

DUNLOE SANDS

Environmental Monitoring Report November 2010 to April 2011



Prepared by Planit Consulting May 2011





Review and Amendments Schedule – PLANIT CONSULTING PTY LTD

		Date
Author	ТА	April & May 2011
Reviewer	AS	May 2011

Amendments	

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Executive Summary & Introduction





Introduction & Context

Development consent for Ramtech Pty Ltd's (Ramtech) proposal to construct and operate a sand quarry at Lot 1 in DP 755721 & Lots 1 & 2 in DP 780199 Pottsville Mooball Road, Mooball was granted by the Minister for Planning on 24th November 2008. Schedule 3 of the development consent requires that individual management plans for the key environmental issues be prepared and that environmental management and monitoring conditions be fulfilled. To this end an EMP was approved by the DOP which integrates the prescribed environmental monitoring programs in accordance with Condition 2 of Schedule 5 into a planning and operations framework.

Within Schedule 5 of the consent, condition No.5 requires that within twelve (12) months of the date of the approval and annually thereafter, Ramtech is to submit an Annual Environmental Management Report (AEMR). This report is to be submitted to the Director General of the Department of Planning and other relevant agencies in accordance with the abovementioned Condition 5 (the Development Consent is presented within Appendix A). The AEMR will describe works undertaken, provide a summary and analysis of any complaints and monitoring results, identify any trends in monitoring results and identify any non compliance over the preceding 12 months. An outline of any actions that were or are proposed to be undertaken to ensure compliance will be included. The AEMR will also identify the proposed construction, extraction and rehabilitation activities planned for the following 12 months.

Construction commenced on a general trial basis in September 2011 with formal commencement occurring in October of 2011. Operations are at a basic level with estimated annual production in the order of 20,000 tonnes per annum only at this stage.

Description of Resource

Concrete Sand

The Dunloe Park sand, after washing, is suitable as a concrete sand additive. It is expected that this will be the major use of the sand. Low extraction costs will make the sand competitive into the local Pottsville markets. As sand demand increases, the Dunloe Park sand may be competitive into the Brisbane market. The average haul distance (130km) is 80 km more than the current distance. However, upgrades to the Pacific Highway, in particular the Tugun Bypass and Banora Bypass, the delivery time and distance will be further decreased.

Loam

Further investigation into loam resources were carried out in mid 2007 (Coffey Geosciences, 2007), the area selected for investigation being the initial mining area proposed for the sand quarry (Gilbert and Sutherland, 2007). A 200m x 200 m area approximately 1.2 m deep in the alluvial soil below the topsoil (which averaged approximately 0.3m depth) equating to approximately 90,000t of loam, was sampled by auger drilling and assessed for suitability as a loam.

Fill Material

Fill material represents a portion of demand in South East Queensland and Northern NSW. The sand appears to match Rocla specifications for fill sand in NSW (Rocla, 2007). From investigations carried out by Coffey Mining, it is considered that the Dunloe Park sand can be used as "low grade" fill material which is not dissimilar to fill material supplied into the northern and central coast of NSW. Major local sources of fill include sandstone fill from Kangaroo Creek (near Grafton) which also provides road base and hard materials.

Plastering and Rendering Sand

Coffey Mining is of the opinion that the sand in the Dunloe Park Resource, when washed, will be suitable for lower grade plastering and rendering sand and this is similar to current material supplied into the northern and central NSW market. To confirm this, it is recommended that the following be completed:



- Washed material be prepared and provided to agents for trialing and feedback.
- Laboratory tests be completed for fineness modulus, clay/silt content (<3%), organics and shell content.

Other Uses

Other "specialist" products which fit closely to the grading of the Dunloe Park sands include:

- Golf course sands colour (usually whiteness) is a major issue.
- Grout sands.
- Fine filter sands.

Sale of these sands (except for local demand) is not considered to be a major opportunity for Dunloe Park due to established marketing strategies (including bagging of filter sands and grout sands) by other manufacturers. If these products are required in the future, then blending with imported (generally coarser size ranges) will be required. This is commonplace within the sand industry.

Dunloe Park in situ Indicated Mineral Resources

Pit	Overburden Mm3	Sand Mm3	Total Mm3
North Pit	0.14	3.70	3.84
South Pit	0.08	2.96	3.04
Total	0.22	6.66	6.88

Extraction rates are not to exceed 300,000 tonnes per annum in accordance with Condition 7 of Schedule 2 of the Development Consent. Condition 5 of Schedule 2 provides for operations being permitted until 1 January 2035.

Monitoring

Planit Consulting has been contracted by Ramtech Pty Ltd to prepare this report based on environmental monitoring undertaken upon site by the proponents.

The monitoring includes;

- Sand Stockpiles;
- Blue Green Algae;
- Noise (Benchmark testing);
- Dust;
- Vegetation Management and Regeneration (within a separate report);
- Ground Waters; and
- Surface Waters.

This report was prepared by Planit Consulting and includes the following;

- Sand Stockpile pH Level results for November 2010 to April 2011;
- Algae Level results for January to March 2011;
- Ground Water chemical results for January to March 2011;
- Noise testing results;
- Surface Water chemical results for March 2011; and



Rainfall levels from November 2010 to March 2011.

Water samples for algae were collected twice monthly between January and March 2011 at the Lake site number 1. Mixed Algae results from all water samples remained steady with less than 100cells/mL. These results are significantly less than the maximum allowable water quality objective of 50,000cells/mL.

Groundwaters were sampled monthly over a 3-month period between January and March 2011. Monthly monitoring provided levels of pH, Electrical Conductivity (EC), Redox Potential and Dissolved Oxygen (DO) from locations DLP1 to DLP11. The pH level across the site varied however the majority of the samples maintained within the pH interim target range presented within the Environmental Management Plan. The EC levels were all below the interim target apart from location DLP3. DO levels vary over the site and months however the majority of samples provide levels above the minimum interim target. The quarterly sampling took place in March 2011 which sampled water for levels of Chloride, Calcium, Magnesium, Sodium, Potassium, Sulphate, Arsenic, Iron and Manganese. Groundwater sampling locations as approved by the DOP are contained at **Appendix A**.

Surface water samples were collected for the quarterly sampling event in March 2011 at sites SW1 to SW12. Results show generally good quality water with most sites sampled maintaining low EC, suspended solids, phosphorus and nitrogen. pH levels were consistent maintaining levels between the 5.0 - 8.5 levels of the interim target and DO levels were above the interim target. Surface water sampling locations as approved by the DOP are contained at **Appendix B**.

The Bureau of Meteorology (BOM) recorded rainfall within surrounding suburbs over the five month period from November 2010 to March 2011. The recorded rainfall averaged from three sites – Coolangatta, Murwillumbah and Byron Bay – was approximately 1,121.1mm over the five month period.

Complaints Recorded

No complaints have been registered by the proponents to date.

Acoustic Testing (Noise)

Pursuant to the consent conditions and approved EMP, operational noise testing was undertaken by the proponents (CRG Consulting), with a focus on all relative plant, machinery and loading and unloading. The results of this testing indicate that operations are performing as indicated in the development application and do not exceed background levels associated with surrounding residents.

A copy of this certification is attached at Appendix D.



Chapter 1.0 Sampling Program





Sampling Program

Dunloe Sand Quarry conducts environmental monitoring in accordance to Development Consent, Condition 2 of Schedule 5 and the approved Environmental Management Plan (EMP). Ramtech undertake sand stockpile, algae, surface water and groundwater monitoring for the project. Ramtech commenced monitoring in November given that this coincided with the in earnest commercial operations of the project.

The Sand stockpile was sampled weekly for a period of 23-weeks between November 2010 and April 2011, although operations commenced in September on a limited trial scale only. To date, operations have been limited by market conditions and are estimated to comprise an extraction rate of only 20,000 tonnes per annum.

The weekly samples monitored the pH levels present. Samples of the Lake at site 1 were taken twice monthly for two months to monitor the mixed algae within the lake.

Groundwater sites are monitored monthly for pH, EC, Redox Potential and DO and quarterly for Chloride, Calcium, Magnesium, Sodium, Potassium, Sulphate, Arsenic, Iron and Manganese. Samples are collected from sites DLP1 to DLP11. Sites locations are shown on the Ground Water Location Map under **Appendix A**.

Surface water analysis includes pH, conductivity, DO, suspended solids, total phosphorus and total nitrogen is conducted quarterly at sites SW1 to SW12. Site locations are depicted within the Surface Water Location Map under **Appendix B**.

It is noted the results illustrated within this report have been taken directly from the Laboratory Reports. The full laboratory Reports are provided in **Appendix C.**



Chapter 2.0 Monthly Monitoring Results





2.1 Groundwater Depth

Date	DLP1	DLP1A	DLP2	DLP3	DLP3A	DLP4	DLP5	DLP6
30/08/2004	0.30	0.26	0.23	0.31	0.21	0.29	0.33	0.33
06/09/2004	0.25	0.25	0.20	0.25	0.30	0.29	0.29	0.33
13/09/2004	0.28	0.23	0.18	0.13	0.30	0.28	0.21	0.34
17/12/2004	0.83	0.99	1.25	0.45	0.72	1.37	0.75	1.19

Date	DLP7	DLP7A	DLP8	DLP8A	DLP9	DLP10	DLP10A	DLP11
30/08/2004	0.29	0.23	0.43	0.41	0.31	0.42	0.24	0.24
06/09/2004	0.27	0.23	0.42	0.40	0.29	0.38	0.25	0.23
13/09/2004	0.25	0.21	0.38	0.37		0.37	0.24	0.21
17/12/2004	1.09	0.79	1.16	1.28	0.53	1.31	1.36	0.80

Ground w	Ground water boreholes (Depth) 19th April 2011												
DLP1	DLP2	DLP3	DLP4	DLP5	DLP6	DLP7	DLP8	DLP9	DLP10	DLP11			
0.64	0.62	0.58	0.59	0.68	0.60	0.62	0.62	0.58	0.57	0.59			

As referenced in the current and reference (background) levels above, the groundwater depth has stayed quite uniform across the site, with no marked difference detected relative to proximity to the Extraction Lake or operational area.

2.2 Dust Monitoring

The EMP sets out the Dust monitoring requirements applicable to the site. This criterion was developed in accord with the original testing undertaken by Simmonds & Bristow which was based on benchmark background results associated with the climatic and environmental conditions on site.

Dust deposition gauges and custom stands have been erected at various locations around the site in accord with the EMP and Australian Standard AS 2922-1987 "Ambient Air – Guide for the Siting of Sampling Units" (NSW DECC Method AM-1) and AS 3580.9.6-2003 "Particulate Matter – PM10 – high volume sampler with size selective inlet".

Practical sampling on site has been difficult in the preceding months due to the extent of rain and the inability to gain unaffected samples due to the frequency of rain events and as such no sampling has been undertaken to date. It is intended to rectify this situation over the winter months.

It is pertinent to note nonetheless that Ramtech have implemented mechanical sprinkler systems on site and undertaken all sealing works in accord with the EMP requirements and conditions of consent.

2.3 Sand Stockpile Results

Figure 1 displays the results for November 2010 to April 2011. Results are displayed in pH levels at a weekly monitoring rate.

Laboratory analysis is provided in Appendix C.



