



#### Review and Amendments Schedule - PLANIT CONSULTING PTY LTD

		Date
Author	EB/LB	June 2015 / December 2015
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Amendments

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#### **Table of Contents**

#### Sections

Table of Contents	3
Executive Summary & Introduction	4
1.0 Sampling Program	8
2.0 Monthly Monitoring Results	10
3.0 Quarterly Monitoring Results	18
4.0 Conclusion	29
Appendix A	31
Appendix B	32
Appendix C	33



### **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 Department of Planning which integrates the prescribed environmental monitoring programs in accordance with Condition 2 of Schedule 5 into a planning and operations framework.

Construction commenced on a general trial basis in September 2010 with formal commencement occurring in October of 2010. Operations are at a basic level with estimated annual production in the order of 20,000 tonnes per annum only at this stage. The final extraction for the past 12 months is not yet identifiable, however it is estimated at no more than 35,000 tonnes. Full operations (staffed and marketed) commenced in 2011.

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 AEMR is to be submitted to the Director General of the Department of Planning and other relevant agencies in accordance with the abovementioned Condition 5. This AEMR describes works undertaken, provides a summary and analysis of any complaints and monitoring results, identifies any trends in the monitoring results and identifies any non compliance over the preceding 12 months. Also included is any proposed construction, extraction and rehabilitation activities planned for the following 12 months.

This report represents a six monthly report for presentation to the CCC and for presentation to the DOP. This will be incorporated in to the formal 12 monthly report when appropriate.

#### **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 within the local Pottsville markets. As sand demand increases, the Dunloe Park sand may become competitive within the Brisbane market.

#### 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 200m 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.



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Laboratory tests be completed for fineness modulus, clay/silt content (<3%), organics and shell content.</li>

#### 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 Mm <sup>3</sup>	Sand Mm <sup>3</sup>	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;

- Blue Green Algae;
- Vegetation Management and Regeneration (refer appendices);
- Groundwater; and
- Surface Water.

All monitoring was undertaken by Ramtech staff.

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

- Algae Level results for December 2014 to May 2015;
- Ground Water chemical results (pH, EC, DO and RP) for December 2014 to May 2015;
- Quarterly groundwater chemical results (Chloride, Calcium, Magnesium, Sodium, Potassium, Sulphate, Arsenic, Iron and Manganese);
- Quarterly Surface Water chemical results (December 2014, March 2015);
- Rainfall levels from December 2014 to May 2015; and

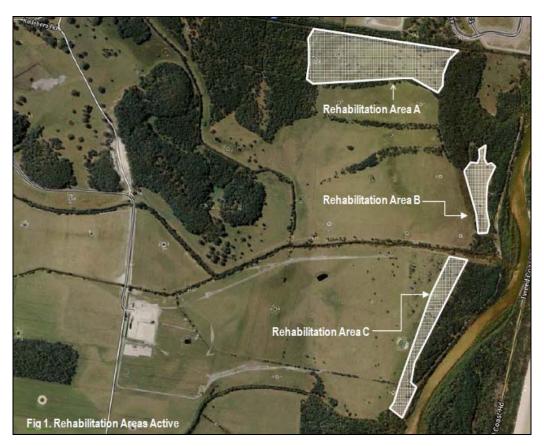
The Bureau of Meteorology (BOM) recorded rainfall within surrounding suburbs over the 6 month period from December 2014 to May 2015. The recorded rainfall at Byron Bay, for this period, was approximately 1043.4mm, representing a wet start to the year.



#### **Vegetation Management and Regeneration Works**

As part of the Dunloe Sand Quarry's approved Environmental Management Plan, re-vegetation and regenerative landscaping is required (Appendix C of the EMP). Ongoing management of the surrounding vegetation is being carried out by Ramtech P/L over the lifetime of the Dunloe Quarry operations.

The regenerative works have been undertaken via a combination of assisted and natural regrowth and all areas have been fenced so as to limit the intrusion of cattle. In this regard, depending on soil types and topography, each of the areas has been very successful in establishing quality regrowth. The only limiting factors have been some cattle getting in and around existing fences (primarily at low tide where they have been able to traverse the creek lines. There are also some areas of extensive grass intrusion that will be subject to ongoing spray control so as to allow for further natural regrowth to occur. The works have been successful to date as referred to above.



#### **Complaints Recorded**

No complaints have been registered by the proponents to date, however correspondence with the Department of Planning highlighted that the required dust monitoring and noise (monthly) assessments were not being undertaken properly. Since then noise assessments have commenced and a formal review of dust monitoring was undertaken by ASK Consulting. This review resulted in a number of recommended changes due to the nature of the operations. This review has been sent to the Department of Planning for ratification in to the formally approved EMP for the site.



# **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 algae, surface water and groundwater monitoring for the project.

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, DLP3, DLP5, DLP6 and DLP7. Sites locations are shown on the **Ground Water Location Map** under **Appendix A**.

Surface water analysis includes pH, electro-conductivity (EC), dissolved oxygen (DO), suspended solids, total phosphorus and total nitrogen and is conducted quarterly at sites SW3, SW4, SW9 and SW10. Site locations are depicted within the Surface Water Location Map under Appendix B.

All of the Sampling Raw Data that has been used to compile this report is included in Appendix C.



# Chapter 2.0 Monthly Monitoring Results





#### 2.1 Algae Results

The results of the algae monitoring for the period of November 2013 to October 2014 are displayed within **Table 1**. Results are presented in cells/mL.

Table 1: Dunloe Sands - Lake - Algae Results November 2014 to May 2015

	11 2014	16/12 2014	22/01 2015	26/02 2015	27/03 2015	27/04 2015	29/05 2015	
Cyanophyta (cells/mL)	-	-	-	-	-	-	-	
Chlorophyta (cells/mL)	-	106,500	37,000	<100	8,750	8,000	76,000	211,000

The Cyanophyta results gathered between December 2014 and June 2015 remains low being <100 cells/mL.

