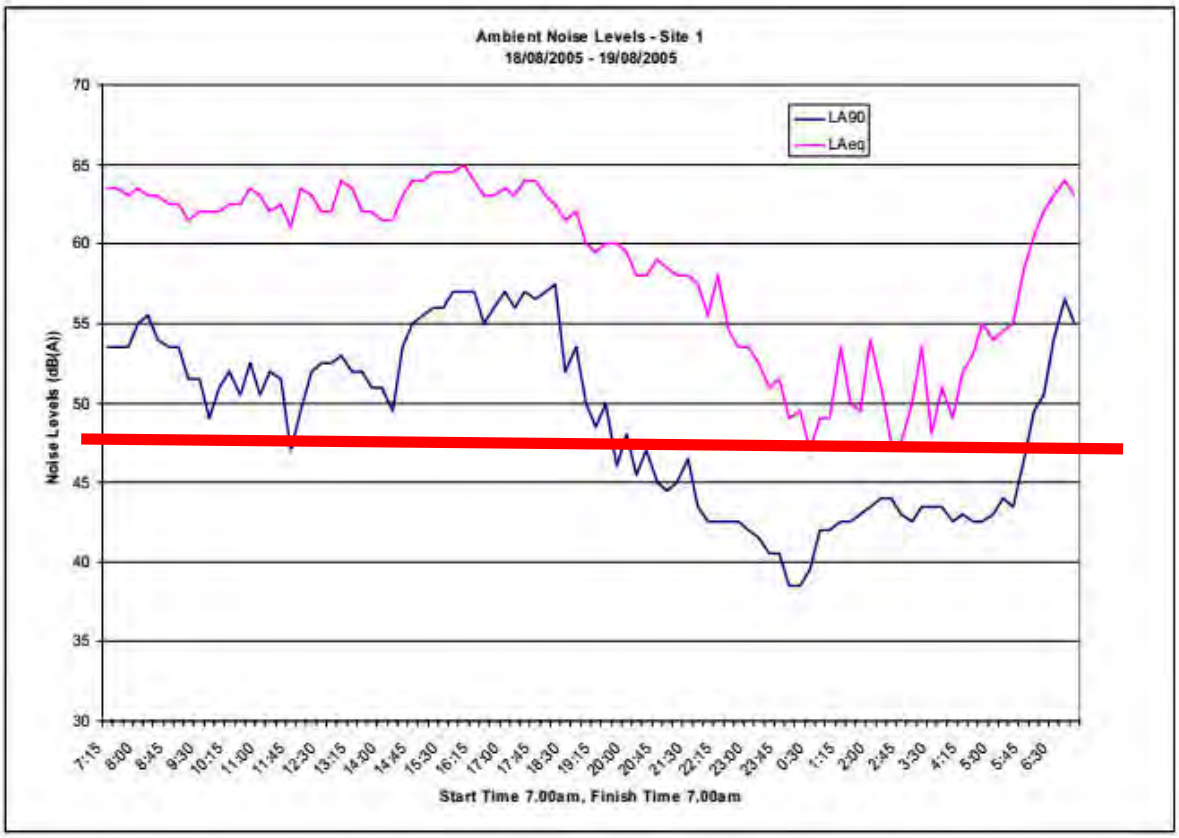
APPENDIX A PRE CONSTRUCTION TESTING

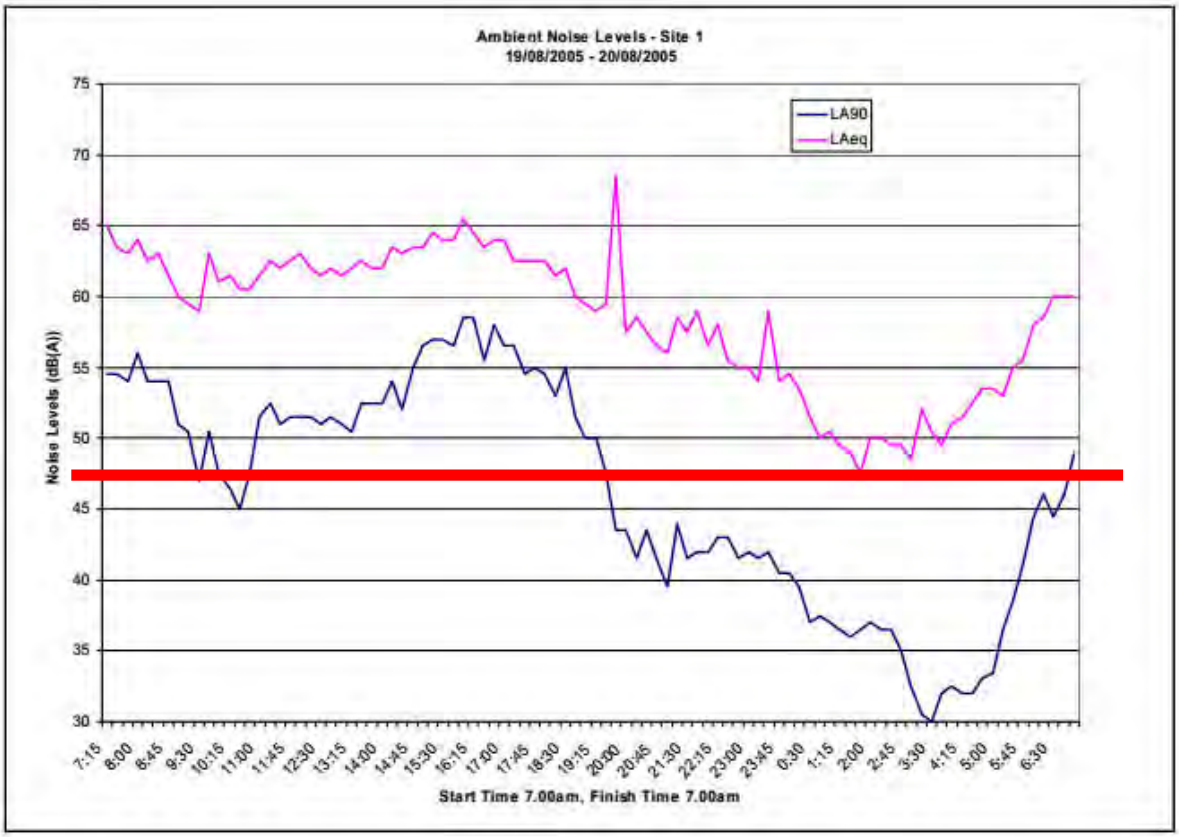
Measurements taken by Ron Rumble Pty Ltd and originally presented in Ron Rumble, (2008). Noise Assessment Report 61704- Part B.

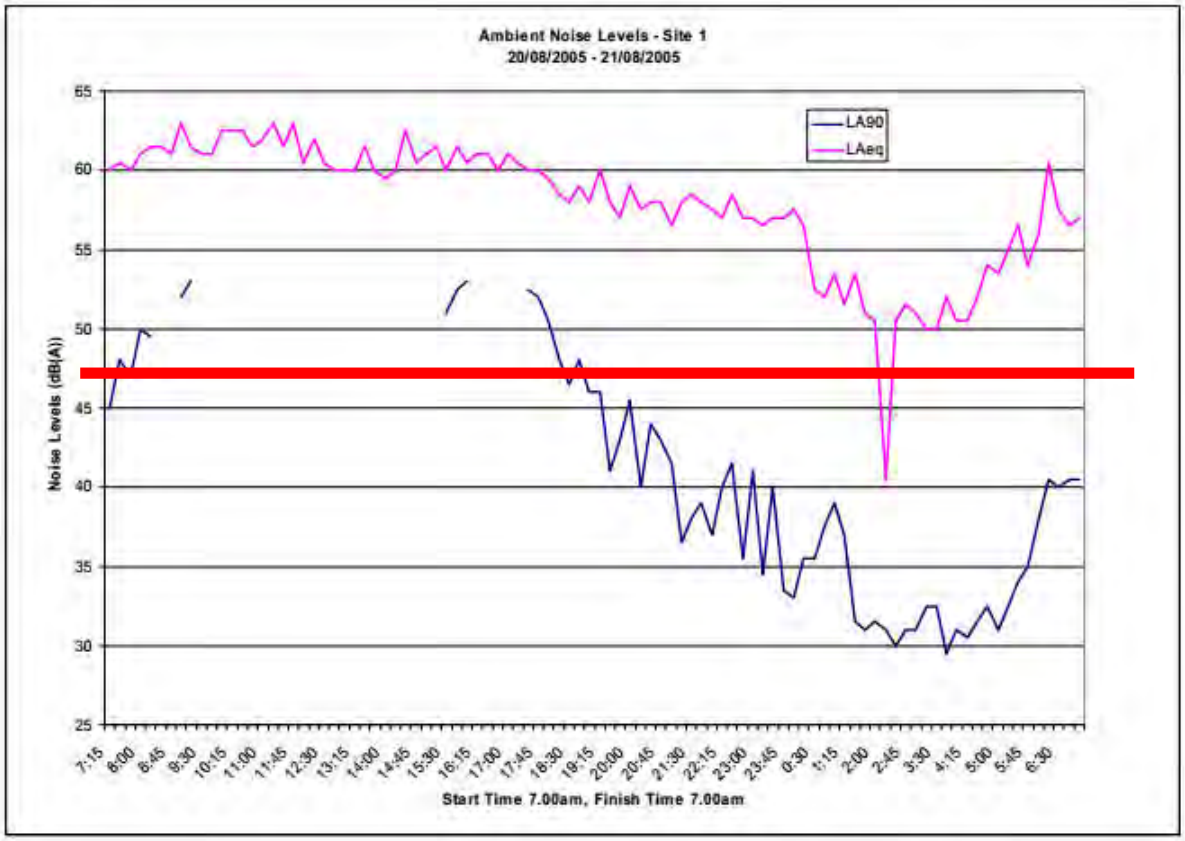
SPECIALIST CONSULTANT STUDIES 8 - 87 **GALES-KINGSCLIFF PTY LTD**
Part 8 – Noise Assessment *Cudgen Lakes Sand Extraction Project*
Report No. 617/04

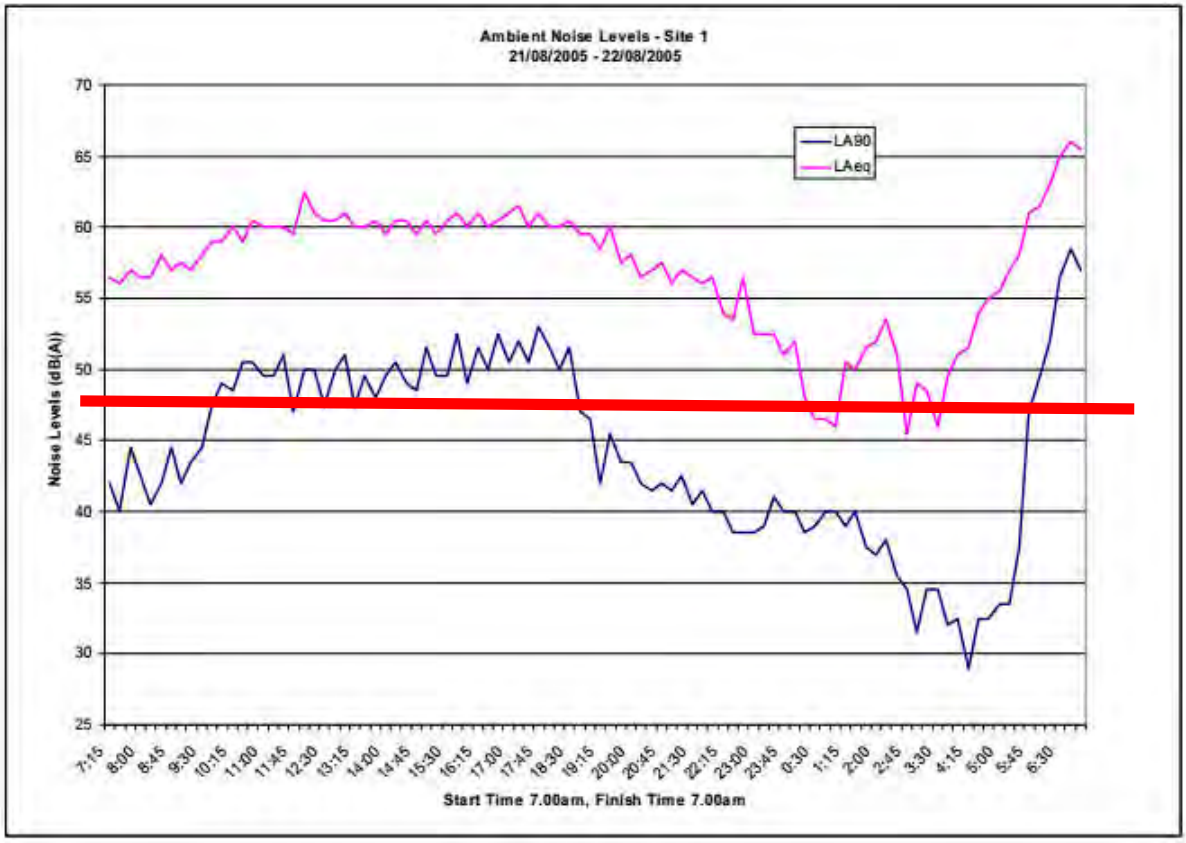


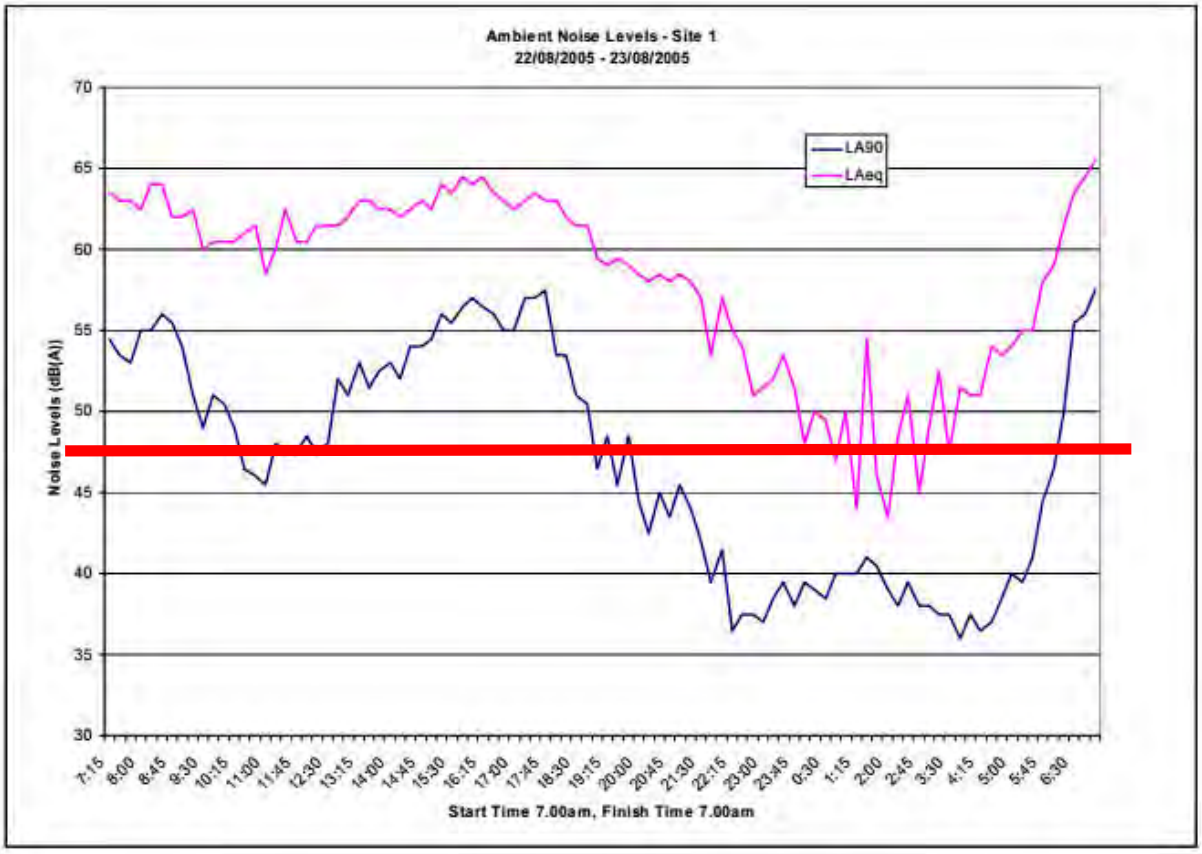


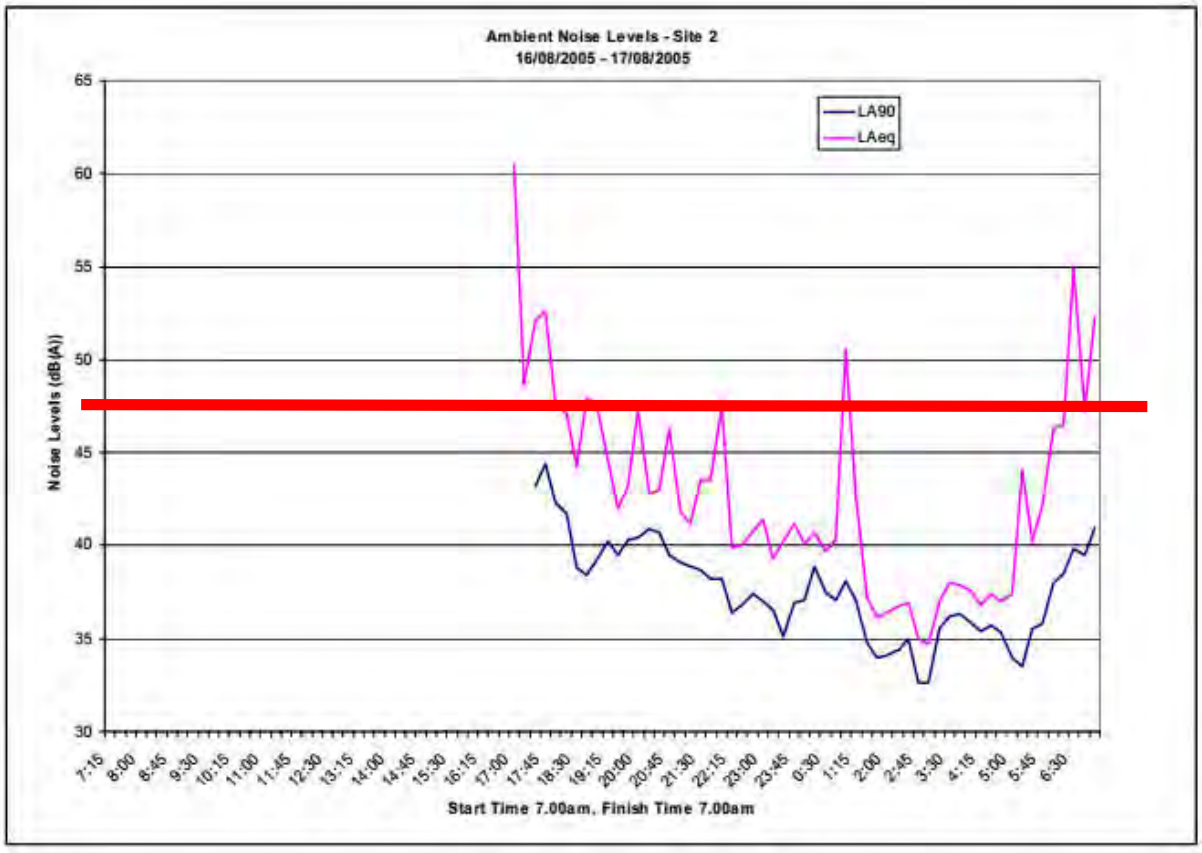

Ambient Noise Levels - Site 1
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

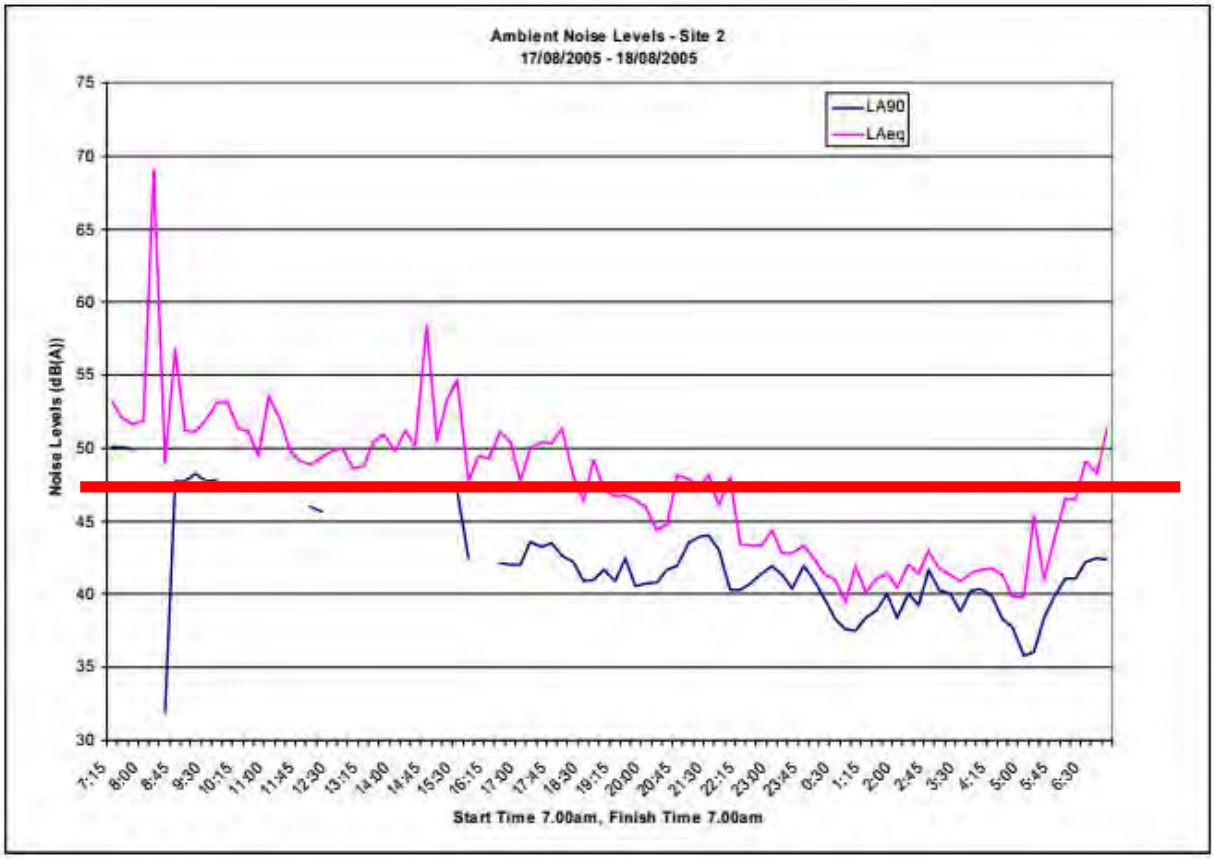

Ambient Noise Levels - Site 1
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

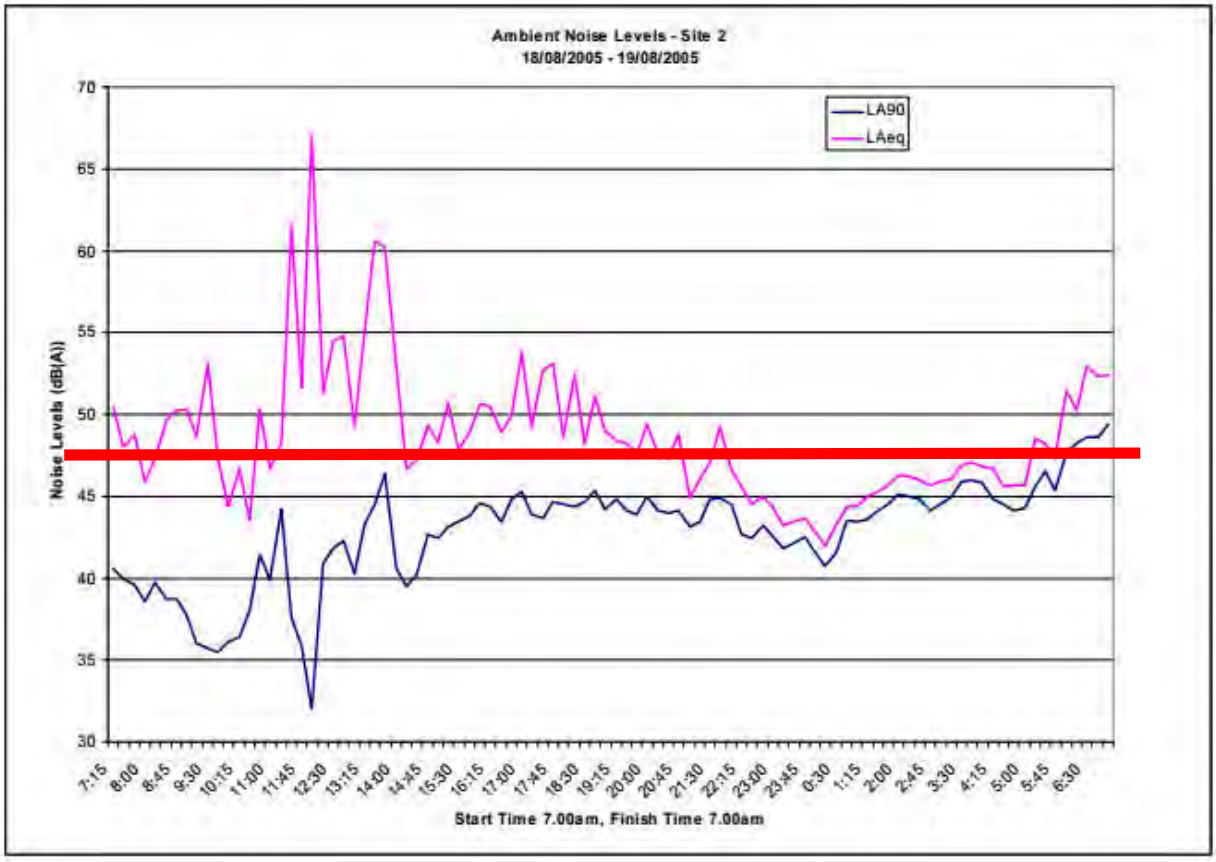

Ambient Noise Levels - Site 1
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

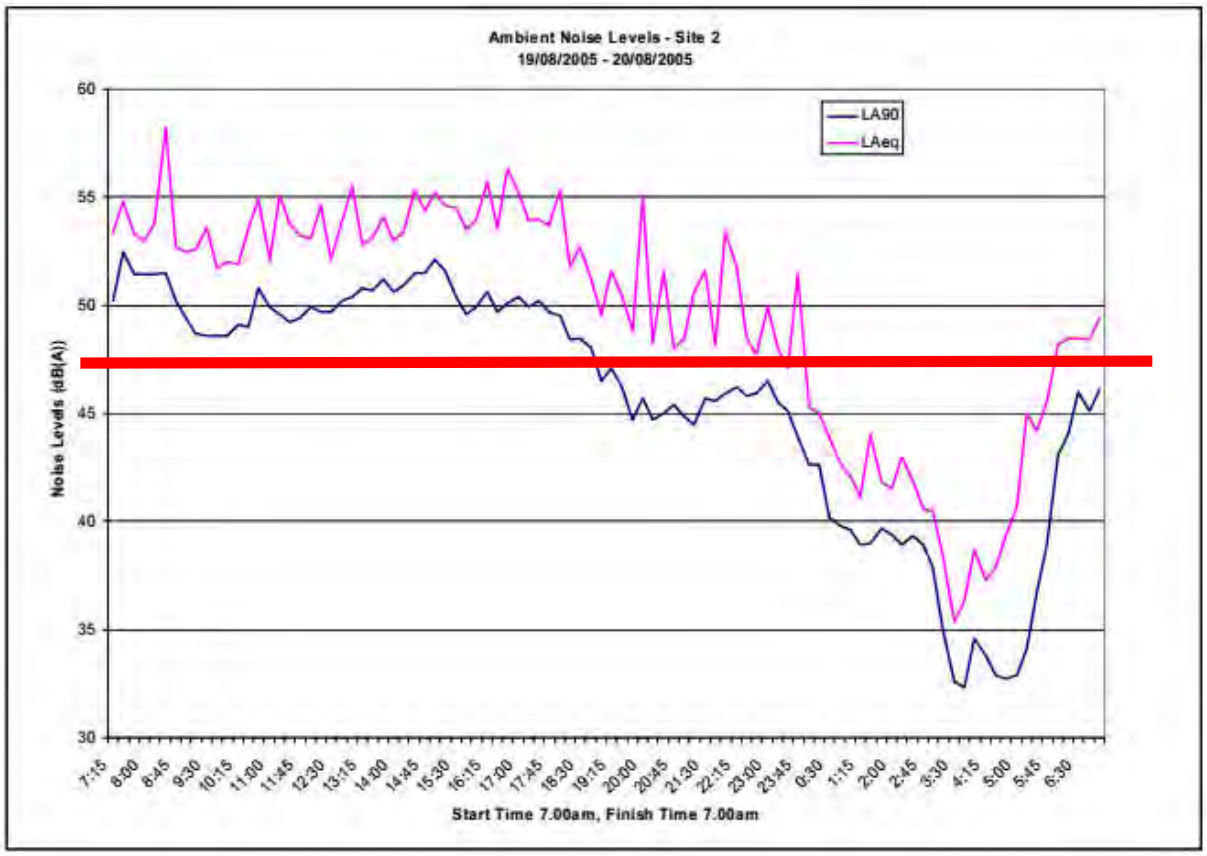

Ambient Noise Levels - Site 1
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

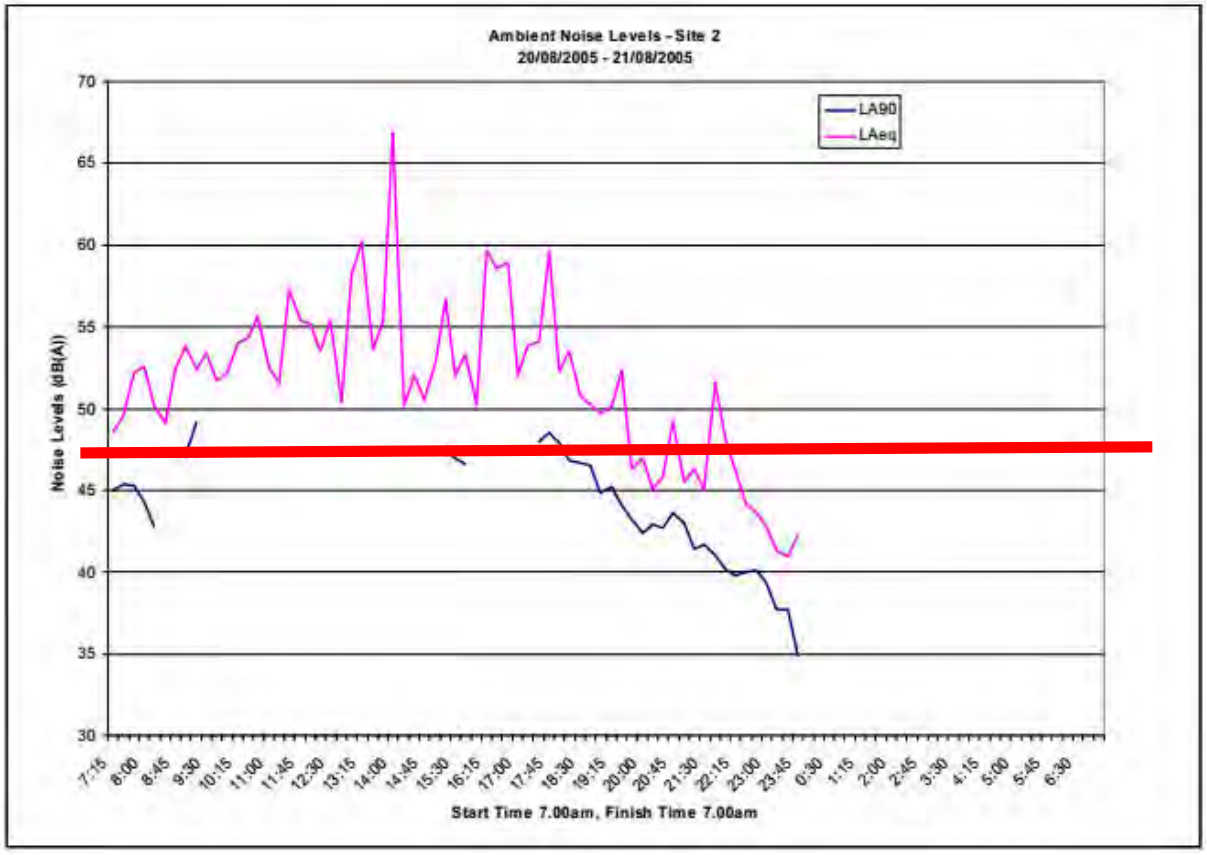

Ambient Noise Levels - Site 1
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