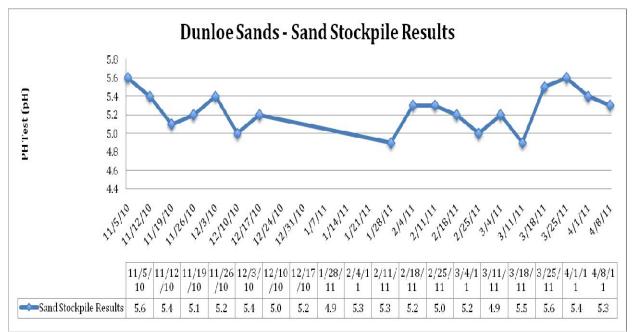


Figure 1: Dunloe Sands - Sand Stockpile (pH Test) Results November 2010 to April 2011

The results displayed show pH levels within the sand stockpile to be generally consistent. Over the six month monitoring period pH levels ranged between 4.9pH and 5.6pH. Analysing this graph against the total rainfall on site shows direct correlations illustrating that increased rainfall in the vicinity produce lower pH levels within the lake. This correlation explains the varied pH level results as rainfall over December and January are considerably higher than that of the other months within the monitoring period, although considerable rainfall was also experienced within the low peak noticeable in March.

2.4 Mixed Algae Results

The results of the mixed algae monitoring for the period of January 2011 to March 2011 are displayed within **Table 1**. Results are presented in cells/mL twice monthly.

	21/01/2011	27/01/2011	14/02/2011	28/02/2011	18/03/2011	28/03/2011
Mixed Algae (cells/mL)	<100	<100	<100	<100	<100	<100

Table 1: Dunloe Sands – Lake - Mixed Algae Results January to March 2011

The results gather between January and March 2011 remain consistently low with less than 100cell/mL. These results are well below the maximum water quality objectives presented within the EMP of 50,000cells/MI.

2.5 Ground Water & Lake Results

Monthly ground water monitoring was conducted between January 2011 and March 2011. Samples monitored the pH, EC, Redox Potential and DO levels of twelve sample sites; including eleven ground water and one lake sample site. The locations of the DLP sites are illustrated within the Ground Water Locations Map **Appendix A**.



The results are displayed within four separate graphs illustrating the results of each test site over the three month monitoring period. Figure 2 depicts the pH test results, Figure 3 illustrates the EC, Figure 4 shows the Redox Potential and Figure 5 presents DO levels.

It is noted data and results for March at sample site DLP5 is not available within any of the conducted tests.

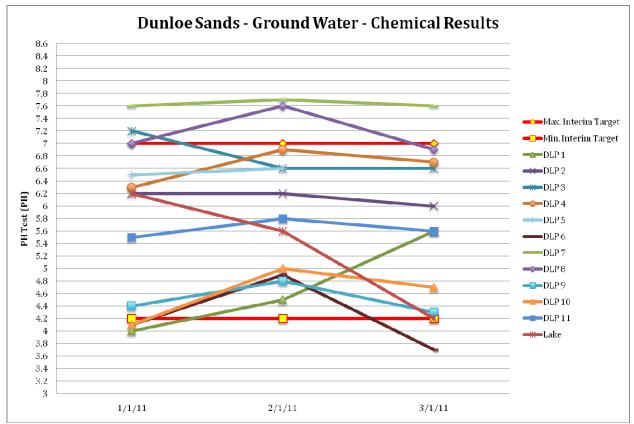


Figure 2: Dunloe Sands - Ground Water - Chemical (pH Test) Results January to March 2011

The EMP provided the interim target range regarding the pH levels of ground water sampling. The majority of the results displayed are between the minimum of 4.2pH and maximum of 7.0pH.

DLP 7 constantly sits outside the maximum levels by between .6 and .7pH presenting a lower (more alkaline) acidity level than that of the target level, whilst DLP 8 also lifted above the target level in February. This is not unexpected given that similar levels were experienced prior to construction within background testing.



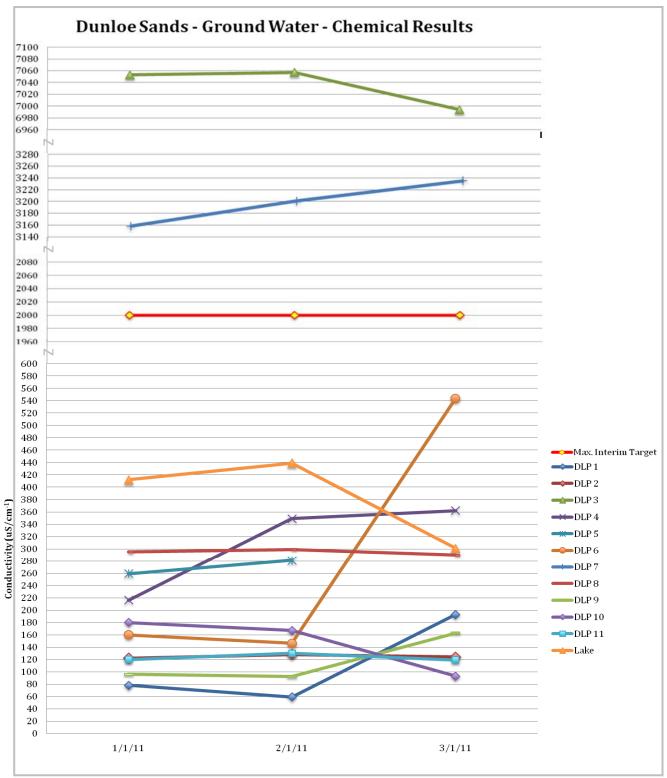


Figure 3: Dunloe Sands - Ground Water - Chemical (EC Test) Results January to March 2011

The majority of the samples taken produce considerably low EC levels when compared to the EMP maximum interim target.



Two samples sites; DLP3 and DLP7 present conductivity levels well above the maximum interim target of 2,000uS/cm⁻¹ stated within the EMP, each of which also expressed similar levels of EC within background testing. This is quite easily explained in respect of DLP 3 as DLP3 was installed in the low-lying portion of the floodplain adjacent to the sections of Mooball Creek and the main agricultural drainage line that are subject to tidal influences. It is therefore considered likely that some localised salinisation of surficial groundwaters has occurred within the vicinity of monitoring location DLP3 due to tidal influences within these nearby waterways.

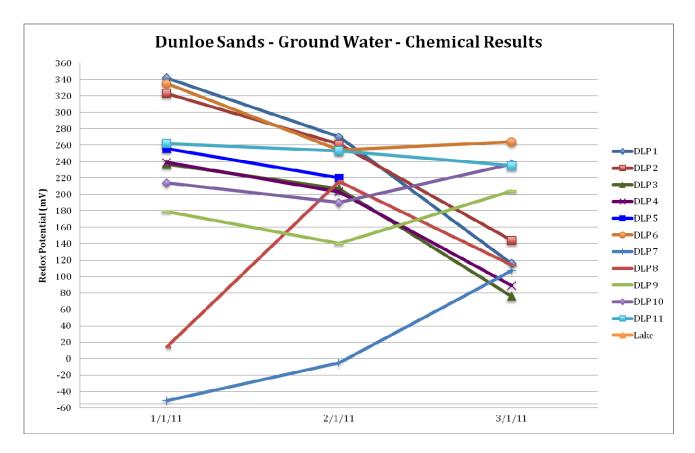
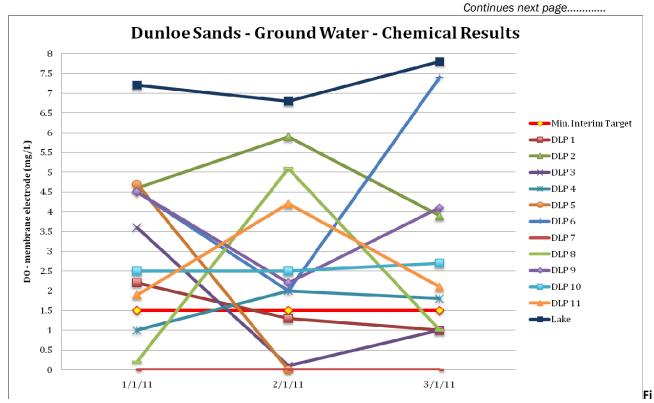


Figure 4: Dunloe Sands - Ground Water - Chemical (Redox Potential Test) Results January to March 2011

The EMP does not provide an exact interim target level for Redox Potential but instead states 'MAXIMUM'. The results are split with half the locations (generally locations DLP 1 to DLP 5) presenting a higher to lower Redox Potential rate and the locations DLP 6, DLP 9, DLP 10 and DLP 11 producing a steady or higher - lower - higher Redox Potential rate. DLP 7 depicts an extremely low Redox Potential level of -51 in January that increases rather rapidly to +105 during March, this is difficult to explain but is likely to be related to the decomposition of sub surface organic matter given its location immediately proximate to the adjacent wetland.





gure 5: Dunloe Sands - Ground Water - Chemical (DO Test) Results January to March 2011

The minimum DO level provided within the EMP is 1.5mg/mL. The results vary in DO levels considerably with the majority not presenting or conforming to a pattern over the three month monitoring period.

The majority of groundwater samples collected is above the minimum interim target however ten samples collected from varied locations present levels below the target. The lake sample presents the highest level and remains above 6.5mg/MI.

Whilst background testing indicated generally low DO levels inherently across the site, the results for DLP 7, 1, 3 & 5 require some further consideration, particularly with respect to the temperature of samples at these locations as exceedingly warm samples will automatically generate a low DO reading. Low results may also be related to excessive faecal matter and nutrients associated with livestock use. Each of these potential reasons should be considered in the context of future sample results so as to look towards potential ameliorative measures.

Results for tests of turbidity, suspended solids, oil and grease, total phosphorus and total nitrogen were only collected within the lake sample site. Figure 6 presents the sample levels compared to the EMP interim target levels.



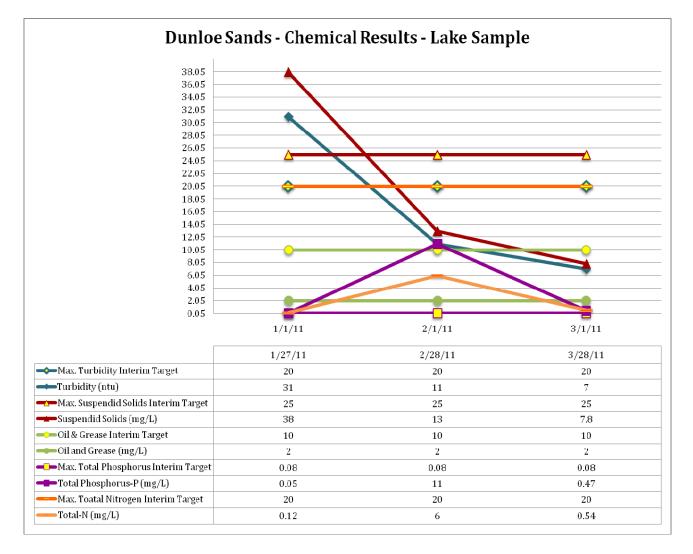


Figure 6: Dunloe Sands - Lake - Chemical Results January to March 2011

Interim target levels for turbidity present a maximum level of 20ntu within the EMP. The levels recorded over the three month monitoring period show levels above the maximum during January however levels are decreased to below maximum levels during the February and March monitoring. This could be generally explained by the high rainfall experienced in January, however it also warrants consideration of the effectiveness of ensuring that surface water inflows do not flow into the lake from external sources (inclusive of the plant area).

The maximum interim target level for the suspended solids within the EMP is 25mg/L. Results present a level above the maximum during January and levels below this target during February and March. Again this result is likely due to the excessively high rainfall experienced in January. It should be noted that generally a maximum level of 50 ntu is applied to discharge levels from development sites, indicating that generally levels are and remain quite low across the site.

The EMP states a maximum level of 10mg/L in regard to oil and grease. Levels of oil and grease within the samples are consistent over the three month monitoring period at 2mg/L.