The Chlorophyta results gathered between December 2014 and May 2015 detail mixed results as has been traditional on this site. Consultation was undertaken with the Blue Green Algae expert nominated in the EMP (Paul Wright from the Tweed Laboratory), who explained that high Chlorophyta results do not represent an exceedance of the EMP threshold as the risk is evidently related to the Cyanophota results and not Chlorophyta results. Advice received is that it is quite normal for Chlorophyta results to vary markedly and that high readings are not dangerous or indicative of any other potential cause for concern.

It is noted that there is a high reading on May and this contradicts earlier observations that there is potential correlation between high temperatures and low rainfall (and increased Chlorophyta results), however advice received also indicates that again there is no apparent direct reason for increase levels and that such readings are representative of other quarries in the local area.

Continued monitoring will ensure the conditions relating to green algae growth are monitored and reduced where possible. No potentially hazardous levels of Cyanophyta were noted. Furthermore continued efforts will be required to ensure organic soil materials from the upper stratum and bird droppings are not contaminating the lake.

Strict adherence to the minimum monthly sampling is also required as it is noted that no result has been given for February. Contact has been made with the Laboratory in this regard.

#### 2.2 Ground Water

Monthly ground water monitoring was conducted between December 2014 and May 2015. Samples monitored the pH, EC, Redox Potential and DO levels of five (5) sample sites. 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 twelve (12) month monitoring period. Figure 2 depicts the pH test results, Figure 3 illustrates the EC, Figure 4 shows the Redox Potential and Figure 5 shows DO levels.

#### 2.3 Groundwater Depth

Ground water was encountered in all boreholes at between 1.2m and 950mm below the natural surface level.



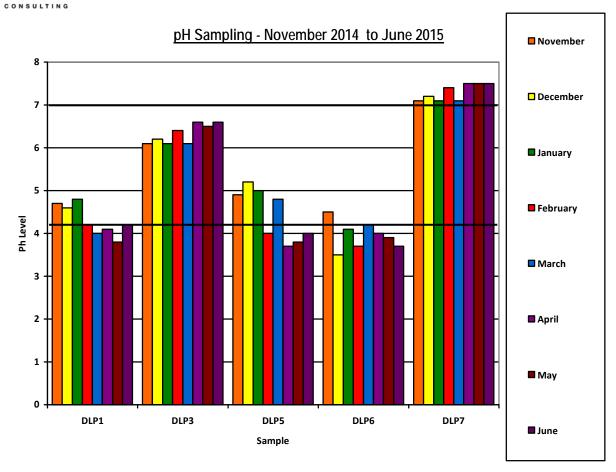


Figure 1: Dunloe Sands - Ground Water - Chemical (pH Test) Results November 2014 to June 2015

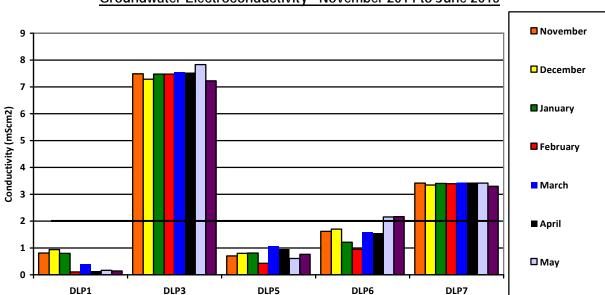
The EMP provides the interim target range regarding the pH levels of ground water sampling. The majority of the results displayed are between the minimum of 4.2pH and maximum of 7.0pH (shown as black lines). DLP 7 shows all samples outside of the maximum interim target levels by between 0.1 and 0.6pH. This presents a more alkaline pH level than the target range. These minimal exceedances of pH at DLP7 are not considered to be of any significance as small fluctuations in groundwater pH is common within regions which experience both high and low levels of rainfall and are consistent with background levels which were consistently acidic before operations commenced.

DLP1, 5 and 6 record samples below the 4.2pH interim target. This presents a more acidic pH level than the target range. This is considered to have been caused by significantly high levels of rainfall following dry periods and generally low lying environments conducive to acidic soils (<4m AHD). It is probable in this regard that organic acidity has leached in to the shallow ground water from surrounding low lying soils during rainfall events. The majority of results present within the target range and therefore the sampling for the year in considered to be generally consistent with the EMP requirements and background readings.

As with earlier reports, there is potential also for DLP 5 & 6 to require flushing in order to ensure accurate readings. The proponents are aware of this and have been requested to monitor the accuracy of each sample point and to ensure flushing is undertaken at six monthly intervals.

June





#### Groundwater Electroconductivity - November 2014 to June 2015

Figure 2: Dunloe Sands - Ground Water - Chemical (EC Test) Results November 2014 to June 2015

Sample

The majority of the samples taken produce considerably low EC levels when compared to the EMP maximum interim target of 2.00mS/cm2. However, two samples sites; DLP3 and DLP7 present conductivity levels above the maximum interim target of 2.00mS/cm2 stated within the EMP (shown as a black line). These sites have also expressed similar levels of EC within background testing. This can be explained by the sampling wells being installed in the low-lying portion of the floodplain. The wells are adjacent to sections of Mooball Creek and the main agricultural drainage line which can be subject to tidal influences. It is therefore considered likely that some localised salinisation of surficial groundwater has occurred within the vicinity of monitoring locations DLP3 and DLP7, albeit at levels consistent with background readings.

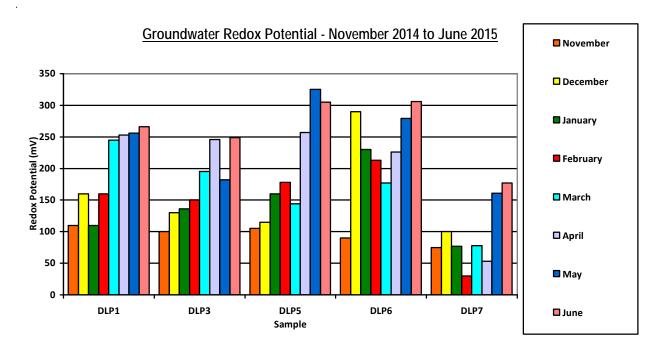


Figure 3: Dunloe Sands - Ground Water - Chemical (Redox Potential Test) Results November 2014 to June 2015



The EMP does not provide an interim target level for Redox Potential but instead states that results should be monitored for outlier samples. All samples present in a uniform manner, with no outliers present. High levels generally correspond with higher than normal periods of rainfall.