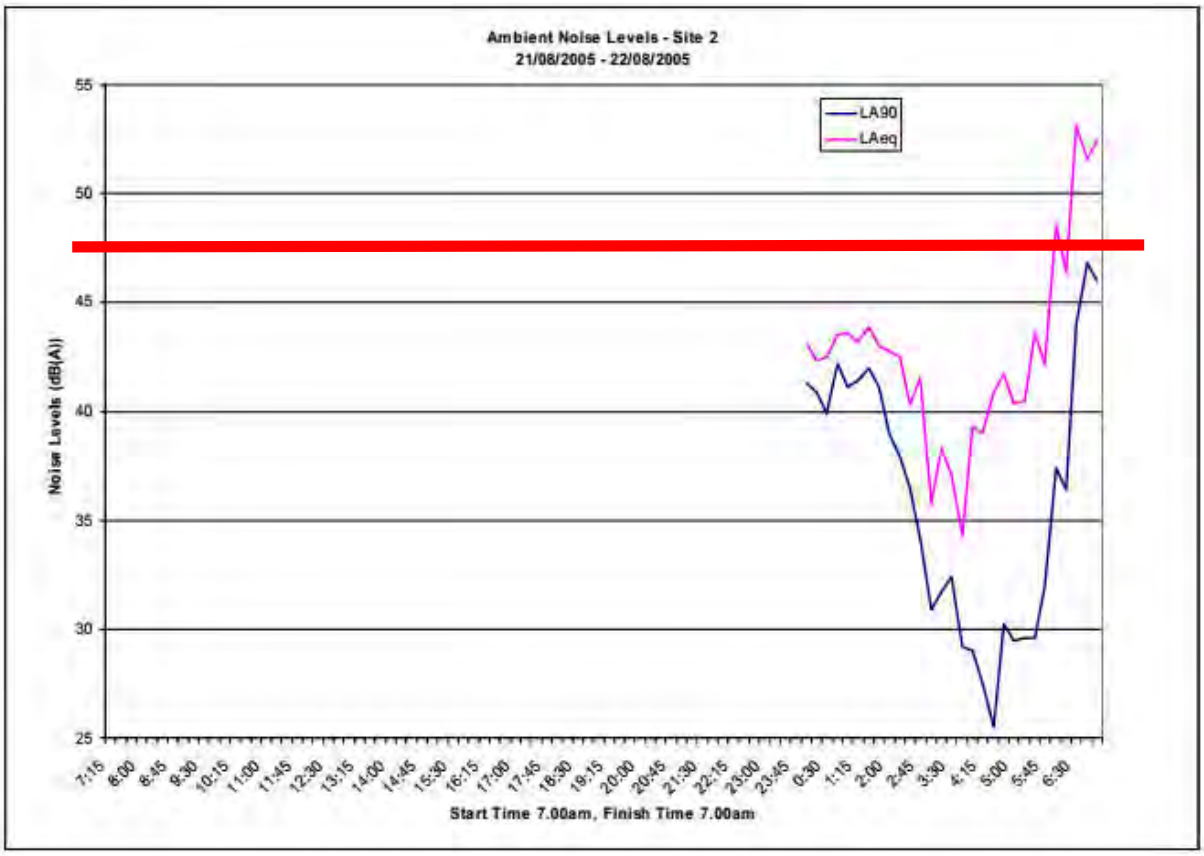

Ambient Noise Levels - Site 2
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

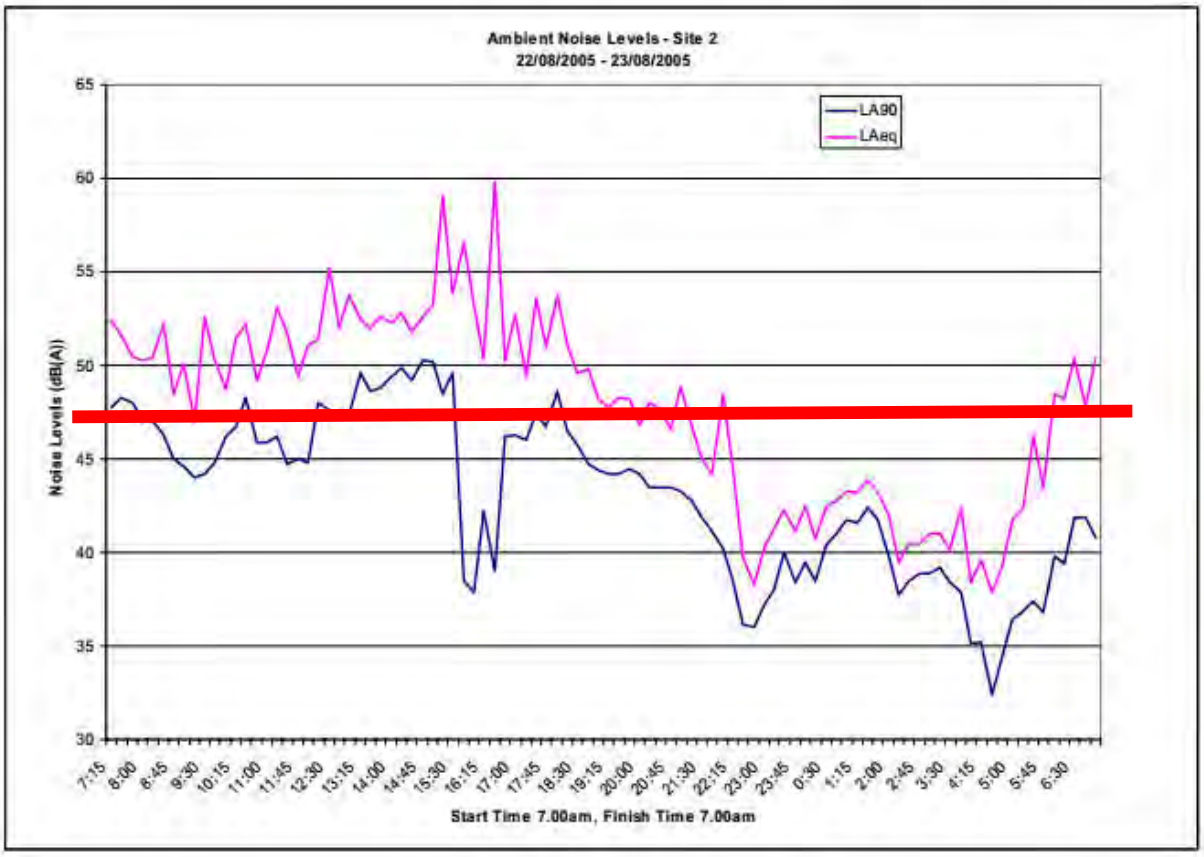

Ambient Noise Levels - Site 2
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

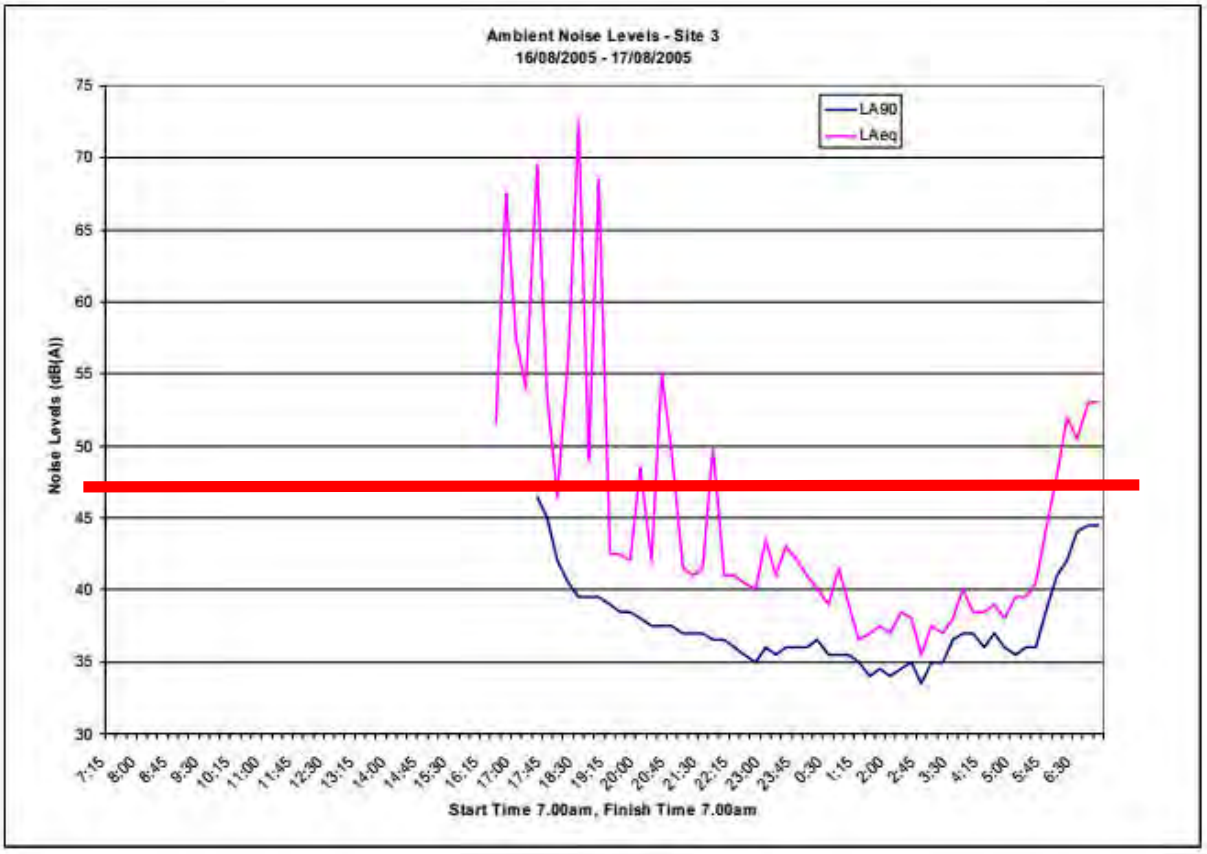

Ambient Noise Levels - Site 2
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

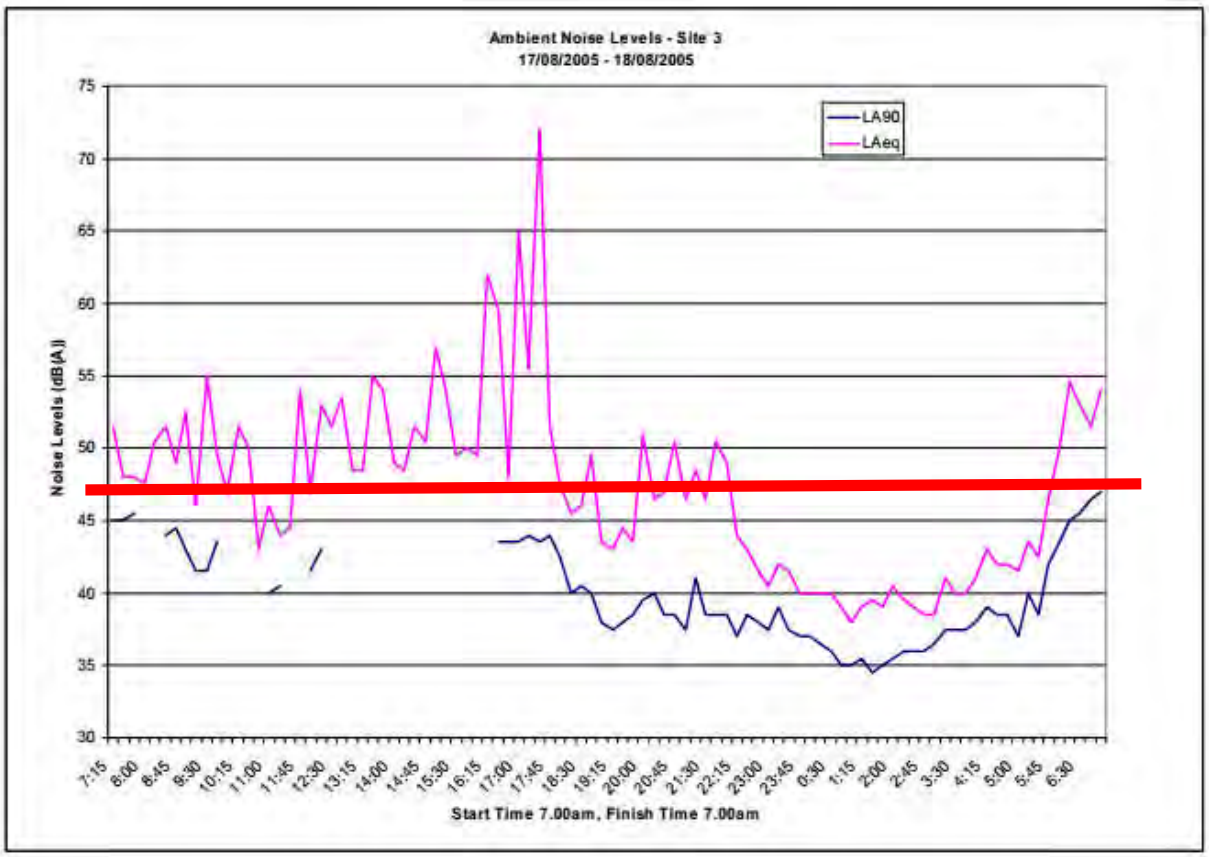

Ambient Noise Levels - Site 2
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

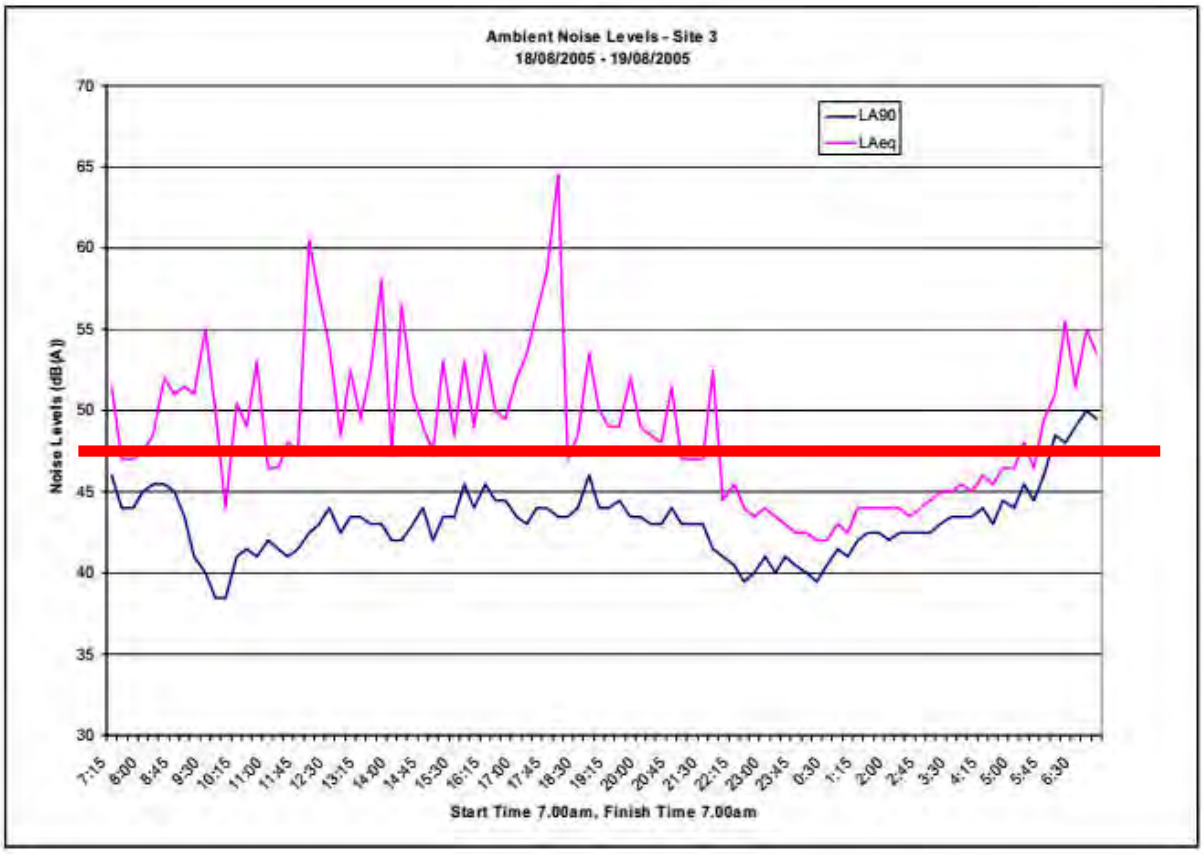

Ambient Noise Levels - Site 2
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15
8:00
8:45
9:30
10:15
11:00
11:45
12:30
13:15
14:00
14:45
15:30
16:15
17:00
17:45
18:30
19:15
20:00
20:45
21:30
22:15
23:00
23:45
0:30
1:15
2:00
2:45
3:30
4:15
5:00
5:45
6:30
Start Time 7.00am, Finish Time 7.00am

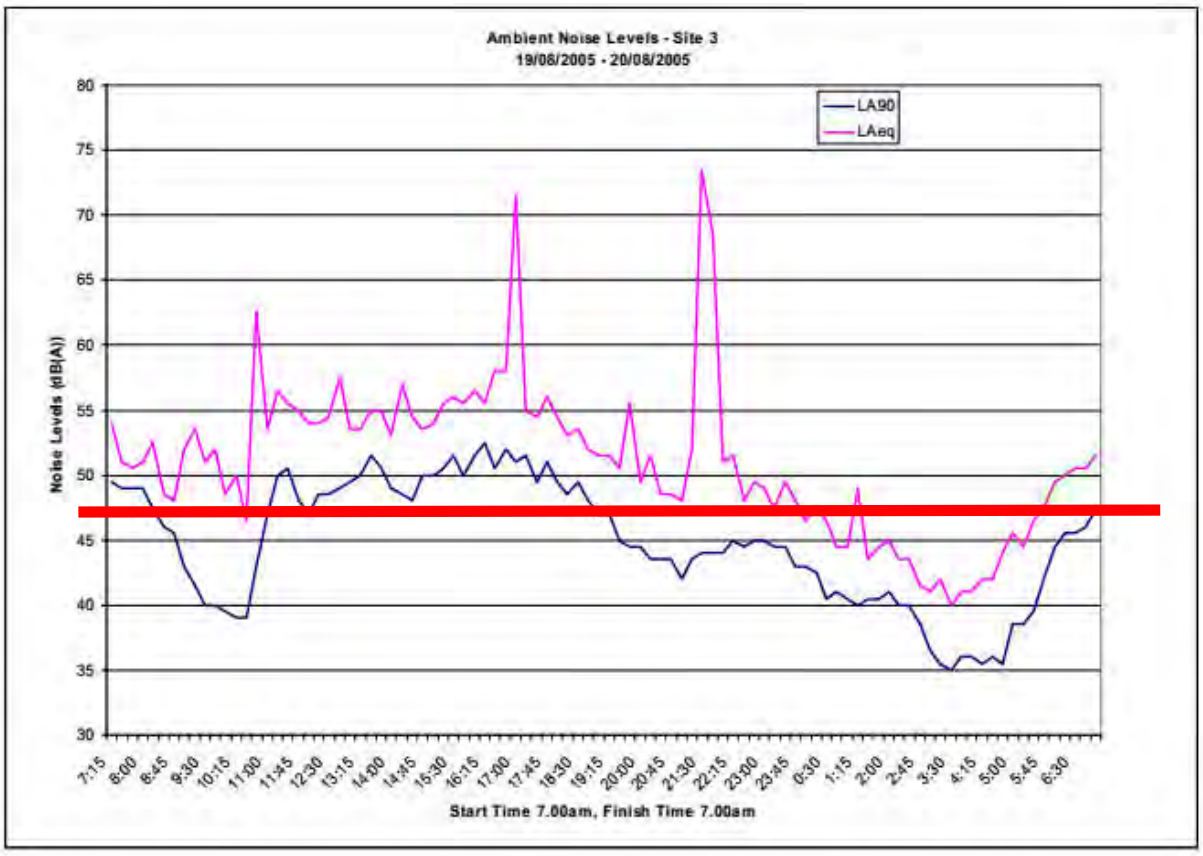

Ambient Noise Levels - Site 2
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

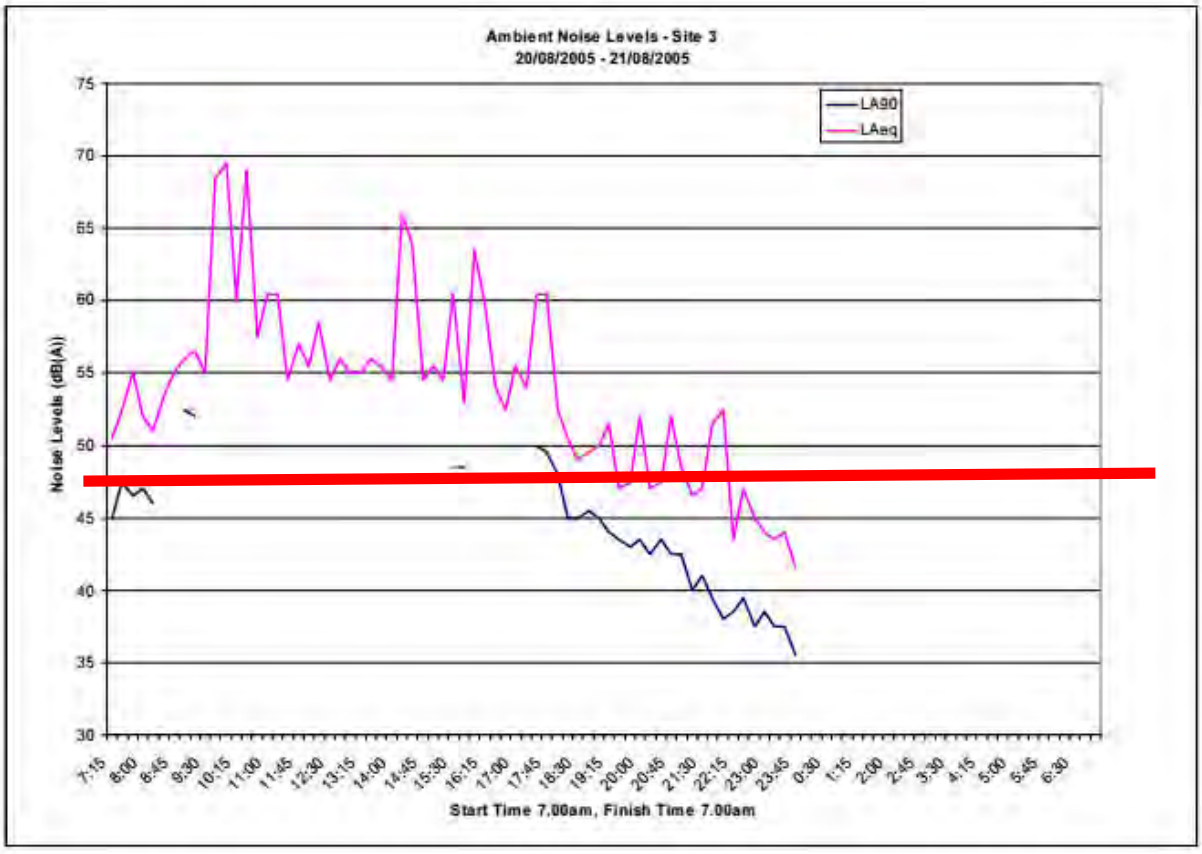

Ambient Noise Levels - Site 2
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

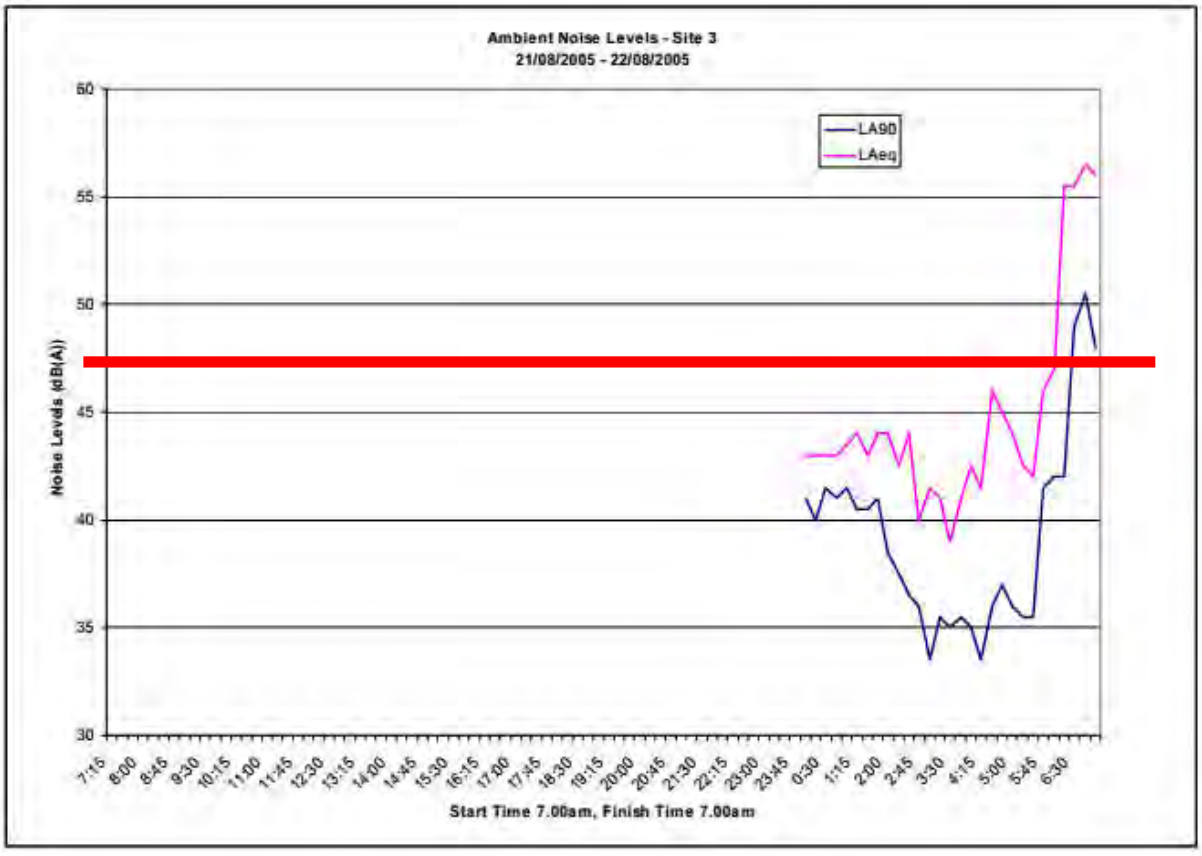

Ambient Noise Levels - Site 3
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

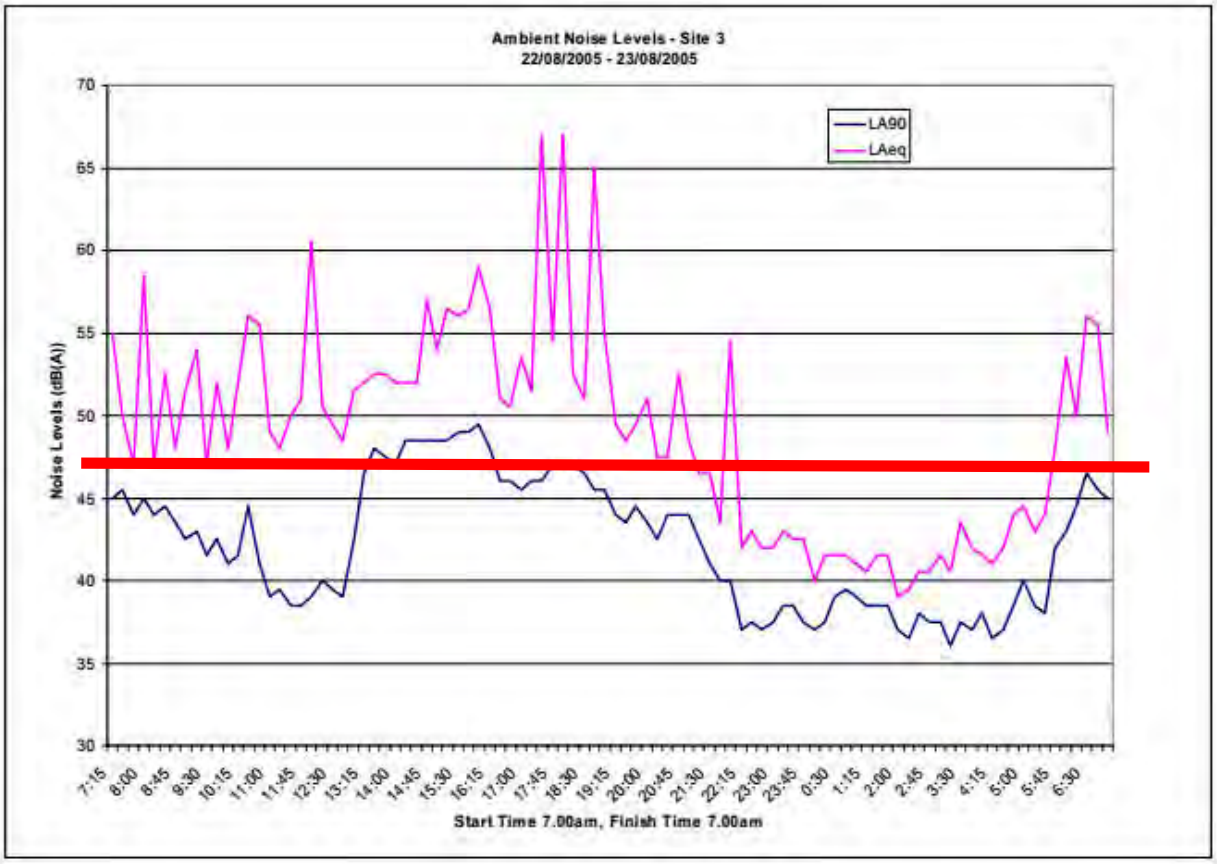

Ambient Noise Levels - Site 3
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

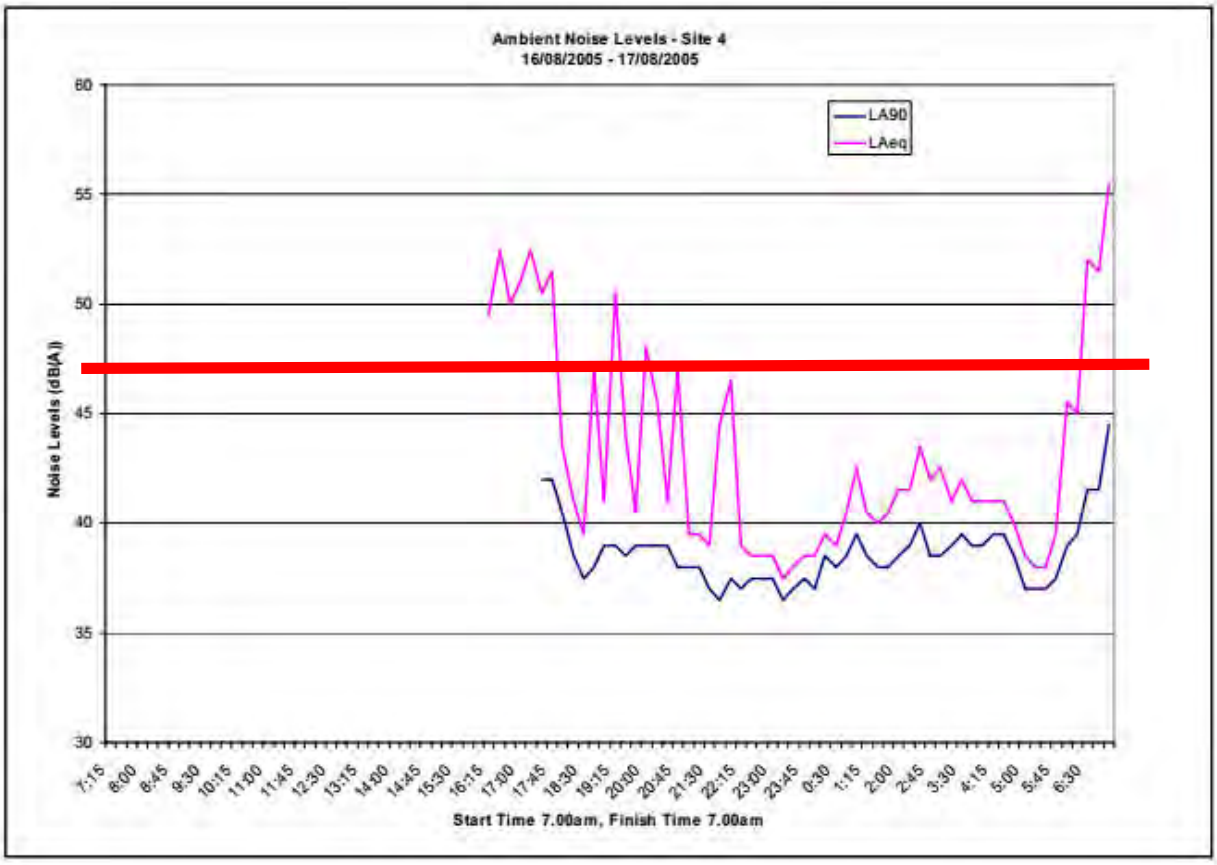

Ambient Noise Levels - Site 3
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

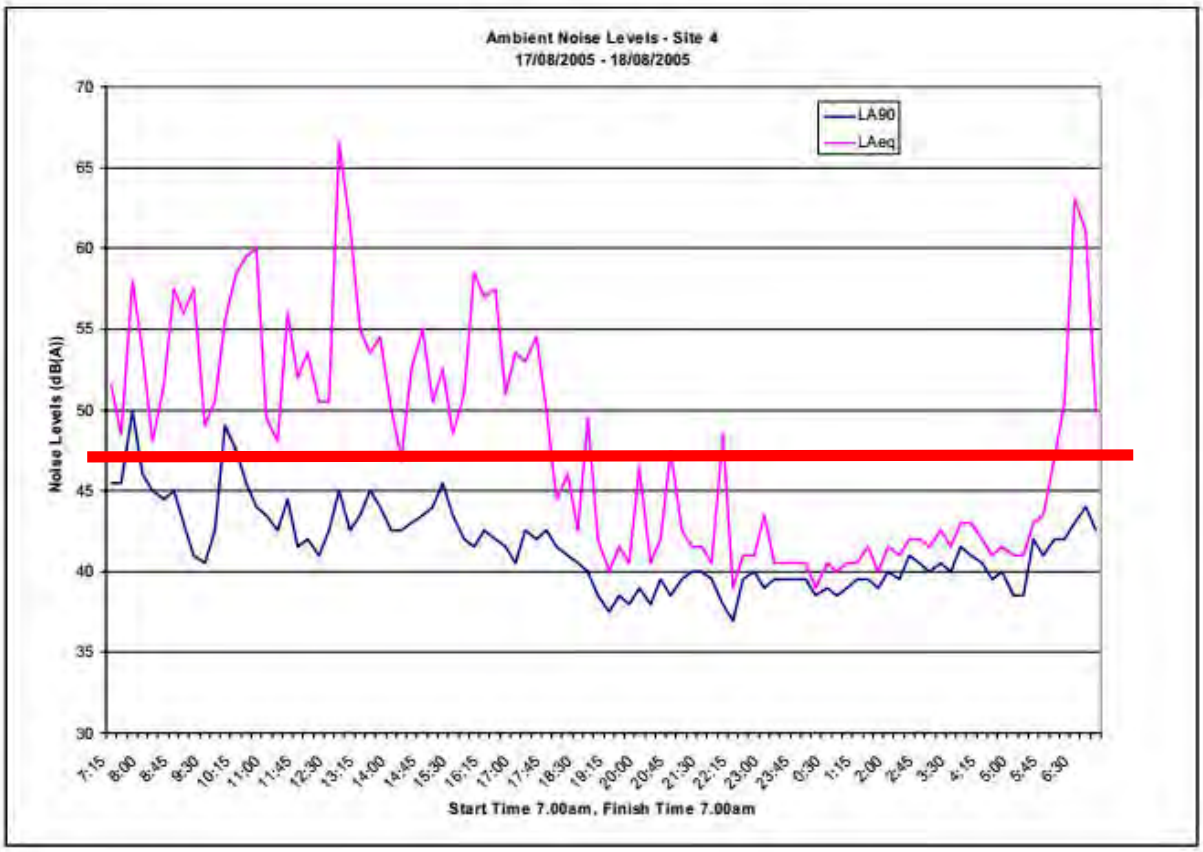

Ambient Noise Levels - Site 3
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
80
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