Total phosphorus levels are generally higher than the maximum interim target levels contained within the EMP. January results present lower than target levels of phosphorus however the results of February sampling presents a sharp increase well above the target levels. During March the level of phosphorus decreased considerably producing a level only slightly higher than the target rate. It is difficult to explain



the elevated reading in February as Suspended Solids (often concurrently high with phosphorous readings) were quite low at the equivalent time.

Total nitrogen levels remain consistently lower than the interim target of 20mg/L with a maximum result of 6mg/L.

2.5 Recorded Rainfall

The BOM have recorded rainfall within the surrounding areas of Pottsville; including Coolangatta (24.3km from Pottsville), Murwillumbah – Bray Park (18.9km from Pottsville) and Byron Bay (28.5km from Pottsville). The results are illustrated within Figure 7 along with the recorded rainfall average.

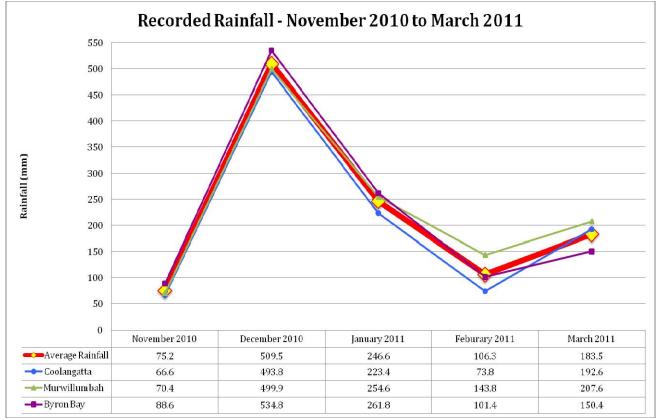


Figure 7: Recorded Rainfall November 2010 to March 2011

The recorded rainfall of the three suburbs surrounding Pottsville has been averaged to produce an approximate on site rainfall. December 2010 presented a high level of rain with approximately 509.5mm of rain being recorded. In total over the five month period approximately 1,121.1mm of rain was recorded on site.



Chapter 3.0 Quarterly Monitoring Results





3.1 Ground Water Results

Quarterly monitoring of the ground waters on site within locations DLP 1 to DLP 11 and the Lake sample water for levels of chloride (Table 2), calcium (Table 3), magnesium (Table 4), sodium (Table 5), potassium M8 (Table 6), sulphate (Table 7), arsenic (Table 8), iron (Table 9) and Manganese (Table 10). Samples were collected in March 2011. Tables present the results compared against the interim target criteria contained within the EMP.

It is noted data and results for March at sample site DLP 5 is not available within any of the conducted tests, presumably due to accessibility constraints.

The majority of the samples collected are consistent with the interim target criteria of the EMP. Some variants are illustrated within the results. These variants have been highlighted with bold text.

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Table 2: Dunloe Sands - Ground Water - Chemical (Chloride Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	27.0	22.0	2,200.0	59.0	-	24.0	930.0	24.0	15.0	16.0	18.0	14.0
Interim												
Target	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0

Comments: As highlighted previously, two samples sites (DLP3 and DLP7) presented conductivity levels well above the maximum interim target of 2,000uS/cm⁻¹ stated within the EMP, each of which also expressed similar levels of EC within background testing. The latter also correlates with the high chloride levels shown above, which indicate a high level of Saltwater intrusion at these points. This is quite easily explained in respect of DLP 3 as DLP3 was installed in the low-lying portion of the floodplain adjacent to the sections of Mooball Creek and the main agricultural drainage line that are subject to tidal influences. It is also not unexpected in the instance of DLP 7 given that it sits immediately adjacent the existing wetland, which would in itself act as a 'drawer' of permanently saline conditions in order to sustain its dominant vegetative makeup. It is therefore considered likely that some localised salinisation of surficial groundwaters has occurred within the vicinity of both DLP3 & DLP7 due to tidal influences within these nearby waterways and wetlands.

Table 3: Dunloe Sands - Ground Water - Chemical (Calcium Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	1.9	4.4	66.0	1.7	-	48.0	13.0	36.0	6.1	1.5	1.5	27.0
Interim												
Target	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0

NB. Major cation

Comments: The spike associated with DLP3 is consistent with background testing and consistent with the sites location proximate to the adjacent tidal waterway.



Table 4: Dunloe Sands - Ground Water - Chemical (Magnesium Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	3.3	3.3	104.0	2.1	-	6.7	25.0	3.2	4.1	0.6	1.6	3.6
Interim												
Target	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0

NB. Major cation

Comments: The spike associated with DLP3 is consistent with background testing and consistent with the sites location proximate to the adjacent tidal waterway.

Table 5: Dunloe Sands - Ground Water - Chemical (Sodium Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	12.0	9.8	1,035	31.0	-	11.0	377.0	12.0	8.7	7.8	9.0	8.2
Interim												
Target	280.0	280.0	280.0	280.0	280.0	280.0	280.0	280.0	280.0	280.0	280.0	280.0

NB. Major cation

Comments: As highlighted previously, two samples sites (DLP3 and DLP7) presented conductivity levels well above the maximum interim target of 2,000uS/cm⁻¹ stated within the EMP, each of which also expressed similar levels of EC within background testing. The latter also correlates with the high chloride levels shown above, which indicate a high level of Saltwater intrusion at these points. This is quite easily explained in respect of DLP 3 as DLP3 was installed in the low-lying portion of the floodplain adjacent to the sections of Mooball Creek and the main agricultural drainage line that are subject to tidal influences. It is also not unexpected in the instance of DLP 7 given that it sits immediately adjacent the existing wetland, which would in itself act as a 'drawer' of permanently saline conditions in order to sustain its dominant vegetative makeup. It is therefore considered likely that some localised salinisation of surficial groundwaters has occurred within the vicinity of both DLP3 & DLP7 due to tidal influences within these nearby waterways and wetlands



	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	6	< 5.0	53.0	< 5.0	-	< 5.0	34.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Interim												
Target	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5

NB. Major cation

Comments: As highlighted previously, two samples sites (DLP3 and DLP7) presented conductivity levels well above the maximum interim target of 2,000uS/cm⁻¹ stated within the EMP, each of which also expressed similar levels of EC within background testing. The latter also correlates with the high chloride levels shown above, which indicate a high level of Saltwater intrusion at these points. This is quite easily explained in respect of DLP 3 as DLP3 was installed in the low-lying portion of the floodplain adjacent to the sections of Mooball Creek and the main agricultural drainage line that are subject to tidal influences. It is also not unexpected in the instance of DLP 7 given that it sits immediately adjacent the existing wetland, which would in itself act as a 'drawer' of permanently saline conditions in order to sustain its dominant vegetative makeup. It is therefore considered likely that some localised salinisation of surficial groundwaters has occurred within the vicinity of both DLP3 & DLP7 due to tidal influences within these nearby waterways and wetlands

Table 7: Dunloe Sands - Ground Water - Chemical (Sulphur as Sulphate Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	31	5.5	133.0	9.9	-	190.0	118.0	3.3	26.0	8.9	8.2	68.0
Interim												
Target	175	175	175	175	175	175	175	175	175	175	175	175

Comments: A very minor exceedance of the target level was noted at DLP 6, which is located near the stockpile and plant. It is recommended that this be monitored for stability over the next testing period to determine if there are interactive causes between the plant area and lake and the readings in this bore.



Table 8: Dunloe Sands - Ground Water - Chemical (Arsenic Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	< 0.005	< 0.005	< 0.005	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Interim												
Target	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Table 9: Dunloe Sands - Ground Water - Chemical (Iron Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	7.8	4.42	0.09	0.59	-	1.44	0.09	1.12	6.45	3.26	7.94	0.73
Interim												
Target	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5

Comments: A very minor exceedance of the target level was noted at DLP1 and DLP 11. Further monitoring is recommended however no action is considered necessary at this point given the minor nature of the spike.

Table 10: Dunloe Sands - Ground Water - Chemical (Manganese Test) Results (mg/L)

	DLP 1	DLP 2	DLP 3	DLP 4	DLP 5	DLP 6	DLP 7	DLP 8	DLP 9	DLP 10	DLP 11	Lake
Sample	0.04	0.03	0.63	< 0.01	-	0.36	0.10	0.12	0.10	0.02	0.03	0.19
Interim												
Target	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

Comments: Manganese is typically associated brackish or slightly saline conditions and therefore the readings at DLP3 are entirely expected and consistent with background. Interestingly, the reading at DLP 6 is also consistent with background and therefore is cause for little concern. The proximity of the lake to DLP 6



Dunloe Sands Environmental Monitoring Report November 2010 to April 2011

(which has high background levels inherently) may also explain the slightly elevated reading in the lake, however it is recommended that the interaction between the two (2) be monitored over time before any action is implemented.



3.2 Surface Water Results

Quarterly monitoring of the surface waters on site within locations SW 1 to SW 12 sample water for levels of pH (Table 11), EC (Table 12), DO (Table 13), suspended solids (Table 14), phosphorus (Table 15) and nitrogen (Table 16). Samples were collected in March 2011. Tables present the results compared against the interim target criteria contained within the EMP.

The majority of the samples collected are consistent with the interim target criteria of the EMP. Some variants are illustrated within the results. These variants have been highlighted with bold text.



Table 11: Dunloe Sands - Surface Water - Chemical (pH Test) Results (pH)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12
Sample	7.2	7.1	5.9	6.3	6.4	7.3	6.1	5.9	6.7	6.4	6.4	5.9
Interim												
Target	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5

Table 12: Dunloe Sands - Surface Water - Chemical (EC Test) Results (uS/cm⁻¹)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12
Sample	2,021	2,768	336	2,384	4,069	2,028	843	330	4,116	538	3,724	346
Interim												
Target	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500	< 5,500

Table 13: Dunloe Sands - Surface Water - Chemical (DO Test) Results - (mg/L)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12
Sample	6.2	6.7	4.6	6.2	5.7	7.6	6.5	6.4	5.7	9.2	6.6	5.4
Interim												
Target	> 4	> 4	> 4	> 4	> 4	> 4	> 4	> 4	> 4	> 4	> 4	> 4



Table 14: Dunloe Sands - Surface Water - Chemical (Suspended Solids Test) Results (mg/L)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12
Sample	14	13	14	7.3	24	14	17	11	12	45	12	176
Interim												
Target	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25

Comment: Both SW10 and SW 12 are upstream of floodgates and the elevated readings shown above were experienced in March, where a high rainfall was also experienced. This is likely to explain the concentration of suspended solids in these areas. It is recommended that this be monitored in addition to the function of the flood gates during high rainfall events.

Table 15: Dunloe Sands - Surface Water - Chemical (Total Phosphorus Test (Results (mg/L)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12
Sample	0.09	0.08	< 0.05	< 0.05	< 0.05	0.09	< 0.05	< 0.05	< 0.05	0.05	< 0.05	0.11
Interim												
Target	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08

Comments: A very minor exceedance of the target level was noted at SW1, SW6 and SW 12. Further monitoring is recommended however no action is considered necessary at this point given the minor nature of the spike. It is also noted that the levels recorded are generally consistent with the levels recorded in background testing relative to other sites within the property.

Table 16: Dunloe Sands - Surface Water - Chemical (Total Nitrogen Test) Results (mg/L)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12
Sample	0.51	0.52	1.36	0.97	0.88	0.5	1.31	1.3	0.52	1.57	0.88	1.84
Interim												



Target	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	
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Chapter 4.0 Conclusion





4.1 Conclusion

This report represents the initial monitoring report for the operation and will be utilised to not only inform in the immediate sense in respect of operational compliance and environmental characteristics on the site, but also to cross reference in respect of future monitoring reports so as to identify potential trends and areas requiring intervention and environmental amelioration.