#### Groundwater Dissolved Oxgen Test Results - November 2014 to June 2015

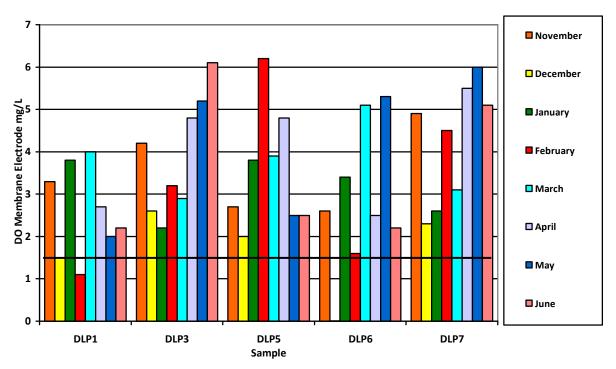


Figure 4: Dunloe Sands - Ground Water - Chemical (DO Test) Results November 2014 to June 2015

The minimum DO level provided within the EMP is 1.5mg/mL (shown as a black line). The results vary in DO levels considerably with the majority not presenting or conforming to a pattern over the monitoring period. The majority of the groundwater samples that were collected are above the minimum interim target however one sample collected from DLP 1 presented levels below the target. The improvements in DLP 7 & 3 continue to be pleasing and reverse the trend from the previous periods.

Whilst background testing indicated generally low DO levels inherently across the site, the result for February for DLP 1 is likely indicative of exceedingly warm temperatures increased rainfall for the month of February (>250mm). All results require further consideration by the sampler, 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 and access to the testing sites given that these are placed in open accessible areas. Each of these potential reasons should be considered in the context of future sample results so as to look towards potential ameliorative measures when required. Nevertheless, we note that background readings for DLP 1 were often below the minimum target set.



2.3 Lake Samples

#### Chemical Results - Lake Sample - November 2014 to May 2015

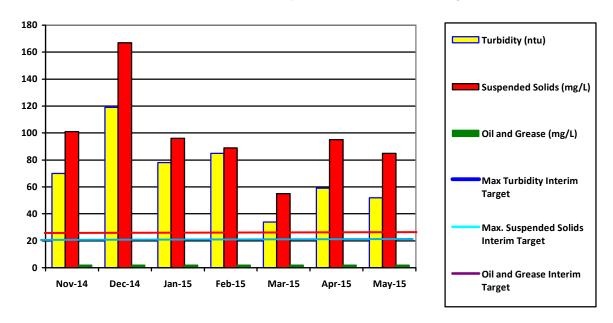


Figure 5: Dunloe Sands - Lake - Chemical Results - November 2014 to May 2015

Interim target levels for turbidity present a maximum level of 20ntu within the EMP. The levels recorded over the monitoring period show levels above the maximum levels during the majority of samples, primarily it is considered due to the presence of the dredging apparatus on site which would understandably increase turbidity levels. In this regard, the site does not have a permanent dredge on site, rather it relies upon the hire of a suitable machine after which stockpiles are created. It is also noted that well over 1000mm of rain has been recorded in the monitoring period corresponding with high turbidity readings. This is entirely expected given both high rainfall and active dredging.

The maximum interim target level for the suspended solids within the EMP is 25mg/L. Results for this element also demonstrate exceedances across the board, however suspended solids and turbidity are both interrelated and hence high levels of one will automatically in most circumstances result in high levels of the other.

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 six month monitoring period at less than 2mg/L.

Additional cross referencing of results will be needed against times when active dredging is not underway.



#### Chemical Results - Lake Samples - November 2014 to May 2015

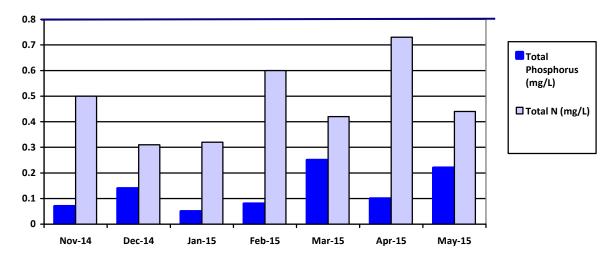


Figure 6: Dunloe Sands - Lake - Chemical Results - November 2014 to May 2015

Total phosphorus levels have a maximum interim target of 0.8mg/L (shown as red line). All sample data results in levels of below the maximum interim target levels contained within the EMP.

Total nitrogen levels remain consistently lower than the interim target of 20mg/L with a maximum result of circa 0.72 mg/L.

#### 2.4 Recorded Rainfall

The Bureau of Meteorology (BOM) have recorded rainfall within the surrounding area of Byron Bay (28.5km from Pottsville). The results are illustrated within **Figure 8** along with the recorded rainfall average.

Total Rainfall - November 2014 to May 2015

### 300

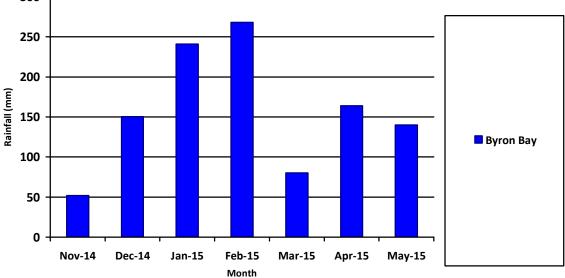


Figure 7: Recorded Rainfall November 2014 to May 2015 (graph needs to change start month)



The recorded rainfall of the three suburbs surrounding Pottsville has been averaged to produce an approximate on-site rainfall. In total over the six month period approximately 1043.4mm of rain was recorded on-site.



# **Chapter 3.0 Quarterly Monitoring Results**





#### 3.1 Quarterly Ground Water Chemical Results

Quarterly monitoring of the ground waters on-site from locations DLP 1, DLP 3, DLP 5, DLP 6 and DLP 7 have been undertaken to determine 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 December 2014, March 2015 and June 2015.