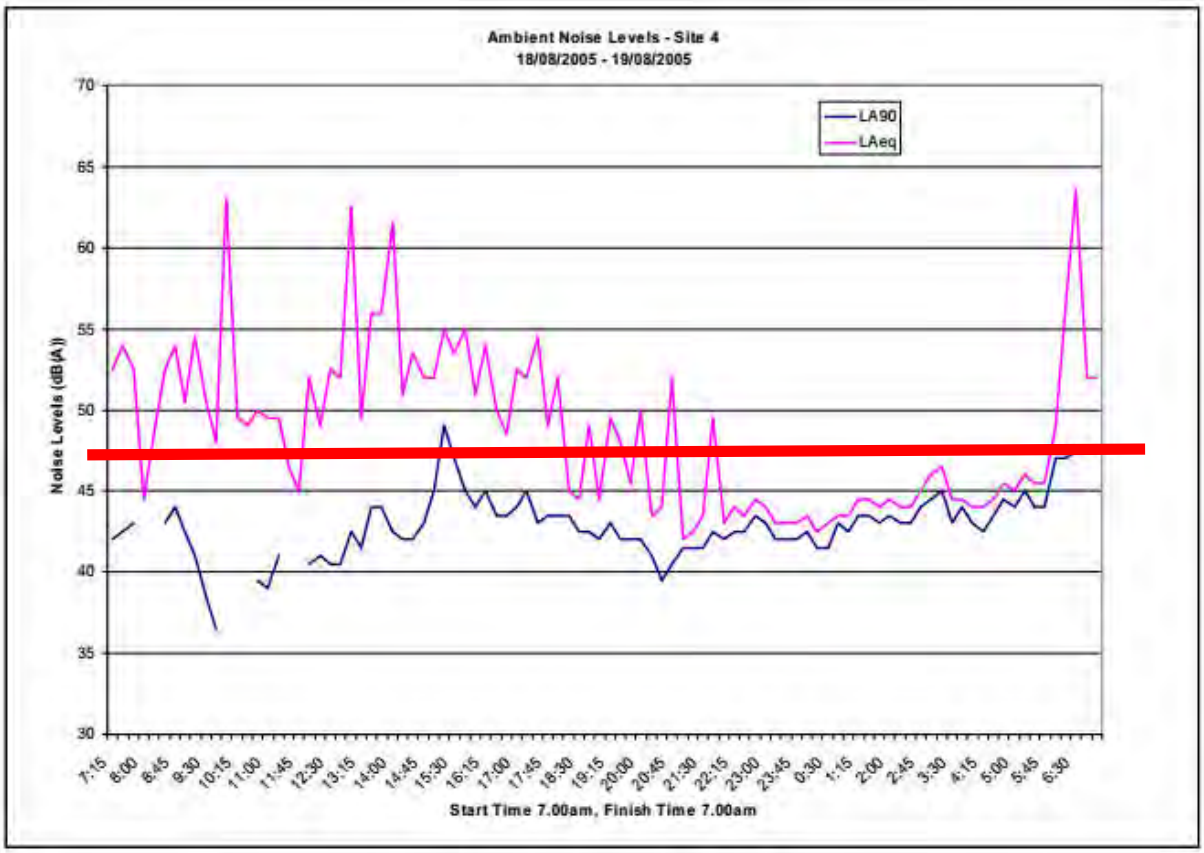

Ambient Noise Levels - Site 3
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

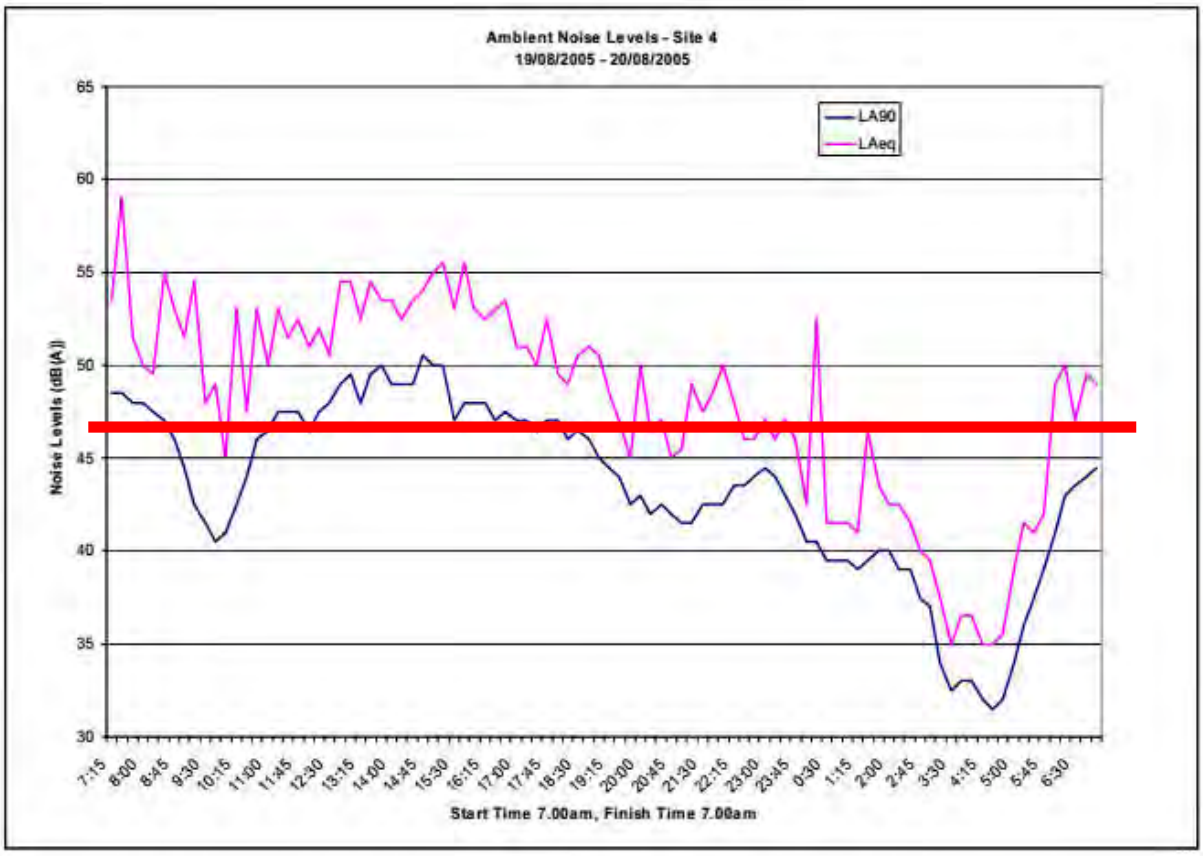

Ambient Noise Levels - Site 3
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

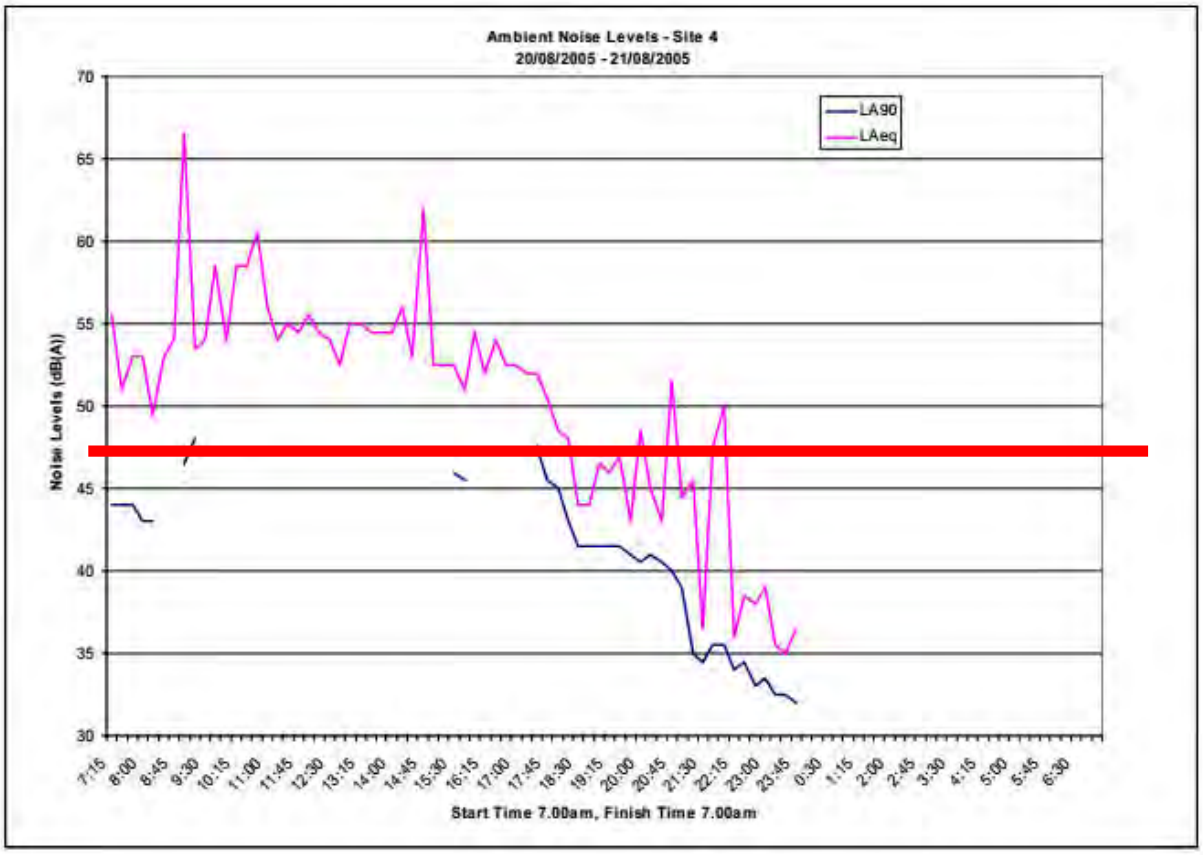

Ambient Noise Levels - Site 3
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

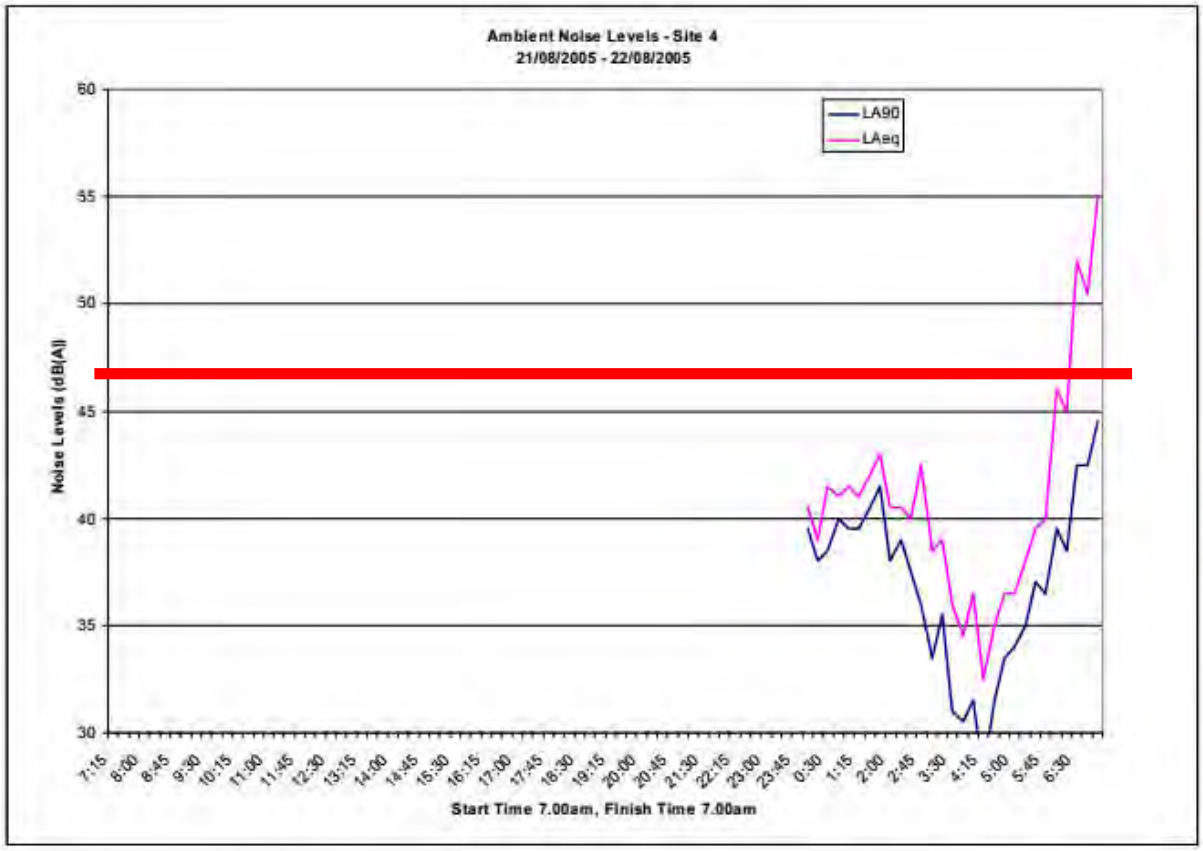

Ambient Noise Levels - Site 4
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

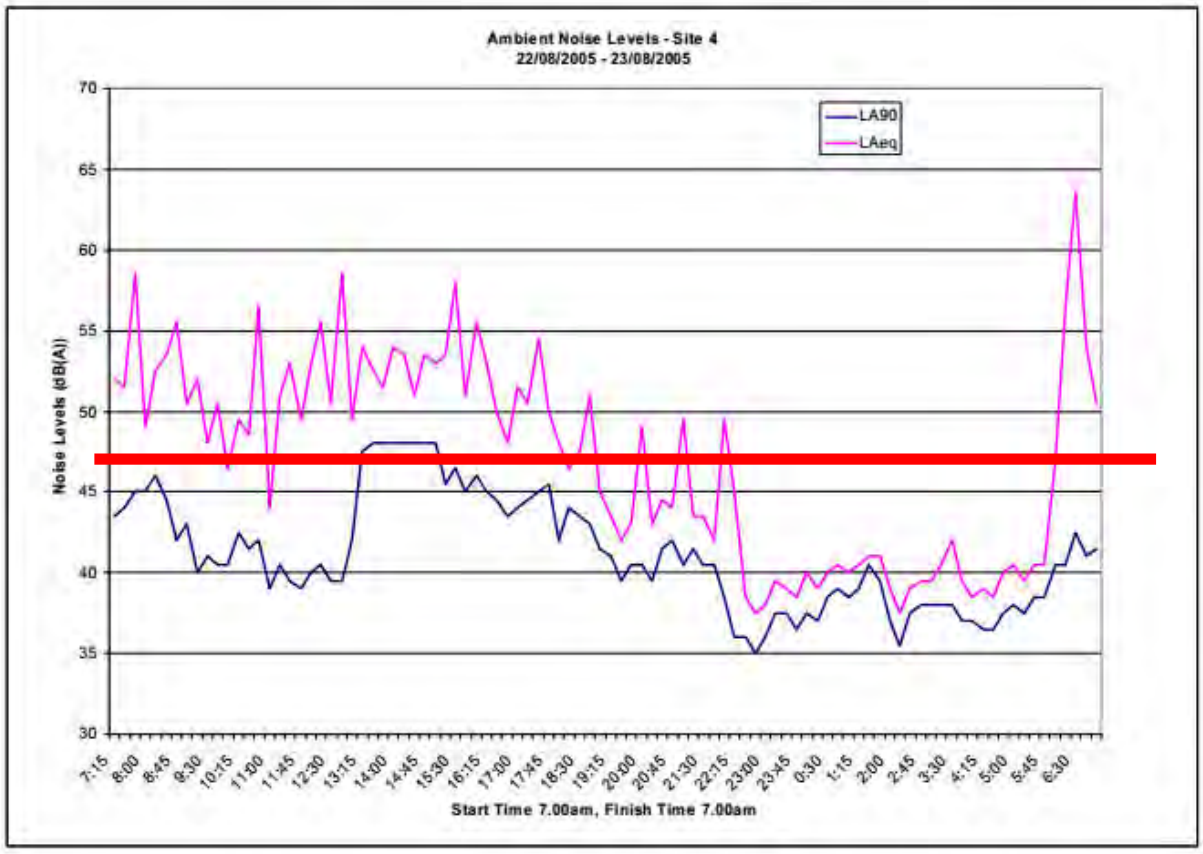

Ambient Noise Levels - Site 4
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am

This page has intentionally been left blank

Appendix 3

Air Quality Monitoring Results

(Total No. of pages including blank pages = 4)

This page has intentionally been left blank

All Deposited Dust Monitoring Results

Samples On	Samples Off	Month	Deposited Dust (g/m²/month)					
			DG1		DG2		DG3	
			Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average	Insoluble Matter	Rolling Annual Average
11-07-17	10-08-17	Jul-17	0.28	0.28	0.98	0.98	0.42	0.42
10-08-17	09-09-17	Aug-17	0.54	0.41	0.82	0.90	0.74	0.58
09-09-17	09-10-17	Sep-17	1.36	0.73	0.66	0.82	0.68	0.61
09-10-17	08-11-17	Oct-17	4.23	1.60	1.71	1.04	0.36	0.55
08-11-17	09-12-17	Nov-17	17.4	4.76	15.55	3.94	1.02	0.64
09-12-17	09-01-18	Dec-17	9.25	5.51	0.84	3.43	0.7	0.65
09-01-18	09-02-18	Jan-18	3.56	5.23	0.39	2.99	1.04	0.71
14-04-20	14-05-20	Apr-20	13.35	ID	0.64	ID	0.86	ID
14-05-20	12-06-20	May-20	0.85	ID	1.00	ID	0.35	ID
12-06-20	13-07-20	Jun-20	0.21	ID	0.10	ID	0.13	ID
13/07/20	13/08/20	Jul-20	2.66	ID	2.11	ID	0.17	ID
13/08/20	11/09/20	Aug-20	2.6	ID	2.70	ID	0.40	ID
11/09/20	13/10/20	Sep-20	10.0	ID	2.10	ID	0.20	ID
13/10/20	10/11/20	Oct-20	3.34	ID	1.66	ID	0.34	ID
10/11/20	10/12/20	Nov-20	0.33	ID	0.75	ID	0.37	ID
1/12/20	11/01/21	Dec-21	0.02	ID	0.04	ID	0.32	ID
11/01/21	8/02/21	Jan-21	0.87	ID	0.76	ID	0.00*	ID
8/02/21	9/03/21	Feb-21	1.44	ID	0.64	ID	2.07	ID
9/03/21	9/04/21	Mar-21	NT	ID	0.83	1.11	0.80	0.50
9/04/21	10/05/21	Apr-21	0.74	2.10	0.07	1.06	0.69	0.49
10/05/21	7/06/21	May-21	3.08	2.30	0.12	0.99	0.08	0.46
7/06/21	7/07/21	Jun-21	2.62	2.52	0.75	1.04	NT	0.49
Average			**3.75**	**-**	**1.60**	**-**	**0.59**	**-**
Monthly Maximum			***17.4***	**-**	***15.55***	**-**	***2.07***	**-**
Monthly Minimum			***0.02***	**-**	***0.04***	**-**	***0.08***	**-**

ID – Insufficient data to calculate *NT – Not Tested (sample broken in transit)* **Suspected spurious laboratory result*

This page has intentionally been left blank

Appendix 4

Surface Water Monitoring Results

(Total No. of pages including blank pages = 14)

This page has intentionally been left blank

Site: DP1			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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	30/11/2015	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		
	26/01/2016	Fine, Clear, some algae, catttle & 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		
	25/02/2016	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		
	17/03/2016	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		
	4/09/2017			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
	5/10/2017			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		
	8/10/2017	Algae/chrorophyll only to lab		27.2	7.81	886	6.83	61.2		156																					5	10
2017/2018	30/10/2017	**Commencement of extraction**																															
	30/10/2017	Daily monitoring requirement for first 2 weeks of dredging.		23.4	8.0	1056	4.23	224																									
	31/10/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.1	7.9	1069	4.28	210																									
	1/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22.1	7.9	1061	4.25	216																									
	2/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22.4	7.6	980	2.78	2.12																									
	3/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.2	7.7	1142	3.26	206																									
	6/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22.4	7.6	1042	4.18	214																									
	7/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22.1	7.3	1031	3.76	210																									
	8/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.9	8.0	1090	3.93	212																									
	9/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.7	7.7	1052	4.05	209																									
	10/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.5	7.9	1067	4.02	204																									
	13/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.1	7.4	1767	4.2	132																									
	14/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.7	8.1	1837	4	122																									
	15/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21	7.2	1795	3.9	134																									
	21/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.5	7.4	1623	4.6	133																									
	28/11/2017			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
	30/11/2017	Weekly monitoring requirement.		21.6	7.6	1455	4.8	143																									
	6/12/2017	Weekly monitoring requirement.		22	7.8	3210	6.53	206																									
	13/12/2017	Weekly monitoring requirement.		22.9	7.8	3150	3.95	147																									
	13/12/2017	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
	20/12/2017	Weekly monitoring requirement.		22.8	7.7	3550	4.15	157																									
	11/01/2018	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
	12/01/2018	Weekly monitoring requirement.		21.8	7.7	1610	4.16	172																									
	17/01/2018	Weekly monitoring requirement.		20.9	7.4	797	3.43	116																									
	23/01/2018	Weekly monitoring requirement.		21.8	7.7	1569	4.12	168																									
	24/01/2018	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
	31/01/2018	Weekly monitoring requirement.		20.5	7.8	3391	5.73	161																									
	7/02/2018	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
	7/02/2018	Weekly monitoring requirement.		19.1	7.8	4040	5.68	111																									
	8/02/2018	**Last day of first extraction campaign.**																															
	8/03/2018	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
	13/04/2018	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
	31/05/2018	Aquatic Birds on dredge pond		19.6	8.12	3960	5.59	61		6.8	5	663	135	101	23	1290	313	270	0.02	0.002	0.05	0.01	0.01	0.8	0.01	0.03	0.8	0.06	0.03	20	50	14900	9
2018/2019	25/10/2018			25.1	8.62	4553	6.59	80	5	15.2	5	671	121	100	22	1250	334	205	0.05	0.005	0.05	0.03	0.01	1.2	0.01	0.01	1.2	0.06	0.01	110	40	50300	13
	3/12/2018	S/W WIND TBC		27.6	8.8	5061	8.76	44.2	12	10.1		642	112	99	22	1310	301	188	0.03	0.001	0.06	0.02	0.01	1.4	0.01	0.02	1.4	0.02	0.02			284000	15
	17/12/2018			26.5	8.72	5048	9.92	13	7	11.3		686	107	99	24	1170	302	171	0.06	0.002	0.05	0.04	0.01	1.4	0.01	0.01	1.4	0.05	0.01			247000	31
	15/01/2019			29.4	8.54	4978	4.93	26.5	6	7.5	5	813	116	119	27	1320	298	148	0.02	0.002	0.05	0.02	0.01	1.3	0.01	0.01	1.3	0.05	0.01	270	410	97700	15
	7/02/2019	Aquatic Birds and Cattle. No algal scum on surface. No Oil and grease sampling. Hut mud DP1-8		28.8	8.47	5172	7.84	-43.6	18	10.3		691	94	98	22	1380	364	172	0.04	0.002	0.05	0.03	0.005	1.4	0.01	0.01	1.4	0.01	0.01			14900	10
	21/02/2019			27.8	8.32	5440	8.14	16.8	7	23.8		755	110	115	26	1380	328	161	0.03	0.002	0.05	0.01	0.001	1.1	0.01	0.01	1.1	0.06	0.01			5090	5
	6/03/2019	Cattle on site and near dredge pond. Aquatic birds on dredge pond. No visible algal scum		26.8	8.41	5352	8.93	-41.6	5	1.2		730	110	110	24	1390	323	194	0.02	0.002	0.05	0.05	0.008	0.6	0.01	0.01	0.6	0.01	0.01			1200	8
	21/03/2019			28.1	8.69	5995	5.72	-110	5	3.24		738	110	112	26	1340	296	171	0.03	0.002	0.05	0.03	0.001	1	0.01	0.01	1	0.02	0.01			13400	11
	3/04/2019			24.3	8.47	5298	5.27	109		8.2	5	757	124	117	24	1250	303	188	0.03	0.002	0.05	0.05	0.003	1.2	0.01	0.01	1.2	0.03	0.01	230	120	36800	9
	1/05/2019			23.4	8.28	4559	8.52	40.9	5	4.3		786	127	123	26	1310	297	189	0.01	0.002	0.05	0.02	0.001	1	0.01	0.01	1	0.03	0.01			52000	10
	5/06/2019			17.9	7.8	4140	6.9	57.2	6	-9.7		706	125	111	24	1300	292	226	0.01	0.002	0.05	0.01	0.004	1.3	0.02	0.04	1.2	0.37	0.06			12700	12
2019/2020	3/07/2019			18.7	8.48	6549	5.17	85		1.1	5	728	124	110	24	1290	256	226	0.01	0.001	0.05	0.01	0.001	1.1	0.02	0.11	1	0.13	0.13	430	1800	17700	11
	31/07/2019	Aquatic birds on drdge pond, no visible algal scum on dredge pond, no cattle on site.		18	8.58	7007	6.54	111.2	5	7.4		717	126	109	24	1330	311	216	0.01	0.001	0.05	0.02	0.001	1	0.01	0.1	0.9	0.03	0.1			21700	7
	3/09/2019	Water birds, yellow/brown water colour. Posible machine activity recently.		20.9	8.7	5475	7.4	123.1	5	8.2		721	122	110	23	1350	328	188	0.01	0.001	0.05	0.02	0.001	1	0.01	0.01	1	0.01	0.01			52100	8
	2/10/2019			25	8.7	5298	5.3	91.8	5	5.7	5	760	132	114	25	1370	308	193	0.01	0.002	0.05	0.04	0.001	1.2	0.01	0.01	1.2	0.02	0.01	10	10	42900	10
	6/11/2019	Aquatic birds present. Cattle present. Low water level		23	8.5	4974	8.8	115.5	5	5.7		735	105	109	25	1350	318	187	0.02	0.002	0.05	0.02	0.001	1.1	0.01	0.01	1.1	0.01	0.01			58700	15
	15/01/2020	Aquatic birds present. Cattle present. Low water level. pH meter calibration issue - spurious data		28.3	10.6*	6025	8	72.3	5	3.1		833	121	125	28	1400	335	167	0.01	0.001	0.05	0.05	0.001	1.3	0.01	0.01	1.3	0.01	0.01	500	420	870	8
	28/04/2020	Land-based extraction commenced 16/04/20		24.6	8.19	3565	8.71	43.4	5	20.8	5	523	64	77	18	1000	183	134	0.01	0.002	0.05	0.04	0.001	0.7	0.01	0.01	0.7	0.03	0.01	20	100	4160	1
2020/2021	7/07/2020	Clear.		16.7	6.4	3691	9.1	124	5	2.8	5	581	85	88	20	1010	205	180	0.01	0.002	0.05	0.01	0.002	0.9	0.01	0.04	0.9	0.17	0.04	60	10	11800	
	12/08/2020	Clear		18.6	8.19	3061	10.5	82	9	6.6	5	546	88	83	19	1030	182	169	0.01	0.002	0.05	0.03	0.001	1	0.01	0.04	0.9	0.05	0.05	50	20	24600	8
	16/09/2020			21.4	8.48	3640	10.67	95.8	15	55.43	5	564	87	83	19	1080	197	148	0.01	0.002	0.05	0.03	0.002	0.9	0.01	0.01	0.9	0.02	0.01	10	30	21000	13
	14/10/2020			24.4	8.39	3503	9.85	62.1	8	13	5	553	96	82	19	1040	228	141	0.02	0.002	0.05	0.02	0.001	0.7	0.01	0.01	0.7	0.01	0.01			7510	1
	11/11/2020			24.4	8.15	3649	9.44	74.1	5	2.5		552	88	82	19	1070	233	143	0.03	0.002	0.05	0.01	0.001	0.8	0.01	0.01	0.8	0.06	0.01	30	280	1280	5
	24/02/2021	Clear		26.8	8.3	3061	8.35	69.8	5	6.1		436	77	67	15	905	192	126	0.03	0.002	0.05	0.01	0.001	0.6	0.01	0.01	0.6	0.01	0.01	640	280	3690	4
	10/06/2021	Clear		17.6	8.02	2465	8.8	50.6	5	4.35		392	70	56	14	762	165	136	0.02	0.002	0.05	0.01	0.001	0.8	0.02	0.04	0.7	0.2	0.06	30	10	5	2