The results within the this report demonstrate that generally environmental characteristics remain consistent with background readings and within the acceptable limits set out within the consent and approved EMP, taking into account the pre existing conditions of the site.

It is important to monitor those areas in which mention has been made of the importance to analyse future readings so as to ensure that not only a full understanding is generated in respect of the site and operations but also to ensure that best practice management measures are applied over the longer term.

Adam Smith Director Planit Consulting

May 2011

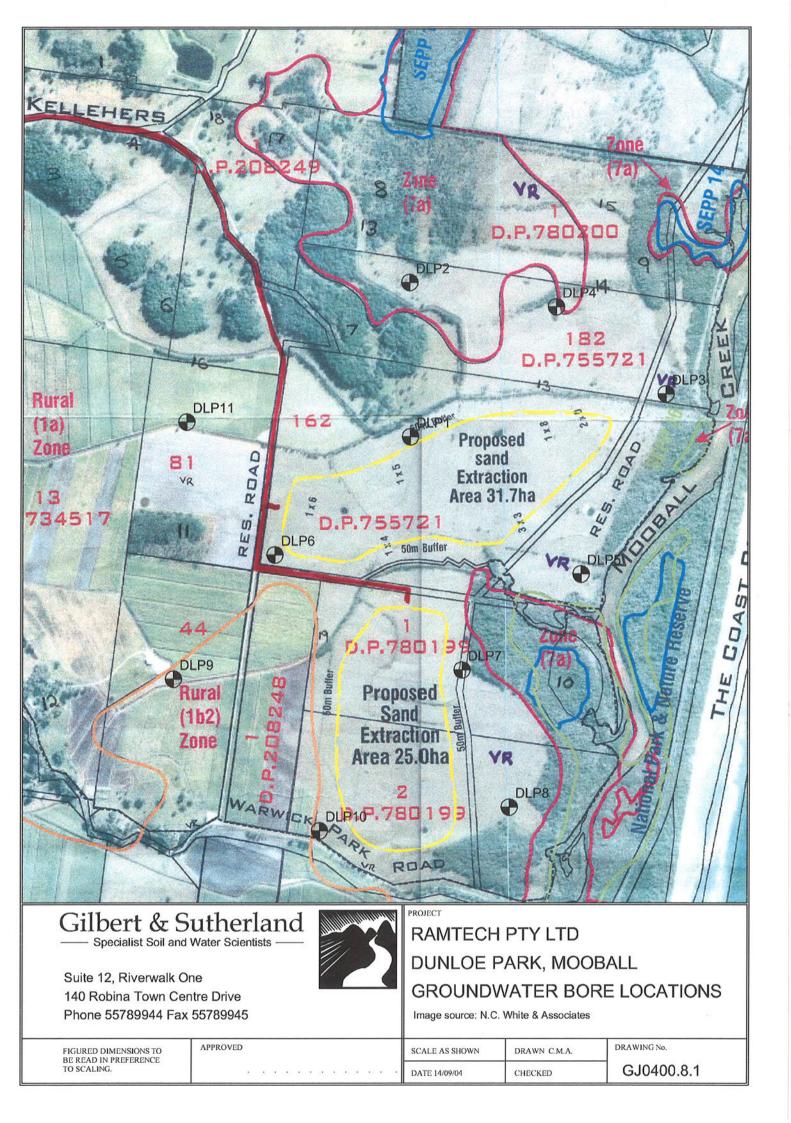
Steve Petersen Director RAMTECH

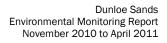
May 2011



Appendix A Ground Water Location Map



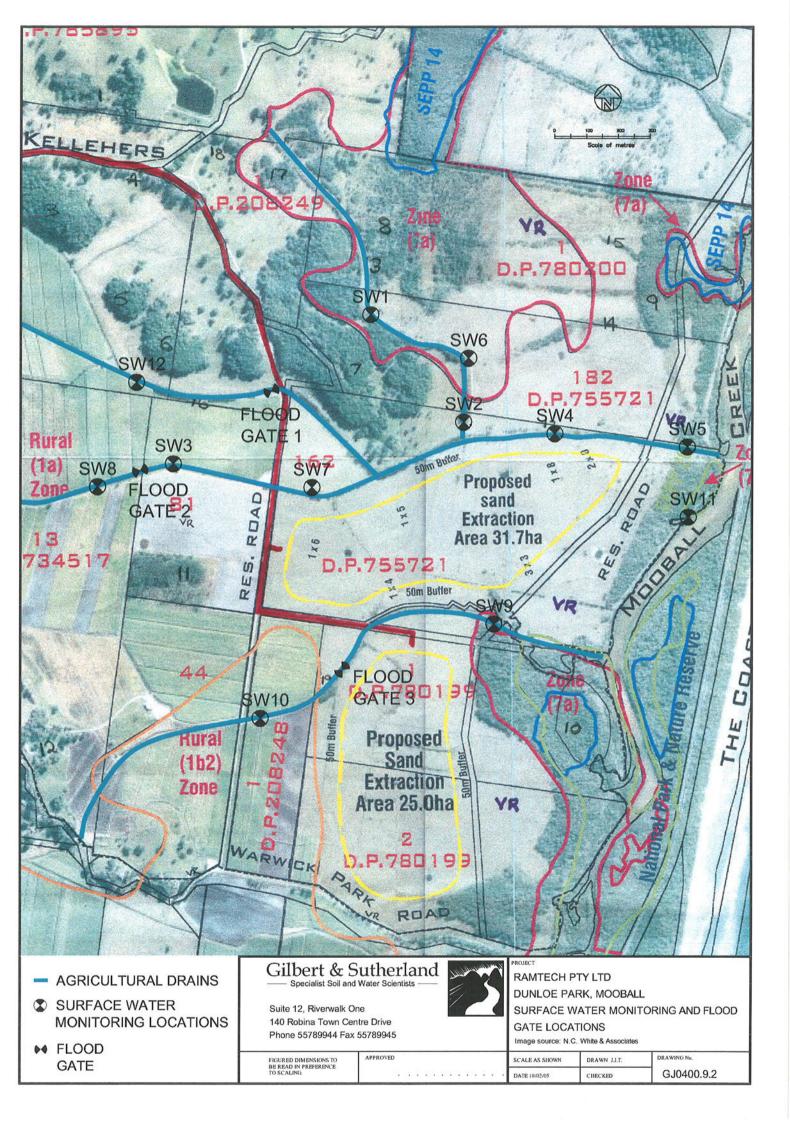






Appendix B Surface Water Location Map







Appendix C Laboratory Analysis



Tweed Labo	ratory Centre		SHIRE COUNCIL
	Correspondence: Tweed Shire (Avenue: Tweed Heads South NSW 2486 < 07 5524 266 ABN 90 178 732 496 Council PO Box 816 Munwillumbah NSW tweedlab.com.au	
	CONTRACTOR CONTRACTOR AND A CONTRACT OF A		
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 4
Attention: Copy To:	Steve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0237-C 07/02/2011
		ort have been checked and approved. y not be reproduced except in full.	
Taken By: Date Taken: Date Received:	Client 27/01/2011 27/01/2011	No of Samples: Date Testing Commenced: Date Testing Completed:	12 27/01/2011 0 7/ 02/2011
Sample Description:	Dunloe Sands Water Sa	amples - Chemical	
Sample/Site No 1 2 3 4 5 6 7 8 9 10 11 12	Sample/Site Descript DLP 1 DLP 2 DLP 3 DLP 4 DLP 5 DLP 6 DLP 7 DLP 8 DLP 9 DLP 10 DLP 11 Lake Sample	ion	
NATA accordance v accreditation Accredited to ISO/IEC 1702	requirements. r compliance with	Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.new.gov.au	



Client:	Ramtech Pty Ltd		
Address:	61-65 Quarry Road	Lims1 Report No: Date Testing Completed:	11/0237-C 07/02/2011
A b k = c k k = c c k	MURWILLUMBAH NSW 2484	Date of Report:	07/02/2011
Attention:	Steve Peterson		
Sample Descr	iption: Dunloe Sands Water Samples - Chemical		

COMMENTS:

Results refer to samples as received at the Laboratory.

* Tests not covered by NATA accreditation.

Dissolved Oxygen, Redox and pH should be performed on site.

The results may not reflect the true level at the time of sampling.



amtech Pty Ltd

Address: 61-65 Quarry Road MURWILLUMBAH

NSW 2484 Attention: Steve Peterson

Sample Description: Dunloe Sands Water Samples - Chemical

Sample Identification:			DLP 1	DL.P 2	DLP 3	DLP 4	DLP 5
Date Taken:			27/01/2011	27/01/2011	27/01/2011	27/01/2011	27/01/2011
Date Received:			27/01/2011	27/01/2011	27/01/2011	27/01/2011	27/01/2011
Date Testing Commenced:			27/01/2011	27/01/2011	27/01/2011	27/01/2011	27/01/2011
Test	Method	Units	11/0237-C-1	11/0237-C-2	11/0237-C-3	11/0237-C-4	11/0237-C-5
рН	P1	pH units	4.0	6.2	7.2	6.3	6.5
Conductivity	P2	µScm ⁻¹	78	122	7,053	216	259
*Redox Potent(a)	P16	mV	+342	+323	+237	+239	+256
DO (membrane electrode)	P12	mg/L	2.2	4.6	3.6	1	4.7
Turbidity	P8	ntu					
Suspended Solids	P4	mg/L					
Oil and Grease	C8	mg/L	~~			ar a	
Total Phosphorus-P	C17	mg/L			-*		
Total-N	C7	mg/L					

Sample Identification:			DLP 6	DLP 7	DLP 8	DLP 9	DLP 10
Date Taken:			27/01/2011	27/01/2011	27/01/2011	27/01/2011	27/01/2011
Date Received;			27/01/2011	27/01/2011	27/01/2011	27/01/2011	27/01/2011
Date Testing Commenced;			27/01/2011	27/01/2011	27/01/2011	27/01/2011	27/01/2011
Test	Method	Units	11/0237-C-6	11/0237-C-7	11/0237-C-8	11/0237-C-9	11/0237-C-10
pН	P1	pH units	4.1	7.6	7.0	4.4	4.1
Conductivity	P2	µScm⁻¹	160	3,158	295	96	180
*Redox Potential	P16	mV	+335	-51	+14	+179	+214
DO (membrane electrode)	P12	mg/L	4.5	<0.1	0.2	4.5	2.5
Turbidity	P8	ntu			75		
Suspended Solids	P4	mg/L		~			
Oll and Grease	C8	mg/L	·			J-	
Total Phosphorus-P	C17	mg/L					
Total-N	C7	mg/L					

Page 3 of 4

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07/02/2011

Lims1 Report No:

Date of Report:

Date Testing Completed:



Client:	Ramtech Pty Ltd

Address:	61-65 Quarry Road
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MURWILLUMBAH NSW 2484 Attention: Steve Peterson

Sample Description: Dunloe Sands Water Samples - Chemical

Sample Identification:	(DLP 11	Lake Sample
Date Taken:			27/01/2011	27/01/2011
Date Received:			27/01/2011	27/01/2011
Date Testing Commenced:			27/01/2011	27/01/2011
Test	Method	Units	11/0237-C-11	11/0237-C-12
pН	P1	pH units	5.5	6.2
Conductivity	P2	µScm ⁻¹	120	412
*Redox Potentíal	P16	mV	+262	L (-)>
DO (membrane electrode)	P12	mg/L	1.9	7.2
Turbidity	P8	ntu		31
Suspended Solids	P4	mg/L		38
Oil and Grease	C8	mg/L		<2
Total Phosphorus-P	C17	mg/L		<0.05
Total-N	C7	mg/L	u	0.12