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.

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	15	2,370	220	<3	780
Interim					
Target	285.0	285.0	285.0	285.0	285.0
March	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
2015					
Sample	26	2,360	300	<3	780
Interim					
Target	285.0	285.0	285.0	285.0	285.0
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	24	2370	180	<50	780
Interim					
Target	285.0	285.0	285.0	285.0	285.0

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

Comments: As highlighted previously, two (2) samples sites (DLP3 and DLP7) presented conductivity levels above the maximum interim target of 285mg/L 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 as these sampling wells have been 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 groundwater has occurred within the vicinity of DLP3 and DLP7 due to tidal influences within these nearby waterways and wetlands. It is noted that these results are consistent with background readings.

The slight exceedance in DLP 5 in March would likely result from the higher than average rainfalls in February which exceeded 250mm for the month.

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

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	1.6	82	6.2	134	22
Interim					
Target	55.0	55.0	55.0	55.0	55.0
March	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7



2015					
Sample	30	72	7.6	94	18
Interim					
Target	55.0	55.0	55.0	55.0	55.0
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.5	76	4.9	43	18
Interim					
Target	55.0	55.0	55.0	55.0	55.0

NB. Major cation

Comments: The spike associated with the DLP3 sample is consistent with background testing and consistent with the sites location proximate to the adjacent tidal waterway. The results for increased calcium in DLP 6 are somewhat odd and not consistent with background readings, although results reduced again for the June reading. Whilst the increased calcium readings indicate that DLP 6 was 'hard', this may be able to explained by the higher than average rainfalls and leaching of calcium in to the bore during this period, most probably due to the application of lime in proximity to the work area. Water hardness in most groundwater is naturally occurring from weathering of limestone, sedimentary rock and calcium bearing minerals.

To be monitored for trends.

All other samples present at levels lower than the interim target.

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

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.4	118	15	26	43
Interim					
Target	40.0	40.0	40.0	40.0	40.0
March 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	4.1	108	18	22	38
Interim					
Target	40.0	40.0	40.0	40.0	40.0
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.4	116	8.8	25	38
Interim					
Target	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. All other samples present at levels lower than the interim target.

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

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	10	1,240	110	24	685
Interim					
Target	280.0	280.0	280.0	280.0	280.0
March	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7



2015					
Sample	14	1,200	142	19	651
Interim					
Target	280.0	280.0	280.0	280.0	280.0
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	14	1,250	92	17	652
Interim					
Target	280.0	280.0	280.0	280.0	280.0

NB. Major cation

Comments: As highlighted previously, two (2) sample sites (DLP3 and DLP7) presented conductivity levels above the maximum interim target of 280mg/L stated within the EMP, each of which also expressed similar levels of EC within background testing. The latter also correlates with the high sodium levels shown above, which indicate a high level of saltwater intrusion at these points. This is explained as the sampling wells were 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 groundwater has occurred within the vicinity of DLP3 and DLP7 due to tidal influences within these nearby waterways and wetlands.



Table 6: Dunloe Sands - Ground Water - Chemical (Potassium M8 Test) Results (mg/L)

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	<5	48	<5	10	29
Interim					
Target	17.5	17.5	17.5	17.5	17.5
March 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	<5	46	<5	8	26
Interim					
Target	17.5	17.5	17.5	17.5	17.5
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	<5	42	<5	8	24
Interim					
Target	17.5	17.5	17.5	17.5	17.5

NB. Major cation

Comments: As highlighted previously, two (2) samples sites (DLP3 and DLP7) presented conductivity levels above the maximum interim target of 17.5mg/L stated within the EMP, each of which also expressed similar levels of EC within background testing. The latter also correlates with the high potassium levels shown above, which indicate a high level of saltwater intrusion at these points. This is quite easily explained as the sampling wells were 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 groundwater has occurred within the vicinity of DLP3 and DLP7 due to tidal influences within these nearby waterways and wetlands. Efforts to date to clear these wells have not had a noticeable impact upon readings, indicating that levels are naturally high in this regard.

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

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	6.1	146	11	768	211
Interim					
Target	175	175	175	175	175
March 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	128	178	25	892	250
Interim					
Target	175	175	175	175	175
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	14	179	29	1,500	241
Interim					
Target	175	175	175	175	175

Comments: Minor exceedances were experienced during both sampling periods at DLP 7 and in DLP 3 in March. These exceedances are very small. Background testing shows that DLP 7 and DLP 3 have previously tested with high test results.





Larger exceedances inconsistent with previous sampling was identified again (also present in August 2014) for DLP 6. This will need to be monitored at the next round to determine if there are any ongoing trends in this regard. It is noted that the background pH readings for this bore were in the order of 4.65 pH, which would indicate that this area is naturally acidic. Nevertheless the exceedances here require further consideration and potentially greater flushing efforts of this bore in coming months.



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

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Interim					
Target	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
March 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.002	< 0.001	< 0.001	0.017	< 0.001
Interim					
Target	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.001	<0.001	<0.001	0.013	<0.001
Interim					
Target	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Comments: The samples are fully compliant with the interim targets as set out by the EMP, with the exception of a small exceedance at DLP 6. This is not representative of background and whilst it may appear as a result of natural movement of naturally occurring arsenic through the site, the proximity of this bore to the work site requires further consideration relative to potential risks that might exist. This will be monitored in coming results.

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

December 2014	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	2.55	3.53	14.0	322	1.62
Interim					
Target	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5
March 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	5.14	3.66	17.7	265	2.62
Interim					
Target	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	3.84	2.13	4.90	382	2.53
Interim					
Target	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5

Comments: Exceedance of the target iron levels is noted at DLP 6 and DLP 5. Background testing suggests a history of DLP6 and a high reading of iron, albeit the levels highlighted in this round of sampling are higher than background and therefore are warranting of review. DLP 5 is in accord with background levels.