Pre-Extraction 2017/2018 (From Extraction)	Average	-	26.6	8.27	717	6.78	108.0	16	44.4	4	85	30	14	8	148	27	85	0.09	0.001	0.03	0.04	0.016666667	0.8	0.01	0.03	0.8	0.02	0.02	1070	567	5	6
	Maximum		30.9	8.10	4915	7.37	224.0	55	125.3	5	693	137	103	24	1350	315	264	0.04	0.002	0.05	0.15	0.01	1.6	0.01	0.12	1.6	0.32	0.12	110	2160	6980	51
	Minimum		19.1	7.20	797	0.20	-0.7	12	0.6	5	454	110	72	19	874	197	223	0.01	0.001	0.05	0.01	0.01	0.9	0.01	0.01	0.9	0.01	0.01	20	40	5	6
Reporting Period (2020/2021)	Average		21.4	7.99	3296	9.53	79.8	7	13.0	5	518	84	77	18	985	200	149	0.02	0.002	0.05	0.02	0.001285714	0.8	0.01	0.02	0.8	0.07	0.03	137	105	9984	6
	Maximum		26.8	8.48	3691	10.67	124.0	15	55.4	5	581	96	88	20	1080	233	180	0.03	0.002	0.05	0.03	0.002	1.0	0.02	0.04	0.9	0.20	0.06	640	280	24600	13
	Minimum		16.7	6.40	2465	8.35	50.6	5	2.5	5	392	70	56	14	762	165	126	0.01	0.002	0.05	0.01	0.001	0.6	0.01	0.01	0.6	0.01	0.01	10	10	5	1
All Results	Average	-	23.6	8.02	3125	5.97	102.2	10	21.8	5	576	99	85	20	1036	238	175	0.03	0.002	0.05	0.03	0.006641026	1.0	0.01	0.02	1.0	0.06	0.03	394	403	32592	12
	Maximum	-	30.9	9.07	7007	10.67	224.0	68	156.0	5	833	137	125	28	1400	364	270	0.19	0.005	0.07	0.15	0.02	1.6	0.02	0.12	1.6	0.37	0.13	4800	2160	284000	51
	80th Percentile	-	27.0	8.48	4992	8.56	168.8	11	20.7	5	736	126	111	24	1350	315	226	0.04	0.002	0.05	0.05	0.01	1.3	0.01	0.04	1.3	0.10	0.04	444	828	50300	15
	Median (50th Percentile)	-	23.0	8.00	3391	5.68	107.0	5	7.1	5	639	110	98	22	1180	292	180	0.02	0.002	0.05	0.03	0.005	1.0	0.01	0.01	1.0	0.02	0.01	110	120	12250	10
	20th Percentile	-	20.9	7.65	1055	4.02	44.0	5	2.9	4	450	70	67	15	874	182	134	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.8	0.01	0.01	20	18	825	5
	Minimum	-	16.7	6.40	591	0.20	-110.0	2	-9.7	2	64	24	11	7	110	14	57	0.01	0.001	0.01	0.01	0.001	0.5	0.01	0.01	0.5	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: DP1-1			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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre - Extraction	4/09/2017			21.5	8.44	824	7.01	121	5	3.9		129	33	20	8	236	56	98	0.05	0.001	0.06	0.01	0.01	0.4	0.01	0.01	0.4	0.02	0.01	10	10	5	1
	5/10/2017			24	7.51	819	4.51	54.4	62	149		98	46	17	7	179	39	128	0.07	0.001	0.06	0.15	0.01	0.9	0.01	0.03	0.9	0.16	0.03	480	840		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017			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		
	11/01/2018			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		
	24/01/2018			27.5	7.51	4693	2.88	37.3		53.6																							
	7/02/2018			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		
	8/02/2018	**Last day of first extraction campaign.**																																
2018 / 2019	25/10/2018			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		
	15/01/2019			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		
	3/04/2019			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	3/07/2019			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		
	2/10/2019			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		
	15/01/2020	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	7/07/2020	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		
	12/08/2020	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		
	16/09/2020			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		
	14/10/2020			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
	11/11/2020			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		
	24/02/2021	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		
	10/06/2021	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		
Pre-Extraction		**Average**	-	22.8	7.98	822	5.76	87.7	34	76.5	ND	114	40	19	8	208	48	113	0.06	0.001	0.06	0.08	0.010	0.7	0.01	0.02	0.7	0.09	0.02	245	425	5	1
		Maximum	-	24.0	8.44	824	7.01	121.0	62	149.0	ND	129	46	20	8	236	56	128	0.07	0.001	0.06	0.15	0.010	0.9	0.01	0.03	0.9	0.16	0.03	480	840	5	1
		Minimum	-	21.5	7.51	819	4.51	54.4	5	3.9	ND	98	33	17	7	179	39	98	0.05	0.001	0.06	0.01	0.010	0.4	0.01	0.01	0.4	0.02	0.01	10	10	5	1
Reporting Period (2020/2021)		**Average**	-	21.4	8.08	3362	9.56	74.9	5	13.7	5	523	86	78	18	983	200	149	0.02	0.002	0.05	0.05	0.003	0.8	0.01	0.02	0.8	0.05	0.03	77	82	ND	ID
		Maximum	-	26.7	8.63	3694	10.71	121.0	6	60.1	5	602	98	90	20	1080	238	183	0.03	0.002	0.05	0.29	0.007	1.0	0.02	0.04	1.0	0.18	0.06	220	240	ND	ID
		Minimum	-	16.8	6.40	2456	8.56	20.5	5	2.4	5	400	72	58	14	767	166	126	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.6	0.01	0.01	10	10	ND	ID
All Results		**Average**	-	24.0	8.13	3914	6.72	63.5	12	24.8	5	565	100	85	20	1026	228	171	0.02	0.002	0.05	0.05	0.005	1.0	0.01	0.02	1.0	0.07	0.02	139	155	5	3.5
		Maximum	-	30.6	8.80	6553	10.71	121.0	62	149.0	5	838	153	121	28	1410	334	263	0.07	0.005	0.06	0.29	0.010	1.4	0.02	0.12	1.4	0.29	0.13	480	840	5	6
		80th Percentile	-	27.5	8.57	5286	9.50	94.5	9	53.6	5	740	126	112	24	1326	309	224	0.03	0.002	0.05	0.08	0.010	1.2	0.01	0.04	1.2	0.14	0.04	268	252	ID	ID
		Median (50th Percentile)	-	24.6	8.38	3694	6.50	67.6	5	7.7	5	584	98	88	20	1065	234	163	0.02	0.002	0.05	0.02	0.005	1.0	0.01	0.01	1.0	0.04	0.01	90	100	5	3.5
		20th Percentile	-	18.7	7.62	3053	4.51	20.5	5	3.8	5	431	77	64	16	855	181	134	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	16	10	ID	ID
		Minimum	-	16.8	6.40	819	2.16	-2.0	5	2.4	5	98	33	17	7	179	39	98	0.010	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:	DP1-2		Physical									Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
Sample Date		Comments/ Flow	Water Level m AHD	Temp °C	pH	ElectricalConductivity uS/cm	Dissolved Oxygen 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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	4/09/2017			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
	5/10/2017			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	30/10/2017	**Commencement of extraction**																															
	28/11/2017			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		
	11/01/2018			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
	24/01/2018			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**
	7/02/2018			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		
	8/02/2018	**Last day of first extraction campaign**																															
	8/03/2018			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**
	13/04/2018			24.9	8.11	**4663**	6.7	113		7.1																						5160	7
	31/05/2018			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	25/10/2018			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**
	3/12/2018			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**
	17/12/2018			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**
	15/01/2019			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**
	7/02/2019			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**
	21/02/2019			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
	6/03/2019			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
	21/03/2019			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
	3/04/2019			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**
	1/05/2019			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**
	5/06/2019			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	3/07/2019			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**
	31/07/2019			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
	3/09/2019			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
	2/10/2019			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
	6/11/2019	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**
	15/01/2020	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
	7/07/2020	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	
	12/08/2020	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**
2020/2021	16/09/2020			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
	14/10/2020			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
	11/11/2020			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
	24/02/2021	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	0.6	0.01	0.01	120	120	6260	5
	10/06/2021	Clear		17.3	8.03	2438	8.77	57.5		**3.92**		397	71	58	14	787	164	134	0.01	0.002	0.05	0.01	0.001	**0.7**	0.02	0.04	0.6	0.18	**0.06**	40	20	5	2
Pre-Extraction 2017/2018 (Extraction)		**Average**	-	21.6	7.78	793	**5.09**	94.9	26	**84.0**	ND	115	40	19	8	207	51	114	0.08	0.001	0.08	**0.06**	**0.010**	**0.8**	0.01	0.02	0.8	0.10	**0.02**	245	**510**	5	2
		Maximum	-	28.3	8.11	**4903**	6.96	113.0	53	**99.0**	5	**693**	146	**110**	26	**1350**	311	265	0.03	0.002	0.05	**0.09**	**0.010**	**1.4**	0.01	0.02	1.4	0.31	**0.02**	60	130	12700	**30**
		Minimum	-	24.8	7.49	**3048**	**2.17**	-0.9	13	7.1	5	454	108	72	18	878	198	223	0.01	0.001	0.05	0.01	**0.010**	**1.0**	0.01	0.01	1.0	0.01	0.01	30	50	5	7
Reporting Period (2020/2021)		**Average**	-	20.8	8.11	**3359**	9.60	77.4	5	9.9	5	**524**	85	78	18	988	203	149	0.017143	0.002	0.05	**0.03**	0.001	**0.8**	0.01	0.02	0.8	0.07	**0.03**	52	48	9498	7
		Maximum	-	26.6	**8.72**	**3692**	10.72	119.0	5	33.5	5	**586**	100	88	20	**1080**	236	175	0.03	0.002	0.05	**0.11**	0.004	**1.2**	0.02	0.04	1.1	0.24	**0.06**	120	120	20600	**12**
		Minimum	-	16.8	6.40	2438	8.77	35.2	5	**2.9**	5	397	71	58	14	787	164	126	0.01	0.001	0.05	0.01	0.001	**0.6**	0.01	0.01	0.6	0.01	0.01	10	10	5	2
All Results		**Average**	-	23.5	8.20	**4412**	6.97	52.8	10	17.9	5	**626**	108	95	22	**1145**	261	183	0.023125	0.0018125	0.051563	**0.03**	0.005	**1.0**	0.01	0.02	1.0	0.08	**0.02**	104	139	39417	**11**
		Maximum	-	29.0	**8.80**	**7123**	10.72	127.0	53	166.0	5	**831**	146	**123**	28	**1410**	345	270	0.11	0.005	0.1	**0.11**	**0.010**	**1.4**	0.02	0.11	1.4	0.36	**0.13**	450	**1010**	**299000**	**32**
		80th Percentile	-	27.3	**8.61**	**5318**	8.93	98.4	13	22.6	5	**734**	128	**113**	25	**1344**	314	224	0.03	0.002	0.05	**0.05**	**0.010**	**1.2**	0.01	0.04	1.2	0.15	**0.04**	132	138	40000	**13**
		Median (50th Percentile)	-	24.0	8.38	**4663**	7.26	63.8	5	7.3	5	**686**	112	**101**	24	**1255**	289	179	0.02	0.002	0.05	**0.02**	0.003	**1.0**	0.01	0.01	1.0	0.04	0.01	50	60	13700	9
		20th Percentile	-	19.2	7.72	**3496**	**5.37**	1.3	5	**3.2**	5	**548**	88	82	19	**1022**	198	143	0.01	0.001	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.01	0.01	38	10	1480	6
		Minimum	-	16.8	6.40	787	**2.17**	-106.0	5	**-9.8**	5	96	33	17	7	176	44	97	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	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

Site: DP1-3			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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	4/09/2017			19.1	8.05	769	6.02	125	6	**3.4**		130	33	21	8	236	57	96	0.04	0.001	0.05	0.01	**0.01**	**0.5**	0.02	0.01	0.5	0.02	**0.03**	20	20	5	2
	5/10/2017			22.8	7.03	743	**3.12**	76.6	48	**163**		96	48	17	7	174	43	134	0.01	0.001	0.05	**0.09**	**0.01**	**1**	0.01	0.02	1	0.19	**0.02**	400	**770**		
2017/2018	30/10/2017	**Commencement of extraction**																															
	28/11/2017			27.1	7.54	**3053**	**3.09**	18.1	88	**113**		456	110	72	18	881	221	244	0.01	0.001	0.05	**0.14**	**0.01**	**1.6**	0.01	0.09	1.5	0.3	**0.09**	170	120		
	13/12/2017			27.6	7.56	**4703**	**2.49**	31.1																									
	11/01/2018			27.9	7.45	**4008**	**1.07**	-14	12	**24.2**	5	**640**	133	99	24	**1120**	277	253	0.01	0.002	0.05	**0.04**	**0.01**	**1.3**	0.01	0.01	1.3	0.3	0.01	10	10		
	7/02/2018			27.7	7.53	**4916**	**4.54**	26		**39.5**	5	**682**	133	100	24	**1370**	309	262	0.01	0.002	0.05	**0.07**	**0.01**	**1.2**	0.01	0.02	1.2	0.21	**0.02**	10	30		
	8/02/2018	**Last day of first extraction campaign.**																															
	31/05/2018			19.3	8.12	**3927**	8.59	60.7			5	**634**	128	96	22	**1270**	284	270	0.01	0.002	0.05	0.01	**0.01**	**0.7**	0.01	0.03	0.7	0.08	**0.03**	30	90	25500	8
2018 / 2019	25/10/2018			22.3	**8.58**	**4510**	7.17	84	11	11.7	5	**687**	122	**102**	22	**1240**	330	200	0.05	0.005	0.05	**0.03**	**0.01**	**1**	0.01	0.01	1	0.02	0.01	40	10		
	15/01/2019			28.8	**8.53**	**4894**	**4.5**	24.1	8	9.8	5	**698**	98	**105**	24	**1310**	301	138	0.03	0.002	0.05	**0.02**	**0.01**	**1.4**	0.01	0.01	1.4	0.05	0.01	220	140		
	3/04/2019			24.9	8.42	**5308**	**4.53**	83	8	6.2	5	**745**	127	**115**	25	**1200**	288	181	0.03	0.002	0.05	**0.02**	0.001	**1**	0.01	0.01	1	0.04	0.01	190	190		
2019 / 2020	3/07/2019			18.2	8.42	**6577**	**5.41**	85	5	5.4	5	**721**	124	**110**	24	**1270**	252	227	0.01	0.001	0.05	0.01	0.001	**1.1**	0.02	0.11	1	0.14	**0.13**	40	90		
	2/10/2019			23.3	**9.7**	**5262**	6	59.8	5	5.5	5	**765**	132	**115**	25	**1380**	306	190	0.02	0.002	0.05	**0.02**	0.001	**1**	0.01	0.01	1	0.02	0.01	30	10		
2020/2021	7/07/2020	Clear.		16.7	**6.4**	**3691**	9	117	5	**3.1**	5	**609**	90	91	21	**1020**	199	178	0.02	0.002	0.05	0.01	0.004	**0.9**	0.01	0.04	0.9	0.19	**0.04**	70	10		
	12/08/2020	Clear		17.1	8.3	**3494**	10.4	89	5	8.2	5	**537**	89	83	18	**1020**	182	166	0.01	0.002	0.05	**0.02**	0.001	**1**	0.02	0.03	1	0.05	**0.05**	40	20		
	16/09/2020			20.8	8.49	**3624**	10.78	97.3	5	**27.63**	5	**573**	89	86	19	**1090**	191	151	0.01	0.001	0.05	**0.04**	0.002	**0.8**	0.01	0.01	**0.8**	0.01	0.01	170	**910**		
	14/10/2020			23.4	**8.6**	**3501**	9.26	89.6	5	13.8	5	**562**	92	83	20	**1040**	227	140	0.03	0.002	0.05	**0.02**	0.002	**0.8**	0.01	0.01	0.8	0.01	0.01				
	11/11/2020			23.2	8.42	**3662**	9.08	81.8	5	**3**		**548**	88	82	19	**1060**	236	147	0.03	0.002	0.05	0.01	0.005	**0.8**	0.01	0.01	0.8	0.01	0.01	40	80		

Pre-Extraction	Average	-	21.0	7.54	756	**4.57**	100.8	27	**83.2**	ND	113	41	19	8	205	50	115	0.03	0.001	0.05	**0.05**	**0.010**	**0.8**	0.02	0.02	0.8	0.11	**0.03**	210	**395**	5	2
	Maximum	-	22.8	8.05	769	6.02	125.0	48	**163.0**	ND	130	48	21	8	236	57	134	0.04	0.001	0.05	**0.09**	**0.010**	**1.0**	0.02	0.02	1.0	0.19	**0.03**	400	**770**	5	2
	Minimum	-	19.1	7.03	743	**3.12**	76.6	6	**3.4**	ND	96	33	17	7	174	43	96	0.01	0.001	0.05	0.01	**0.010**	**0.5**	0.01	0.01	0.5	0.02	**0.02**	20	20	5	2
Reporting Period (2020/2021)	Average	-	20.2	8.04	**3594**	9.70	94.9	5	11.1	5	**566**	89.6	85	19	**1046**	207	156	0.02	0.002	0.05	**0.02**	0.003	**0.9**	0.01	0.02	0.9	0.05	**0.02**	80	**255**	ND	ND
	Maximum	-	23.4	**8.60**	**3691**	10.78	117.0	5	**27.6**	5	**609**	92	91	21	**1090**	236	178	0.03	0.002	0.05	**0.04**	0.005	**1.0**	0.02	0.04	1.0	0.19	**0.05**	170	**910**	ND	ND
	Minimum	-	16.7	**6.40**	**3494**	9.00	81.8	5	**3.0**	5	**537**	88	82	18	**1020**	182	140	0.01	0.001	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.01	0.01	40	10	ND	ND
All Results	Average	-	23.0	8.07	**3920**	6.18	66.7	15	**29.2**	5	**568**	102.25	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**	99	167	12753	5
	Maximum	-	28.8	**9.70**	**6577**	10.78	125.0	88	**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**	400	**910**	25500	8
	80th Percentile	-	27.6	**8.55**	**5054**	9.15	92.7	12	**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**	186	180	ID	ID
	Median (50th Percentile)	-	23.2	8.30	**3927**	6.00	81.8	6	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**	40	80	12753	5
	20th Percentile	-	18.7	7.50	**3318**	**3.11**	25.2	5	**3.8**	5	488	88.4	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	22	10	ID	ID
	Minimum	-	16.7	**6.40**	743	**1.07**	-14.0	5	**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	10	10	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

Site:	DP1-4		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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-E	4/09/2017			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
	5/10/2017			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	30/10/2017	**Commencement of extraction**																															
	28/11/2017			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		
	13/12/2017																																
	11/01/2018			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
	24/01/2018			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**
	7/02/2018			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		
	8/02/2018	**Last day of first extraction campaign**																															
	8/03/2018			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**
	13/04/2018			24.9	8.1	**4651**	6.16	131		8.7																						3380	5
	31/05/2018			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	25/10/2018			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**
	3/12/2018			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**
	17/12/2018			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**
	15/01/2019			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
	7/02/2019			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**
	21/02/2019			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**
	6/03/2019			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**
	21/03/2019			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
	3/04/2019			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
	1/05/2019			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**
	5/06/2019			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	3/07/2019			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
	31/07/2019			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
	3/09/2019			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
	2/10/2019			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
	6/11/2019	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**
	15/01/2020	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
2020/2021	7/07/2020	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	
	12/08/2020	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
	16/09/2020			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**
	14/10/2020			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
	11/11/2020			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**	0.01	0.01	0.7	0.04	0.01	20	50	1560	7
	24/02/2021	Clear		25.7	8.31	**3095**	8.07	50.6	5	**3.7**		430	76	65	16	911	198	128	0.03	0.002	0.05	0.01	0.004	**0.6**	0.01	0.01	0.6	0.1	0.01	140	80	6390	7
	10/06/2021	Clear		17.4	8.04	2448	8.73	62.8		**3.88**		390	69	56	14	758	163	138	0.01	0.002	0.05	0.01	0.001	**0.8**	0.02	0.04	0.7	0.23	**0.06**	10	70	5	3
Pre-Extraction	**Average**		-	20.3	7.51	762	**3.68**	103.1	34	**85.4**	ND	111	39.5	19	7	204	50	116	0.03	0.001	0.06	**0.06**	**0.010**	**0.7**	0.015	0.02	0.7	0.1	**0.03**	290	**850**	5	2
	Maximum		-	22.7	7.95	777	**5.57**	125.0	61	**166.0**	ND	131	46	20	8	234	57	134	0.05	0.001	0.06	**0.10**	**0.010**	**1.0**	0.02	0.02	1.0	0.2	**0.04**	290	**850**	5	2
	Minimum		-	17.9	7.06	746	**1.79**	81.1	7	**4.8**	ND	90	33	17	6	173	43	97	0.01	0.001	0.05	0.01	**0.010**	**0.4**	0.01	0.02	0.4	0.0	**0.02**	290	**850**	5	2
Reporting Period (2020/2021)	**Average**		-	20.0	7.99	**3352**	8.34	85.1	6	8.7	5	**520**	84.714	77	18	981	198	157	0.02	0.002	0.05	**0.01**	0.002	**0.8**	0.0114	0.02	0.8	0.1	**0.03**	47	50	9389	6.8333
	Maximum		-	25.7	8.42	**3695**	9.60	115.0	12	**23.4**	5	**605**	94	91	20	**1080**	232	175	0.03	0.002	0.05	**0.02**	0.004	**1.0**	0.02	0.04	0.9	0.2	**0.06**	140	80	43800	**11**
	Minimum		-	16.6	**6.40**	2448	**5.64**	50.6	5	**2.8**	5	390	69	56	14	758	163	128	0.01	0.001	0.05	0.01	0.001	**0.6**	0.01	0.01	0.6	0.0	0.01	10	10	5	3
All Results	**Average**		-	22.6	8.00	**4353**	**5.17**	33.4	106	**20.6**	5	**623**	108.69	94	22	**1140**	260	195	0.02	0.002	0.05	**0.08**	**0.005**	**1.2**	0.0113	0.02	1.1	0.1	**0.03**	86	133	34219	**13.552**
	Maximum		-	28.1	**8.52**	**7103**	9.60	137.6	2660	**166.0**	5	**833**	146	**124**	28	**1410**	333	264	0.05	0.005	0.19	**1.81**	**0.010**	**7.3**	0.02	0.14	7.3	0.4	**0.14**	420	**850**	**387000**	**89**
	80th Percentile		-	26.0	8.41	**5214**	8.14	100.1	8	**25.4**	5	**744**	128	**112**	25	**1334**	309	233	0.03	0.002	0.05	**0.04**	**0.010**	**1.2**	0.01	0.03	1.2	0.2	**0.04**	122	172	40920	**15**
	Median (50th Percentile)		-	22.9	8.17	**4651**	**5.15**	60.3	5	5.9	5	**683**	111.5	**102**	24	**1250**	287	190	0.01	0.002	0.05	**0.02**	0.004	**1.0**	0.01	0.01	1.0	0.1	0.01	40	70	6625	9
	20th Percentile		-	18.1	7.58	**3486**	**2.78**	-22.8	5	**3.2**	5	**540**	88	82	19	**1020**	198	165	0.01	0.001	0.05	0.01	0.001	**0.8**	0.01	0.01	0.7	0.0	0.01	10	10	352	6
	Minimum		-	16.6	**6.40**	746	**0.33**	-219.7	5	**-9.8**	5	90	33	17	6	173	43	97	0.01	0.001	0.05	0.01	0.001	**0.4**	0.01	0.01	0.4	0.0	0.01	10	10	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

Site: DP1-5			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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	30/10/2017	**Commencement of extraction**																															
	11/01/2018			28.2	7.39	4020	0.47	-4.9	19	26.1	5	645	135	99	24	1120	229	245	0.01	0.002	0.05	0.05	0.01	1.4	0.01	0.01	1.4	0.35	0.01	40	50		
	24/01/2018			27.4	7.49	4671	2.74	36.7		84																							
	7/02/2018			25.5	7.48	4979	4.08	20		112	5	704	146	104	26	1370	309	268	0.11	0.002	0.3	0.09	0.01	1.2	0.01	0.02	1.2	0.18	0.02	60	60		
	8/02/2018	**Last day of first extraction campaign.**																															
	31/05/2018			19.3	8.11	3936	5.07	59.4		6.5	5	626	127	95	22	1280	282	270	0.01	0.002	0.05	0.01	0.01	0.7	0.01	0.03	0.7	0.07	0.03	30	90	22300	8
2018 / 2019	25/10/2018			20.5	8.44	4517	5.22	89	5	4.6	5	667	121	100	22	1250	338	214	0.05	0.005	0.05	0.02	0.01	0.8	0.01	0.01	0.8	0.03	0.01	10	30		
	15/01/2019			23.9	7.55	4302	0.36	-220	5	4.2	5	653	114	99	22	1270	290	232	0.01	0.002	0.08	0.02	0.01	0.8	0.01	0.01	0.8	0.05	0.01	20	150		
	3/04/2019			23.5	7.53	5451	0.59	-104.5	7	5.5	5	742	127	111	24	1240	293	180	0.03	0.002	0.05	0.02	0.001	1	0.01	0.01	1	0.04	0.01	120	100		
2019 / 2020	3/07/2019			17.9	8.1	6687	2.46	85	5	2.2	5	728	127	110	24	1320	257	232	0.01	0.001	0.05	0.01	0.001	1.3	0.02	0.1	1.2	0.29	0.12	330	360		
	2/10/2019			19.4	8	5221	1.5	36.4	5	2.6	5	764	132	117	25	1360	303	231	0.01	0.002	0.05	0.01	0.001	0.8	0.01	0.01	0.8	0.02	0.01	80	40		
2020/2021	7/07/2020	Clear.		16.7	6.4	3693	8.8	115	5	2.6	5	587	85	88	20	1020	196	174	0.01	0.002	0.05	0.01	0.004	1	0.01	0.04	1	0.14	0.04	50	20		
	12/08/2020	Clear		16.9	8.2	3499	9.5	89	5	7.8	5	544	89	82	19	1020	185	171	0.01	0.002	0.05	0.01	0.001	1	0.02	0.03	0.9	0.05	0.05	30	20		
	16/09/2020			18.1	7.75	3635	5.86	120	5	24.61	5	550	85	81	18	1080	192	177	0.01	0.001	0.05	0.02	0.001	0.7	0.01	0.01	0.7	0.01	0.02	10	20		
	14/10/2020			19.3	8.03	3442	2.56	47.8	5	20.5	5	569	95	84	19	1030	219	172	0.06	0.002	0.05	0.02	0.001	0.7	0.01	0.01	0.7	0.05	0.01				
	11/11/2020			22.1	8.11	3654	4.61	83	5	2.8		540	88	82	19	1040	231	159	0.02	0.002	0.05	0.01	0.001	0.7	0.01	0.01	0.7	0.01	0.01	20	100		

Reporting Period (2020/2021)	Average	-	18.6	7.70	3585	6.27	91.0	5	11.7	5	558	88	83	19	1038	205	171	0.02	0.002	0.05	0.01	0.002	0.8	0.01	0.02	0.80	0.1	0.03	28	40	ND	ND
	Maximum	-	22.1	8.20	3693	9.50	120.0	5	24.6	5	587	95	88	20	1080	231	177	0.06	0.002	0.05	0.02	0.004	1.0	0.02	0.04	1.00	0.1	0.05	50	100	ND	ND
	Minimum	-	16.7	6.40	3442	2.56	47.8	5	2.6	5	540	85	81	18	1020	185	159	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.70	0.0	0.01	10	20	ND	ND
All Results	Average	-	21.3	7.76	4408	3.84	32.3	6	21.9	5	640	113	96	22	1185	256	210	0.03	0.002	0.07	0.02	0.005	0.9	0.01	0.02	0.92	0.1	0.03	67	87	22300	8
	Maximum	-	28.2	8.44	6687	9.50	120.0	19	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	1.40	0.4	0.12	330	360	22300	8
	80th Percentile	-	25.5	8.11	5221	5.86	89.0	6	26.1	5	731	133	110	24	1328	304	250	0.05	0.002	0.06	0.03	0.010	1.2	0.01	0.03	1.20	0.2	0.04	96	120	ID	ID
	Median (50th Percentile)	-	20.0	7.88	4161	3.41	53.6	5	6.0	5	645	121	99	22	1240	257	214	0.01	0.002	0.05	0.02	0.001	0.8	0.01	0.01	0.80	0.1	0.01	35	55	22300	8
	20th Percentile	-	17.9	7.48	3635	0.59	-4.9	5	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	0.70	0.0	0.01	16	20	ID	ID
	Minimum	-	16.7	6.40	3442	0.36	-220.0	5	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	0.70	0.0	0.01	10	20	22300	8

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: DP1-6			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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	30/10/2017	**Commencement of extraction**																															
	24/01/2018			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**
	7/02/2018			24.8	7.56	**4858**	**1.11**	23.1		10																							
	8/02/2018	**Last day of first extraction campaign.**																															
	8/03/2018			24.3	7.85	**4651**	**3.37**	53		14.2		**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**
	13/04/2018			24.9	8.09	**4655**	6.34	138		**4.3**																						5030	5
	31/05/2018			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
2018/2019	25/10/2018			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
	3/12/2018			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
	17/12/2018			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
	15/01/2019			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
	7/02/2019			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
	21/02/2019			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
	6/03/2019			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
	21/03/2019			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**
	3/04/2019			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**
	1/05/2019			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**
	5/06/2019			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	3/07/2019			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
	31/07/2019			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
	3/09/2019			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
	2/10/2019			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
	6/11/2019			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
	15/01/2020	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	7/07/2020	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	
	12/08/2020	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
	16/09/2020			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
	14/10/2020			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
	11/11/2020			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
	24/02/2021	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
	10/06/2021	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
Reporting Period (2020/2021)	**Average**		-	18.7	7.62	**3361**	**5.30**	34.1	5	9.4	5	**518**	84	77	18	984	197	162	0.01	0.002	0.07	**0.01**	0.001	**0.8**	0.02	0.02	0.81	0.1	**0.03**	33	47	6309	5
	Maximum		-	25.1	8.02	**3691**	9.00	122.1	5	**20.9**	5	**596**	90	90	20	**1080**	219	177	0.02	0.002	0.22	**0.02**	0.002	**1.0**	0.03	0.04	1.00	0.3	**0.06**	60	160	27700	8
	Minimum		-	16.7	**6.40**	2431	**1.19**	-109.5	5	**2.7**	5	403	72	58	15	774	168	134	0.01	0.001	0.05	0.01	0.001	**0.7**	0.01	0.01	0.70	0.0	0.01	10	10	5	1
All Results	**Average**		-	20.8	7.74	**4578**	**3.11**	-24.3	6	9.1	5	**653**	116	99	22	**1208**	262	224	0.01	0.002	0.08	**0.03**	0.005	**1.1**	0.01	0.02	1.07	0.2	**0.03**	59	62	15891	**14**
	Maximum		-	27.4	8.31	**7141**	9.00	153.0	19	**95.0**	5	**791**	148	**119**	27	**1360**	344	342	0.05	0.005	0.22	**0.15**	**0.025**	**2.6**	0.03	0.12	2.60	1.4	**0.12**	260	210	**276000**	**149**
	80th Percentile		-	24.3	8.09	**5207**	6.34	93.0	5	12.9	5	**732**	131	**113**	25	**1320**	302	267	0.02	0.002	0.13	**0.03**	**0.010**	**1.3**	0.01	0.03	1.30	0.4	**0.04**	74	104	17000	**12**
	Median (50th Percentile)		-	20.2	7.80	**4651**	**2.31**	23.1	5	**4.3**	5	**672**	123	**102**	23	**1270**	278	220	0.01	0.002	0.05	**0.02**	0.002	**1.0**	0.01	0.01	1.00	0.1	0.01	50	40	1270	6
	20th Percentile		-	17.7	7.46	**3638**	**0.64**	-154.9	5	**2.3**	5	**556**	88	83	19	**1032**	198	176	0.01	0.001	0.05	0.01	0.001	**0.8**	0.01	0.01	0.80	0.0	0.01	10	18	5	4
	Minimum		-	16.7	**6.40**	2431	**0.11**	-313.0	5	**-9.7**	5	403	72	58	15	774	168	134	0.01	0.001	0.05	0.01	0.001	**0.7**	0.01	0.01	0.70	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

Site: DP1-7			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		-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017 / 2018	31/05/2018			19.5	8.13	3971	5.82	55		7.8	5	630	130	96	22	1270	307	271	0.01	0.002	0.05	0.01	0.01	0.7	0.01	0.03	0.7	0.07	0.03	50	120	16400	8
2018 / 2019	25/10/2018			20.2	8.4	4623	3.44	78	5	2.2	5	727	130	110	24	1270	342	221	0.05	0.005	0.05	0.02	0.01	0.8	0.01	0.01	0.8	0.03	0.01	20	40		
	15/01/2019			21.7	7.32	4190	0.31	-273.6	5	2.7	5	665	127	101	22	1250	268	280	0.01	0.002	0.16	0.02	0.01	0.9	0.01	0.01	0.9	0.22	0.01	40	270		
	3/04/2019			22.2	7.4	5385	0.44	-194	5	2.9	5	694	145	105	22	1250	240	326	0.01	0.002	0.09	0.02	0.012	2.7	0.01	0.01	2.7	1.67	0.01	60	50		
2019 / 2020	3/07/2019			17.9	8.2	6713	3.04	87	5	3.8	5	727	127	111	24	1320	264	236	0.01	0.001	0.05	0.01	0.001	1.2	0.02	0.11	1.1	0.28	0.13	190	190		
	2/10/2019			20.7	8.2	5222	2.2	-50.8	5	2.3	5	736	128	112	24	1360	300	236	0.01	0.002	0.07	0.01	0.001	1	0.01	0.01	1	0.17	0.01	230	190		
2020/2021	7/07/2020	Clear.		16.7	6.4	3705	8.9	117	5	2.8	5	606	88	92	20	1020	198	177	0.01	0.002	0.05	0.02	0.017	0.9	0.01	0.04	0.9	0.18	0.04	40	10		
	12/08/2020	Clear		17	7.85	3517	8.1	96	5	10.9		486	80	72	17	1030	190	178	0.02	0.001	0.05	0.02	0.001	1	0.04	0.01	1	0.1	0.05	20	20		
	16/09/2020			17.4	7.45	3025	2.15	112.4	5	52.41	5	568	88	84	19	1080	191	202	0.01	0.001	0.05	0.02	0.001	0.8	0.02	0.01	0.8	20	0.02	10	10		
	14/10/2020			18	7.57	3440	2.31	-126.7	7	22.3	5	562	95	81	20	1030	215	178	0.02	0.002	0.1	0.01	0.005	1	0.01	0.01	1	0.32	0.01				
	11/11/2020			18.4	7.55	3627	2.7	-140.3	5	3.1		531	85	80	18	1040	215	173	0.01	0.002	0.17	0.01	0.001	1.1	0.01	0.01	1.1	0.44	0.01	30	140		
Reporting Period (2020/2021)	Average		-	17.5	7.36	3463	4.83	11.7	5	18.3	5	551	87.2	82	18.8	1040	202	182	0.01	0.002	0.08	0.016	0.005	1.0	0.02	0.02	0.96	4.2	0.03	25	45	ND	ND
	Maximum		-	18.4	7.85	3705	8.90	117.0	7	52.4	5	606	95	92	20	1080	215	202	0.02	0.002	0.17	0.02	0.017	1.1	0.04	0.04	1.10	20.0	0.05	40	140	ND	ND
	Minimum		-	16.7	6.40	3025	2.15	-140.3	5	2.8	5	486	80	72	17	1020	190	173	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.80	0.1	0.01	10	10	ND	ND
All Results	Average		-	19.1	7.68	4311	3.58	-21.8	5	10.3	5	630	111.18	95	21.0909	1175	248	225	0.02	0.002	0.08	0.02	0.006	1.1	0.01	0.02	1.09	2.1	0.03	69	104	16400	8
	Maximum		-	22.2	8.40	6713	8.90	117.0	7	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	2.70	20.0	0.13	230	270	16400	8
	80th Percentile		-	21.3	8.20	5320	7.19	105.8	5	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	1.10	1.2	0.05	164	190	ID	ID
	Median (50th Percentile)		-	18.4	7.57	3971	2.70	55.0	5	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	1.00	0.2	0.01	40	85	16400	8
	20th Percentile		-	17.2	7.35	3471	1.12	-172.5	5	2.5	5	543.4	86.2	80.4	18.4	1030	194	177.4	0.01	0.001	0.05	0.01	0.001	0.8	0.01	0.01	0.80	0.1	0.01	20	12	ID	ID
	Minimum		-	16.7	6.40	3025	0.31	-273.6	5	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	0.70	0.0	0.01	10	10	16400	8

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: DP1-8			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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	30/10/2017	**Commencement of extraction**																															
	7/02/2018			25.7	7.55	4994	4.64	18		153																				40	80		
	8/03/2018			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
	13/04/2018			25	8	4656	6.03	102		6.9																						8790	6
	8/02/2018	**Last day of first extraction campaign.**																															
	31/05/2018			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
2018/2019	25/10/2018			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
	3/12/2018			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
	17/12/2018			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
	7/02/2019																																
	21/02/2019	Hit Bottom																															
2019/2020	15/01/2020	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	5	6
2020/2021	7/07/2020	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	
	11/11/2020			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
	24/02/2021	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
	10/06/2021	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