 Lims1 Report No:
 11/0237-C

 Date Testing Completed:
 07/02/2011

 Date of Report:
 07/02/2011

Page 4 of 4

Chain of Custody Record

Analysis Request

Tweed Laboratory Centre

SHIRE COUNCIL

Tweed La	RECH	y Centr		Tweed Laboratory Centre 46 Enterprise Avenue, Tweed Heads, South NSW 2486 AMDECH NT/LTID Project Reference:	ue, Tw	eed Hec	ads, Sóu Proj	South NSW 2486 Project Reference: Purchase Order No:	2486 ence: ler No:	Ph. 07 5589 3103	569 310	Fax:	07.5524.2678		E: àdmin@	àdmin@tweedjab.com.au	b.com.a		· · · · · · · · · · · · · · · · · · ·	
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NSW 2484		
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28/02/2011	Date Testing Completed.	
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DLP 1 DLP 2 DLP 3 DLP 4 DLP 5 DLP 6 DLP 7		
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	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484 Steve Peterson Fax: 02 6672 3896 All pages of this Repo This document may Client 28/02/2011 28/02/2011	atory Centre, 46 Enterprise Avenue. Tweed Heads South NSW 2486 Ausi Laboratory Centre, 75569 3103 Fax: 07 5524 266 ABN: 90 178 732 498 correspondence: Tweed Shire Council PO Box 816 Murwillumbah NSW 2484 Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484 Steve Peterson Fax: 02 6672 3896 Lims1 Report No: Client All pages of this Report have been checked and approved. This document may not be reproduced except in full. Client 28/02/2011 28/02/2011 28/02/2011 28/02/2011 28/02/2011 28/02/2011 Dunloe Sands Water Samples - Chemical



Client:	Ramtech Pty Ltd	Lims1 Report No:	11/0567-C
Address:	61-65 Quarry Road	Date Testing Completed: Date of Report:	11/03/2011 11/03/2011
Attention:	MURWILLUMBAH NSW 2484 Steve Peterson		
Sample Descri	ption: Dunloe Sands Water Samples - Chemical		

COMMENTS:

Results refer to samples as received at the Laboratory.

* Tests not covered by NATA accreditation.

Dissolved Oxygen, Redox and pH should be performed on site.

The results may not reflect the true level at the time of sampling.

Additional sample for Lake was taken and received on 02/03/2011 for the testing of Suspended Solids only (insufficient original Lake sample available).



Client: Ramtech Pty Ltd

Address: 61-65 Quarry Road

MURWILLUMBAH NSW 2484 Attention: Steve Peterson

Sample Description: Dunloe Sands Water Samples - Chemical

Sample Identification:			DLP 1	DLP 2	DLP 3	DLP 4	DLP 5
Date Taken:			28/02/2011	28/02/2011	28/02/2011	28/02/2011	28/02/2011
Date Received:			28/02/2011	28/02/2011	28/02/2011	28/02/2011	28/02/2011
Date Testing Commenced:			28/02/2011	28/02/2011	28/02/2011	28/02/2011	28/02/2011
Test	Method	Units	11/0567-C-1	11/0567-C-2	11/0567-C-3	11/0567-C-4	11/0567-C-5
pH	 P1	pH units	4.5	6.2	6.6	6.9	6.6
Conductivity	P2	µScm ⁻¹	59	128	7,057	349	281
*Redox Potential	P16	mV	+270	+261	+207	+203	+220
DO (membrane electrode)	P12	mg/L	1.3	5.9	0.1	2.0	<0.1
Turbidity	P8	ntu					
Suspended Solids	P4	mg/L					
Oil and Grease	C8	mg/L					
Total Phosphorus-P	C17	mg/L					
Total-N	C7	mg/L					

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Sample Identification:			DLP 6	DLP 7	DLP 8	DLP 9	DLP 10
Date Taken:			28/02/2011	28/02/2011	28/02/2011	28/02/2011	28/02/2011
Date Received:			28/02/2011	28/02/2011	28/02/2011	28/02/2011	28/02/2011
Date Testing Commenced:			28/02/2011	28/02/2011	28/02/2011	28/02/2011	28/02/2011
Test	Method	Units	11/0567-C-6	11/0567-C-7	11/0567-C-8	11/0567-C-9	11/0567-C-10
pH	P1	pH units	4.9	7.0	7.6	4.8	5.0
Conductivity	P2	µScm ⁻¹	146	299	3,201	92	167
*Redox Potential	P16	mV	+254	+216	-5	+140	+190
DO (membrane electrode)	P12	mg/L	2.0	5.1	<0.1	2.2	2.5
Turbidity	P8	ntu					
Suspended Solids	P4	mg/L					
Oil and Grease	C8	mg/L					
Total Phosphorus-P	C17	mg/L					
Total-N	C7	mg/L					

Page 3 of 4

11/0567-C 11/03/2011

11/03/2011

Lims1 Report No:

Date of Report:

Date Testing Completed:



Address:	61-65 Quarry Road
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MURWILLUMBAH NSW 2484 Attention: Steve Peterson

Sample Description:	Dunloe Sands Water Samples - Chemical
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Sample Identification:			DLP 11	Lake Sample
Date Taken:			28/02/2011	28/02/2011
Date Received:			28/02/2011	28/02/2011
Date Testing Commenced:			28/02/2011	28/02/2011
Test	Method	Units	11/0567-C-11	11/0567-C-12
pH	P1	pH units	5.8	5.6
Conductivity	P2	µScm⁻¹	130	439
*Redox Potential	P16	mV	+253	
DO (membrane electrode)	P12	mg/L	4.2	6.8
Turbidity	P8	ntu		11
Suspended Solids	P4	mg/L		13
Oil and Grease	C8	mg/L		<2
Total Phosphorus-P	C17	mg/L		11.00
Total-N	C7	mg/L		0.26

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 11/0567-C

 Date Testing Completed:
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Analysis Request



Tweed Laboratory Centre

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Tweed Labo	ratory Centre		SHIRE COUNCIL
Tweed Phone: 07:5569 (Al	and anon Twood Shire	e Avenue; Tweed Heads South NSW 2486 samplereception@tweed.nsw.gov.au Al Council PO Box 816 Murwillumbah. NSW tweedlab.com.au	2484)
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 8
Attention: Copy To:	Steve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0884-C 08/04/2011
		port have been checked and approved. ay not be reproduced except in full.	
Taken By: Date Taken: Date Recelved:	Client 28/03/2011 28/03/2011	No of Samples: Date Testing Commenced: Date Testing Completed:	25 28/03/2011 08/04/2011
Sample Description	n: Dunloe Sands Water S	Samples - Chemical	
Sample/Site No 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Sample/Site Descrip DLP 1 DLP 2 DLP 3 DLP 4 DLP 5 DLP 6 DLP 7 DLP 8 DLP 9 DLP 10 DLP 11 Lake Sample - 1 Mett Lake Sample - 2 Mett	re) , the	
NATA accordan accredita Accredite ISO/IEC	ument is issued in co with NATA's tion requirements. d for complianco with 17025. ation No: 12754 & 13538	Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.a	

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Tweed Laboratory Centre

Client:	Ramtech Pty Ltd	Lims1 Report No:	11/0884-C
Address:	61-65 Quarry Road	Date Testing Completed: Date of Report:	08/04/2011 08/04/2011
Attention:	MURWILLUMBAH NSW 2484 Steve Peterson		

Sample Description: Dunloe Sands Water Samples - Chemical

Sample/Site No	Sample/Site Description
16	SW 3
17	SW 4
18	SW 5
19	SW 6
20	SW 7
21	SW 8
22	SW 9
23	SW 10
24	SW 11
25	SW 12



Client:	Ramtech Pty Ltd		
		Lims1 Report No:	11/0884-C
Address:	61-65 Quarry Road	Date Testing Completed:	08/04/2011
	· · · · · · · · · · · · · · · · · · ·	Date of Report:	08/04/2011
	MURWILLUMBAH		
	NSW 2484		
Attention:	Steve Peterson		
Sample Desci	iption: Dunloe Sands Water Samples - Chemical		

COMMENTS:

Results refer to samples as received at the Laboratory. * Tests not covered by NATA accreditation. Dissolved Oxygen, Redox and pH should be performed on site. The results may not reflect the true level at the time of sampling.

No sample received for DLP 5.

NP = Not Present.

P. 005/010



Tweed Laboratory Centre

Client:	Ramtech	Ptv I td
Aneur.	Nameen	FULLU

Address:	81-65	Quarry Road
	MURW	ILLUMBAH
	NSW	2484

Attention: Steve Peterson

Sample Description: Dunice Sands Water Samples - Chemical

Sample Identification:			DLP 1	DLP 2	DLP 3	DLP 4	DLP 5
Date Taken:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Received:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Testing Commenced:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Test	Method	Units	11/0884-C-1	11/0884-C-2	11/0884-C-3	11/0884-C-4	11/0884-C-5
pH	P1	pH units	5.6	6.0	6.6	6.7	
Conductivity	P2	µScm⁻¹	193	124	6,994	362	
*Redox Potential	P16	mV	+116	+144	+76	+89	
Alkalinity as CaCO3	C10	mg/L	25	19	310	56	
Bicarbonate HCO3	C10	mg/L	15	12	190	34	
DO (membrane electrode)	P12	mg/L	<1.0	3.9	1	1.8	**
- Turbidity	P8	ntu					
 Suspended Solids 	P4	mg/L					
 Oil and Grease 	C8	mg/L	-st-1	w			be to
 Total Phosphorus-P 	C17	mg/L					
	C7	mg/L					
Chloride	C20	mg/L	27	22	2,200	59	
Calcium	M8	mg/L	1.9	4.4	66.0	1.7	
Magnesium	M8	mg/L	3.3	3.3	104.0	2.1	
Sodium	M8	ing/L	12.0	9.8	1,035.0	31.0	
Potassium M8	M8	mg/L	0 .0	<5.0	53.0	<5.0	
Sulphur as Sulphate	M8	mg/L	31.0	5.5	133.0	9.9	14 14
Arsenic (Total)	M7	mg/L	<0.005	<0.005	<0.005	<0.005	
Iron (Total)	M8	mg/L	7.80	4,42	0.09	0.59	
Manganese	M8	mg/L	0.04	0.03	0.63	<0.01	

11/0884-C

08/04/2011

08/04/2011

Lims1 Report No:

Date of Report:

Date Testing Completed:

TWEED SHIRE COUNCIL

Tweed Laboratory Centre

Ramtech Pty Ltd Client:

Address: 61-65 Quarry Road

MURWILLUMBAH NSW 2484 Steve Paterson Attention:

Dunloe Sands Water Samples - Chemical Sample Description:

Sample Identification:			DLP 6	DLP 7	DLP 8	DLP 9	DLP 10
Date Taken:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Received:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Testing Commenced:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
. Test	Method	Unifs	11/0884-C-6	11/0884-C-7	11/0984-C-8	11/0884-C-9	11/0884-C-10
pH	P1	pH units	3.7	7.6	6.9	4.3	4.7
Conductivity	P2	µScm ⁻¹	544	3,235	290	163	93
*Redox Potential	P16	mV	+264	+107	+114	+204	+237
Alkalinity as CaCO3	C10	mg/L	NP	860	94	NP	1
Bicarbonate HCOs	C10	mg/L	NP	525	57	NP	<1
DO (membrane electrode)	P12	/mg/L	7.4	<1.0	<1.0	4.t	2.7
Turbidity	P8	ntu				**	
Suspended Solids	P4	mg/L					
Oll and Grease	C8	mg/L		20 L.			
Total Phosphorus-P	Ç17	mg/L				•••	
Total-N	C7	mg/L					
Chloride	C20	mg/L	24	930	24	15	16
Calcium	M8	mg/L	48.0	13.0	36.0	6.1	1.5
Magnesium	M8	mg/L	6.7	25.0	3.2	4.1	0.6
Sodium	M8	mg/L	11.0	377.0	12.0	8.7	7.8
Potassium M8	M8	mg/L	<5.0	34.0	<5.0	<5.0	<5.0
Sulphur as Sulphate	M8	mg/L	190.0	118.0	3.3	26.0	8.9
Arsenic (Total)	M7	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Iron (Total)	M8	mg/L	1.44	0.09	1.12	6.45	3.26
Manganese	M8	mg/L	0.36	0.10	0.12	0.10	0.02

11/0884-C

08/04/2011

08/04/2011

Limst Report No: Date Testing Completed:

Date of Report:



Client:	Ramtech Pty Ltd

Address:	61-65 Quarry Road

MURWILLUMBAH NSW 2484 Attention: Steve Peterson
 Lims1 Report No:
 11/0884-C

 Date Testing Completed:
 08/04/2011

 Date of Report:
 08/04/2011

Sample Description: Dunloe Sands Water Samples - Chemical

Sample Identification:			DLP 11	Lake Sample - 1 Metre	Lake Sample - 2 Metre	SW 1	SW 2
Date Taken:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Received:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Testing Commenced:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Test	Method	Units	11/0884-C-11	11/0884-C-12	11/0884-C-13	11/0884•C-14	11/0884-C-15
pН	P1	pH units	5.6	4.2	4.2	7.2	7.1
Conductivity	P2	µScm ⁻¹	119	301		2,021	2,768
*Redox Potential	P16	mV	+235				
Alkalinity as CaCOs	C10	mg/L	12	NP			
Bicarbonate HCO3	C10	mg/L	7	NP			
DO (membrane electrode)	P12	mg/L	2.1	7.8		6.2	6.7
Turbidity	P8	ntu	uc	7.0	4.4	**	
Suspended Solids	P4	mg/L		7.8		14	13
Oil and Grease	C8	mg/L		<2			
Total Phosphorus-P	C17	mg/L		0.47		0.09	80.0
Total-N	C7	mg/L		0.54		0.51	0.52
Chloride	C20	mg/L	18	14			
Calcium	M8	mg/L	1.5	27.0		~	
Magnesium	M8	mg/L	1.6	3.6			
Sodium	M8	mg/L	9.0	8.2			
Potassium M8	MB	mg/L	<5.0	<5.0			
Sulphur as Sulphate	M8	mg/L	8.2	68.0			
Arsenic (Total)	M7	mg/L	<0.005	<0.005			
Iron (Total)	M8	mg/L	7.94	0.73			
Manganese	M8	mg/L	0.03	0.19			



SHIRE COUNCIL

Tweed Laboratory Centre

Cilent:	Ramtech Pty Ltd		
		Lims1 Report No:	11/0884-C
Address:	61-65 Quarry Road	Date Testing Completed:	08/04/2011
	· · · · · · · · · · · · · · · · · · ·	Date of Report:	08/04/2011
	MURWILLUMBAH		
	NSW 2484		
Attention:	Steve Peterson		

Sample Description: Dunice Sands Water Samples - Chemical

Sample Identification:		[]	SW 3	SW 4	SW 5	SW 6	SW 7
Date Taken:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Received:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Testing Commenced:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Test	Method	Units	11/0884-C-16	11/0884-C-17	11/0884-C-18	11/0884-C-19	11/0884-C-20
рН	P1	pH units	5.9	6.3	6.4	7.3	6.1
Conductivity	P2	µScm ⁻¹	336	2,384	4,069	2,028	843
*Redox Potential	P16	mV					
Alkalinity as CaCOs	C10	mg/L					
Bicarbonate HCO3	C10	mg/L					
DO (membrane electrode)	P12	mg/L	4.6	8 .2	5.7	7.6	6.5
Turbidity	P8	ntu					
Suspended Solids	P4	mg/L	14	7.3	24	14	17
Oil and Grease	C8	mg/L					
Total Phosphorus-P	C17	mg/L	<0.05	<0.05	<0.05	0.09	≺0.05
Total-N	C7	mg/L	1.36	0.97	0.88	0.50	1.31
Chloride	C20	mg/L					
Calclum	M8	mg/L					
Magnesium	M8	mg/L					
Sodium	M8	mg/L		**			
Potassium M8	M8	mg/L					
Sulphur as Sulphata	M8	mg/L					
Arsenic (Total)	M7	mg/L					
Iron (Total)	M8	mg/L				**	
Manganese	M8	mg/L					

Page 7 of 8

Page 8 of 8



Tweed Laboratory Centre

Client: Ramtech Pty Ltd

Attention:

MURWILLUMBAH NSW 2484 Steve Peterson
 Lims1 Report No:
 11/0884-C

 Date Testing Completed:
 08/04/2011

 Date of Report:
 08/04/2011

Sample Description:	Dunloe Sands Water Samples - Chemical

Sample Identification:			SW 8	SW 9	SW 10	SW 11	SW 12
Date Taken:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Received:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Date Testing Commenced:			28/03/2011	28/03/2011	28/03/2011	28/03/2011	28/03/2011
Test	Method	Units	11/0884-C-21	11/0884-C-22	11/0884-C-23	11/0884-C-24	11/0884-C-25
pH	P1	pH units	5,9	6.7	6.4	6.4	5.9
Conductivity	P2	µScm⁻¹	330	4,116	538	3,724	346
*Redox Potential	P16	mV					
Alkalinity as CaCO3	C10	mg/L			~~		
Bicarbonate HCO3	C10	mg/L					
DO (membrane electrode)	P12	mg/L	6.4	5.7	9.2	6.6	5.4
Turbidity	P8	ntu					
Suspended Solids	P4	mg/L	11	12	45	12	176
Oil and Grease	C8	mg/L		N C			
Total Phosphorus-P	C17	mg/L	<0.05	<0.05	0.05	<0.05	0.11
Total-N	C7	mg/L	1.30	0.52	1.57	0.88	1.84
Chloride	C20	mg/L					
Calcium	M8	mg/L					
Magnesium	M8	mg/L					
Sodium	M8	mg/L					
Potassium M8	M8	mg/L					
Sulphur as Sulphate	M8	mg/L					
Arsenic (Total)	M7	mg/L					
Iron (Totai)	Mð	mg/L					•
Manganese	M8	mg/L	u				



Chain of Custody Record

Analysis Request

Tweed Laboratory Centre

TWEED SHIRE COUNCIL

company:	I X TA HOATSANDY	אר. היי	アン	Ē	6			Pro	Project Reference:	erence:	4	Somes San of	B	235	\$		-		1				1
Address:	•		:				· · ·	Pur	chase C	Purchase Order No:					<u>الج</u>		: · . · .				· · ·		
Contact Name:		•	!		· ·	· · ·	•	Ser	Send Results fo:	lts fo:		• •					•					. :	
Telephone:			Fax:	::	i			L															
Emait:								Τu	UNOJEU	Turnaround time for results is within 10 working days for most samples. Additional charges may apply if required sooneg	r results	s is with	in 10 wa	rking da	lys for m	ost sam	ples, Ao	ditional	charges	may ap	ply if rer	uired so	Gano
	SAMPLE DESCRIPTION	CRIP	TION							Å	ANALYSIS REQUIRED	IS REC	UIRED	- 1	(please indicate	ate if total	tal and	and/or soluble	Je)		ş		Q
Sample ID	Sample	Water		Soil	Comments	, <mark>r</mark>	ů Ľ	<u>ං</u> ධ	d'	ی لچ	Ű	รัพ กา	na	¥	n N	CL Lo ride	Alkalinih	statque	heave	F	about	Merger	ordeard
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	64						Ľ	Special Requirements (eg. OHS issues etc.)	squireme	ents (eg. 1	DHS issu	ses etc.]			Sample	Sample Receipt Advice (Lab Use Only)	Advice (L	ah Use C	luly}				Ì
Relinquished by (sig):		Å	с О.				*	å	S + REPOX	AN XON	ينحيكيا ا	τų.	2	1	A(I Sam	All Samples Received in Good Condition	eived in t	Good Ca	ndilion				D
Relinquished by {name} STEVE Continue	STEVER	J.	N-SSE				v I	ctone on	Ğ	Silc.)				All Doct	All Documentation in Proper Order	on in Pro	per Orde	L 4				ZZ
Doreirod hu (ciol.		۸	đ	Date:	2432	٩	:			:			:		Samples	samples Received Within Recommended Holding Times	≥d Withir	Recomr	u hended F	f guiblot	imes	×] 🗂
	G BJACKWELL Time:	: KF	: J ; J	20	0.0	~	Plea	Please Note: Later tha received	Samples in 4:30pi 1 (by 1:0	e Note: Samples are to be received at the Laboratory no later than 4:30pm unless prior notification has been received (by 1:00pm) or additional charges may apply.	e receive prios not dditiona	id at the Uffication I charge	Laborato has bee s may ap	n n ply.	For Enq Subcord	For Enquires please quote Balch No. Subcontracted work:.	ase quol rark:.	e Batch I	Ö		8	×44	<i>\</i> □

08/APR/2011/FRI 16:09

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FAX No,

Tweed Labo	oratory Centre		SHIRE COUNCIL
지 않으시 이지는 것을 생활하는 것을 생활했다.	Phone D/ 5569 3103 Il correspondence: Tweed Shi	rise Avenue, Tweed Heads South NSW 248 Fax: 07,5524 266 ABN: 90/178/732 496 Re Council PO Box 816 Murwillombah: NSW ww.tweedlab.com.au	
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 2
Attention: Copy To:	Steve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0177-A 24/01/2011
		Report have been checked and approved. t may not be reproduced except in full.	
Taken By: Date Taken: Date Received:	Client 21/01/2011 21/01/2011	No of Samples: Date Testing Commenced: Date Testing Completed:	1 21/01/2011 24/01/2011
Sample Description	n: Dunloe Sands Wat	er Sample - Algae	
LIMS NO 11/0177-A		Sample/Site Description Dunioe Sands	
COMMENTS:			
Results refer to sam	ples as received at the Laborate	ory.	
NATA accredit Accredit ISO/IEC	ument is issued in noe with NATA's ation requirements, ed for compliance with 17025, tation No: 12754 & 13538	Dr Paul J Wright (Laboratory Coordinate paulw@tweed.nsw.gov	



Client:	Ramtech Pty Ltd		
		Lims1 Report No:	11/0177-A
Address:		Date Testing Completed:	24/01/2011
	61-65 Quarry Road	Date of Report:	24/01/2011
	MURWILLUMBAH		
Attention:	Steve Peterson		