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

December 2014 DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
------------------------	-------	-------	-------	-------



Sample	0.02	0.59	0.08	1.91	0.06
Interim					
Target	0.15	0.15	0.15	0.15	0.15
March 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.351	0.681	0.130	2.31	0.077
Interim					
Target	0.15	0.15	0.15	0.15	0.15
June 2015	DLP 1	DLP 3	DLP 5	DLP 6	DLP 7
Sample	0.11	0.570	0.052	2.94	0.019
Interim					
Target	0.15	0.15	0.15	0.15	0.15

Comments: Manganese is typically associated brackish or slightly saline conditions. The readings at DLP3 are roughly equivalent with background sampling. Efforts to date to clear these wells have not had a noticeable impact upon readings, indicating that levels are naturally high in this regard. High trending results are established in DLP 6 (close proximity to the work site), indicating movement of manganese within the water table. To be monitored, however no real risk likely in respect of results shown.

#### 3.2 Surface Water Results

Quarterly monitoring of the surface waters on site within locations SW 3, SW4, SW9 and SW10 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 December 2013, March, June and August 2014. 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)

December 2014	SW 3	SW 4	SW 9	SW 10
Sample	7.7	8.0	8.0	7.6
Interim				
Target	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5
March	SW 3	SW 4	SW 9	SW 10
2015				
Sample	3.7	3.7	4.2	4.2
Interim				
Interim Target	5 – 8.5	5 – 8.5	5 – 8.5	5 – 8.5
	5 – 8.5 SW 3	5 – 8.5 SW 4	5 – 8.5 SW 9	5 – 8.5 SW 10
Target				
Target June 2015	SW 3	SW 4	SW 9	SW 10

Comments: BOM stats indicate sampling undertaken 48 hours after 48mm rain event which is likely to have facilitated a flush in the system hence the lower pH results. Note that no break in bund was evident or any leakage from the work area detected hence all results are likely associated with activities in the upper catchment, particularly as all exceedances were



evident both up and downstream from the quarry and hence the cause of the increased acidity may well have been further up the catchment

Review of background readings also indicate that at various times (shoulders) there appears to be naturally low pH levels in all sampling locations due to mobilisation of Acid I the soil profile.

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

December 2014	SW 3	SW 4	SW 9	SW 10
Sample	30,732	29,527	26,966	26,936
Interim				
Target	< 5,500	< 5,500	< 5,500	< 5,500
March	SW 3	SW 4	SW 9	SW 10
2015				
Sample	1,834	1,426	763	779
Interim				
Target	< 5,500	< 5,500	< 5,500	< 5,500
June 2015	SW 3	SW 4	SW 9	SW 10
Sample	1,071	571	460	383
Interim				
Target	< 5,500	< 5,500	< 5,500	< 5,500

Comments: All of the December samples taken exceeded the interim target levels outlined within the EMP. The March samples show all samples within acceptable levels.

Saltwater has a high level of electro conductivity and therefore saltwater intrusion is considered overwhelmingly the most likely explanation for the high December sample readings, particularly as saltwater exhibits similar readings to those identified above.

It is considered likely that the samples were taken with the incoming tide, therefore giving a higher than normal reading. Further advice is to be given to the proponent with respect to sampling methods in this regard.

All readings, including the elevated December samples are consistent with background readings.

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

December 2014	SW 3	SW 4	SW 9	SW 10
Sample	7.9	10	10	12
Interim				
Target	> 4	> 4	> 4	> 4
March 2015	SW 3	SW 4	SW 9	SW 10
Sample	4.8	4.7	5.2	5.6
Interim				
Target	> 4	> 4	> 4	> 4
June 2015	SW 3	SW 4	SW 9	SW 10



Sample	8.0	8.6	8.3	7.3
Interim				
Target	> 4	> 4	> 4	> 4

Comments: All of the samples taken are compliant with the interim target levels outlined within the EMP, with the exception of the December surface water samples at each point. This corresponds with higher suspended solids (refer below) and high rainfall for this month. It was also observed that the high December rainfall came on the back of high summer temperatures. These results were then observed to recede with lower temperatures through to the March sampling results.

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

December 2014	SW 3	SW 4	SW 9	SW 10
Sample	35	33	37	44
Interim				
Target	< 25	< 25	< 25	< 25
March	SW 3	SW 4	SW 9	SW 10
2015				
Sample	23	24	5.8	8.0
Interim				
Target	< 25	< 25	< 25	< 25

Comment: Generally all readings were satisfactory, however slightly increased levels were recorded in December which corresponded with heavy rainfall activity (>150mm fell in December). Reduced readings were evident in March sampling as only 80mm fell in this period.

All results, including the elevated December results are consistent with Background results.

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

December 2014	SW 3	SW 4	SW 9	SW 10
Sample	0.03	0.05	0.08	0.07
Interim				
Target	< 0.08	< 0.08	< 0.08	< 0.08
March 2015	SW 3	SW 4	SW 9	SW 10
Sample	0.04	0.10	0.02	0.06
Interim				
Target	< 0.08	< 0.08	< 0.08	< 0.08

Comments: The majority of the samples taken are compliant with the interim target levels outlined within the EMP. SW4 presented levels slightly greater that the interim target in March, however these exceedances are quite minor and not representative of earlier results.

All results are consistent with background readings.



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

December 2014	SW 3	SW 4	SW 9	SW 10
Sample	0.36	0.86	1.52	1.38
Interim				
Target	< 20	< 20	< 20	< 20
March 2015	SW 3	SW 4	SW 9	SW 10
Sample	1.32	1.15	1.04	1.08
Interim				
Target	< 20	< 20	< 20	< 20

Comments: All of the samples taken are compliant with the interim target levels outlined within the EMP.

#### 3.3 Noise Monitoring

Noise monitoring of potentially sensitive sources has been undertaken pursuant to the EMP.

These assessments were undertaken on the following dates:-

- a. January 2015 Friday the 30th
- b. February 2015 Thursday the 26th
- c. March 2015 Monday the 30th
- d. April 2015 Thursday the 30<sup>th</sup>
- e. May 2015 Friday the 29th
- f. June 2015 Monday the 29th

All results were taken in the morning between the hours of 7.30am and 9am. All results were monitored using Centre 320 Series Sound Level Meter (tripod fixed).