Reporting Period (2020/2021)	**Average**	-	18.2	7.27	3346	5.02	-60.1	5	6.2	5	512	83	77	18	976	189	185	0.01	0.003	0.07	0.02	0.002	1.3	0.01	0.03	1.28	0.5	0.03	55	125	770	12
	Maximum	-	20.9	8.02	3692	8.80	116.0	5	14.6	5	608	91	91	20	1060	212	218	0.02	0.004	0.11	0.03	0.003	2.2	0.02	0.04	2.20	1.3	0.06	120	280	2680	34
	Minimum	-	16.7	6.40	2434	0.90	-233.7	5	3.1	5	402	71	58	15	774	170	139	0.01	0.002	0.05	0.01	0.001	0.7	0.01	0.01	0.60	0.1	0.01	10	10	5	1
All Results	**Average**	-	21.5	7.66	4220	3.96	-40.8	5	17.9	5	602	108	90	21	1141	235	230	0.02	0.002	0.08	0.02	0.007	1.3	0.01	0.02	1.25	0.4	0.02	55	139	8429	11
	Maximum	-	26.1	8.39	5042	8.80	116.0	8	153.0	5	759	134	111	25	1330	333	294	0.05	0.005	0.13	0.04	0.015	2.4	0.02	0.04	2.40	1.3	0.06	120	280	34800	34
	80th Percentile	-	25.3	8.07	4981	7.05	87.6	6	10.5	IS	670	131	101	23	1286	302	269	0.04	0.004	0.12	0.03	0.010	2.1	0.01	0.04	2.06	1.1	0.04	112	272	23240	23
	Median (50th Percentile)	-	21.1	7.62	4520	4.33	16.7	5	4.9	5	633	117	94	22	1180	221	240	0.02	0.002	0.06	0.01	0.010	1.1	0.01	0.01	1.05	0.2	0.01	45	130	540	7
	20th Percentile	-	17.7	7.30	3629	0.83	-204.7	5	3.2	IS	518	84	79	18	1026	176	181	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.72	0.0	0.01	10	18	5	2
	Minimum	-	16.7	6.40	2434	0.64	-246.3	5	1.4	5	402	71	58	15	774	170	139	0.01	0.001	0.05	0.01	0.001	0.7	0.01	0.01	0.60	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

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 mel/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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	30/11/2015	No sample collected due to equipment failure. Fine Sunny Approx 30mm rain previous week (BoM - Coolangatta).																															
	26/01/2016	Fine, clear, some algae, cattle & ducks		27.3	**8.61**	663	**5.87**	194	4.3	**4.7**	2	64	25	12	7	120	16	94	0.07	0.001	0.07	**0.05**	**0.020**	**0.94**			0.94	0.02	**0.02**	128	174		
	25/02/2016	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		
	17/03/2016	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**		
	8/10/2017	Algae/chrorophyll only to lab		27.5	7.8	890	6.41	58.8		**143**																					5	9
2017/2018	30/10/2017	**Commencement of extraction**																															
	30/10/2017	Daily monitoring requirement for first 2 weeks of dredging.		23.3	7.7	932	**4.25**	230																									
	31/10/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.3	7.7	1029	**4.01**	175																									
	1/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.2	7.4	997	**4.11**	192																									
	2/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.8	7.7	957	**2.77**	209																									
	3/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.4	7.7	1158	**2.96**	204																									
	6/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22.4	7.6	1118	**4.1**	217																									
	7/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22	7.6	1098	**3.8**	211																									
	8/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.9	7.6	1125	**3.9**	210																									
	9/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.4	7.7	1065	**3.98**	204																									
	10/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.6	7.8	1069	**3.92**	208																									
	13/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.3	7.6	1762	**4.1**	134																									
	14/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.5	8.1	1806	**4.3**	124																									
	15/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.5	7.1	1769	**4.3**	178																									
	21/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.4	7.2	1586	**4.7**	143																									
	28/11/2017								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
	30/11/2017	Weekly monitoring requirement.		21.6	7.3	1458	**5**	154																									
	6/12/2017	Weekly monitoring requirement.		22	7.9	**3290**	6.28	199																									
	13/12/2017	Weekly monitoring requirement.		22.7	7.8	**3140**	**3.58**	144																									
	13/12/2017			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**
	20/12/2017	Weekly monitoring requirement.		23.3	7.7	**3450**	**3.88**	158																									
	11/01/2018			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**
	12/01/2018	Weekly monitoring requirement.		21.7	7.6	1600	**4.1**	271																									
	17/01/2018	Weekly monitoring requirement.		20.9	7.4	791	**3.37**	153																									
	23/01/2018	Weekly monitoring requirement.		21.7	7.6	1560	**4.07**	265																									
	24/01/2018			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**
	31/01/2018	Weekly monitoring requirement.		22.3	8.1	1008	**5.02**	1322																									
	7/02/2018			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**
	7/02/2018	Weekly monitoring requirement.		21.2	7.8	**3900**	**5.66**	206																									
	8/02/2018	**Last day of first extraction campaign.**																															
	8/03/2018			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**
	13/04/2018			26.2	8.4	**4708**	8.15	178		**104**																						7880	7
	31/05/2018			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	25/10/2018			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**
	3/12/2018			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**
	17/12/2018			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**
	15/01/2019			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**
	7/02/2019			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**
	21/02/2019			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
	6/03/2019			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
	21/03/2019			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
	3/04/2019			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**
	1/05/2019			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
	5/06/2019			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	3/07/2019			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
	31/07/2019			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
	3/09/2019			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
	2/10/2019			25.1	**8.7**	**5312**	6.7	80.4	5	5.8	5	**755**	131	**114**	25	**1380**	309	193	0.01	0.002	0.05	**0.02**	0.001	**1**	0.01	0.01	1	0.02	0.01	100	10	30800	10
	6/11/2019			23.1	8.5	**4977**	8.6	37.8	8	**3.7**		**727**	105	**109**	25	**1340**	319	190	0.02	0.002	0.05	**0.02**	0.001	**1.2**	0.01	0.01	1.2	0.02	0.01			**215000**	**14**
	15/01/2020	pH meter calibration issue - spurious data.		28.5	**9.1***	**6007**	8.2	-77.3	5	**4.6**		**844**	124	**126**	28	**1420**	322	162	0.01	0.002	0.05	**0.02**	0.001	**1**	0.01	0.01	1	0.01	0.01	820	**590**	5	7
	28/04/2020	Land-based extraction commenced 16/04/20		25.1	8.12	**3594**	8.81	53.3	5	**24.9**	5	**525**	64	77	18	1000	188	132	0.01	0.002	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.02	0.01	40	90	3700	2
2020/2021	7/07/2020	Cloudy.		17.1	**6.4**	**3700**	9	116	5	**3.8**	5	**602**	88	90	20	**1020**	221	174	0.01	0.002	0.05	**0.02**	**0.006**	**0.96**	0.01	0.04	0.9	0.18	**0.04**	60	20	11900	
	12/08/2020	Clear		18.4	8.3	**3488**	10.6	92	5	7.3	5	**559**	90	82	19	**1020**	182	168	0.01	0.001	0.05	0.01	0.001	**1**	0.01	0.04	0.9	0.04	**0.05**	30	10	17500	9
	16/09/2020			21.6	8.41	**3636**	10.59	85.1	5	**45.8**	5	**570**	87	84	19	**1080**	189	149	0.01	0.002	0.05	**0.03**	0.001	**0.8**	0.01	0.01	**0.8**	0.01	0.01	10	10	22600	**11**
	14/10/2020			24.7	**8.53**	**3489**	9.46	47.9	5	14.3	5	**567**	96	82	19	**1040**	232	136	0.02	0.002	0.05	**0.02**	0.001	**0.8**	0.01	0.01	0.8	0.01	0.01			4480	6
	11/11/2020			24.7	8.33	**3677**	9.31	-21.7	5	**3**		**548**	86	81	18	**1060**	236	143	0.03	0.002	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.01	0.01	10	180	1160	5
	24/02/2021	Clear		26.7	8.03	**3050**	8.15	67.4	5	5.6		433	77	65	16	901	194	127	0.04	0.002	0.05	0.01	0.004	**0.7**	0.01	0.01	**0.7**	0.2	0.01	620	180	4090	5
	10/06/2021	Clear		17.5	8.08	2451	9.02	78.6	5	**3.38**		392	69	56	14	782	163	136	0.01	0.002	0.05	0.01	0.001	**0.7**	0.02	0.04	0.6	0.18	**0.06**	10	50	5	2

Pre-Extraction 2017/2018 (Extraction)	**Average**	-	26.3	8.12	695	**4.87**	114.7	6	**39.1**	3	65	26	12	8	117	15	95	0.07	0.002	0.03	**0.04**	**0.020**	**0.9**	ND	ND	0.9	0.0	**0.02**	139	188	5	9
	Maximum	-	32.0	8.40	**4918**	8.15	1322.0	38	**104.0**	5	**680**	137	**101**	24	**1340**	305	260	0.03	0.002	0.05	**0.10**	**0.010**	**1.4**	0.01	0.05	1.4	0.2	**0.05**	150	**1180**	7880	**40**
	Minimum	-	20.3	7.10	791	**0.19**	-0.8	18	17.6	5	453	109	71	18	882	198	220	0.01	0.001	0.05	0.01	**0.010**	**1.0**	0.01	0.01	1.0	0.0	0.01	130	120	5	7
Reporting Period (2020/2021)	**Average**	-	21.5	8.01	**3356**	9.45	66.5	5	11.9	5	**524**	85	77	18	986	202	148	0.02	0.002	0.05	**0.02**	0.002	**0.8**	0.01	0.02	0.8	0.1	**0.03**	123	75	8819	6
	Maximum	-	26.7	**8.53**	**3700**	10.60	116.0	5	**45.8**	5	**602**	96	90	20	**1080**	236	174	0.04	0.002	0.05	**0.03**	**0.006**	**1.0**	0.02	0.04	0.9	0.2	**0.06**	620	180	22600	**11**
	Minimum	-	17.1	**6.40**	2451	8.15	-21.7	5	**3.0**	5	392	69	56	14	782	163	127	0.01	0.001	0.05	0.01	0.001	**0.7**	0.01	0.01	0.6	0.0	0.01	10	10	5	2
All Results	**Average**	-	23.5	7.99	**3215**	6.05	131.0	7	19.1	5	**602**	103	91	21	**1107**	252	179	0.02	0.002	0.05	**0.03**	**0.006**	**1.0**	0.01	0.02	1.0	0.1	**0.03**	160	208	42169	**12**
	Maximum	-	32.0	**8.83**	**7136**	10.60	1322.0	38	**143.0**	5	**844**	137	**126**	28	**1420**	335	270	0.10	0.005	0.07	**0.10**	**0.020**	**1.4**	0.02	0.11	1.4	0.4	**0.13**	820	**1180**	**409000**	**40**
	80th Percentile	-	27.0	8.49	**5076**	8.71	204.0	9	**24.5**	5	**741**	126	**113**	25	**1348**	316	226	0.04	0.002	0.05	**0.05**	**0.010**	**1.2**	0.01	0.04	1.2	0.1	**0.04**	180	**340**	44980	**15**
	Median (50th Percentile)	-	22.7	7.91	**3489**	**5.65**	116.0	5	7.2	5	**674**	112	99	23	**1250**	294	178	0.02	0.002	0.05	**0.02**	0.004	**1.0**	0.01	0.01	1.0	0.0	0.01	100	120	11900	9
	20th Percentile	-	21.2	7.60	1069	**3.98**	41.5	5	**3.6**	5	**530**	86	78	18	997	190	137	0.01	0.001	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.0	0.01	30	20	1095	6
	Minimum	-	17.1	**6.40**	613	**0.19**	-109.0	4	**-9.9**	2	64	25	12	7	110	14	94	0.01	0.001	0.01	0.01	0.001	**0.6**	0.01	0.01	0.6	0.0	0.01	10	10	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

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 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	-	-	*6.5-8.5*	*<3000*	*>6*			*5-20*	*10*	*<500*		*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*				*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	8/10/2017	Algae/chrorophyll only to lab		27.3	7.87	898	7.17	63.4		139																					5	7
2017/2018	30/10/2017	**Commencement of extraction**																															
	30/10/2017	Daily monitoring requirement for first 2 weeks of dredging.		23.5	7.8	956	**4.8**	225																									
	31/10/2017	Daily monitoring requirement for first 2 weeks of dredging.		19.4	7.9	1266	**4.83**	184																									
	1/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.5	7.9	1170	**4.83**	195																									
	2/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.9	7.6	1119	**2.17**	211																									
	3/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		20.7	7.7	1202	**3.46**	205																									
	6/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22.5	7.6	1117	**4.1**	219																									
	7/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		22	7.6	1098	**3.82**	209																									
	8/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.9	7.6	1128	**3.88**	212																									
	9/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.7	7.6	1043	**3.94**	210																									
	10/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.7	7.8	1073	**3.97**	211																									
	13/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.1	7.6	1783	**4.2**	136																									
	14/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.7	8.2	1784	**4.8**	120																									
	15/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.3	7.4	1790	**4.1**	132																									
	21/11/2017	Daily monitoring requirement for first 2 weeks of dredging.		21.4	7.7	1752	**5.3**	136																									
	28/11/2017			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
	30/11/2017	Weekly monitoring requirement.		21.7	7.4	1584	**4.9**	129																									
	6/12/2017	Weekly monitoring requirement.		22	7.9	**3260**	6.31	199																									
	13/12/2017	Weekly monitoring requirement.		22.6	7.8	**3220**	**3.67**	153																									
	13/12/2017			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**
	20/12/2017	Weekly monitoring requirement.		23.3	7.5	**3540**	**3.57**	161																									
	11/01/2018			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**
	12/01/2018	Weekly monitoring requirement.		21.7	7.7	1660	**4.3**	180																									
	17/01/2018	Weekly monitoring requirement.		20.8	7.5	857	**3.4**	145																									
	23/01/2018	Weekly monitoring requirement.		21.7	7.7	1620	**4.21**	178																									
	24/01/2018			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**
	31/01/2018	Weekly monitoring requirement.		23.3	8.2	1068	**2.55**	168																									
	7/02/2018	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**
	7/02/2018	Weekly monitoring requirement.		20.9	7.8	**3980**	**5.08**	201																									
	8/02/2018	**Last day of first extraction campaign.**																															
	8/03/2018			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**
	13/04/2018			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
	31/05/2018			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
2018/209	25/10/2018			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**
	3/12/2018			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**
	17/12/2018			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**
	15/01/2019			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**
	7/02/2019			28.3	8.44	**5156**	7.62	-70.5	ND	**3.1**		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
	21/02/2019			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
	6/03/2019			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
	21/03/2019			27.7	8.46	**5954**	**5.74**	-94.8	5	**3.21**		**745**	110	**112**	26	**1290**	293	162	0.03	0.002	0.05	**0.02**	0.001	**1**	0.01	0.01	1	0.01	0.01			12100	9
	3/04/2019			25	8.44	**5291**	**4.91**	197	10	7.8	5	**746**	126	**114**	24	**1240**	302	170	0.02	0.002	0.05	**0.05**	0.002	**1.1**	0.01	0.01	1.1	0.05	0.01	330	**270**	27500	9
	1/05/2019			23.2	8.19	**4553**	7.72	-62	5	6.1		**800**	127	**119**	25	**1300**	294	188	0.01	0.002	0.05	**0.02**	0.001	**0.9**	0.01	0.01	0.9	0.04	0.01			**63600**	10
	5/06/2019			18.4	7.7	**4147**	7.4	73	6	**-9.7**		**710**	128	**110**	24	**1270**	306	224	0.01	0.002	0.05	**0.03**	0.002	**1.4**	0.02	0.04	1.3	0.36	**0.06**			11900	**11**
2019/2020	3/07/2019			19.7	8.39	**6587**	7.05	87	5	**1.8**	5	**733**	125	**108**	24	**1280**	249	224	0.01	0.001	0.05	0.01	0.001	**1.3**	0.02	0.14	1.1	0.14	**0.16**	50	40	19800	10
	31/07/2019			**18.4**	8.39	**7215**	6.6	95.8	5	9.1		**702**	125	**110**	24	**1330**	304	212	0.01	0.001	0.05	**0.02**	0.001	**1.1**	0.01	0.11	1	0.01	**0.11**			27600	7
	3/09/2019			20.8	7.4	**5514**	9.5	116.4	5	9.6		**738**	124	**111**	23	**1340**	333	175	0.01	0.001	0.05	**0.02**	0.001	**1.1**	0.01	0.01	**1.1**	0.03	0.01			33200	**14**
	2/10/2019			24.5	**8.55**	**5283**	**5.9**	95.3	5	5.3	5	**754**	129	**113**	24	**1390**	312	194	0.01	0.002	0.05	0.01	0.001	**1.1**	0.01	0.01	1.1	0.01	0.01	60	40	38400	10
	6/11/2019			22.7	8.5	**4938**	8.8	126.8	5	5.4		**734**	106	**109**	25	**1290**	318	187	0.02	0.002	0.05	**0.02**	0.001	**1.2**	0.01	0.01	1.2	0.02	0.01			**100000**	**15**
	15/01/2020	pH meter calibration issue - spurious data.		27.2	**13.4***	**5864**	8	54.2	5	**3**		**846**	118	**126**	28	**1400**	316	163	0.02	0.001	0.05	0.01	0.001	**1**	0.01	0.01	1	0.02	0.01	120	80	5	9
	28/04/2020	Land-based extraction commenced 16/04/20.		24.2	8.21	**3530**	8.83	48.8	5	**-2.4**	5	**531**	64	78	18	1000	187	130	0.01	0.002	0.05	0.01	0.001	**0.7**	0.01	0.01	0.7	0.01	0.01	20	80	4260	3
2020/2021	7/07/2020	Clear.		16.7	**6.4**	**3560**	9.3	132	5	**2.1**	5	**590**	87	89	20	**1020**	216	174	0.01	0.002	0.05	0.01	0.005	**0.9**	0.01	0.02	0.9	0.16	**0.02**	70	10	5360	
	12/08/2020	Clear		17.8	8.03	**3871**	10.4	93	5	8.1	5	**552**	89	85	19	**1030**	183	165	0.02	0.002	0.05	**0.03**	0.001	**1**	0.01	0.04	1	0.05	**0.05**	20	30	36000	9
	16/09/2020			21.5	8.4	**3639**	10.5	137	8	**95**	5	**572**	87	85	19	**1080**	191	148	0.01	0.002	0.05	**0.02**	0.001	**0.9**	0.01	0.01	**0.9**	0.11	0.01	10	10	20500	**11**
	14/10/2020			23.7	8.38	**3497**	9.7	86.1	5	10.8	5	**573**	97	84	20	**1030**	230	141	0.03	0.002	0.05	**0.02**	0.001	**0.8**	0.01	0.01	0.8	0.01	0.01			6380	6
	11/11/2020			24.2	8.25	**3687**	9.35	87.9	5	**2.9**		**549**	88	82	19	**1040**	235	142	0.03	0.002	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.03	0.01	10	130	915	6
	24/02/2021	Clear		26.6	8.12	**3047**	8.35	-180.1	5	**4**		440	77	67	16	903	195	126	0.03	0.002	0.05	0.01	0.001	**0.6**	0.01	0.01	0.6	0.01	0.01	80	40	4000	5
	10/06/2021	Clear		18	8.05	2483	8.93	49.6	5	**35.21**		393	70	57	14	779	164	136	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	2

Pre-Extraction	**Average**	-	27.3	7.87	898	7.17	63.4	ND	**139.0**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	7
2017/2018 (Extraction)	**Maximum**	-	30.8	8.20	**4786**	8.66	225	54	**31.4**	5	**681**	136	**101**	25	**1350**	322	266	0.03	0.002	0.05	**0.12**	**0.010**	**1.5**	0.01	0.06	1.5	0.23	**0.06**	260	**1620**	9200	**48**
	Minimum	-	19.4	7.28	857	**0.19**	-0.5	14	**0.7**	5	456	104	73	18	845	192	224	0.01	0.001	0.05	0.01	**0.010**	**1.0**	0.01	0.01	1.0	0.01	0.01	130	**260**	5	3
Reporting Period (2020/2021)	**Average**	-	21.2	7.95	**3398**	9.50	57.929	5	22.6	5	**524**	85	78	18	983	202	147	0.02	0.002	0.05	**0.02**	0.002	**0.8**	0.01	0.02	0.8	0.08	**0.02**	33	40	10451	7
	Maximum	-	26.6	8.40	**3871**	10.50	137	8	95.0	5	**590**	97	89	20	**1080**	235	174	0.03	0.002	0.05	**0.03**	0.005	**1.0**	0.02	0.04	1.0	0.20	**0.06**	80	130	36000	**11**
	Minimum	-	16.7	6.40	2483	8.35	-180.1	5	**2.1**	5	393	70	57	14	779	164	126	0.01	0.002	0.05	0.01	0.001	**0.6**	0.01	0.01	0.6	0.01	0.01	10	10	5	2
All Results	**Average**	-	23.375	7.952678571	**3368.36842**	6.0133	105.33	8.7296296	16.11576	5	**645.78125**	110.59375	97.65625	22.15625	**1187.21875**	272.0625	188.75	0.019688	0.0018438	0.05156	**0.0284848**	0.004727273	**1.0606061**	0.0109	0.0239	1.0394	0.06818	**0.0260606**	89.375	181.875	41666.9697	**12.1212**
	Maximum	-	30.8	**8.81**	**7215**	10.5	225	53.7	**139**	5	**846**	136	**126**	28	**1400**	333	273	0.05	0.005	0.1	**0.12**	**0.01**	**1.5**	0.02	0.14	1.5	0.36	**0.16**	330	**1620**	**418000**	**48**
	80th Percentile	-	26.9	8.39	**5046.8**	8.812	195.8	11.2	**25.66**	5	**740.8**	127	**111.4**	24.4	**1334**	316.8	231	0.03	0.002	0.05	**0.042**	**0.01**	**1.22**	0.01	0.04	1.2	0.14	**0.052**	126	216	41840	**16**
	Median (50th Percentile)	-	22.6	7.9	**3560**	**5.3**	116.4	5	7.9	5	**667.5**	114.5	99.5	22.5	**1250**	300	183.5	0.02	0.002	0.05	**0.02**	0.002	**1.1**	0.01	0.01	1.1	0.04	0.01	65	65	11900	10
	20th Percentile	-	20.8	7.6	1189.2	**3.916**	40.8	5	**2.74**	5	**558**	88.6	84.6	19	**1026**	207.6	145.6	0.01	0.001	0.05	0.01	0.001	**0.8**	0.01	0.01	0.8	0.01	0.01	14	24	1015	6
	Minimum	-	16.7	**6.4**	857	**0.19**	-180.1	5	**-9.7**	5	393	64	57	14	779	164	126	0.01	0.001	0.05	0.01	0.001	**0.6**	0.01	0.01	0.6	0.01	0.01	10	10	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

This page has intentionally been left blank

This page has intentionally been left blank

Appendix 5

Groundwater Monitoring Results

(Total No. of pages including blank pages = 18)

This page has intentionally been left blank

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB1

Site: MB1			Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae											
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*<10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	2/07/2002					6.98	1516										108	492		0.01		1.09												
	18/07/2002					6.59	1854	0.91																										
	19/07/2002																53	437		0.01		7.15												
	28/08/2002					6.85	1364										35	425		0.01		15.7												
	1/10/2002					6.84	1272	0.64																										
	23/10/2002					6.54	1372	0.91																										
	24/10/2002																55	227		0.09		3.14												
	28/11/2002					6.66	1215	1.07																										
	13/12/2002					7.32	1463	1.28																										
	16/12/2002																59	271		0.01		0.69												
	20/01/2003					7.31	1587										58	287		0.01		3.61												
	24/06/2003					7.01		4.98	23				58	193	36		103	375	230	0.01		3.95												
	22/07/2003					7.11		7.66																										
	28/08/2003					6.79		2.03																										
	29/09/2003					6.76		0.9																										
	24/10/2003					6.96		3.53																										
	30/11/2004					7	1536																											
	16/12/2004					7.24	1087																											
	13/01/2005					7	978																											
	2/02/2005					6.9		0.14																										
	8/03/2005					6.85	872	0.05	-85				40	139	25	5	55	216	153	0.04		18												
	10/05/2005					6.85	880												143															
	19/07/2005					7.07	1109	0.54					44	178	25	5	80	246	165	0.12		19												
	5/08/2005					7.48	1066	0.68																										
	10/11/2005					7.21	985	0.27					31	121	20	5	75	173	142	0.11		13												
	12/01/2006					7.12	1214	0.29					36	136	22	5	63		170	0.11		14												
	7/04/2006					7.18	1036	0.20																										
	3/05/2006					7.12	1005	0.18										161																
	10/05/2006					7.01	1002	0.20	-155				38	135	21	5	42	186	218	0.01		5.51												
	19/05/2006					6.88	1008	0.66																										
	26/05/2006					6.43	905	0.42																										
	1/06/2006					6.92	948	0.48																										
	8/06/2006					6.84	1016	0.36																										
	15/06/2006					7.08	1029	0.21					37	176	25	5	124	191	110	0.14		12												
	23/06/2006					6.71	1100	0.38	-113																									
	29/06/2006					6.43	1006	0.20																										
	6/07/2006					7.76	935	0.21	-168																									
	13/07/2006																		183															
	14/07/2006					7.05	978	0.35																										
	8/02/2007					6.87	979	0.32	-102				45	143	20	5	80	171		0.04		22												
	4/03/2007																																	
	29/08/2007					7.1	1026	0.31	-1398				33	113	15	5	40	103	160	0.01		6.51												
	26/10/2007					7.02	733	0.20					32	100	16	5	52	102	181	0.01		0.24												
	14/11/2007					6.74	828	0.26					37	105	17	5	38	96	180	0.01		11												
	2/09/2008					7.4	840																											
	4/09/2017		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				
	5/10/2017		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	10	10		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		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	10	10		
	13/12/2017		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			5	1
	11/01/2018		1.38	-0.18	24.8	7.78	642	0.46	-142		5.7	5	31	107	11	4	28	3	317	0.01	0.001	0.05	0.18	0.010	1.20	0.01	0.01	1.2	0.55	0.01	2	8	5	1
	24/01/2018		1.76	-0.56	23.8	7.48	717	0.52	-32.7		15.8		27	105	9	4	24	6	295	0.01	0.001	8.29	0.14	0.010	1.10	0.01	0.02	1.1	0.78	0.03			5	1
	6/02/2018		1.76	-0.56	25	7.09	722	1.15	-109		7.5	5	29	100	10	3	115	27	320	0.01	0.001	0.05	0.12	0.010	0.70	0.01	0.01	0.7	0.47	0.01	10	10		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		0.75	0.45	23.9	7.02	689	0.18	-92		1.8		24	96	11	3	26	7	335	0.01	0.001	0.11	0.11	0.010	1.20	0.01	0.02	1.2	0.56	0.02			5	1
	13/04/2018		0.92	0.28	25	6.66	692	2.73	-69		4.3		31	101	11	3	23	14	326	0.01	0.001	9.5	0.18	0.010	0.70	0.01	0.01	0.7	0.29	0.01			5	1
	31/05/2018		0.93	0.27	20.7	7.21	601	0.72	-86		0.5	5	21	102	10	3	38	20	316	0.01	0.001	5.1	0.11	0.010	0.60	0.01	0.01	0.6	0.35	0.01	10	10	5	1
2018/2019	24/10/2018		0.81	0.39	19.3	6.93	707	1.08	-97.1	26	1.2	5	21	92	10	3	38	8	307	0.05	0.005	8.77	0.17	0.010	0.8	0.01	0.01	0.8	0.39	0.01	10	10	5	1
	3/12/2018		1.08	0.12	21	7.12	721	0.6	-95.7	23	0.2		31	83	10	3	37	9	301	0.01	0.001	7.8	0.13	0.010	0.7	0.01	0.01	0.7	0.36	0.01			5	1
	17/12/2018		1.05	0.15	20.8	7.42	639	0.39	-159	29	0.3		31	83	10	3	34	6	284	0.01	0.001	8.2	0.11	0.010	0.4	0.01	0.01	0.4	0.31	0.01			5	1
	15/01/2019		1.18	0.02	24.4	7.07	612	0.35	-123.5	24	2.7	5	31	89	10	3	33	10	303	0.01	0.001	10.2	0.17	0.010	0.6	0.01	0.01	0.6	0.38	0.01	10	10	5	1
	6/02/2019	Cap Missing	1.34	-0.14	23	6.95	593	0.51	-147.9	31	-0.2		37	99	12	3	32	7	298	0.01	0.001	0.05	0.18	0.080	0.5	0.01	0.01	0.5	0.31	0.01			5	1
	21/02/2019	No Cattle Noted. MB1 logger dropped to bottom of bore - cattle?	1.41	-0.21	24.4	7.07	654	0.31	-186.9	30	44.6		33	90	11	3	32	4	277	0.01	0.001	13.6	0.26	0.010	0.7	0.01	0.01	0.7	0.44	0.01			5	1
	6/03/2019	Cattle on site. Downloaded loggers (elevation & rain). Retrieved logger from MB1	1.41	-0.21	26	7.13	674	0.66	-145	33	9.4		34	92	11	3	41	3	596	0.01	0.001	9.97	0.28	0.003	0.7	0.01	0.02	0.7	0.33	0.02			5	1
	20/03/2019		0.95	0.25	24.5	7.14	841	1.21	-21.4	34	0.41		32	100	10	4	28	3	309	0.01	0.001	10.3	0.15	0.004	0.8	0.01	0.01	0.8	0.42	0.01			5	1
	4/04/2019		0.84	0.36	24.12	7.04	756	0.61	-17.2		0.37	5	30	119	8	4	24	8	334	0.01	0.001	11.8	0.19	0.010	1.2	0.01	0.01	1.2	0.55	0.01	10	10	5	1
	30/04/2019		0.96	0.24	22.1	6.64	702	0.36	-122	24	10		29	119	12	4	23	14	347	0.01	0.001	11.6	0.16	0.018	0.9	0.01	0.02	0.09	0.47	0.02			5	1
	5/06/2019		1	0.2	21.5	7	679	0.66	-133	26	-8.6		26	118	11	4	25	11	332	0.01	0.001	10.4	0.16	0.003	1	0.01	0.01	1	0.44	0.01			5	1
2019/2020	3/07/2019		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	10	10	5	1
	31/07/2019	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			5	1
	4/09/2019	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			5	1
	2/10/2019		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	10	20	5	1
	6/11/2019		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			5	1
	15/01/2020	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	10	10		
	28/04/2020	Monitoring bore damaged (buried during drain cleaning) and requires repair. No sample could be obtained. Bore and logger recovered 10/07/20.																																
2020/2021	16/09/2020		0.61		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	10	5	1
	14/10/2020	Overcast	0.79		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	10	10	5	1
	11/11/2020		0.83		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	10	10	5	1
	10/06/2021		0.47		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	40	20	5	1

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB1

Pre-Extraction	Average	0.92	0.285	20.8	6.98	1081	0.96	-233.0	32	18.2	5	39	131	21	5	64	220	186	0.05	0.001	9.18	**0.29**	**0.010**	**0.7**	0.01	0.01	0.7	0.34	**0.01**	10	10	ND	ND
	Maximum	0.97	0.340	21.8	7.76	1854	**7.66**	23.0	32	35.0	5	58	193	36	5	124	492	292	0.14	0.001	**22.00**	**0.46**	**0.010**	**0.7**	0.01	0.01	0.7	0.39	**0.01**	10	10	ND	ND
	Minimum	0.86	0.230	19.8	**6.43**	576	0.05	-1398.0	32	1.4	5	31	77	13	4	35	10	110	0.01	0.001	0.24	**0.11**	**0.010**	**0.6**	0.01	0.01	0.6	0.28	**0.01**	10	10	ND	ND
	80th Percentile	ID	ID	ID	7.17	1327	1.07	-18.1	ID	ID	ID	44	176	25	5	80	375	230	0.11	**ID**	15.70	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile	ID	ID	ID	6.78	890	0.20	-168.0	ID	ID	ID	33	96	15	5	42	102	143	0.01	**ID**	3.14	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average	0.68	ND	20.6	6.71	656	1.89	-73.3	32	656.4	5	26	110	11	4	27	3	334	0.01	0.001	8.54	**0.16**	**0.016**	0.1	0.01	0.03	0.9	0.42	**0.03**	18	13	5	1
	Maximum	0.83	0.000	22.0	6.88	722	2.40	7.5	47	2546.8	5	28	119	11	4	28	5	368	0.01	0.001	13.00	**0.22**	**0.044**	**0.4**	0.01	0.05	1.2	0.62	**0.05**	40	20	5	1
	Minimum	0.47	0.000	18.9	6.51	528	1.39	-113.3	20	4.9	5	23	93	9	3	26	1	280	0.01	0.001	0.05	**0.04**	0.001	0.0	0.01	0.01	0.3	0.01	**0.01**	10	10	5	1
All Results	Average	1.07	0.071	22.5	6.99	923	0.96	-126.0	30	90.7	5	33	111	14	4	46	91	282	0.03	0.001	8.46	**0.18**	**0.019**	**0.9**	0.01	0.02	1.0	0.52	**0.02**	11	11	5	1
	Maximum	1.76	0.450	26.0	7.78	1854	**7.66**	23.0	86	2546.8	5	58	193	36	5	124	492	**596**	0.14	0.005	**22.00**	**0.46**	**0.108**	**2.6**	0.01	0.21	2.6	1.44	**0.22**	40	20	5	1
	80th Percentile	1.36	0.316	24.5	7.18	1100	1.30	-56.3	34	15.4	5	39	125	18	5	58	196	335	0.03	0.001	12.88	**0.23**	**0.018**	**1.3**	0.01	0.02	1.3	0.72	**0.02**	10	10	5	1
	Median (50th Percentile)	0.98	0.150	22.1	7.00	880	0.54	-95.2	29	4.9	5	32	105	11	4	39	10	301	0.01	0.001	9.97	**0.17**	**0.010**	**0.7**	0.01	0.01	0.8	0.44	**0.01**	10	10	5	1
	20th Percentile	0.82	-0.192	20.7	6.79	675	0.21	-142.6	22	0.4	5	28	91	10	3	27	4	181	0.01	0.001	0.93	**0.11**	**0.006**	**0.5**	0.01	0.01	0.6	0.32	**0.01**	10	10	5	1
	Minimum	0.47	-0.560	18.9	**6.43**	526	0.05	-1398.0	5	-8.6	5	21	77	8	3	23	1	110	0.01	0.001	0.05	**0.04**	0.001	0.0	0.01	0.01	0.1	0.01	**0.01**	2	8	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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB2