Sample Description: Dunloe Sands Water Sample - Algae

		Algal identification	Method Code	Units	Count
LIMS NO.	11/0177-A/1				
	~~~~	Mixed Algae (No Cyanophyta Detected)	89	cells/mL	<100

Page 2 of 2

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Analysis Request



Tweed Laboratory Centre

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24/JAN/2011/MON 11:40

Tweed Labora	atory Centre		SHIRE COUNCIL
, (Alio Tweed	orrespondence	rise Avenue: Tweed Heads South NSW 2466 Fax: 07.5524 266: ABN: 90.178 702 496 re Council PO Box 816 Munwillumbelin:NSW <u>ww.tweedlab.com.au</u>	Adstralia 2464)
		Shiziofangong (UA ISISIO) A S	
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 2
Attention: Copy To:	Støve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0237-A 27/01/2011
	All pages of this f This documen	Report have been checked and approved. t may not be reproduced except in full.	
Taken By: Date Taken: Date Received:	Client 27/01/2011 27/01/2011	No of Samples: Date Testing Commenced: Date Testing Completed:	1 27/01/2011 27/01/2011
Sample Description:	Dunloe Sands Wat	ter Sample - Algae	
LI <b>MS NO</b> . 11/0237-A/1	Sample/Site No 1	Sample/Site Description Dunloe Sands	
COMMENTS:			
Results refer to sample	es as received at the Laborat	ory.	
NATA accreditati Accredited ISO/IEC 17	nent is issued in e with NATA's on requirements. for compliance with 7025. ion No: 12754 & 13538	Sally Everson (Senior Technical Officer eallye@tweed.nsw.gov	– Phycology) au



Client:	Ramtech Pty Ltd	Lims1 Report No:	11/0237 <del>-</del> A
Address:	61-65 Quarry Road MURWILLUMBAH	Date Testing Completed: Date of Report:	27/01/2011 27/01/2011
Attention:	Steve Peterson		

Sample Description: Dunloe Sands Water Sample - Algae

	~~ <u>~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Algal Identification	Method	Code	Units	Count
LIMS NO.	11/0237-A/1					
		Mixed Algae (No Cyanophyta Detected)	Bģ		cells/mL	<100

Page 2 of 2

# **Chain of Custody Record** Analysis Request

SHIRE COUNCIL **Tweed Laboratory Centre** 

		iay apply if required sconer.								λΞ.		10 ( 0233 C
XԹ   E- admin@tweedlab,⇔m.au		10 working days for most samples. Additional charges may apply if required sooner.	JCANE AND						Sample Receipt Advice (Lab Use Only) All Samples Received in Good Condition	All Documentation in Proper Order	Samples Received Property Chilled Samples Received Within Recommended Holding Times	uote Batch No.
3 (Fax, 07 5524 2676		orking days for mos	HLERE LEDA		) ) )	Ş			Sample Rect All Samples	All Documer	Samples Rev Samples Rev	and the second
1 Ph. W.4568 a 103		results)is within 10 y	TO/61						19 issues atc.)			se Note: Samples are to be received at the Laboratory no later than 4:30pm unless prior notification has been received (by 1:06pm) or additional charges may apply.
Project Reference:	Send Results to:	Turnaround time for results)ts within	5.5 9801 09						Special Requirements (eg. OHS issues atc.)			:: Samples are to be r than 4:30pm unless pr red (by 1:00pm) or add
			े जन भार्य					 	))) ))) Special			Please Note later t
Districtionse Avenue, Tweed t			Comments						27	1234	27.	12.30
PT/LTD 27/LTD 7/A DD	Fax:		Water Soil	L	7	<u>}</u>	 		Date:	LEBANAme:	Date:	
Amtech Orylo			Sample Date	1	=	 	 		A A	SPACE OF		C.K.
Company: XI	Contact Name: Telephone:	Email: And Andrease and Andr	Sample ID	LAKE	11-1070.	PLOAT LAKE			Relinquished by (sig):	Relinquished by (name):	Received by (sig):	Received by (name):

Chain of Custody Issue No: 4: 28/06/2010

Page 1 of

Address:

61-65 Quarry Road

MURWILLUMBAH

EB/2011/TUE	E 11:30	FAX No.		P. 002
Tweed	Laboratory Centre		Ŵ	TWEED SHIRE COUNCIL
	(All correspondence: Tweed Shi	Fax: 07 5524 266 ABN: 90 178	732 496	
Client:	Ramtech Pty Ltd			Page 1 of 2

NSW 2484 Lims1 Report No: 11/0404-A **Client Reference:** Attention: Steve Peterson Copy To: Fax: 02 6672 3896 Date of Report: 15/02/2011 All pages of this Report have been checked and approved. This document may not be reproduced except in full. Client No of Samples: 1 Taken By: Date Testing Commenced: 14/02/2011 14/02/2011 Date Taken: 14/02/2011 Date Testing Completed: 14/02/2011 Date Received: Dunloe Sands Water Sample - Algae Sample Description: LIMS NO. Sample/Site No Sample/Site Description 11/0404-A/1 1 Lake COMMENTS: Results refer to samples as received at the Laboratory. This document is issued in



accordance with NATA's accreditation requirements. Accredited for compliance with ISO//JEC 17025. Accreditation No: 12754 & 13538

Sally Everson (Senior Technical Officer - Phycology) sallys@tweed.nsw.gov.au

SHIRE COUNCIL

## **Tweed Laboratory Centre**

Client:	Ramtech Pty Ltd		
		Lims1 Report No:	11/0404-A
Address:		Date Testing Completed:	14/02/2011
	61-65 Quarry Road	Date of Report:	15/02/2011
	MURWILLUMBAH		
Attention:	Steve Peterson		

Sample Description: Dunloe Sands Water Sample - Algae

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	••••	Algal Identification	Method Code	Units	Count
LIMS NO.	11/0404-A/1				
		Mixed Algae (No Cyanophyta Detected)	B9	cells/mL	<100



Page 2 of 2

# **Chain of Custody Record**

**Analysis Request** 

SHIRE COUNCIL Tweed Laboratory Centre

	Tweed Laboralofy Centre   46.1	anterprise Avenue. Twe	Tweed Laboralofy Centre   46 Enterprise Avenue, Tweed Heads South NSW 2436] Ph. 07.5589-8103 (Fay: 07.5524.2626   E. admin@tweedtab.com.au	
	KAMTEUN .		Project Reference: 'Dいくしろ SA いのく	
			Purchase Order No:	
Contact Name:	· · · · · · · · · · · · · · · · · · ·		Send Results to:	
Telephone:	Fax:	na na mana mana kata kata kata kata kata na na mana kata kata kata kata kata kata kata k		
Email:			Turnaround time for results is within 10 working days for most samples. Additional charnes may amply if semicred means	ķ
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Received by (sig):	Date	14.2.11	rded Holding Times	ואן
Received by {name):	GENACICUES Time:	11 130	Please Note: Samples are to be received at the Laboratory no For Enquires please quote Batch No. [1 ( OtOt-1) nate than 4:30pm unless prior notification has been received (by 1:00pm) or additional charges may apply, Subcontracted work:.	
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Chain of Custody Issue No: 4: 28/06/2010

Page 1 of 1

Tweed Labor	atory Centre		SHIRE COUNCIL
	Phone: 07:5569.3103 Fax correspondence: Tweed Shire Co	venue: Tweed Heads South NSW 248 07 5524 266 - ABN : 90 178 732 496 uncil, PC Box 816 Munyillumban : NSW eedlab.com.au	Sandi da Sak Madada
	a ne her als littletter share break a she take and a she		an a
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 2
Attention: Copy To:	Steve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0567-A 01/03/2011
		have been checked and approved. not be reproduced except in full.	
Taken By: Date Taken: Date Received:	Client 28/02/2011 28/02/2011	No of Samples: Date Testing Commenced: Date Testing Completed:	1 28/02/2011 01/03/2011
Sample Description:	Dunloe Sands Water San	nple - Algae	
LIMS NO.	Sample/Site No	Sample/Site Description	
11/0567-A/1	1 .	Lake	
COMMENTS:			
Results refer to sample	es as received at the Laboratory.		
NATA accordance accreditation Accredited & ISO/IEC 170	ent is issued in with NATA's n requirements, or compliance with 125. on No: 12754 & 13538	Sally-Everson (Senior Technical Officer sallye@tweed.nsw.gov.	



Client:	Ramtech Pty Ltd		
		Lims1 Report No:	11/0567-A
Address:		Date Testing Completed:	01/03/2011
	61-65 Quarry Road MURWILLUMBAH	Date of Report:	01/03/2011
Attention:	Steve Peterson		

Sample Description: Dunloe Sands Water Sample - Algae

		Algal Identification	Method	Code	Units	Count
LIMS NO.	11/0567-A/1					
		Mixed Algae (No Cyanophyta Detected)	B9		celis/mL	<100

Page 2 of 2

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Company:	KAMTECH 012					Project	Projocí Raference:		なものと		(BULK)					7:32
						Purchas	Pumhase Order No:									
Contact Name:						Send Re	Send Results to:	1				ananahari talah mangan di konsi Amerikanya di sebahari talah menangkan sebahari talah sebahari talah sebahari t				
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Chain of Custody Issue No. 4: 28/06/2010

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Tweed Labo	pratory Centre		SHIRE COUNCIL
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	FINAL CERTIF	ICATE OF ANALYSIS	
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 2
Attention: Copy To:	Steve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0782-A 21/03/2011
		t have been checked and approved. not be reproduced except in full.	
Taken By: Date Taken: Date Received:	Client 18/03/2011 18/03/2011	No of Samples: Date Testing Commenced: Date Testing Completed:	1 18/03/2011 18/03/2011
Sample Descriptio	n: Dunloe Sands Water Sa	mple - Algae	
LIMS NO	). Sample/Site No	Sample/Site Description	
11/0782-A	<b>v</b> 1 1	Lake	
COMMENTS:			
Results refer to sam	ples as received at the Laboratory.		
NATA accredit Accredit (SO/IEC	ument is issued in nce with NATA's ation requirements, ed for compliance with 17025, itation No: 12754 & 13538	Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.	)

FAX No.

P. 003



## **Tweed Laboratory Centre**

Client:	Ramtech Pty Ltd	Líms1 Report No:	11/0782-A
Address:	61-65 Quarry Road MURWILLUMBAH	Date Testing Completed: Date of Report:	18/03/2011 21/03/2011
Attention:	Steve Peterson		

Sample Description: Dunice Sands Water Sample - Algae

		Algal Identification	Method	Code	Units	Count
LIMS NO.	11/0782-A/1		Same and the second			
		Mixed Algae (No Cyanophyta Detected)	Bg	)	cells/ml,	<100

Page 2 of 2

# **Chain of Custody Record**

Analysis Request

SHIRE COUNCIL Tweed Laboratory Centre

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Chain of Custody Issue No: 4: 28/06/2016

Page 1 of 1

Fweed Labo	ratory Centre		SHIRE COUNCIL.
Tweed 2 Phone: +07: 5660 (All	Laboratory Centre, 46 Enterpris 103 Eax 207:5524-2676 Emai carrospondence: Tweed Shire www	e Avenue, Tweed Heads South NSV I "samplereception@tweed.hsw.gov Counting RSBgs 816 Minwillumbah rweediab.com.ay	/ 2486 Australia au ABN 90178732496 NSW 2484
		HIPATESTE NULL ELSE	
Client: Address:	Ramtech Pty Ltd 61-65 Quarry Road MURWILLUMBAH NSW 2484		Page 1 of 2
Attention: Copy To:	Steve Peterson Fax: 02 6672 3896	Lims1 Report No: Client Reference: Date of Report:	11/0883-A 28/03/2011
<u></u>	All pages of this Re This document n	port have been checked and approved nay not be reproduced except in full.	d.