Results were taken from three locations as identified in the EMP. On each occasion, the site operations have been inaudible above background. This was further demonstrated when ASK consulting were asked to undertake a reading whilst also reviewing the air quality parameters for the operation, wherein they were also unable to register readings for the operation. It is pertinent to note that volumes being extracted from the operation are far below that which the approval granted consent for and hence it is not unexpected that noise levels are unable to be recorded.

#### 3.4 Vegetation Rehabilitation & Regeneration

As part of the Dunloe Sand Quarry's approved Environmental Management Plan, re-vegetation and regenerative landscaping is required (Appendix C of the EMP). Ongoing management of the surrounding vegetation is being carried out by Ramtech P/L over the lifetime of the Dunloe Quarry operations.

The regenerative works have been undertaken via a combination of assisted and natural regrowth and all areas have been fenced so as to limit the intrusion of cattle. In this regard, depending on soil types and topography, each of the areas has been very successful in establishing quality regrowth.

Monitoring sheets reflective of the progress of regeneration areas are included at Appendix D.



### **Chapter 4.0 Conclusion**





#### 4.1 Conclusion

This report represents the ongoing monitoring for the operation of the Dunloe Sands Quarry. It is to be utilised in respect of operational compliance and environmental characteristics on the site, as well as to be cross referenced with future monitoring reports. This will allow the identification of potential trends and areas requiring intervention and environmental amelioration.

The results within this report demonstrate that the environmental characteristics on-site remain consistent with background readings and within the acceptable limit set out within the consent and approved EMP.

Luke Blandford Town Planner Planit Consulting

June 2015

Adam Smith
Director
Planit Consulting

June 2015

Steve Petersen Director RAMTECH

June 2015



### Appendix A Ground Water Location Map





Stage 01 Ground Water Monitoring Location

Stage 02 Ground Water Monitoring Location

Stage 01 & 02 Ground Water Monitoring Location

Excavation Area









### **Appendix B Surface Water Location Map**





Stage 01 & 02 Surfacewater Monitoring Location

Excavation Area









### Appendix C Sampling Raw Data





#### **Tweed Laboratory Centre**

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

Sample Description:

Dunioe Sands Lake - Algae

Lims1 Report No:	14/3330-A		
Date Testing Completed:	16/12/2014		
Date of Report:	16/12/2014		

		Algal Identification	Method Code	Units	Count
LIMS NO.	14/3330-A/1				
		No Cyanophyta Detected	В9	cells/mL	ND
		Chlorophyta	В9	cells/mL	106,500
		Diatoms (Bacillariophyta)	В9	cells/mL	220
		Dinophyta (Dinoflagellates)	B9	cells/mL	35



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Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

14/3330-C

Page 1 of 3

Client Reference:

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Date of Report:

31/12/2014

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Taken By:

Client

No of Samples:

10

Date Taken:

15/12/2014

**Date Testing Commenced:** 

16/12/2014

Date Received:

16/12/2014

Date Testing Completed:

31/12/2014

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

Sample/Site Identification Sample/Site Description

Lake

2

DLP 1

3 4 DLP 3

5

DLP 5

6

DLP 6

7

DLP 7 SW<sub>3</sub>

8 9

SW 4

10

SW 9 SW 10

COMMENTS:

NP = Not Present.

Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator)

paulw@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunioe Sands Qtly Lake, SW & DLP

Lims1 Report No: 14/3330-C
Date Testing Completed: 31/12/2014

**Date of Report:** 31/12/2014

Sample Identification:			Lake	DLP1	DLP3	DLP5	DLP6
Date Taken:			15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014
Date Received:			16/12/2014	16/12/2014	16/12/2014	16/12/2014	16/12/2014
Date Testing Commenced: Test	Method	Units	16/12/2014	16/12/2014	16/12/2014	16/12/2014	16/12/2014
	ivieurod	Units	14/3330-C-1	14/3330-C-2	14/3330-C-3	14/3330-C-4	14/3330-C-5
рН	P1	pH units	4.4	4.6	6.2	5.2	3.5
Conductivity	P2	μScm <sup>-1</sup>	1,005	94	7,280	801	1,700
DO (membrane electrode)	P12	mg/L	8,0	1,5	2,6	2.0	<0.1
*Redox Potential	P16	mV	****	+160	+130	+115	+290
Alkalinity as CaCO3	C10	mg/L	NP	NP	130	5	NP
Bicarbonate HCO <sub>3</sub>	C10	mg/L	<1	<1	77	3	<1
Turbidity	P8	NTU	119	22222	*****	*****	*****
Suspended Solids	P4	mg/L	167	****	****	90000	
Oil and Grease	C8	mg/L	<2	*****	*****	*****	(*****)
Total Phosphorus-P	C17	mg/L	0.14		*****	77.77	****
Total-N	C55	mg/L	0.31		****		*****
Chloride	C20	mg/L	40	15	2,370	220	⊲ 3
Calcium	M8	mg/L	159	1.6	82	6.2	134
Magnesium	M8	mg/L	18	0.4	118	15	26
Sodium	M8	mg/L	29	10	1,240	110	24
PotassiumM8	M8	mg/L	7	<5	48	<5	10
Sulphur as Sulphate	M8	mg/L	394	6,1	146	11	768
Aluminium (Total)	M8	mg/L	33,0	0.32	0.04	0.30	10.0
Arsenic (Total)	M7	mg/L	800.0	<0.005	<0.005	<0.005	<0.005
Iron (Total)	M8	mg/L	11.0	2.55	3.53	14.0	322
Manganese (Total)	M8	mg/L	1.23	0.02	0,59	0.08	1.91



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH NSW 2484

Attention: Steve

Steve Peterson

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

Lims1 Report No:	14/3330-C
Date Testing Completed:	31/12/2014
Date of Report:	31/12/2014