Site: MB2			Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae												
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	22/05/2002																20	27		0.86		7.77												
	2/07/2002					7.42	1875										20	17		1.08		7.04												
	18/07/2002					6.88	2380	1.13																										
	19/07/2002																14	17		0.97		7.93												
	28/08/2002					5.93	160										10	18		1.45		9.5												
	1/10/2002					7.72	180	0.67																										
	23/10/2002					7.38	2394	0.86																										
	24/10/2002																22	13		1.5		8.06												
	28/11/2002					6.67	178	0.79																										
	13/12/2002					6.36	174	1.15																										
	16/12/2002																27	19		1.32		8.28												
	20/01/2003					6.92	1909										24	16		1.92		8.84												
	24/06/2003					6.39		0.8	216				18	1	1		24	13	11	0.44		3.13												
	22/07/2003					6.53		5.09																										
	28/08/2003					6.61		3.8																										
	29/09/2003					5.96		0.6																										
	24/10/2003					6.66		3.47																										
	30/11/2004					5.65	138																											
	16/12/2004					6.43	139																											
	13/01/2005					6.67	365																											
	2/02/2005					6.22		0.37																										
	8/03/2005					6.81	115	0.28	-130				15	0.43	0.46	17	22	14	15.9	6.37		9.14												
	10/05/2005					5.56	118												24															
	19/07/2005					4.62	161	0.21					18	0.8	0.4	17	40	17	14.6	3.95		6.57												
	10/11/2005					5.87	348	0.21					15	1.42	0.4	14	45	14	17	4.81		7.38												
	12/01/2006					5.49	182	0.26					17	1.8	0.6	19	34		60	6.16		7.71												
	7/04/2006					5.88	188	0.20																										
	3/05/2006					5.6	142	0.25										23																
	10/05/2006					6.07	88	0.16	-104				12	0.2	0.2	19	14	14	14	0.73		3.12												
	19/05/2006					5.61	123	0.32																										
	26/05/2006					6.1	139	0.23																										
	1/06/2006					6.07	199	0.43																										
	8/06/2006					6.4	139	0.30																										
	15/06/2006					6.05	134	0.28					16	0.5	0.2	20	37	16	11	1.21		4.85												
	23/06/2006					4.95	131	0.23	-29																									
	29/06/2006					5.75	133	0.28																										
	6/07/2006					5.28	115	0.17	-21																									
	13/07/2006																		7.8															
	14/07/2006					5.33	132	0.27																										
	8/02/2007					5.05	150	0.33	-10				16	0.4	0.3	20	27	16		1.98		6.88												
	29/08/2007					5.69	178.4	0.24	110.9				17	0.4	0.6	15	28	16	10	2.08		5.76												
	26/10/2007					5.4	124.4	0.17					23	0.7	1	15	33	14	7	1.42		5.8												
	14/11/2007					5.76	129.3	0.22					22	0.3	2	13	38	21	7	1.5		6.78												
	2/09/2008					6.1	127.6																											
	4/09/2017		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**				
	5/10/2017		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**	10	10		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		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**	1	1		
	13/12/2017		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**			5	1
	11/01/2018		2.69	-0.74	25.1	**5.56**	749	0.62	-5		6.7	5	119	11	8	26	182	159	1	0.05	0.002	18.9	**0.06**	**0.01**	**1.50**	0.01	0.01	1.5	0.77	**0.01**	1	**410**	5	1
	24/01/2018		2.66	-0.71	24.1	**5.76**	582	0.34	-5		14.8		72	10	5	7	152	67	12	0.2	0.008	**23.4**	**0.04**	**0.02**	**0.80**	0.01	0.01	0.8	0.2	**0.01**			5	3
	6/02/2018		2.6	-0.65	26.1	**5.55**	705	0.37	2		6.2	5	97	20	9	7	162	92	23	0.07	0.014	16.8	**0.14**	**0.01**	**1.50**	0.01	0.01	1.5	0.45	**0.01**	10	**560**		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		1.56	0.39	24.2	**5.85**	872	0.19	-115		6.7		95	25	8	6	185	92	28	0.15	0.007	16.1	**0.02**	**0.02**	**1.30**	0.01	0.01	1.3	0.38	**0.01**			5	1
	13/04/2018		1.67	0.28	24.5	**5.33**	882	1.28	-20		1.5		116	19	8	6	178	103	12	0.12	0.018	**20.3**	**0.05**	**0.02**	**0.80**	0.01	0.01	0.8	0.17	**0.01**			5	4
	31/05/2018		1.69	0.26	22.3	7.18	718	0.74	19.4		13.4	5	102	19	7	6	180	100	1	0.15	0.014	18.8	**0.02**	**0.01**	0.04	0.01	0.01	0.4	0.19	**0.1**	10	10	5	2
2018/2019	24/10/2018		1.5	0.45	20.25	**5.18**	840	0.31	-8.1	5	0.5	5	96	11	6	10	189	134	17	0.13	0.025	**30**	**0.05**	**0.01**	**0.7**	0.01	0.01	0.7	0.32	**0.01**	10	10	5	1
	3/12/2018		1.77	0.18	22.9	**5.22**	835	2.85	39.1	9	2.1		99	10	8	13	173	115	15	0.11	0.031	**33.2**	**0.06**	**0.02**	**0.8**	0.01	0.01	0.8	0.58	**0.01**			5	1
	17/12/2018		1.82	0.13	22.1	**5.94**	584	2.2	0.3	27	12.6		81	9	6	14	128	119	5	0.13	0.032	**21.4**	**0.06**	**0.01**	**1**	0.01	0.01	1	0.42	**0.01**			5	1
	15/01/2019		1.9	0.05	23.8	**5.41**	423	0.38	-71	8	8.2	5	70	10	5	11	100	85	4	0.13	0.026	**23.1**	**0.05**	**0.01**	**0.8**	0.01	0.01	0.8	0.41	**0.01**	10	10	5	1
	6/02/2019		2.05	-0.1	23.5	**5.17**	309	0.75	61.5	41	7		41	5	4	10	70	57	4	0.15	0.03	12	**0.06**	**0.005**	**0.9**	0.01	0.01	0.9	0.3	**0.01**			5	1
	21/02/2019		2.15	-0.2	23.6	**5.25**	427.5	0.46	5.4	28	70.6		37	5	3	11	51	36	11	0.17	0.028	**20.3**	**0.05**	**0.03**	**0.7**	0.01	0.01	0.7	0.14	**0.01**			5	1
	6/03/2019		2.13	-0.18	24.9	**5.28**	620	0.54	-90.1	5	5.7		89	8	5	10	136	76	17	0.14	0.022	**21.8**	**0.04**	**0.005**	**0.6**	0.01	0.01	0.6	0.27	**0.01**			5	1
	20/03/2019		1.72	0.23	24.5	**5.48**	478	0.79	75.4	8	0.23		54	6	4	10	89	60	16	0.18	0.026	16.6	**0.06**	0.002	**0.7**	0.01	0.01	0.7	0.27	0.01			5	1
	4/04/2019		1.67	0.28	24.39	**5.4**	333	0.74	76	8	0.16	5	80	8	5	10	134	87	13	0.14	0.031	**20.6**	**0.06**	0.002	**0.9**	0.01	0.01	0.9	0.3	0.01	140	10	5	1
	30/04/2019		1.94	0.01	22.5	**4.9**	438	0.61	51.6	6	8.6		78	11	7	13	146	100	10	0.17	0.079	**27**	**0.05**	**0.017**	**0.8**	0.01	0.01	0.08	0.33	0.01			5	2
	5/06/2019		1.72	0.23	21.7	**5**	722	0.63	4.8	7	-8.4		88	6	7	12	148	115	6	0.17	0.046	**29.3**	**0.05**	0.004	**1**	0.01	0.01	1	0.48	0.01			5	1
2019/2020	3/07/2019		1.51	0.44	22.05	**5.39**	879	0.17	-51.2	5	0	5	68	9	6	12	116	80	22	0.2	0.116	**33.5**	**0.08**	0.001	**1.3**	0.01	0.01	1.3	0.56	0.01	930	10	5	1
	31/07/2019		1.63	0.32	21	**5.37**	827	3.55	64.5	54	10.3		76	9	7	12	129	100	1	0.21	0.092	**35.5**	**0.08**	**0.032**	**1.1**	0.01	0.01	1.1	0.37	0.01			5	1
	4/09/2019		1.73	0.22	22.2	**5.1**	722	0.3	64.9	5	18.4		70	9	6	11	129	104	8	0.15	0.063	**34.1**	**0.06**	**0.015**	**0.8**	0.01	0.01	0.8	0.32	0.01			5	1
	2/10/2019		1.87	0.08	21.8	**5.1**	569	0.5	64.2	62	4.3	5	49	7	5	10	80	57	1	0.21	0.109	**26.8**	**0.07**	**0.015**	**1.1**	0.01	0.01	1.1	0.28	0.01	10	10	5	1
	6/11/2019		2.02	-0.07	22.9	**5.4**	250.8	**1.1**	21	5	21.5		34	4	3	8	75	53	3	0.24	0.106	16.8	**0.08**	**0.018**	**0.9**	0.01	0.01	0.9	0.36	0.01			5	1
	15/01/2020	pH meter calibration issue - spurious data.	2.44	-0.49	23	**8***	372	0.61	-3.5	2	16.6		42	4	3	8	65	36	1				**0.08**	**0.01**	**0.9**	0.01	0.01	0.9	0.35	0.01	10	10		
	28/04/2020	Land-based extraction commenced 16/04/20.	1.24	0.71	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	10	10		
2020/2021	7/07/2020	Cloudy	1.35		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	10	10	5	3
	12/08/2020	Clear	1.22		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	10	10	5	5
	16/09/2020		1.36		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	10	5	2
	14/10/2020		1.57		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	10	10	5	2
	11/11/2020	Cloudy, Odour	1.61		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	10	10	5	2
	10/06/2021		1.25		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	10	10	5	1

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB2

Pre-Extraction	Average	1.71	0.245	21.3	**6.07**	383	0.74	5.1	9	10.9	5	16	1	1	15	26	15	16	**2.03**	0.010	6.60	**0.075**	**0.050**	**0.7**	0.01	0.01	0.7	0.24	**0.01**	10	10	ND	ND
	Maximum	1.77	0.310	21.7	7.72	2394	5.09	216.0	9	14.4	5	23	2	2	20	45	27	60	**6.37**	0.011	9.50	**0.08**	**0.070**	**0.8**	0.01	0.01	0.8	0.29	**0.01**	10	10	ND	ND
	Minimum	1.64	0.180	20.8	**4.62**	88	0.16	-130.0	9	7.3	5	12	0	0	4	10	1	7	0.43	0.009	3.12	**0.07**	**0.030**	**0.6**	0.01	0.01	0.6	0.19	**0.01**	10	10	ND	ND
	80th Percentile	ID	ID	ID	6.67	197	0.81	110.9	ID	ID	ID	19	1	1	19	36	19	17	**3.58**	ID	8.24	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile	ID	ID	ID	**5.51**	123	0.21	-104.0	ID	ID	ID	13	0	0	10	17	13	8	**0.76**	ID	4.04	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average	1.39	ND	21.0	**5.79**	129	1.42	4.7	9	910.8	5	17	2	1	4	21	9	11	0.48	0.043	4.00	**0.17**	**0.049**	**0.9**	0.01	0.01	1.8	0.25	**0.01**	10	10	5	3
	Maximum	1.61	0.000	21.8	6.90	160	2.01	80.3	16	4009.2	5	19	2	1	4	31	10	17	**0.62**	0.071	7.44	**0.26**	**0.220**	**2.0**	0.01	0.01	2.0	0.31	**0.01**	10	10	5	5
	Minimum	1.22	0.000	20.2	**5.20**	98	0.77	-47.0	5	13.5	5	14	1	1	3	8	7	5	0.32	0.001	0.05	**0.07**	0.002	0.0	0.01	0.01	1.3	0.15	**0.01**	10	10	5	1
All Results	Average	1.84	0.010	22.8	**5.83**	440	0.88	2.3	15	181.6	5	49	6	3	11	75	49	12	**0.93**	0.039	14.39	**0.08**	**0.022**	**0.9**	0.01	0.01	1.0	0.32	**0.01**	67	62	5	2
	Maximum	2.89	0.710	26.1	7.72	2394	5.09	216.0	62	4009.2	5	119	25	9	26	189	159	60	**6.37**	0.116	**37.40**	**0.26**	**0.220**	**2.0**	0.01	0.01	2.0	0.77	**0.10**	930	**560**	5	5
	80th Percentile	2.15	0.312	24.5	**6.41**	720	1.15	63.1	27	70.6	5	87	10	7	15	140	95	17	**1.44**	0.065	**23.28**	**0.08**	**0.026**	**1.3**	0.01	0.01	1.5	0.41	**0.01**	10	10	5	2
	Median (50th Percentile)	1.73	0.155	22.7	**5.40**	474	0.70	3.4	8	8.4	5	69	7	5	9	109	72	11	0.17	0.028	19.50	**0.06**	**0.014**	**0.8**	0.01	0.01	0.9	0.30	**0.01**	10	10	5	1
	20th Percentile	1.51	-0.410	21.0	**5.18**	153	0.37	-47.0	5	1.5	5	17	2	1	4	25	10	3	0.13	0.009	4.81	**0.05**	**0.005**	**0.6**	0.01	0.01	0.7	0.20	**0.01**	10	10	5	1
	Minimum	1.22	-0.940	20.2	**4.90**	98	0.17	-115.0	2	-8.4	5	12	1	1	3	8	1	1	0.04	0.001	0.05	**0.02**	0.001	0.0	0.01	0.01	0.1	0.14	**0.01**	1	1	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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB10

Site: MB10			Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae												
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	9/06/2005					7.41																												
	16/06/2005					8.75	36300	1.96					7330	205	1130	292	12828	2490		0.09		1.61												
	19/07/2005					7.09	38200	0.71					7440	233	1150	290	350	1740	302	0.34		1.96												
	5/08/2005					7.71	33000	2.13																										
	10/11/2005					7.43	36400	3.48					6860	139	169	213	13250	1600	852	0.12		0.88												
	12/01/2006					7.34	43800	0.71					7460	161	1070	213	13086		806	0.15		0.81												
	25/01/2006					7.43	74900																											
	7/04/2006					7.51	28600	2.69																										
	3/05/2006					7.25	31900	2.16										1890																
	10/05/2006					7.64	36900	3.86	-187																									
	19/05/2006					7.07	36300	1.40																										
	26/05/2006					7.31	33600	2.69																										
	1/06/2006					7.65	33800	1.12																										
	8/06/2006					7.71	35100	3.15																										
	15/06/2006					7.33	30000	2.01																										
	23/06/2006								-129																									
	29/06/2006					7.44	34400	2.28																										
	6/07/2006					7.55	32000		-100																									
	13/07/2006																		247															
	14/07/2006					7.53	30800	1.81																										
	30/01/2007					7.22	32300	0.57	-48																									
	8/02/2007					7.46	28600	2.78	-80				758	136	107		1345	176		0.02		0.19												
	29/08/2007					7.71	45200	4.11	13.5				7500	210	1010	251	14750	1780	570	0.01		0.02												
	26/10/2007					7.28	32200	0.38					1170	162	444	245	13500	1200	766	0.01		0.01												
	14/11/2007					7.58	3640	2.58					6807	198	1057	262	12800	1789		0.01		0.01												
	2/09/2008					7.3	41300																											
	4/09/2017		1.37	0.25	19.9	8.11	1605	3.9	107		13	5	109	33	18	26	195	78	**651**	0.15	0.002	0.57	**2.71**	**2.56**	**152.00**	3.2	0.18	149	**136**	**3.38**				
	5/10/2017		1.46	0.16	23.7	8.07	1988	0.89	-159	5	5.97	5	94	30	17	24	194	77	**684**	0.03	0.002	0.1	**3.32**	**3.22**	**162.00**	4.39	1.2	157	**158**	**5.59**	10	20		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		2	-0.38	22.8	8.14	1866	0.33	-187	5	1.1	5	104	30	17	26	199	76	**757**	0.01	0.002	0.18	**3.35**	**2.99**	**186.00**	1.9	0.36	184	**150**	**2.26**	1	3		
	13/12/2017		1.79	-0.17	23.7	8.13	2210	0.23	-214		30		113	35	19	28	204	71	**650**	0.02	0.001	0.09	**3.11**	**3.41**	**145.00**	0.01	0.01	0.5	0.23	**0.01**			5	1
	11/01/2018		2.23	-0.61	25.2	8.1	2065	0.26	-205		7.3	5	115	30	18	29	211	77	**619**	0.01	0.002	0.06	**3.17**	**3.49**	**161.00**	0.03	0.02	161	**168**	**0.05**	1	**39000**	5	1
	24/01/2018		2.24	-0.62	24	8.11	2118	0.44	-111.8		6		103	33	18	25	230	75	**614**	0.03	0.001	0.06	**3.23**	**3.86**	**155.00**	1.12	0.17	154	**174**	**1.29**			5	1
	6/02/2018		2.07	-0.45	24.6	7.79	**10724**	0.86	-224		5.8	5	**4470**	166	**675**	**152**	**7150**	**826**	**837**	0.01	0.001	0.09	**1.75**	**1.76**	**64.00**	1.09	0.26	62.7	**64.5**	**1.35**	10	**1800**		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		1.25	0.37	23.5	7.32	**35568**	0.08	-210		3.2		**6800**	224	**1020**	**219**	**12000**	**1770**	**1090**	0.05	0.005	0.06	**1.05**	**1**	**33.40**	0.01	0.04	33.4	**22.8**	**0.04**			5	1
	13/04/2018		1.67	-0.05	24.8	7.12	**36887**	1.84	-72		3.2		**6590**	236	**1060**	**217**	**11800**	**1680**	**1140**	0.05	0.005	0.23	**1.24**	**1.26**	**36.10**	0.01	0.01	36.1	**31.2**	**0.01**			5	1
	31/05/2018		1.53	0.09	21	7.46	**30959**	0.89	-187		19.8	5	**6140**	169	**927**	**203**	**12200**	**1770**	**1170**	0.05	0.005	0.05	**1.04**	**1.13**	**25.80**	0.01	0.01	25.8	**30**	**0.01**	10	90		1
2018/2019	24/10/2018		1.31	0.31	20.6	7.71	**37680**	1.58	-119		2.7	5	**6770**	218	**998**	**210**	**12300**	**1870**		0.05	0.005	0.27	**1.21**	**1.02**	**31.5**	0.01	0.01	31.5	**27.4**	**0.01**	10	10	5	1
	3/12/2018		1.71	-0.09	23.1	7.59	**37120**	1.49	-118.9	38	3.2		**6400**	229	**1000**	**207**	**11900**	**1780**	**1130**	0.05	0.005	0.13	**0.98**	**0.93**	**30.9**	0.01	0.04	30.9	**28**	**0.04**			5	1
	17/12/2018		1.71	-0.09	21.5	7.09	**33706**	1.91	-135	8	4.1		**6540**	207	**1070**	**225**	**10500**	**1670**	**1120**	0.05	0.005	0.13	**0.98**	**1.1**	**3.47**	0.04	0.01	34.7	**27**	**0.03**			5	1
	15/01/2019		1.84	-0.22	23.6	7.21	**31347**	0.09	-260	5	0.1	5	**6040**	219	**986**	**205**	**11700**	**1680**	**1120**	0.05	0.005	0.21	**1.07**	**0.99**	**29.5**	0.01	0.02	29.5	**30.1**	**0.02**	10	**520**	5	1
	6/02/2019		1.91	-0.29	22.2	7.11	**31974**	4.7	-205	5	0.2		**6840**	232	**1100**	**234**	**11800**	**1890**	**1120**	0.05	0.005	0.08	**1.14**	**0.987**	**29.3**	0.01	0.01	29.3	**27.1**	**0.01**			5	1
	21/02/2019		2.06	-0.44	23.8	7.1	**34927**	0	-270.6	5	1.3		**6490**	214	**1020**	**222**	**12000**	**1910**	**1100**	0.05	0.005	0.11	**1.06**	**1.06**	**30.7**	0.04	0.02	30.6	**27.6**	**0.06**			5	1
	6/03/2019		1.98	-0.36	26.3	7.28	**37096**	5.4	-273	5	5.1		**6090**	204	**952**	**198**	**12200**	**1890**	**1160**	0.05	0.005	0.08	**0.97**	**0.945**	**29.8**	0.14	0.01	29.8	**26.4**	**0.03**			5	1
	20/03/2019		1.35	0.27	24.6	7.43	**43460**	0.65	-38.2	6	28.01		**7120**	272	**1150**	**232**	**11800**	**1800**	**1140**	0.1	0.005	0.08	**1.01**	**1.04**	**28.8**	0.01	0.05	28.8	**26.6**	**0.05**			5	1
	4/04/2019		1.24	0.38	24.09	7.45	**39080**	0.52	-40.9	10	24.89	5	**7610**	244	**1140**	**254**	**11500**	**1710**	**1090**	0.05	0.005	0.1	**1.02**	**1.03**	**2.94**	0.01	0.01	29.4	**25.4**	0.01	10	40	5	1
	1/05/2019		1.46	0.16	23.2	7.25	**33600**	2.34	-116	5	1.5		**6850**	227	**1100**	**224**	**11900**	**1630**	**1100**	0.05	0.005	0.07	**0.96**	**1.04**	**29.2**	0.43	0.01	28.8	**25.1**	**0.44**			5	1
	5/06/2019		1.55	0.07	21	7.5	**32000**	0.84	-10	8	-11.1		**7360**	243	**1170**	**249**	**11800**	**1760**	**1060**	0.01	0.001	0.05	**1.18**	**0.975**	**31.3**	0.53	0.03	30.7	**26.8**	**0.56**			5	1
2019/2020	3/07/2019		1.29	0.33	20.72	7.71	**49170**	0.2	44.9	5	0.5	5	**7260**	248	**1130**	**241**	**12000**	**1680**	**1160**	0.05	0.005	0.05	**1**	**1.05**	**30.6**	0.01	0.02	30.6	**28.4**	**0.03**	30	**310**	5	1
	31/07/2019		1.53	0.09	19.6	7.7	**52530**	0.41	130.2	5	1.6		**6200**	215	**960**	**205**	**12300**	**1600**	**1170**	0.05	0.005	0.05	**0.91**	**0.982**	**28.3**	0.03	0.01	28.3	**28.7**	**0.03**			5	1
	4/09/2019		1.62	0.00	20.4	7.6	**40130**	0.5	122.4	5	0		**7040**	240	**1110**	**230**	**12100**	**1880**	**1080**	0.05	0.005	0.05	**0.92**	**0.92**	**29**	1.13	0.17	27.7	**27.3**	**1.3**			5	1
	2/10/2019		1.78	-0.16	22.3	7.5	**37500**	0.9	-27	5	0	5	**6750**	213	**1070**	**220**	**11800**	**1670**	**1020**	0.05	0.005	0.24	**0.88**	**0.869**	**28.1**	0.08	0.03	28	**22.4**	**0.11**	**1600**	120	5	1
	6/11/2019		1.95	-0.33	26.2	7.2	73	**3.4**	-61.3	5	3.3		**6670**	232	**1010**	**214**	**11000**	**1700**	**1100**	0.05	0.005	0.09	**2.71**	**0.932**	**78.2**	0.18	0.01	78	**25.1**	**0.19**			5	1
	15/01/2020	pH meter calibration issue - spurious data.	2.16	-0.54	23.5	**13.4***	**34659**	1.8	-82.9	5	5		**6760**	235	**1070**	**226**	**11200**	**1670**	**955**				**0.96**	**0.94**	**31.3**	0.01	0.01	31.3	**27.5**	0.01	10	20		
	28/04/2020	Monitoring bore damaged during April preparation works and requires repair. No sample could be obtained. Repaired 30/07/20.																																
2020/2021	12/08/2020	Cear	2.3	-0.68	19.5	6.5	916	2.5	84	18	268	5	42	148	16	7	70	74	372	0.02	0.002	0.28	**0.04**	0.001	**3**	0.01	0.79	2.2	0.44	**0.79**	430	40	5	2
	16/09/2020		2.51	-0.89	21.3	6.7	936	2.3	149	24	47.7	5	41	148	16	6	66	66	382	0.01	0.001	0.11	**0.05**	0.002	**0.78**	0.04	0.74	1.7	0.37	**0.78**	10	10	5	1
	14/10/2020	Sand Mound around borehole	2.8	-1.18	21.8	7.1	885	2.08	96.2	5	23.4	5	42	153	16	7	72	64	354	0.01	0.002	0.06	**0.02**	0.001	**0.37**	0.01	0.37	1.4	0.26	**0.37**	10	110	5	1
	11/11/2020	New pipe extended out of sand mound	4.77		22.7	7.5	1315	3.74	55.2	8	18.7		81	196	25	8	142	175	342	0.01	0.002	0.05	0.01	0.001	0.34	0.01	0.34	1.3	0.13	**0.34**	10	80	5	1
	24/02/2021	Clear	2.16		24.4	6.55	1483	1.97	-89.3	43	64.1		27	293	24	7	39	436	**420**	0.01	0.011	15.5	**0.06**	**0.008**	**2**	0.01	0.01	2	0.88	0.01	20	20	5	1

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB10

Pre-Extraction	Average	1.42	0.205	21.8	7.53	**32513**	2.15	-72.8	5	9.5	5	**4553**	151	**617**	**202**	**8230**	**1282**	**610**	0.09	0.002	0.62	**3.02**	**2.890**	**157.0**	3.80	0.69	153.0	**147.00**	**4.49**	10	20	ND	ND
	Maximum	1.46	0.250	23.7	**8.75**	**74900**	4.11	107.0	5	13.0	5	**7500**	233	**1150**	**292**	**14750**	**2490**	**852**	0.34	0.002	1.96	**3.32**	**3.220**	**162.0**	4.39	1.20	157.0	**158.00**	**5.59**	10	20	ND	ND
	Minimum	1.37	0.160	19.9	7.07	1605	0.38	-187.0	5	6.0	5	94	30	17	24	194	77	247	0.01	0.002	0.01	**2.71**	**2.560**	**152.0**	3.20	0.18	149.0	**136.00**	**3.38**	10	20	ND	ND
	80th Percentile	ID	ID	ID	7.71	**37940**	3.28	32.2	ID	ID	ID	**7456**	209	**1118**	**290**	**13450**	**1870**	**815**	0.15	ID	1.46	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile	ID	ID	ID	7.28	**30640**	0.79	-163.8	ID	ID	ID	**1088**	138	**157**	**213**	**1146**	**995**	269	0.01	ID	0.01	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average	2.91	-0.917	21.9	6.87	1107	2.52	59.0	20	84.4	5	47	188	19	7	78	163	374	0.01	0.004	3.20	**0.04**	0.003	**1.3**	0.02	0.45	1.7	0.42	**0.46**	96	52	5	1
	Maximum	4.77	-0.680	24.4	7.50	1483	3.74	149.0	43	268.0	5	81	293	25	8	142	436	**420**	0.02	0.011	15.50	**0.06**	**0.008**	**3.0**	0.04	0.79	2.2	0.88	**0.79**	430	110	5	2
	Minimum	2.16	-1.180	19.5	6.50	885	1.97	-89.3	5	18.7	5	27	148	16	6	39	64	342	0.01	0.001	0.05	**0.01**	0.001	0.3	0.01	0.01	1.3	0.13	**0.01**	10	10	5	1
All Results	Average	1.89	-0.169	22.8	7.47	**28124**	1.76	-83.1	10	18.4	5	**4625**	182	**701**	**168**	**8162**	**1244**	**845**	0.05	0.004	0.64	**1.35**	**1.297**	**50.9**	0.45	0.16	47.8	**43.55**	**0.60**	136	**2637**	5	1
	Maximum	4.77	0.380	26.3	**8.75**	**74900**	5.40	149.0	43	268.0	5	**7610**	293	**1170**	**292**	**14750**	**2490**	**1170**	0.34	0.011	15.50	**3.35**	**3.860**	**186.0**	4.39	1.20	184.0	**174.00**	**5.59**	**1600**	**39000**	5	2
	80th Percentile	2.19	0.232	24.5	7.71	**37644**	2.73	47.0	12	24.0	5	**7104**	235	**1100**	**241**	**12280**	**1798**	**1124**	0.05	0.005	0.27	**2.71**	**2.080**	**104.9**	0.75	0.29	68.8	**44.52**	**0.99**	26	**436**	5	1
	Median (50th Percentile)	1.79	-0.125	23.2	7.45	**33600**	1.81	-94.7	5	4.6	5	**6515**	209	**999**	**213**	**11800**	**1675**	**955**	0.05	0.005	0.09	**1.03**	**1.010**	**30.2**	0.02	0.02	30.2	**27.20**	**0.05**	10	60	5	1
	20th Percentile	1.42	-0.522	20.9	7.20	2136	0.48	-205.0	5	0.9	5	105	141	18	26	200	77	**510**	0.01	0.002	0.05	**0.90**	**0.900**	**3.3**	0.01	0.01	16.4	13.79	**0.01**	10	14	5	1
	Minimum	1.24	-1.180	19.5	6.50	73	0.00	-273.0	5	-11.1	5	27	30	16	6	39	64	247	0.01	0.001	0.01	**0.01**	0.001	0.3	0.01	0.01	0.5	0.13	**0.01**	1	3	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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB11

Site:	MB11		Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae												
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	16/06/2005					6.81	1625	0.65					220	211	72	19	300	484		3.13		11												
	19/07/2005					7.42	1553	1.00					127	289	65	11	311	456	302	0.64		3.57												
	5/08/2005					7.54	1492	1.13																										
	10/11/2005					7.37	1505	0.54					51	191	50	11	90	520	235	0.15		1.08												
	12/01/2006					7.25	1743	0.40					149	215	67	16	74		432	0.15		3.14												
	3/05/2006																	360																
	8/02/2007					7.32	1312	2.11	-144																									
	2/09/2008					7.6	1552																											
	4/09/2017	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**				
	5/10/2017	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**	10	10		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		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**	1	1		
	13/12/2017		1.25	0.34	24.5	7.37	1365	0.18	-134		0.7		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**			5	
	11/01/2018		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	**34000**	5	
	24/01/2018		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**			5	
	6/02/2018		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**	10	**320**		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		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**			5	
	13/04/2018		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	
	31/05/2018		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**	10	20		1
2018/2019	24/10/2018		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**	10	**4200**	5	1
	3/12/2018		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**			5	1
	17/12/2018		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**			5	1
	15/01/2019		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**	10	**710**	5	1
	6/02/2019		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**			5	1
	21/02/2019		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**			5	1
	6/03/2019		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**			5	1
	20/03/2019		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			5	1
	4/04/2019		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	10	**1300**	5	1
	1/05/2019		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**			5	1
	5/06/2019		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			5	1
2019/2020	3/07/2019		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	10	10	5	1
	31/07/2019		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			5	1
	4/09/2019		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			5	1
	2/10/2019		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	10	10	5	1
	6/11/2019		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			5	1
	15/01/2020	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	10	30		
	28/04/2020	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	10	10		
2020/2021	6/07/2020		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	**0.37**	**0.259**	**2.9**	0.01	0.03	2.9	1.58	**0.03**	10	**430**	5	1
	13/08/2020	Clear	0.96	0.63	20.1	7.2	1121	1.9	-123	140	82.7	5	34	168	47	10	44	286	350	0.01	0.001	0.68	**0.53**	**0.256**	**4.2**	0.01	0.01	4.2	1.5	0.01	360	**1300**	100	2
	16/09/2020		1.08	0.51	19.4	7.1	1186	1.66	-170.7	14	178.03	5	34	169	45	13	46	263	372	0.02	0.001	0.07	**0.79**	**0.605**	0.01	0.01	0.01	3.4	2.75	0.01	90	**440000**	5	1
	14/10/2020		1.43	0.16	20.5	7.14	1130	0.22	-297.8	7	19.5	5	34	181	46	12	52	254	373	0.01	0.001	0.08	**0.66**	**0.653**	0.01	0.01	0.01	3.6	3.26	0.01	10	**5560**	5	1
	11/11/2020	Ants & Eggs, Very Dirty, Strong odour	1.39	0.2	20.5	7.17	1146	1.72	-108.4	11	7		31	184	43	10	42	279	320	0.01	0.001	1.41	**0.22**	**0.2**	0.01	0.01	0.01	1.2	0.83	0.01	10	**2300**	5	1
	24/02/2021	Clear, Strong odour, ants	0.71		24.6	7.12	1208	0.68	-233.6	23	8.1		35	169	44	11	43	26	337	0.02	0.001	0.09	**0.65**	**0.569**	**3.1**	0.01	0.01	3.1	2.77	0.01	**1120**	**1520**	5	1
	10/06/2021	Oily film, very strong odour, ants	1.1		20.4	7.24	1082	1.42	-268.5	65	0.98		27	151	35	9	40	194	381	0.01	0.001	0.28	**0.4**	**0.373**	**3.3**	0.01	0.01	3.3	1.71	0.01	10	**260**	5	1