Takon By: Date Taken: Date Received:	Client 28/03/2011 28/03/2011 n: Dunloe Sands Water	No of Samples: Date Testing Commenc Date Testing Completed	
Sample Description	n: Dunloo Sands Water	Sample - Age	
LI <b>MS NO</b> 11/0883-A		Sample/Site Descriptio	9 <b>n</b>
COMMENTS:		N	
Results refer to sam	ples as received at the Laborator	,.	
NATA accorda accredit Accredit ISO/IEC	cument is issued in Ince with NATA's tation requirements. ted for compliance with 0 17025. (itation No: 12754 & 13538	Sally Everson (Senior Technic sally@tweed	cal Officer – Phycology)

Page 2 of 2



# **Tweed Laboratory Centre**

Client:	Ramtech Pty Ltd	Lims1 Report No:	11/0883-A
Address:	61-65 Quarry Road MURWILLUMBAH	Date Testing Completed: Date of Report:	28/03/2011 28/03/2011
Attention:	Steve Peterson		
Sample Descri	ption: Dunloe Sands Water Sample - Algae		

# **Chain of Custody Record**

Analysis Request

SHIRE COUNCIL

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28/MAR/2011/MON 14:23



Tweed Laboratory Centre, 46 Enterprise Avenue, Tweed Heads South NSW 2486 Australia Phone: 07 5569 3103 Fax: 07 5524 266 ABN: 90 178 732 496 (All correspondence: Tweed Shire Council PO Box 816 Murwillumbah NSW 2484) www.tweedlab.com.au Client: Page 1 of 2 Ramtech Pty Ltd Address: 61-65 Quarry Road MURWILLUMBAH NSW 2484 Lims1 Report No: 10/2256-S Attention: Steve Peterson **Client Reference:** 1/10/2010 Fax: 02 6672 3896 Date of Report: Copy To: All pages of this Report have been checked and approved. This document may not be reproduced except in full. No of Samples: 2 Taken By: Client 21/09/2010 Date Taken: 21/09/2010 Date Testing Commenced: 1/10/2010 Date Testing Completed: **Date Received:** 21/09/2010 Dunloe Sands - Soil Sample - ASS Chromium Sample Description: Sample/Site No Sample/Site Description Sand 1 2 Sandy Loam COMMENTS: Results refer to samples as received at the Laboratory.



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator) paulw@tweedtab.com.au



Address:	61-65 Quarry Road
	MURWILLUMBAH
	NISIA/ 2484

Attention:

NSW 2484 Steve Peterson

10/2256-S Lims1 Report No: Date Testing Completed: 1/10/2010 Date of Report: 1/10/2010

Sample Description: Dunloe Sands - Soil Sample - ASS Chromium

Sample Identification:			Sand	Sandy Loam
Date Taken:			21/09/2010	21/09/2010
Date Received:			21/09/2010	21/09/2010
Date Testing Commenced:			21/09/2010	21/09/2010
Test	Method	Units	10/2256-S-1	10/2256-S-2
Scr	ASS7	%	0.07	0.01
TAA	ASS2	mol⊦f*/t	8.0	38
pH - ASS Cr Reducible	ASS2	pH units	5.5	5.2

Page 2 of 2



Appendix D Acoustic Certification





## CARTER RYTENSKILD GROUP

Traffic and Acoustical Consultants

GOLD COAST

2563 Gold Coast Highway Mermaid Beach Queensland 4218

POSTAL: PO Box 441 Mermaid Beach Queensland 4218

**P**: (07) 5527 7333 **F**: (07) 5527 7555

**E**: info@crg.net.au

CRG Traffic & Acoustics Pty Ltd

BRISBANE

Level 36, Riparian Plaza 71 Eagle Street Brisbane Queensland 4000 POSTAL: Level 36, Riparian Plaza 71 Eagle Street Brisbane Queensland 4000

**P**: (07) 3121 3198 **F**: (07) 3121 3030

www.crg.net.au

ABN 47 553 772 655

**11th April 2011** CRGref: 06362a Letter 11_04_11

Ramtech Pty Ltd C/- Mr. Adam Smith, Planit Consulting P O Box 1632 KINGSCLIFF NSW 2487

Dear Adam,

## RE: Dunloe Sands Operational Noise Measurements at Stage 1, Pottsville Road Pottsville

Thank you for your request for CRG to complete operation noise measurements at the Dunloe Sands Stage 1 Sandmine located along Pottsville Road at Pottsville. The following outlines the results of the attended measurements:

## 1.0 Attended Measurements

Attended measurements of onsite equipment and ambient noise levels were conducted on the Morning of Monday 11th April between 7am and 8:30am at near field measurements at the equipment locations and measurements at the common boundaries with the nearest offsite noise sensitive receivers.

Measurements were conducted with a Rion 29E Octave Band Sound Level Meter over the octave band centre frequencies between 31.5 Hz to 8,000 Hz. Measurements were conducted in "A" weight with the microphone in a free-field location approximately 1.2m above ground and pointing towards the noise source.

Measurements were conducted generally in accordance with Australian Standard AS 1055:1997 – "*Acoustics-Description and measurement of environmental noise*". The operation of the sound level equipment was field calibrated before and after the measurement session, with no significant drift from the reference signal recorded.

Weather conditions during the survey periods were fine and calm with wind speeds less than 5m/s.

The results of the near field measurements and the measurements at the common boundaries with the offsite nearest noise sensitive receivers are presented in Table 1 over the page.

We note that during measurements at the common boundary with the offsite noise sensitive receivers all equipment was in operation (i.e. dredge, screen and loader).



Fauinmont	Distance		S	SPL Hz	Octave	Band C	Centre F	requen	cies dB	(A)	
Equipment	<b>To Source</b>	31.5	63	125	250	500	1k	2k	4k	8k	AP
(1) Stage 1 Dredge	50m	27	38	43	45	52	53	49	42	33	57
(2) Volvo L150F Loader	10m	35	61	59	62	65	59	59	55	46	69
(2) CAT Truck with Dog Trailer	3m	40	55	65	68	71	68	65	59	51	75
(3) Powerscreen 1400 Loader	7m 15m	48	56	65	67	71	74	71	69	61	78
(3) Loader tipping sand into Powerscreen 1400	7m	48	63	62	69	72	74	72	71	63	79
(4) Powerscreen 1400 and Loader on other side of constructed earth bund	25m	30	48	43	46	50	51	50	44	32	56
(5): Impact to South Bo	undary					Ina	udible				
(6): Impact to North Bo	5						udible				
(5): Background LA90 So	outh	12	26	27	29	37	35	34	35	32	43
(6): Background LA90 N	orth	11	20	25	27	32	31	23	24	29	38

(1): Refer to Figure 1 below for measurement locations.

 Table 2: Attended measurement results.

Figure 1: Aerial of Sand Mine and Measurement Locations





## 2.0 Predicted Impact Levels from Near-field Source Levels

Given that the onsite equipment was observed to be inaudible at the common boundaries with the nearest offsite receivers (i.e. dwellings) predictions of impacts have been determined from the measured near-field source levels. It is noted that the nearest dwellings to the south and west are at least 1.0 km away from the nearest onsite equipment, with the nearest northern common boundary at least 1.2 km away.

Noise predictions have assumed a minus 6 dB reduction for every doubling of distance and an 8 dB reduction for the constructed earth mound (for the southern and western dwellings). We note from the measured levels the earth bund provided approximately 11 dB reduction (at 25m from the source); however, given that the offsite receivers are further away and higher then the measurement location at 25m we have applied a minus 8 dB reduction for the earth mound. The predicted combined impacts from all plant are as follows:

Southern Dwellings:	33 dB(A) at façade (28 dB(A) inside);
Western Dwellings:	33 dB(A) at façade (28 dB(A) inside); and
Northern Dwellings:	35 dB(A) at façade (33 dB(A) inside).

Refer to calculation sheet at the rear of this letter.

## 3.0 Noise Criterion

The noise criterion determined from the previous acoustic report for the development (crgref: 06362a report March 2008) is as follows:

• Daytime (7am to 6pm) 48 dB(A)  $L_{eq}$  (RBL + 5 dB).

From onsite attended measurements of Background  $L_{A90}$  levels conducted on 11th April 2011 at the northern and southern site boundaries (refer to the presented Levels in Table 1 of this letter) the following Background criterion would apply:

Southern and Western Dwellings:	43 $L_{A90}$ dB(A) + 5 dB = 48 dB(A); and
Northern Dwellings:	$38 L_{A90} dB(A) + 5 dB = 43 dB(A).$

Overall both the measured levels and predicted levels are below the noise criterion for the development; therefore, operational activities occurring at the sand mine are in compliance.

We trust the above is of assistance; please do not hesitate to contact the undersigned regarding any queries in relation to the above information.

Letter Reviewed By:

JAY CARTER BSc Director

Letter Compiled by:

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Matthew Lopez BEng Consultant



## APPENDIX

Model Calculations / Predictions



### ONSITE ACTIVITY NOISE IMPACTING:

Dwellings	due south

Dwellings due south			Dwellings due west			Dwellings due North		
Dredge	57	dB(A) @ 50m	Dredge	57	dB(A) @ 50m	Dredge	57 dB(A) @	50m
Distance source to receiver	1000	m	Distance source to receiver	1000	m	Distance source to receiver	1350 m	
Distance attenuation	-26.0	dB(A)	Distance attenuation	-26.0	dB(A)	Distance attenuation	-28.6 dB(A)	
Screening	0	dB(A)	Screening	0	dB(A)	Screening	0 dB(A)	
Façade reflection	0	dB(A)	Façade reflection	0	dB(A)	Façade reflection	0 dB(A)	
Impact at façade	31.0	dB(A)	Impact at façade	31.0	dB(A)	Impact at façade	28.4 dB(A)	
Impact inside opern window	26.0	dB(A)	Impact inside opern window	26.0	dB(A)	Impact inside opern window	23.4 dB(A)	
Screen and loader	79	dB(A) @ 7m	Screen and loader	79	dB(A) @ 7m	Screen and loader	79 dB(A) @	7m
Distance source to receiver	1050		Distance source to receiver	1000		Distance source to receiver	1300 m	
Distance attenuation	-43.5	dB(A)	Distance attenuation	-43.1	dB(A)	Distance attenuation	-45.4 dB(A)	
Earth bound screening	-8	dB(A)	Earth bound screening	-8	dB(A)	Screening	0 dB(A)	
Façade reflection	0	dB(A)	Façade reflection	0	dB(A)	Façade reflection	0 dB(A)	
Impact at façade	27.5	dB(A)	Impact at façade	27.9	dB(A)	Impact at façade	33.6 dB(A)	
Impact inside opern window	22.5	dB(A)	Impact inside opern window	22.9	dB(A)	Impact inside opern window	28.6 dB(A)	
Truck with dog trailer	75	dB(A) @ 3m	Truck with dog trailer	75	dB(A) @ 3m	Truck with dog trailer	75 dB(A) @	3m
Distance source to receiver	1100	m	Distance source to receiver	1000	m	Distance source to receiver	1200 m	
Distance attenuation	-51.3	dB(A)	Distance attenuation	-50.5	dB(A)	Distance attenuation	-52.0 dB(A)	
Screening	0	dB(A)	Screening		dB(A)	Screening	0 dB(A)	
Façade reflection	0	dB(A)	Façade reflection	0	dB(A)	Façade reflection	0 dB(A)	
Impact at façade	23.7	dB(A)	Impact at façade	24.5	dB(A)	Impact at façade	23.0 dB(A)	
Impact inside opern window	18.7	dB(A)	Impact inside opern window	19.5	dB(A)	Impact inside opern window	18.0 dB(A)	
Combined impact at façade	33.1	dB(A)	Combined impact at façade	33.3	dB(A)	Combined impact at façade	35.0 dB(A)	
Impact inside opern window	28.1	dB(A)	Impact inside opern window	28.3	dB(A)	Impact inside opern window	30.0 dB(A)	