Pre-Extraction	Average	1.34	0.250	20.0	7.28	1446	1.02	-107.3	5	27.2	5	103	209	58	13	146	416	333	**0.75**	0.001	4.18	**0.53**	**0.140**	**3.7**	0.01	0.01	3.7	1.64	**0.01**	10	10	ND	ND
	Maximum	1.39	0.300	20.8	7.60	1743	2.11	-74.0	5	43.1	5	220	289	72	19	311	520	**432**	**3.13**	0.001	11.00	**0.64**	**0.270**	**4.6**	0.01	0.01	4.6	1.80	**0.01**	10	10	ND	ND
	Minimum	1.29	0.200	19.1	6.81	1056	0.37	-144.0	5	11.3	5	34	168	45	9	47	328	235	0.01	0.001	0.87	**0.42**	**0.010**	**2.8**	0.01	0.01	2.8	1.48	**0.01**	10	10	ND	ND
	80th Percentile	ID	ID	ID	7.54	1625	2.01	ID	ID	ID	ID	192	259	70	18	307	506	**416**	**2.13**	ID	8.77	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile	ID	ID	ID	7.08	1174	0.39	ID	ID	ID	ID	36	173	47	9	50	335	248	0.07	ID	0.95	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average	1.11	0.394	20.8	7.05	1159	1.21	-190.3	46	46.5	5	32	170	44	11	44	223	356	0.01	0.001	0.52	**0.52**	**0.416**	**1.9**	0.01	0.01	3.1	2.06	**0.01**	230	**64481**	19	1
	Maximum	1.43	0.630	24.6	7.24	1240	1.90	-108.4	140	178.0	5	35	184	47	13	52	286	381	0.02	0.001	1.41	**0.79**	**0.653**	**4.2**	0.01	0.03	4.2	3.26	**0.03**	**1120**	**440000**	100	2
	Minimum	0.71	0.160	19.4	6.40	1082	0.22	-297.8	7	1.0	5	27	151	35	9	40	26	320	0.01	0.001	0.07	**0.22**	**0.200**	0.0	0.01	0.01	1.2	0.83	**0.01**	10	**260**	5	1
All Results	Average	1.26	0.303	22.6	7.23	1320	1.23	-147.7	24	30.3	5	48	170	46	10	66	282	343	0.14	0.003	1.15	**0.42**	**0.348**	**2.6**	0.03	0.07	2.7	1.92	**0.08**	90	**25894**	8	1
	Maximum	1.80	0.850	27.1	7.75	1935	7.07	297.1	140	452.5	5	220	289	72	19	311	520	**500**	**3.13**	0.063	11.00	**1.37**	**1.750**	**11.8**	0.33	0.56	11.7	9.71	**0.72**	**1120**	**440000**	100	2
	80th Percentile	1.55	0.574	24.8	7.49	1539	2.00	-52.0	33	28.3	5	45	192	52	11	74	338	372	0.05	0.001	1.28	**0.65**	**0.559**	**3.5**	0.03	0.08	3.6	2.75	**0.08**	10	**4200**	5	1
	Median (50th Percentile)	1.25	0.320	22.0	7.30	1276	0.94	-138.7	11	7.8	5	38	176	45	10	49	286	347	0.01	0.001	0.31	**0.32**	**0.261**	**1.8**	0.01	0.01	2.1	1.47	**0.01**	10	**430**	5	1
	20th Percentile	0.97	0.030	20.4	7.11	1140	0.30	-278.4	5	0.9	5	33	164	42	9	43	205	321	0.01	0.001	0.09	**0.22**	**0.104**	**1.4**	0.01	0.01	1.4	0.68	**0.01**	10	10	5	1
	Minimum	0.71	-0.210	19.1	5.30	158	0.10	-354.0	5	-5.5	5	17	2	1	2	17	11	3	0.01	0.001	0.06	**0.10**	**0.010**	0.0	0.01	0.01	0.2	0.04	**0.01**	1	1	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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB12

Site:	MB12		Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae											
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
		Objective	-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	16/06/2005					6.9	1588	0.68					66	433	54	13	147	706		**0.74**		2.98												
	19/07/2005					6.8	1587	0.54					43	322	59	12	87	528	223	0.12		1.61												
	5/08/2005					7.5	1619	1.02																										
	10/11/2005					7.150	1531.000	0.110					47.00	219.000	54.000	11.000	62.000	643.000	238.000	0.18		1.310												
	12/01/2006					7.110	1818.000	0.110					39.00	261.000	58.000	12.000	54.000		230.000	0.15		1.450												
	3/05/2006																	410																
	8/02/2007					7.2	1433	1.55	-98.0																									
	2/09/2008					7.4	1962																											
	4/09/2017	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**				
	5/10/2017		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**	10	10		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		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**	5	5		
	11/01/2018		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	**32000**		
	24/01/2018		1.32	0.05																														
	6/02/2018		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**	10	10		
	8/02/2018	**Last day of first extraction campaign.**																																
	31/05/2018		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**	10	10		
2018/2019	24/10/2018		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**	10	**290**		
	15/01/2019		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**	10	10		
	4/04/2019		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**	10	**480**		
2019/2020	3/07/2019		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**	10	10		
	2/10/2019		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**	10	20		
	15/01/2020	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**	10	10		
	28/04/2020	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**	10	50		
2020/2021	6/07/2020		0.9		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**	10	10		
	13/08/2020	Clear	0.73		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**	10	10		
	16/09/2020		0.87		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	**7360**		
	14/10/2020		1.21		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	0.01	0.6	0.36	0.01	10	**57000**		
	11/11/2020	Ants & Eggs	1.16		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	0.01	0.6	0.31	0.01	10	20		
	24/02/2021	Clear, ants	0.52		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**	20	20		
	10/06/2021		0.89		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**				

Pre-Extraction	Average	1.13	0.245	21.3	7.08	1713	0.72	-75.0	15	13.6	5	49	329	54	12	101	609	267	0.20	0.001	6.99	**0.11**	**0.015**	**0.6**	0.01	0.01	0.6	0.34	**0.01**	10	10	ND	ND
	Maximum	1.19	0.310	21.9	7.46	2080	1.65	-54.0	15	20.1	5	66	433	59	13	147	720	329	**0.74**	0.001	**20.40**	**0.11**	**0.020**	**0.6**	0.01	0.01	0.6	0.34	**0.01**	10	10	ND	ND
	Minimum	1.06	0.180	20.7	6.74	1433	0.09	-98.0	15	7.1	5	39	219	46	10	54	410	223	0.01	0.001	1.31	**0.11**	**0.010**	**0.6**	0.01	0.01	0.6	0.33	**0.01**	10	10	ND	ND
	80th Percentile	ID	ID	ID	7.40	1962	1.57	ID	ID	ID	ID	62	410	59	13	141	714	327	**0.52**	ID	17.92	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile	ID	ID	ID	6.84	1531	0.11	ID	ID	ID	ID	41	236	48	10	57	457	224	0.01	ID	1.37	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average	0.90	ND	20.9	6.87	1870	2.91	-22.9	42	67.5	5	81	314	38	11	69	772	311	0.01	0.001	8.37	**0.09**	**0.005**	**0.4**	0.01	0.13	0.5	0.24	**0.13**	12	**10737**	ND	ND
	Maximum	1.21	ND	23.7	7.29	1995	5.83	172.0	155	197.6	5	98	331	42	12	86	**814**	378	0.01	0.001	17.70	**0.22**	**0.026**	**0.9**	0.01	0.43	0.8	0.38	**0.43**	20	**57000**	ND	ND
	Minimum	0.52	ND	19.7	6.40	1755	0.52	-177.9	5	5.5	5	34	302	36	10	59	699	285	0.01	0.001	0.05	**0.01**	0.001	0.0	0.01	0.01	0.1	0.02	**0.01**	10	10	ND	ND
All Results	Average	1.01	0.307	22.1	7.01	1837	2.04	-36.8	29	39.4	5	60	329	44	11	92	689	299	0.06	0.001	6.06	**0.05**	**0.007**	**0.5**	0.01	0.12	0.5	0.26	**0.12**	10	**5407**	ND	ND
	Maximum	1.58	0.850	26.5	7.46	2667	6.78	172.0	155	197.6	5	98	433	59	13	147	**814**	378	**0.74**	0.005	**20.40**	**0.22**	**0.026**	**0.9**	0.02	0.44	0.8	0.38	**0.46**	20	**57000**	ND	ND
	80th Percentile	1.28	0.580	24.3	7.21	1988	3.49	38.2	38	67.0	5	82	363	52	12	122	771	320	0.06	0.001	13.72	**0.11**	**0.010**	**0.8**	0.01	0.29	0.6	0.38	**0.29**	10	**1856**	ND	ND
	Median (50th Percentile)	0.99	0.265	20.9	7.04	1814	1.64	-69.0	25	22.9	5	55	328	42	11	87	693	306	0.01	0.001	2.98	**0.03**	**0.009**	**0.6**	0.01	0.05	0.6	0.32	**0.05**	10	15	ND	ND
	20th Percentile	0.75	0.050	20.3	6.77	1591	0.58	-109.5	5	7.2	5	42	308	38	10	64	646	276	0.01	0.001	0.05	**0.01**	0.001	0.3	0.01	0.01	0.2	0.06	**0.01**	10	10	ND	ND
	Minimum	0.52	-0.210	19.7	6.40	1433	0.09	-177.9	5	1.1	5	29	219	35	10	54	410	223	0.01	0.001	0.05	**0.01**	0.001	0.0	0.01	0.01	0.1	0.01	**0.01**	1	5	ND	ND

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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB13

Site:	MB13		Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae											
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
		Objective	-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	16/06/2005					6.87	32200	0.22					6940	1170	2040	215	15198	4000		0.75		19												
	19/07/2005					6.36	36800	0.24					6870	559	1050	217	247	2260	304	0.17		1.8												
	5/08/2005					7.18	33300	1.22																										
	10/11/2005					6.84	32300	0.24					6600	609	925	127	12600	2110	401	0.08		10												
	12/01/2006					6.77	35400	0.45					6040	2350	1370	240	11365		194	0.32		6.06												
	3/05/2006																	2170																
	8/02/2007					7.1	21800	1.48	-250																									
	2/09/2008					7	38200																											
	4/09/2017	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**				
	5/10/2017		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**	10	**750**		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		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**	5	**230**		
	11/01/2018		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	**36000**		
	24/01/2018		1.88	-0.17																														
	6/02/2018		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**	10	120		
	8/02/2018	**Last day of first extraction campaign.**																																
	31/05/2018		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**	10	10		
2018/2019	24/10/2018		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**	10	**780**		
	15/01/2019		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**	10	60		
	4/04/2019	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	10	90		
2019 / 2020	3/07/2019		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	10	40		
	2/10/2019		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	10	180		
	15/01/2020	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	10	**760**		
	28/04/2020	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	10	90		
2020/2021	6/07/2020		1.47		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**	10	**310**		
	13/08/2020	Clear	1.3		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	10	**860**		
	16/09/2020		1.41		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	**520**		
	14/10/2020		1.78		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	10	**330**		
	11/11/2020	Ants & Eggs	1.73		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	10	10		
	24/02/2021	Clear, ants	1.08		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	40	**480**		
	10/06/2021	Ants	1.41		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	**67000**	**78000**		

Pre-Extraction	Average	1.55	0.165	22.4	6.84	**29572**	0.86	-112.1	26	3.8	5	**6500**	960	**1227**	**193**	**10702**	**2490**	386	0.23	0.003	8.44	**0.42**	**0.015**	**1.9**	0.01	0.16	1.7	1.37	**0.16**	10	**750**	ND	ND
	Maximum	1.63	0.250	24.0	7.18	**38200**	2.97	-34.0	26	5.9	5	**6940**	2350	**2040**	**240**	**15198**	**4000**	**534**	**0.75**	0.005	19.00	**0.56**	**0.020**	**2.9**	0.01	0.30	2.9	2.59	**0.30**	10	**750**	ND	ND
	Minimum	1.46	0.080	20.7	6.36	2826	0.05	-250.0	26	1.6	5	**5700**	533	**888**	**127**	247	**2110**	194	0.01	0.001	0.05	**0.27**	**0.010**	**0.8**	0.01	0.02	0.5	0.14	**0.02**	10	**750**	ND	ND
	80th Percentile	ID	ID	ID	7.10	**36800**	1.78	ID	ID	ID	ID	**6912**	1878	**1772**	**231**	**14159**	**3304**	**526**	**0.58**	ID	16.88	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile	ID	ID	ID	6.63	**21800**	0.19	ID	ID	ID	ID	**5836**	535	**903**	**139**	**4694**	**2130**	216	0.03	ID	0.75	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average	1.45	ND	21.1	6.64	**31990**	1.45	-101.4	12	39.7	5	**6039**	574	**954**	**169**	**11371**	**2126**	**523**	0.03	0.004	**126.48**	**0.41**	**0.265**	**2.5**	0.01	0.01	4.1	3.70	**0.01**	**9584**	**11501**	ND	ND
	Maximum	1.78	ND	25.4	7.10	**33096**	4.45	-47.7	22	112.8	5	**6220**	621	**1040**	**174**	**12100**	**2320**	**581**	0.05	0.005	**855.00**	**1.20**	**0.827**	**6.1**	0.01	0.02	6.1	5.12	**0.02**	**67000**	**78000**	ND	ND
	Minimum	1.08	ND	19.1	6.20	**30919**	0.53	-195.0	5	0.4	5	**5830**	519	**905**	**158**	**10700**	**1880**	**476**	0.01	0.001	0.14	**0.16**	0.001	0.0	0.01	0.01	2.9	2.40	**0.01**	10	10	ND	ND
All Results	Average	1.58	0.057	22.2	6.77	**32006**	1.27	-97.4	15	27.1	5	**6229**	664	**1024**	**175**	**11175**	**2162**	**495**	0.09	0.004	**41.97**	**0.41**	**0.222**	**3.7**	0.05	0.05	4.2	3.52	**0.10**	**3537**	**6296**	ND	ND
	Maximum	2.12	0.470	25.4	7.33	**46890**	4.45	72.0	33	112.8	5	**7080**	2350	**2040**	**240**	**15198**	**4000**	**597**	**0.75**	0.005	**855.00**	**1.20**	**0.848**	**11.5**	0.35	0.33	11.5	9.21	**0.68**	**67000**	**78000**	ND	ND
	80th Percentile	1.84	0.314	24.4	7.06	**35776**	2.32	-36.8	22	46.6	5	**6820**	609	**1060**	**189**	**12100**	**2270**	**562**	0.06	0.005	11.14	**0.70**	**0.498**	**5.6**	0.03	0.08	5.6	4.80	**0.23**	10	**780**	ND	ND
	Median (50th Percentile)	1.57	0.080	21.6	6.80	**32749**	0.97	-68.9	14	10.8	5	**6075**	577	**955**	**170**	**11400**	**2110**	**503**	0.05	0.005	2.91	**0.29**	**0.048**	**3.4**	0.01	0.01	3.7	3.43	**0.01**	10	**310**	ND	ND
	20th Percentile	1.38	-0.174	20.4	6.54	**30583**	0.41	-202.0	5	2.0	5	**5860**	533	**905**	**157**	**11000**	**1980**	**468**	0.01	0.001	0.12	**0.16**	**0.010**	**0.9**	0.01	0.01	2.5	2.33	**0.01**	10	60	ND	ND
	Minimum	1.08	-0.410	19.1	6.00	2826	0.05	-267.0	5	0.4	5	**5200**	430	**821**	**127**	247	**1540**	194	0.01	0.001	0.05	**0.06**	0.001	0.0	0.01	0.01	0.5	0.14	**0.01**	1	10	ND	ND

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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB14

Site: MB14			Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae												
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
		Objective	-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017				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**	5	140		
	13/12/2017		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**			5	1
	11/01/2018		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	**260**	5	1
	24/01/2018		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**			5	1
	7/02/2018		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**	10	20		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		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**			5	1
	13/04/2018		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	1
	31/05/2018		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**	10	10		1
2018/2019	3/12/2018		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**			5	1
	17/12/2018		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**			5	1
	15/01/2019		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**	10	10	5	1
	6/02/2019		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**			5	1
	21/02/2019		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**			5	1
	6/03/2019		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**			5	1
	21/03/2019		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			5	1
	3/04/2019		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	10	10	5	1
	30/04/2019		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			5	1
	5/06/2019		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			5	1
2019/2020	3/07/2019	Site inaccessible (too wet)																																
	31/07/2019		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			5	1
	4/09/2019		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			5	1
	2/10/2019		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	10	10	5	1
	6/11/2019		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			35	1
	15/01/2020	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	10	50		
	28/04/2020	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	10	10		
2020/2021	7/07/2020		1.66		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	10	**1450**	5	1
	12/08/2020	Clear	1.52		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	10	10	5	2
	16/09/2020		1.67		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	10	5	1
	14/10/2020		0.191		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	10	100	5	1
	11/11/2020		1.93		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	10	10	5	1
	24/02/2021	Clear, no cap	1.31		23.5	7.02	471	2.08	-115.5	5	31.1		50	56	16	5	50	42	175	0.01	0.006	6.6	**0.3**	**0.008**	**3.2**	0.01	0.01	3.2	3.29	0.01	20	20	5	1
	10/06/2021	Ants	1.57		20.7	7.51	590	1.68	59.2	15	44.16		48	60	16	5	71	40	186	0.01	0.001	0.07	**0.26**	**0.007**	0.1	0.01	0.02	0.1	0.01	**0.02**	10	**320**	5	1
Reporting Period (2020/2021)	Average		1.41	ND	21.5	7.38	514	1.46	-50.2	11	61.2	5	47	56	17	5	59	38	186	0.01	0.002	1.48	**0.16**	**0.091**	**0.6**	0.01	0.01	0.6	0.50	**0.01**	11	**274**	5	1
	Maximum		1.93	ND	23.5	7.72	598	2.57	59.2	19	203.6	5	72	62	22	6	83	43	207	0.01	0.006	6.60	**0.30**	**0.470**	**3.2**	0.01	0.02	3.2	3.29	**0.02**	20	**1450**	5	2
	Minimum		0.19	ND	20.7	7.00	319	0.69	-156.1	5	10.3	5	27	52	16	5	46	31	168	0.01	0.001	0.07	**0.11**	**0.007**	0.0	0.01	0.01	0.1	0.01	**0.01**	10	10	5	1
All Results	Average		2.05	-0.074	22.5	7.39	766	1.68	-71.4	25	39.6	5	70	63	19	5	108	50	187	0.01	0.001	2.30	**0.17**	**0.039**	**0.4**	0.01	0.02	0.4	0.16	**0.02**	10	153	6	1
	Maximum		7.54	0.585	28.3	8.17	2296	10.30	210.7	195	217.4	5	182	154	39	8	491	181	284	0.05	0.006	**22.90**	**0.43**	**0.470**	**3.2**	0.10	0.15	3.2	3.29	**0.16**	20	**1450**	35	2
	80th Percentile		2.32	0.467	23.5	7.72	920	2.21	17.5	30	45.6	5	99	64	23	7	150	70	200	0.01	0.001	3.88	**0.27**	**0.048**	**0.4**	0.01	0.01	0.4	0.10	**0.01**	10	212	5	1
	Median (50th Percentile)		1.85	0.255	22.1	7.54	675	1.04	-105.0	15	19.0	5	68	58	17	5	83	42	190	0.01	0.001	0.94	**0.12**	**0.010**	0.3	0.01	0.01	0.3	0.06	**0.01**	10	15	5	1
	20th Percentile		1.66	-0.187	21.3	6.99	538	0.55	-139.8	6	9.1	5	36	49	14	5	44	29	168	0.01	0.001	0.20	**0.10**	**0.010**	0.2	0.01	0.01	0.2	0.03	**0.01**	10	10	5	1
	Minimum		0.19	-5.365	20.7	**6.37**	319	-0.30	-244.0	5	0.6	5	20	33	8	2	17	21	98	0.01	0.001	0.05	**0.08**	0.004	0.0	0.01	0.01	0.1	0.01	**0.01**	1	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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site MB15

Site: MB15			Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae											
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
		Objective	-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	4/09/2017		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**				
	5/10/2017		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	**1900**		
	30/10/2017	**Commencement of extraction**																																
	28/11/2017		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**	1	188		
	13/12/2017		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**			5	1
	11/01/2018		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	**43000**	5	1
	24/01/2018		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**			5	2
	7/02/2018		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**	10	50		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		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**			5	1
	13/04/2018		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	1
	31/05/2018		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	10		1
2018/2019	24/10/2018		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**	10	10	5	1
	3/12/2018		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**			5	1
	17/12/2018		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**			5	1
	15/01/2019		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**	10	10	5	1
	6/02/2019	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**			5	1
	21/02/2019		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**			5	1
	6/03/2019		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**			5	1
	20/03/2019		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			5	1
	4/04/2019		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	490	**310**	5	1
	30/04/2019		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**			5	1
	5/06/2019		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			5	1
2019/2020	3/07/2019		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	10	10	5	1
	31/07/2019		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			5	1
	4/09/2019		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			5	1
	2/10/2019		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	10	10	5	1
	6/11/2019		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			170	1
	15/01/2020	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	20	10		
	28/04/2020	Land-based extraction commenced 16/04/20.	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	10	10		
2020/2021	7/07/2020	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	10	10	5	1
	12/08/2020	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**	20	10	5	1
	16/09/2020		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	10	5	1
	14/10/2020		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	0.01	0.02	0.6	0.15	**0.02**	10	30	5	1
	11/11/2020	Ants & Eggs, Odour	1.07	0.365	21.2	7.45	705	1.86	-142.9	5	3.9		63	60	18	9	97	40	188	0.01	0.001	0.12	**0.2**	**0.162**	0.01	0.01	0.01	1	0.21	0.01	310	180	5	1
	10/06/2021		0.74		19.4	7.64	587	1.34	-150.3	5	1.87		44	67	15	8	69	24	210	0.01	0.001	0.05	**0.19**	**0.077**	**1.8**	0.01	0.02	1.8	0.22	**0.02**	10	10	1720	1

0.425

Pre-Extraction	Average		1.17	0.270	21.1	7.54	590	0.33	-119.8	14	36.5	5	101	33	12	7	79	43	213	0.28	0.002	0.74	**0.28**	**0.215**	**0.5**	0.01	0.01	0.5	0.19	**0.01**	10	**1900**	ND	ND
	Maximum		1.27	0.375	21.6	7.63	625	0.65	-87.0	14	62.0	5	116	40	14	8	83	48	217	**0.52**	0.002	1.35	**0.33**	**0.220**	**0.6**	0.01	0.01	0.6	0.26	**0.01**	10	**1900**	ND	ND
	Minimum		1.06	0.165	20.6	7.45	555	0.01	-152.6	14	10.9	5	86	25	10	6	74	37	208	0.03	0.001	0.13	**0.22**	**0.210**	0.3	0.01	0.01	0.3	0.12	**0.01**	10	**1900**	ND	ND
	80th Percentile		ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile		ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average		0.87	0.541	20.5	7.36	675	1.43	-154.5	6	15.2	5	65	60	16	9	91	39	198	0.01	0.001	0.09	**0.19**	**0.140**	**0.5**	0.01	0.01	0.8	0.19	**0.02**	62	42	291	1
	Maximum		1.07	0.735	21.2	7.64	727	1.86	-142.0	8	69.9	5	74	67	18	9	98	52	210	0.01	0.001	0.13	**0.31**	**0.173**	**1.8**	0.02	0.02	1.8	0.22	**0.02**	310	180	1720	1
	Minimum		0.70	0.365	19.4	6.60	587	0.90	-180.6	5	1.9	5	44	55	15	8	69	24	188	0.01	0.001	0.05	**0.13**	**0.077**	0.0	0.01	0.01	0.3	0.15	**0.01**	10	10	5	1
All Results	Average		1.25	0.174	22.5	7.43	767	1.13	-100.7	10	11.8	5	82	49	16	10	89	52	200	0.03	0.001	0.24	**0.20**	**0.146**	**0.7**	0.01	0.03	0.7	0.30	**0.03**	53	**2543**	75	1
	Maximum		2.43	0.785	25.1	8.38	1170	6.45	203.7	24	69.9	5	144	83	20	14	121	138	228	**0.52**	0.005	1.35	**0.33**	**0.220**	**4.8**	0.10	0.34	4.8	0.66	**0.34**	490	**43000**	1720	2
	80th Percentile		1.68	0.579	24.6	7.80	868	1.80	-31.3	15	20.8	5	97	60	17	11	98	68	210	0.01	0.001	0.33	**0.23**	**0.173**	**0.8**	0.01	0.02	0.8	0.46	**0.02**	20	212	5	1
	Median (50th Percentile)		1.07	0.365	22.6	7.51	716	0.70	-142.5	7	4.3	5	76	49	16	9	88	48	200	0.01	0.001	0.13	**0.19**	**0.143**	**0.4**	0.01	0.01	0.5	0.27	**0.01**	10	10	5	1
	20th Percentile		0.84	-0.255	20.8	7.31	670	0.48	-175.0	5	0.9	5	67	41	15	8	83	35	189	0.01	0.001	0.06	**0.16**	**0.113**	0.3	0.01	0.01	0.3	0.18	**0.01**	10	10	5	1
	Minimum		0.65	-0.995	19.4	**3.18**	555	0.01	-224.4	5	-7.1	5	44	25	10	6	60	4	176	0.01	0.001	0.05	**0.12**	**0.077**	0.0	0.01	0.01	0.2	0.04	**0.01**	1	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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site CSP1

Site:	CSP1		Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae												
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	21/07/1991					8																												
	20/11/1991					7.2	430																											
	12/12/1991					7.4	320																											
	14/01/1992					7.3	426																											
	13/02/1992					6.9	430																											
	22/05/2002												105*	74	26		177	74																
	2/07/2002												12	68	6		20	38				3												
	18/07/2002												20	67	7		22	39		0.41		3												
	19/07/2002												13	68	7		22	32		0.2		3												
	28/08/2002												32	79	9		39	40				3												
	2/02/2005					7.23		0.07					17	210	21		105	309	183	0.11		1.16												
	8/03/2005					7.41	1022	0.29					19	225	23	1	43	303	198	0.06		1.29												
	10/03/2005								-132																									
	10/05/2005					7.27	1118												172															
	9/06/2005																																	
	19/07/2005					7.05	1179	0.10					33	321	25	9	50	329	206	0.1		0.9												
	10/11/2005					7.44	1016	0.30					23	183	20	11	36	327	270	0.11		0.63												
	12/01/2006					7.37	1438	0.23					87*	229	33	16	65		235	0.07		0.59												
	7/04/2006					7.61	1073	0.16																										
	3/05/2006					7.45	1050	0.20										216																
	10/05/2006					7.51	1020	0.26	-193																									
	26/05/2006					7.31	1007	2.61																										
	1/06/2006					7.44	935	0.50																										
	8/06/2006					7.66	1007	0.53																										
	15/06/2006					7.53	1071	0.23																										
	23/06/2006								-125																									
	29/06/2006					6.8	972	0.33																										
	6/07/2006					7.23	877	0.12	-169																									
	14/07/2006					7.38	956	0.27																										
	8/02/2007					7.35	891	0.31	-93				15	176	19	10	37	198		0.11		0.7												
	14/11/2007														12																				
	2/09/2008					7.8	1036																											
	4/09/2017	Purged for 5 mins to clear debris	1.13	0.38	21	7.31	591	0.06	-92		60.9	5	36	84	23	5	32	0.9	327	0.14	0.002	5.85	**0.5**	**0.01**	**1.40**	0.01	0.01	1.4	0.66	**0.01**				
	5/10/2017		1.34	0.17	20.6	7.03	569	1.02	-88.3	35	17	5	24	89	12	4	30	5	302	0.01	0.001	6.3	**0.46**	**0.01**	**1.20**	0.01	0.01	1.2	0.37	**0.01**	10	10		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		2.39	-0.88																														
	13/12/2017																																	
	11/01/2018		2.33	-0.82																														
	8/02/2018	**Last day of first extraction campaign.**																																
2018 / 2019	3/12/2018		1.16	0.35																														
	6/03/2019		1.56	-0.05																														
	4/04/2019		0.99	0.52																														
2019 / 2020	31/07/2019		1	0.51																														
	6/11/2019		1.46	0.05	20.5	7.1	795	1.7	-103.6		-1.1																							
	15/01/2020	pH meter calibration issue - spurious data.	1.78	-0.27	22.1	**8.6***	705	0.7	-113	26	9.3		23	98	10	2	34	52	218				**0.58**	**0.01**	**1.7**	0.01	0.01	1.7	0.44	0.01	10	60		
	28/04/2020	Land-based extraction commenced 16/04/20.	0.75	0.76	22.8	6.8	599	0.12	-140	12	16.6	5	18	79	11	3	32	5	264	0.01	0.001	6.12	**0.63**	**0.172**	**1.5**	0.01	0.01	1.5	0.55	0.01	10	130		
2020/2021	7/07/2020	Cloudy	0.8		20.9	6.6	356	0.7	-48		51																				10	10		
	16/09/2020		0.8		20.2	7.02	635	2.44	-119.5		1053.78																							
	14/10/2020		1.07		20	6.88	592	1.03	-122.6		35.6																							
	11/11/2020	Ants & Eggs	1.08		20.7	6.9	635	1.97	-109.3		6																							
	10/06/2021	Ants	0.7		18.9	7.05	601	1.04	-109.4		164.7																							
Pre-Extraction	Average		1.24	0.275	20.8	7.36	888	0.42	-127.5	35	39.0	5	22	144	17	8	52	147	237	0.13	0.002	2.45	**0.48**	**0.010**	**1.3**	0.01	0.01	1.3	0.52	**0.01**	10	10	ND	ND
	Maximum		1.34	0.380	21.0	8.00	1438	2.61	-88.3	35	60.9	5	36	321	33	16	177	329	327	0.41	0.002	6.30	**0.50**	**0.010**	**1.4**	0.01	0.01	1.4	0.66	**0.01**	10	10	ND	ND
	Minimum		1.13	0.170	20.6	6.80	320	0.06	-193.0	35	17.0	5	12	67	6	1	20	1	172	0.01	0.001	0.59	**0.46**	**0.010**	**1.2**	0.01	0.01	1.2	0.37	**0.01**	10	10	ND	ND
	80th Percentile		ID	ID	ID	7.53	1071	0.51	-90.5	ID	ID	ID	33	226	25	13	73	313	307	0.19	ID	4.14	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
	20th Percentile		ID	ID	ID	7.21	541	0.12	-178.6	ID	ID	ID	14	68	7	3	22	27	181	0.06	ID	0.67	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)	Average		0.89	ND	20.1	6.89	564	1.44	-101.8	ND	262.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	10	ND	ND
	Maximum		1.08	ND	20.9	7.05	635	2.44	-48.0	ND	1053.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	10	ND	ND
	Minimum		0.70	ND	18.9	6.60	356	0.70	-122.6	ND	6.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	10	ND	ND
All Results	Average		1.27	0.065	20.8	7.26	818	0.67	-117.2	24	141.4	5	22	137	17	7	50	131	238	0.12	0.001	2.73	**0.54**	**0.051**	**1.5**	0.01	0.01	1.5	0.51	**0.01**	10	53	ND	ND
	Maximum		2.39	0.760	22.8	8.00	1438	2.61	-48.0	35	1053.8	5	36	321	33	16	177	329	327	0.41	0.002	6.30	**0.63**	**0.172**	**1.7**	0.01	0.01	1.7	0.66	**0.01**	10	130	ND	ND
	80th Percentile		1.69	0.516	21.9	7.47	1044	1.04	-92.2	ID	143.9	ID	32	222	24	11	62	308	296	0.18	ID	5.90	**0.63**	**0.172**	**1.7**	0.01	0.01	1.7	0.66	**0.01**	10	130	ND	ND
	Median (50th Percentile)		1.11	0.170	20.7	7.31	891	0.31	-113.0	26	26.3	5	20	89	16	5	36	52	227	0.11	0.001	3.00	**0.54**	**0.010**	**1.5**	0.01	0.01	1.5	0.50	**0.01**	10	35	ND	ND
	20th Percentile		0.80	-0.600	20.0	6.97	578	0.14	-138.4	ID	6.7	ID	15	69	8	2	24	10	186	0.03	ID	0.69	**0.46**	**0.010**	**1.2**	0.01	0.01	1.2	0.37	**0.01**	10	10	ND	ND
	Minimum		0.70	-0.880	18.9	6.60	320	0.06	-193.0	12	-1.1	5	12	67	6	1	20	1	172	0.01	0.001	0.59	**0.46**	**0.010**	**1.2**	0.01	0.01	1.2	0.37	**0.01**	10	10	ND	ND

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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site CSP3

Site: CSP3			Physical										Major Cations & Anions							Metals			Nutrients / Bacteria / Algae												
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
Pre-Extraction	21/07/1991					7.8																												
	20/11/1991					7.2	330																											
	12/12/1991					6.9	418																											
	14/01/1992					7.5	901																											
	13/02/1992					6.5	300																											
	22/05/2002												20	54	6		39	19																
	2/07/2002												11	51	5		13	7				3												
	18/07/2002												10	50	5		14	8		0.26		3												
	19/07/2002												12	65	7		14	44		0.2		3												
	28/08/2002												9	57	5		8	13				3												
	2/02/2005					7.33		0.17					22	95	8.9	28	26	7	201	0.04		9.47												
	8/03/2005					7.22	546	0.34					27	99	10	5	67	11	183	0.14		9.82												
	10/03/2005								-139																									
	10/05/2005					7.12	578												161															
	9/06/2005																																	
	19/07/2005					6.78	626	0.10					20	106	9	5	52	15	176	0.22		7.31												
	10/11/2005					7.19	647	0.17					16	88	7.6	5	40	9	234	0.06		5												
	12/01/2006					7.07	763	0.19					19	100	8.2	5	51		189	0.09		6.58												
	7/04/2006					7.22	596	0.09																										
	3/05/2006					7.07	562	0.15										7.7																
	10/05/2006					7.13	591	0.20	-154				18	82	6.3	5	47	4.5	215	0.01		0.93												
	19/05/2006					6.34	560	0.44																										
	26/05/2006					6.51	570	2.61																										
	1/06/2006					7.19	556	0.49																										
	8/06/2006					7.16	582	0.30																										
	15/06/2006					7.21	589	0.24																										
	23/06/2006								-154																									
	29/06/2006					6.84	565	0.16																										
	6/07/2006					6.57	517	0.30	-125																									
	14/07/2006					7.11	571	0.27																										
	8/02/2007					6.9	530	0.28	-125				19	91	7	5	1953*	7.6		0.01		6.29												
	29/08/2007					7.21	693	0.19					23	94	6.3	5	90	9.5	135	0.01		2.65												
	8/10/2007						693																											
	26/10/2007					7.1	546	0.14					19	96	8.4	5	61	6	188	0.02		1.21												
	14/11/2007					7.23	622	0.17					27	126		5	90		174	0.01		3.31												
	2/09/2008					7.7	622																											
	9/10/2008					7.16	608	1.86																										
	4/09/2017	Purged for 5 mins to clear debris	1.26	0.10	21.30	8.09	1007.00	0.04	27.70		7.40	5.00	83.00	148	19	16.00	123.00	182.00	271.00	0.05	0.00	0.59	**0.24**	**0.10**	**2.00**	0.01	0.01	2.00	0.60	**0.01**				
	5/10/2017		1.49	-0.13	20.5	7.53	933	0.41	-160.1	5	1.7	5	69	115	14	14	116	157	229	0.01	0.001	0.76	**0.28**	**0.06**	**0.6**	0.01	3.1	0.6	0.28	**0.01**	10	30		
2017/2018	30/10/2017	**Commencement of extraction**																																
	28/11/2017		2.53	-1.17	22.9	7.53	931	0.52	-153	5	1.9	5	77	113	13	14	108	149	247	0.01	0.001	0.05	**0.25**	**0.16**	**0.8**			0.8	0.42	**0.01**	1	1		
	11/01/2018		2.48	-1.12	24.3	7.41	1032	0.3	-255		9.6	5	78	123	14	19	108	109	272	0.01	0.001	0.05	**0.96**	**0.78**	**4.7**			4.7	3.28	**0.01**	2	**41000**		
	6/02/2018		2.32	-0.96	23.5	7.46	1097	7.17	-229.8		2.7	5	72	115	13	16	115	114	268	0.01	0.001	0.05	**0.82**	**0.81**	**3.8**			3.8	3.1	**0.01**	30	**1800**		
	8/02/2018	**Last day of first extraction campaign.**																																
	8/03/2018		1.14	0.22																														
	31/05/2018		1.17	0.19	21.5	7.5	1106	0.59	-259		15.4	5	23	160	22	14	40	133	**458**	0.01	0.001	0.05	**0.64**	**0.59**	**4.2**	0.01	0.01	4.2	4.42	**0.01**	10	**260**		
2018/2019	24/10/2018		1.00	0.36	21.30	7.24	1146	0.08	-133.00	5.00	0.90	5.00	5.00	163	25	14.00	31.00	235.00	342.00	0.05	0.01	0.74	**0.38**	**0.10**	**1.60**	0.01	0.01	1.60	1.24	**0.01**	10.00	10.00		
	3/13/2018		1.32	0.04																														
	15/01/2019		1.46	-0.1	23.4		1028	0.15	-290	5	0.3	5	24	187	26	15	32	222	359	0.01	0.001	0.21	**0.44**	**0.39**	**3.1**	0.01	0.02	3.1	2.68	**0.02**	10	10		
	6/03/2019		1.71	-0.35																														
	4/04/2019		1.14	0.22	24.18	7.31	1347	0.58	-32.9	5	0.67	5	24	211	27	15	33	220	378	0.01	0.001	0.09	**0.43**	**0.389**	**3.1**	0.01	0.01	3.1	2.51	0.01	370	160		
2019/2020	3/07/2019		0.99	0.37	22.46	7.6	1643	0.16	-177	6	3.1	5	23	202	26	15	27	196	360	0.01	0.001	0.05	**0.46**	**0.402**	**3**	0.01	0.01	3	2.71	**0.01**	10	10		
	31/07/2019		1.14	0.22																														
	2/10/2019		1.43	-0.07	22.6	7.6	1241	1	69.2	5	0	5	22	206	27	14	32	258	297	0.01	0.001	0.05	**0.2**	**0.125**	**0.8**	0.02	0.35	0.4	0.01	**0.37**	10	10		
	6/11/2019		1.61	-0.25	21.2	7.5	1080	1.7	-102.7		-3.3																							
	15/01/2020	pH meter calibration issue - spurious data.	1.75	-0.39	22.5	**9.8***	741	1.1	-95.8	5	1.1		24	204	26	16	29	268	267				**0.25**	**0.17**	**0.9**	0.01	0.01	0.9	0.35	0.01	20	40		
	28/04/2020	Land-based extraction commenced 16/04/20.	0.89	0.47	22.8	6.8	599	0.12	-140	5	16.6	5	23	171	24	14	35	241	311	0.01	0.001	0.05	**0.38**	**0.316**	**1.9**	0.01	0.01	1.9	0.92	0.01	10	10		
2020/2021	7/07/2020	Clear, Grass Seeds	0.95		20.9	6.5	1075	1.5	118	5	0	5	22	183	24	13	27	294	313	0.01	0.001	0.08	**0.12**	**0.109**	**0.5**	0.01	0.02	0.02	0.07	**0.02**	10	10	5	1
	12/08/2020	Clear	0.83		20.9	7.3	1044	1.21	68	20	1.5	5	23	184	25	14	30	246	344	0.01	0.001	0.07	**0.11**	**0.066**	**0.4**	0.01	0.01	0.4	0.04	0.01	10	10		
	16/09/2020		0.96		19.6	7.31	1068	2.18	-182.7	5	27.78	5	22	188	24	14	27	236	360	0.01	0.001	0.05	**0.27**	**0.164**	0.03	0.01	0.03	0.5	0.25	**0.03**	10	10		
	14/10/2020		1.21		19.7	6.62	1001	2.59	-193.2	5	11.1	5	22	196	24	14	28	226	349	0.01	0.001	0.08	**0.21**	**0.112**	0.01	0.01	0.01	0.9	0.47	0.01	10	20		
	11/11/2020	Ants & Eggs	1.2		20.5	6.95	1055	1.45	144.7		1		5	200	24	14	26	225	243	0.01	0.001	0.07	**0.21**	**0.138**	0.01	0.01	0.01	1	0.53	0.01	10	40		
	10/06/2021	Ants	0.84		19.2	7.26	964	1.8	-191.2	7	1.53		21	183	22	14	23	108	**485**	0.01	0.001	0.05	**0.73**	**0.525**	**4**	0.01	0.01	4	3.03	0.01	10	20		

Pre-Extraction	Average	1.38	-0.015	20.9	7.13	608	0.40	-118.5	5	4.6	5	25	89	8	9	53	32	196	0.08	0.001	4.12	**0.26**	**0.080**	**1.3**	0.01	1.56	1.3	0.44	**0.01**	10	30	ND	ND
	Maximum	1.49	0.100	21.3	8.09	1007	2.61	27.7	5	7.4	5	83	148	19	28	123	182	271	0.26	0.001	9.82	**0.28**	**0.100**	**2.0**	0.01	3.10	2.0	0.60	**0.01**	10	30	ND	ND
	Minimum	1.26	-0.130	20.5	**6.34**	300	0.04	-160.1	5	1.7	5	9	50	5	5	8	5	135	0.01	0.001	0.59	**0.24**	**0.060**	**0.6**	0.01	0.01	0.6	0.28	**0.01**	10	30	ND	ND
	80th Percentile	ID	ID	ID	7.31	693	0.42	-63.9	ID	ID	ID	27	110	10	15	90	34	231	0.20	ID	7.02	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
	20th Percentile	ID	ID	ID	6.85	546	0.15	-156.4	ID	ID	ID	12	56	5	5	14	7	169	0.01	ID	1.04	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Reporting Period (2020/2021)	Average	1.00	ND	20.1	6.99	1035	1.79	-39.4	8	7.2	5	19	189	24	14	27	223	349	0.01	0.001	0.07	**0.28**	**0.186**	**0.8**	0.01	0.02	1.1	0.73	**0.02**	10	18	5.000	1.000
	Maximum	1.21	ND	20.9	7.31	1075	2.59	144.7	20	27.8	5	23	200	25	14	30	294	**485**	0.01	0.001	0.08	**0.73**	**0.525**	**4.0**	0.01	0.03	4.0	3.03	**0.03**	10	40	5.000	1.000
	Minimum	0.83	ND	19.2	6.50	964	1.21	-193.2	5	0.0	5	5	183	22	13	23	108	243	0.01	0.001	0.05	**0.11**	**0.066**	0.0	0.01	0.01	0.0	0.04	**0.01**	10	10	5.000	1.000
All Results	Average	1.37	-0.131	21.8	7.17	783	0.82	-114.6	6	5.0	5	27	133	16	12	49	121	276	0.04	0.001	2.12	**0.39**	**0.290**	**1.9**	0.01	0.23	1.9	1.42	**0.03**	31	**2414**	5.000	1.000
	Maximum	2.53	0.470	24.3	8.09	1643	7.17	144.7	20	27.8	5	83	211	27	28	123	294	**485**	0.26	0.005	9.82	**0.96**	**0.810**	**4.7**	0.02	3.10	4.7	4.42	**0.37**	370	**41000**	5.000	1.000
	80th Percentile	1.71	0.248	23.3	7.49	1060	1.48	15.6	6	10.8	5	27	188	25	15	90	235	359	0.06	0.001	3.99	**0.64**	**0.525**	**3.8**	0.01	0.03	3.8	3.03	**0.02**	12	180	ID	ID
	Median (50th Percentile)	1.21	-0.015	21.4	7.21	647	0.30	-140.0	5	1.6	5	22	119	14	14	33	114	268	0.01	0.001	0.67	**0.28**	**0.164**	**1.6**	0.01	0.01	1.6	0.60	**0.01**	10	15	5.000	1.000
	20th Percentile	0.96	-0.504	20.5	6.86	561	0.15	-192.8	5	0.4	5	16	88	7	5	26	8	188	0.01	0.001	0.05	**0.21**	**0.100**	**0.4**	0.01	0.01	0.5	0.25	**0.01**	10	10	ID	ID
	Minimum	0.83	-1.170	19.2	**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**	1	1	5.000	1.000

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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site GW062045

Site: GW062045			Physical									Major Cations & Anions							Metals			Nutrients / Bacteria / Algae														
	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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
	Objective		-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	18/09/2017	Pump over bore (no elevation data)			21.60	**5.40**	117.00	1.34	150.00		2.40	5.00	15.00	2.00	5.00	1.00	23.00	5.00	10.00	0.01	0.00	0.05	**0.03**	**0.01**	**5.40**	0.01	5.02	0.40	0.01	**5.02**				
	9/10/2017	Pump over bore (no elevation data)			23.5	**5.52**	140	1.27	142		1.8	5	16	3	4	1	22	4	6	0.21	0.001	0.05	**0.02**	**0.01**	**5.9**	0.01	5.41	0.5	0.06	**5.41**	10	10		
	30/10/2017	**Commencement of extraction**																																	
	28/11/2017	Pump over bore (no elevation data)			22.9	**5.94**	130	5.11	142	5	0	5	15	2	4	1	23	4	11	0.01	0.001	0.05	**0.02**	**0.01**	**5.4**	0.01	5.39	1	0.18	**5.39**	75	1		
	11/01/2018	Pump over bore (no elevation data)			23.1	**6.06**	194	5.66	115		2.1	5	17	2	5	1	20	4	8	0.01	0.001	0.05	**0.05**	**0.01**	**5.5**	0.01	5.48	0.5	0.01	**5.48**	2	8		
	8/02/2018	**Last day of first extraction campaign.**																																	
	9/02/2018	Pump over bore (no elevation data)			22.9	7.23	182.2	5.28	-21.3		2.3	5	16	2	5	1	21	4	6	0.01	0.001	0.05	**0.03**	**0.01**	**6**	0.01	5.6	0.4	0.01	**5.6**	10	20		
	31/05/2018	Pump over bore (no elevation data)			23	**6.1**	189	4.31	109		1.9	5	13	2	4	1	18	5	9	0.02	0.001	0.08	**0.01**	**0.01**	**0.9**	0.01	0.87	0.5	0.01	**0.87**				
2018 / 2019	24/10/2018				22.5	6.72	159	8.43	178	5	11.5	5	1	2	4	1	22	5	34	0.05	0.005	0.05	**0.02**	**0.01**	**4.5**	0.01	3.67	0.8	0.05	**3.67**	10	10		
	15/01/2019				22.7	**5.54**	130	4.24	98.7	5	2.8	5	10	5	2	2	24	3	9	**0.56**	0.015	4.4	**0.27**	**0.21**	**0.7**	0.01	0.95	0.7	0.19	**0.02**	30	**3700**		
2019 / 2020	3/07/2019				22.47	**5.5**	328	3.51	104.5	6	0.5	5	16	2	4	1	19	4	7	0.01	0.001	0.05	0.01	**0.008**	**5.7**	0.01	5.2	0.5	0.02	**5.2**	70	160		
	2/10/2019				23.3	7.8	**228**	6.8	136.3	5	0	5	**19**	3	5	1	24	4	7	0.01	0.001	0.05	**0.05**	0.003	**5.2**	0.01	5.25	0.5	0.01	**5.25**	**10**	10	10	
	28/04/2020	Land-based extraction commenced 16/04/20.			22.9	**5.2**	125	8.19	161.5	6	12.5	5	13	2	4	1	21	5	6	0.02	0.001	0.05	0.01	**0.316**	**4.2**	0.01	3.56	0.6	0.02	**3.56**	40	70		
2020/2021	6/07/2020				17.6	**6.4**	313	8	142	5	1.1	5	10	2	4	1	17	6	8	0.01	0.001	0.05	0.01	**0.008**	**5**	0.01	4.54	0.5	0.04	**4.54**	10	30		
	13/08/2020	Clear			21.3	**5.7**	88.8	7.6	18	5	27.1	5	15	2	4	1	18	6	6	0.01	0.001	0.05	0.01	0.005	**4.58**	0.01	4.37	0.4	0.01	**4.37**	30	20		
	16/09/2020				21.3	**5.04**	161.8	5.94	251.8	5	43.7	5	15	2	4	1	19	5	5	0.02	0.001	0.05	0.01	**0.008**	**5.12**	0.01	5.12	0.2	0.01	**5.12**	10	10		
	14/10/2020				20	**6.21**	140.6	7.95	-165.9	5	28.7	5	15	3	5	1	21	5	4	0.01	0.001	0.06	0.01	0.005	**4.72**	0.01	4.72	0.7	0.01	**4.72**	10	10		
	11/11/2020				22.7	**6.18**	154.1	6.43	159.1		5.4		5	3	4	1	20	5	12	0.01	0.001	0.05	**0.03**	0.004	**4.01**	0.07	3.94	0.5	0.01	**4.01**	10	20		
	24/02/2021	Clear			25.5	**6.19**	109	7.03	0.7	<5	44		19	3	4	1	19	5	4	0.02	0.001	0.05	**0.06**	0.004	**4.3**	0.01	3.82	0.5	0.01	**3.82**	460	**1660**		
	10/06/2021				19.6	**5.23**	118.7	8.41	-54.3	5	2.63		14	2	4	1	18	5	10	0.01	0.001	0.05	**0.04**	**0.012**	**4.2**	0.01	3.75	0.4	0.01	**3.75**	**1400**	**1800**		
Pre-Extraction		Average			22.6	**5.46**	129	1.31	146.0		2.1	5	16	3	5	1	23	5	8	0.11	0.001	0.05	**0.03**	**0.010**	**5.7**	0.01	5.22	0.5	0.04	**5.22**	10	10	ND	ND
		Maximum			23.5	**5.52**	140	1.34	150.0	0	2.4	5	16	3	5	1	23	5	10	0.21	0.001	0.05	**0.03**	**0.010**	**5.9**	0.01	5.41	0.5	0.06	**5.41**	10	10	ND	ND
		Minimum			21.6	**5.40**	117	1.27	142.0	0	1.8	5	15	2	4	1	22	4	6	0.01	0.001	0.05	**0.02**	**0.010**	**5.4**	0.01	5.02	0.4	0.01	**5.02**	10	10	ND	ND
		80th Percentile			ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
		20th Percentile			ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND
Reporting Period (2020/2021)		Average			21.1	**5.85**	155	7.34	50.2	5	21.8	5	13	2	4	1	19	5	7	0.01	0.001	0.05	**0.02**	**0.007**	**4.6**	0.02	4.32	0.5	0.01	**4.33**	276	**507**	ND	ND
		Maximum			25.5	**6.40**	313	8.41	251.8	5	44.0	5	19	3	5	1	21	6	12	0.02	0.001	0.06	**0.06**	**0.012**	**5.1**	0.07	5.12	0.7	0.04	**5.12**	**1400**	**1800**	ND	ND
		Minimum			17.6	**5.04**	89	5.94	-165.9	5	1.1	5	5	2	4	1	17	5	4	0.01	0.001	0.05	**0.01**	0.004	**4.0**	0.01	3.75	0.2	0.01	**3.75**	10	10	ND	ND
All Results		Average			22.2	**6.00**	167	5.86	92.6	5	10.6	5	14	2	4	1	21	5	9	0.06	0.002	0.29	**0.04**	**0.036**	**4.5**	0.01	4.26	0.5	0.04	**4.21**	137	**471**	10.0	ND
		Maximum			25.5	7.80	328	8.43	251.8	6	44.0	5	19	5	5	2	24	6	34	**0.56**	0.015	4.40	**0.27**	**0.316**	**6.0**	0.07	5.60	1.0	0.19	**5.60**	**1400**	**3700**	10.0	ND
		80th Percentile			23.1	**6.46**	201	8.04	159.6	6	27.4	5	16	3	5	1	23	5	10	0.03	0.001	0.05	**0.05**	**0.010**	**5.5**	0.01	5.39	0.7	0.05	**5.39**	73	**1060**	ND	ND
		Median (50th Percentile)			22.7	**6.00**	147	6.19	125.7	5	2.5	5	15	2	4	1	21	5	8	0.01	0.001	0.05	**0.02**	**0.010**	**4.9**	0.01	4.63	0.5	0.01	**4.63**	10	20	10.0	ND
		20th Percentile			21.0	**5.37**	118	4.09	-3.7	5	1.0	5	10	2	4	1	18	4	6	0.01	0.001	0.05	**0.01**	0.005	**4.2**	0.01	3.65	0.4	0.01	**3.65**	10	10	ND	ND
		Minimum			17.6	**5.04**	89	1.27	-165.9	5	0.0	5	1	2	2	1	17	3	4	0.01	0.001	0.05	**0.01**	0.003	**0.7**	0.01	0.87	0.2	0.01	**0.02**	2	1	10.0	0.0

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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site GW300856

Site:	GW300856		Physical									Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
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	Faecal coliforms cells/ml	Enterococci cells/ml	Potentially Toxic Cyanobacteria cells/L	Chlorophyll a ug/L
		Objective	-		-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	18/09/2017	Pump over bore (no elevation data)			20.70	**5.64**	89.00	4.36	41.00		16.00	5.00	8.00	4.00	2.00	2.00	17.00	6.00	7.00	**0.72**	0.02	5.36	**0.31**	**0.32**	**0.80**	0.01	0.01	0.80	0.16	**0.01**				
	9/10/2017	Pump over bore (no elevation data)			22.9	**6.48**	100	2.31	31		17.3	5	8	4	2	2	17	4	10	**3.27**	0.019	6.19	**0.41**	**0.25**	**1.1**	0.01	0.01	1.1	0.2	**0.01**	10	10		
	30/10/2017	**Commencement of extraction**																															
	28/11/2017	Pump over bore (no elevation data)			25.2	7.12	174	4	-3.2	7	19.7	5	9	4	2	1	20	5	8	0.32	0.01	3.1	**0.32**	**0.24**	**0.7**	0.01	0.01	0.7	0.28	**0.01**	5	5		
	11/01/2018	Pump over bore (no elevation data)			23.9	**6.24**	116	4.78	-21		13.5	5	10	5	2	1	23	4	4	0.31	0.012	3.16	**0.29**	**0.16**	**0.7**	0.01	0.01	0.7	0.09	**0.01**	2	8		
	8/02/2018	**Last day of first extraction campaign.**																															
	9/02/2018	Pump over bore (no elevation data)			24.6	**6.44**	119.9	4.26	-25.9		25.5	5	10	3	2	1	20	5	7	**0.54**	0.019	4.88	**0.36**	**0.23**	**0.4**	0.01	0.02	0.4	0.12	**0.02**	10	10		
	31/05/2018	Pump over bore (no elevation data)			22.7	6.98	228	5.26	-41		20.5	5	8	4	2	1	18	5	8	**0.52**	0.012	3.99	**0.24**	**0.2**	**0.6**	0.01	0.01	0.6	0.11	**0.01**				
2018 / 2019	24/10/2018				21.8	**6.1**	78	4.76	9.7	5	8.1	5	1	4	2	1	19	4	11	**0.65**	0.01	4.04	**0.3**	**0.22**	**0.8**	0.01	0.01	0.8	0.14	**0.01**	10	10		
	15/01/2019				25.1	6.85	190	3.8	-44	5	9.6	5	16	2	4	1	21	5	11	0.01	0.001	0.05	**0.01**	**0.01**	**1.4**	0.01	0.02	0.4	0.06	**0.95**	10	60		
	4/04/2019				25.91	6.75	281	4.06	3.3	5	0.13	5	10	4	2	2	18	6	7	**0.58**	0.017	4.64	**0.35**	**0.036**	**1**	0.01	0.01	1	0.21	0.01	10	10		
2019 / 2020	3/07/2019				22.67	**6.02**	161	3.03	-31.3	7	23.1	5	10	5	2	2	21	7	7	0.48	0.01	5.49	**0.25**	**0.009**	**0.8**	0.01	0.01	0.8	0.18	0.01	30	10		
	2/10/2019				24	**6.2**	125	4.4	18.3	5	17.6	5	9	5	2	2	16	8	6	**0.56**	0.009	4.51	**0.24**	**0.03**	**0.9**	0.01	0.01	0.9	0.13	0.01	10	10		
	15/01/2020	pH meter calibration issue - spurious data.			24.6	**13.9***	133	7	-99	5	11.7		9	4	2	2	14	7	3				**0.3**	**0.17**	**0.8**	0.01	0.01	0.8	0.18	0.01	10	10		
	28/04/2020	Land-based extraction commenced 16/04/20.			5.8	**5.8**	108.5	7.01	-54.4	5	56.7	5	8	4	2	2	20	7	5	0.32	0.019	3.55	0.29	**0.019**	**1.1**	0.01	0.01	1.1	0.18	0.01	10	10		
2020/2021	6/07/2020				20.3	7	109	6.9	38	5	9.2	5	12	4	2	2	16	6	7	0.33	0.02	4.06	**0.23**	**0.04**	**0.9**	0.01	0.01	0.9	0.22	0.01	10	10		
	13/08/2020	Clear			22	**5.2**	1.7	7.5	188	5	2.3	5	9	4	2	2	14	7	4	0.33	0.018	4.15	**0.21**	**0.029**	**0.8**	0.01	0.01	0.8	0.18	0.01	10	10		
	16/09/2020				20.8	**5.85**	91.1	6.95	4.4	15	391.64	5	9	4	1	1	13	7	8	0.37	0.016	4.13	**0.31**	**0.042**	0.01	0.01	0.01	0.9	0.19	0.01	10	10		
	14/10/2020				21.6	7.89	87.7	6.99	-33.6	5	86.4	5	9	4	1	1	11	8	9	0.37	0.014	3.2	**0.28**	**0.006**	0.05	0.01	0.05	0.8	0.17	**0.05**	10	10		
	11/11/2020				22.4	7.2	84	7.59	-17.9		25.4		5	4	1	1	10	6	9	0.34	0.012	3.38	**0.28**	**0.034**	0.12	0.02	0.1	0.8	0.13	**0.12**	10	10		
	24/02/2021	Clear			22.4	6.8	124	7.86	140.8	<5	3.4		14	4	2	2	14	12	13	0.36	0.013	2.93	**0.23**	**0.034**	**1**	0.01	0.01	1	0.14	0.01	100	20		
	10/06/2021				21.9	**6.37**	92.3	7.34	253.2	<5	26.95		9	4	2	2	11	6	15	0.36	0.011	2.79	**0.2**	**0.01**	**1.1**	0.01	0.01	1.1	0.17	0.01	10	10		
Pre-Extraction		Average			21.8	**6.06**	95	3.34	36.0	ND	16.7	5	8	4	2	2	17	5	9	**2.00**	0.018	5.78	**0.36**	**0.285**	**1.0**	0.01	0.01	1.0	0.18	**0.01**	10	10	ND	ND
		Maximum			22.9	**6.48**	100	4.36	41.0	0	17.3	5	8	4	2	2	17	6	10	**3.27**	0.019	6.19	**0.41**	**0.320**	**1.1**	0.01	0.01	1.1	0.20	**0.01**	10	10	ND	ND
		Minimum			20.7	**5.64**	89	2.31	31.0	0	16.0	5	8	4	2	2	17	4	7	**0.72**	0.016	5.36	**0.31**	**0.250**	**0.8**	0.01	0.01	0.8	0.16	**0.01**	10	10	ND	ND
		80th Percentile			ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
		20th Percentile			ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Reporting Period (2020/2021)		Average			21.6	6.62	**84**	7.30	81.8	8	77.9	5	10	4	2	2	13	7	9	0.35	0.015	**3.52**	**0.25**	**0.028**	**0.6**	0.01	0.03	0.9	0.17	**0.03**	**23**	11	ND	ND
		Maximum			22.4	7.89	**124**	7.86	253.2	15	391.6	5	**14**	4	2	2	16	12	15	0.37	0.020	**4.15**	**0.31**	**0.042**	**1.1**	0.02	0.10	1.1	0.22	**0.12**	**100**	20	ND	ND
		Minimum			20.3	**5.20**	2	6.90	-33.6	5	2.3	5	5	4	1	1	10	6	4	0.33	0.011	**2.79**	**0.20**	**0.006**	**0.0**	0.01	0.01	0.8	0.13	**0.01**	**10**	10	ND	ND
All Results		Average			22.1	**6.47**	**125**	5.51	17.8	6	39.2	5	9	4	2	2	17	6	8	**0.57**	0.014	**3.87**	**0.27**	**0.104**	**0.8**	0.01	0.02	0.8	0.16	**0.07**	**15**	13	ND	ND
		Maximum			25.9	7.89	**281**	7.86	253.2	15	391.6	5	**16**	5	4	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**	**100**	60	ND	ND
		80th Percentile			24.6	7.00	**171**	7.27	40.4	7	26.7	5	**10**	4	2	2	20	7	11	**0.58**	0.019	**4.88**	**0.32**	**0.228**	**1.1**	0.01	0.02	1.0	0.20	**0.02**	**10**	10	ND	ND
		Median (50th Percentile)			22.5	**6.44**	**113**	5.02	0.0	5	17.5	5	9	4	2	2	17	6	8	0.37	0.013	**4.04**	**0.29**	**0.038**	**0.8**	0.01	0.01	0.8	0.17	**0.01**	**10**	10	ND	ND
		20th Percentile			21.0	**5.85**	**88**	4.01	-39.5	5	8.3	5	8	4	2	1	13	5	5	0.32	0.010	**3.10**	**0.23**	**0.012**	**0.4**	0.01	0.01	0.7	0.12	**0.01**	**10**	10	ND	ND
		Minimum			5.8	**5.20**	2	2.31	-99.0	5	0.1	5	1	2	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**	**2**	5	ND	ND

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

617 - CUDGEN LAKES SAND QUARRY
Groundwater Monitoring Site GW300845

Site: GW300845			Physical									Major Cations & Anions							Metals			Nutrients / Bacteria / Algae										
Sample Date		Comments	Water Level Top of Casing	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 cells/L	Chlorophyll a ug/L
	Objective		-	-	*6.5-8.5*	*<3000*	-	-	-	-	*10*	*<500*	-	*<100*	*<40*	*<1000*	*<800*	*<400*	*<0.5*	*<0.42*	*<20*	*0.01*	*<0.005*	*0.35*	-	-	-	*<20*	*0.01*	*<1000/100*	*<230/100*	*<50000*	*<10*
2017/2018	18/09/2017	Pump over bore but able to measure GW level	1.65	21.30	**6.12**	116.00	1.71	18.00		92.00	5.00	14.00	2.00	2.00	2.00	31.00	4.00	14.00	**0.85**	0.02	8.47	**0.18**	**0.04**	**1.40**	0.01	0.02	1.40	0.21	**0.02**				
	9/10/2017	Site vacant and for sale. No power to pump	1.62																														
	30/10/2017	**Commencement of extraction**																															
	28/11/2017	Site vacant and for sale. No power to pump																															
	11/01/2018	Site vacant and for sale. No power to pump																															
	8/02/2018	**Last day of first extraction campaign.**																															
	9/02/2018	Site vacant and for sale. No power to pump																															
Pre-Extraction	Average		1.64	21.3	**6.1**	116	1.71	18.0		92.0	5	14	2	2	2	31	4	14	**0.85**	0.024	8.47	**0.180**	**0.040**	**1.40**	0.01	0.02	1.4	0.21	**0.020**	ND	ND	ND	ND
	Maximum		1.65	21.3	**6.1**	116	1.71	18.0		92.0	5	14	2	2	2	31	4	14	**0.85**	0.024	8.47	**0.180**	**0.040**	**1.40**	0.01	0.02	1.4	0.21	**0.020**	ND	ND	ND	ND
	Minimum		1.62	21.3	**6.1**	116	1.71	18.0		92.0	5	14	2	2	2	31	4	14	**0.85**	0.024	8.47	**0.180**	**0.040**	**1.40**	0.01	0.02	1.4	0.21	**0.020**	ND	ND	ND	ND
	80th Percentile		ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND	ND	ND
	20th Percentile		ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND	ND	ND
All Results	Average		1.64	21.300	6.1	**116.0**	2	**18.00**	ID	92	5.0	**14**	2	2	2	31	4	14	1	0.02	**8.47**	0.18	**0.040**	**1.400**	0.01	0.02	1.4	0.2	0.02	ND	ND	ND	ND
	Maximum		1.65	21.300	6.1	**116.0**	2	**18.00**	0.0	92	5.0	**14**	2	2	2	31	4	14	1	0.02	**8.47**	0.18	**0.040**	**1.400**	0.01	0.02	1.4	0.2	0.02	ND	ND	ND	ND
	80th Percentile		ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND	ND	ND
	Median (50th Percentile)		1.64	21.300	6.1	**116.0**	2	**18.00**	ID	92	5.0	**14**	2	2	2	31	4	14	1	0.02	**8.47**	0.18	**0.040**	**1.400**	0.01	0.02	1.4	0.2	0.02	ND	ND	ND	ND
	20th Percentile		ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ND	ND	ND	ND
	Minimum		1.62	21.300	6.1	**116.0**	2	**18.00**	0.0	92	5.0	**14**	2	2	2	31	4	14	1	0.02	**8.47**	0.18	**0.040**	**1.400**	0.01	0.02	1.4	0.2	0.02	ND	ND	ND	ND

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 6

Incident Report

(Total No. of pages including blank pages = 6)

This page has intentionally been left blank

08 July 2021

The Secretary
The Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Sent by email to: compliance@planning.nsw.gov.au and submitted via Major Projects Portal

Dear Sir / Madam

Re: Cudgen Sand Lakes Quarry PA 05_0103B – Incident Report
Missed Noise Monitoring Event

I am writing on behalf of Gales-Kingscliff Pty Limited (Gales) to formally report on the non-compliance with the noise monitoring frequency as specified within the approved Noise Management Plan (NMP) for the Cudgen Sand Lakes Quarry (the Quarry). This letter also identifies the measures that have been implemented in order to minimise the potential for a future reoccurrence.

Details of the Incident

The incident is a non-compliance with PA 05_0103B Schedule 3 Conditions 3 and 4 which require attended noise monitoring. In accordance with the approved NMP, noise monitoring "*will be undertaken on a quarterly basis for up to 2 years / up to eight occasions and then on an annual basis thereafter. As operations are likely to initially occur on a campaign basis, should no operations be occurring during that quarter, noise monitoring will be undertaken during the next period of operational activities*."

The Q1 2021 noise monitoring, i.e. a single noise monitoring event required between 01 January 2021 and 31 March 2021, was not undertaken despite some operational activities occurring during the quarter.

This occurred due miscommunication between RWC and the Quarry operator – Kingscliff Sands. RWC had coordinated previous noise monitoring and did not seek clarification of the status of operations, being thought to be suspended due to the permanent wash plant being installed throughout the quarter (completed in March 2021). However, during the 3 month period there were 7 days during which dredging was undertaken and 8 days when the truck movements exceeded 10 trucks per day (36, 23, 21, 17, 13, and the rest less). Kingscliff Sands advises that most movements

Brooklyn Office:
Level 1, 12 Dangar Road, PO Box 239, BROOKLYN NSW 2083
Telephone: (02) 9985 8511 Email: brooklyn@rwcorkery.com
Orange Office:
62 Hill Street, ORANGE NSW 2800
Telephone: (02) 6362 5411 Email: orange@rwcorkery.com
Brisbane Office:
Level 54, 111 Eagle Street, BRISBANE QLD 4000
Telephone: (07) 3205 5400 Email: brisbane@rwcorkery.com

were not pre-booked and they could not book the acoustic monitoring for a day with significant truck movements. RWC has advised Gales that technically, since there have been operations, acoustic monitoring is required, even if it would have been on a day with few or no trucks. This technical error was identified during the review process for the Q2 2021 noise monitoring report and subsequently confirmed during a meeting between RWC, Kingscliff Sands and Gales late on 01 July 2021.

Potential for Adverse Impacts

The failure to complete noise monitoring during Q1 2021 is not expected to have resulted in any adverse environmental impacts. This is concluded based on the following.

- The low intensity nature of the activities, which remain at a much lower intensity than the approved operations.
- The previous monitoring results which have demonstrated compliance with the noise criteria.
- The absence of any complaints relating to noise.

Measures Implemented to Avoid Future Non-compliance

As a result of this non-compliance a review was undertaken of the process for initiating noise monitoring which, in accordance with the NMP, is to "*be undertaken at a time considered representative of higher intensity activities during that period (e.g. during extraction)*". It is noted that monitoring at such a time may be difficult during some quarters where operations are at a low intensity with irregular timing of truck movements.

Given that RWC is not involved in operational scheduling / planning, it has been determined that Kingscliff Sands will directly coordinate noise monitoring in accordance with the following process.

1. At the beginning of each quarter, the Quarry Manager will review the activities expected during the coming quarter and identify periods of representative / higher intensity activities.

2. The Quarry Manager will then directly contact Craig Hill Acoustics (noise monitoring consultant) and confirm suitable dates for noise monitoring. An email confirming the planned monitoring date is to be circulated to Craig Hill Acoustics, Gales and RWC. In the event that operations are not to occur during that quarter, an email is to be circulated confirming that this is the case.

3. Craig Hill Acoustics will complete the monitoring and circulate the monitoring report to Kingscliff Sands, Gales and RWC for review.

In order to facilitate this process, RWC has created a scheduled reminder at the beginning of each quarter (through Outlook) which has been sent to Kingscliff Sands, Craig Hill Acoustics and Gales. The reminder includes details of the above process and the contact details of all relevant personnel.

We believe that this revised process will ensure proper planning for noise monitoring and involve all parties in the process to provide additional redundancy.

Acoustic monitoring has been undertaken in Q2 2021 (i.e. the April-June quarter) and planning for Q3 monitoring has commenced in accordance with the new process.

Should you wish to discuss the above or any other matter relating to the Cudgen Lakes Sand Quarry, please don't hesitate to contact me on 07 3205 5400.

Yours sincerely

Scott Hollamby
Senior Environmental Consultant

Copy: Gales-Kingscliff Pty Limited
Kingscliff Sands
NSW Environment Protection Authority
Tweed Shire Council

This page has intentionally been left blank