Sample Identification:			DLP7	SW3	SW4	SW9	SW10
Date Taken:			15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014
Date Received:			16/12/2014	16/12/2014	16/12/2014	16/12/2014	16/12/2014
Date Testing Commenced:	N. d. add	14-4-	16/12/2014	16/12/2014	16/12/2014	16/12/2014	16/12/2014
Test	Method	Units	14/3330-C-6	14/3330-C-7	14/3330-C-8	14/3330-C-9	14/3330-C-10
Нq	P1	pH units	7.2	7.7	8.0	8.0	7.6
Conductivity	P2	μScm⁻¹	3,340	30,732	29,257	26,966	26,936
DO (membrane electrode)	P12	mg/L	2.3	7.9	10	10	12
*Redox Potential	P16	mV	+100	****	****	*****	CHERRY.
Alkalinity as CaCO3	C10	mg/L	400	******	*****	*****	*****
Bicarbonate HCO <sub>3</sub>	C10	mg/L	243	2005	2015-1	****	( <del></del>
Turbidity	P8	NTU	****	9.9	11	33	33
Suspended Solids	P4	mg/L	60 GSA	35	33	37	44
Oil and Grease	C8	mg/L	******	*****	<del>====</del>	77777	*****
Total Phosphorus-P	C17	mg/L	2222	0,03	0.05	0.08	0.07
Total-N	C55	mg/L	****	0.36	0.86	1.52	1.38
Chloride	C20	mg/L	780	33555	*****		5 <del>00000</del>
Calcium	M8	mg/L	22	20000	990.0000 D	24.00	*****
Magnesium	M8	mg/L	43	****	20120	****	
Sodium	M8	mg/L	685	*****	****	*****	****
PotassiumM8	M8	mg/L.	29	*****		2222	(*****
Sulphur as Sulphate	M8	mg/L	211	*****	*****		
Aluminium (Total)	M8	mg/L	0.34	*****	*****	****	****
Arsenic (Total)	M7	mg/L	<0.005		*****	nana.	:eeeee
Iron (Total)	M8	mg/L	1.62		##XX		*****
Manganese (Total)	M8	mg/L	0.06	20002	*****		



Tweed Laboratory Centre, 46 Enterprise Avenue, Tweed Heads South NSW 2486 Australia Phone: 07 5569 3103 Fax: 07 5524 2676 Email: samplereception@tweed.nsw.gov.au ABN: 90 178 732 496 (All correspondence: Tweed Shire Council PO Box 816 Murwillumbah NSW 2484) www.tweed.nsw.gov.au/tweedlab/

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/0219-A

Page 1 of 2

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22/01/2015

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**Date Testing Commenced:** 

22/01/2015

Date Received:

22/01/2015

**Date Testing Completed:** 

22/01/2015

Sample Description:

Dunloe Sands - Lake Algae

LIMS NO.

Sample/Site No

Sample/Site Description

15/0219-A/1

1

Lake

#### COMMENTS:

Results refer to samples as received at the Laboratory. ND = Not Detected.



Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Sally Hinton (Senior Technical Officer - Phycology) shinton@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

Sample Description:

Dunioe Sands - Lake Algae

Lims1 Report No:	15/0219-A
Date Testing Completed:	22/01/2015
Date of Report:	22/01/2015

		Algal Identification	Method Code	Units	Count
LIMS NO.	15/0219-A/1				
		No Cyanophyta Detected	B9	cells/mL	ND
		Chlorophyta	В9	cells/mL	37,000



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Client:

Ramtech Pty Ltd

Address:

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Client

No of Samples:

6

Date Taken:

22/01/2015

**Date Testing Commenced:** 

22/01/2015

Date Received:

22/01/2015

**Date Testing Completed:** 

04/02/2015

Sample Description:

Dunloe Sands Monthly Lake & DLP

Sample/Site

Sample/Site Description

Identification

1

Lake

2

DLP 1

3

DLF

4

DLP 3

5

DLP 5

6

DLP 6 DLP 7

COMMENTS:

Results refer to samples as received at the Laboratory.

NATA TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Monthly Lake & DLP

Lims1 Report No: Date Testing Completed: 15/0219-C

Date of Report:

04/02/2015 04/02/2015

Sample Identification:			Lake	DLP1	DLP3	DLP5	DLP6
Date Taken:			22/01/2015	22/01/2015	22/01/2015	22/01/2015	22/01/2015
Date Received:			22/01/2015	22/01/2015	22/01/2015	22/01/2015	22/01/2015
Date Testing Commenced:		1	22/01/2015	22/01/2015	22/01/2015	22/01/2015	22/01/2015
Test	Method	Units	15/0219÷C-1	15/0219-C-2	15/0219-C-3	15/0219-C-4	15/0219-C-5
pΗ	P1	pH units	4.4	4.8	6.1	5.0	4.1
Conductivity	<b>P</b> 2	μScm <sup>-1</sup>	1,029	80	7,473	811	1,216
DO (membrane electrode)	P12	mg/L	7.4	3.8	2.2	3.8	3.4
*Redox Potential	P16	mV	+204	+110	+136	+160	+230
Turbidity	P8	NTU	78	One of the last of		(ERROR)	E3773
Suspended Solids	P4	mg/L	96	****		*****	*****
Oil and Grease	C8	mg/L	<2	*****	7 <b>2424</b> 0		92495
Total Phosphorus-P	C17	mg/L	0.05	*****	*****	HEAR)	*****
Total-N	C55	mg/L	0,32				

Sample Identification:			DLP7
Date Taken:			22/01/2015
Date Received:			22/01/2015
Date Testing Commenced:			22/01/2015
Test	Method	Units	15/0219-C-6
рН	P1	pH units	7.1
Conductivity	P2	µScm⁻¹	3,404
DO (membrane electrode)	P12	mg/L	2.6
*Redox Potential	P16	mV	+77
Turbidity	P8	NTU	
Suspended Solids	P4	mg/L	
Oil and Grease	C8	mg/L	
Total Phosphorus-P	C17	mg/L	
Total-N	C55	mg/L	



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www.tweed.nsw.gov.au/tweedlab/

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Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/0529-A

Page 1 of 2

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Taken By:

Client

No of Samples:

1

Date Taken: Date Received: 25/02/2015

Date Testing Commenced:

26/02/2015

26/02/2015

**Date Testing Completed:** 

26/02/2015

Sample Description:

Dunloe Sands Lake - Algae

LIMS NO.

Sample/Site No

Sample/Site Description

15/0529-A/1

1

Lake

#### COMMENTS:

Results refer to samples as received at the Laboratory.



Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.au

Accredited for compliance with ISO/EC 17025

Accreditation No: 12754 & 13538



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

**Sample Description:** 

Dunloe Sands Lake - Algae

Lims1 Report No: 15/0529-A **Date Testing Completed:** 26/02/2015 Date of Report:

26/02/2015

		Algal Identification	<b>Method Code</b>	Units	Count
LIMS NO. 1	15/0529-A/1				
		Mixed Algae (No Cyanophyta Detected)	В9	cells/mL	<100



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#### **FINAL CERTIFICATE OF ANALYSIS**

**Client:** 

Ramtech Pty Ltd

Address:

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NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/0529-C

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Taken By:

Client

No of Samples:

Date Taken:

25/02/2015

**Date Testing Commenced:** 

26/02/2015

**Date Received:** 

26/02/2015

**Date Testing Completed:** 

10/03/2015

Sample Description:

**Dunloe Sands Monthly Lake & DLP** 

#### Sample/Site Identification

#### Sample/Site Description

2

Lake

3

DLP 1

4

DLP<sub>3</sub>

5

DLP 5

6

DLP 6 DLP 7

#### COMMENTS:



Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunioe Sands Monthly Lake & DLP

Lims1 Report No:	15/0529-C
Date Testing Completed:	10/03/2015
Date of Report:	10/03/2015

Sample Identification:			Lake	DLP1	DLP3	DLP5	DLP6
Date Taken:			25/02/2015	25/02/2015	25/02/2015	25/02/2015	25/02/2015
Date Received:			26/02/2015	26/02/2015	26/02/2015	26/02/2015	26/02/2015
Date Testing Commenced:			26/02/2015	26/02/2015	26/02/2015	26/02/2015	26/02/2015
Test	Method	Units	15/0529-C-1	15/0529-C-2	15/0529-C-3	15/0529-C-4	15/0529-C-5
pН	P1	pH units	4.2	4.2	6.4	4.0	3.7
Conductivity	P2	μScm <sup>-1</sup>	960	110	7,478	433	951
DO (membrane electrode)	P12	mg/L	7.0	1.1	3.2	6.2	1.6
*Redox Potential	P16	mV		160	150	178	213
Turbidity	P8	NTU	85	****	****	****	ALCOHOL:
Suspended Solids	P4	mg/L	89		() 75.772	120000	****
Oil and Grease	C8	mg/L	<2	2222	- Project		****
Total Phosphorus-P	C17	mg/L	0.08			:=====:	*****
Total-N	C55	mg/L	0.60	*****	(*****	(STEERE)	*****

Sample Identification:			DLP7
Date Taken:			25/02/2015
Date Received:			26/02/2015
Date Testing Commenced:			26/02/2015
Test	Method	Units	15/0529-C-6
pН	P1	pH units	7.4
Conductivity	P2	μScm <sup>-1</sup>	3,396
DO (membrane electrode)	P12	mg/L	4.5
*Redox Potential	P16	mV	30
Turbidity	P8	NTU	••••
Suspended Solids	P4	mg/L	
Oil and Grease	C8	mg/L	
Total Phosphorus-P	C17	mg/L	
Total-N	C55	mg/L	



Tweed Laboratory Centre, 46 Enterprise Avenue, Tweed Heads South NSW 2486 Australia Phone: 07 5569 3103 Fax: 07 5524 2676 Email: samplereception@tweed.nsw.gov.au ABN: 90 178 732 496 (All correspondence: Tweed Shire Council PO Box 816 Murwillumbah NSW 2484) www.tweed.nsw.gov.au/tweedlab/

#### FINAL CERTIFICATE OF ANALYSIS

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive **MURWILLUMBAH** 

NSW 2484

Attention:

Lims1 Report No:

15/0766-A

Steve Peterson

**Client Reference:** 

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27/03/2015

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Client

No of Samples:

Date Taken:

26/03/2015

**Date Testing Commenced:** 

26/03/2015

Date Received:

26/03/2015

**Date Testing Completed:** 

27/03/2015

Sample Description:

Dunloe Sands Lake - Algae

LIMS NO.

Sample/Site No

Sample/Site Description

15/0766-A/1

1

Lake

#### **COMMENTS:**

Results refer to samples as received at the Laboratory. ND = Not Detected.



Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Sally Hinton (Senior Technical Officer - Phycology) shinton@tweed.nsw.gov.au

15/0766-A

27/03/2015

27/03/2015

Lims1 Report No:

Date of Report:

Date Testing Completed:



# **Tweed Laboratory Centre**

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Lake - Algae

		Algal Identification	<b>Method Code</b>	Units	Count
LIMS NO. 15/0766-A/1					
		No Cyanophyta Detected	В9	cells/mL	ND
		Chlorophyta	B9	cells/mL	8,750



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#### **FINAL CERTIFICATE OF ANALYSIS**

Client:

Ramtech Pty Ltd

Address:

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NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/0766-C

Page 1 of 5

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No of Samples:

14

Date Taken:

26/03/2015

**Date Testing Commenced:** 

26/03/2015

Date Received:

26/03/2015

**Date Testing Completed:** 

08/04/2015

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

Sample/Site	Sample/Site Description
Identification	
1	lako 1

1	Lake 1
2	DLP 1
3	DLP 3
4	DLP 5
5	DLP 6
6	DLP 7
7	SW 3
8	SW 4
9	SW 9
10	SW 10
11	Lake 2
12	Lake 3
13	Lake 4
14	Lake 5



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Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

Lims1 Report No: Date Testing Completed: 15/0766-C 08/04/2015

Date of Report:

08/04/2015

#### **COMMENTS:**

Results refer to samples as received at the Laboratory.



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

 Lims1 Report No:
 15/0766-C

 Date Testing Completed:
 08/04/2015

 Date of Report:
 08/04/2015

Sample Identification: Date Taken: Date Received: Date Testing Commenced: Test	Method	Units	Lake 1 26/03/2015 26/03/2015 26/03/2015 15/0766-C-1	DLP1 26/03/2015 26/03/2015 26/03/2015 15/0766-C-2	DLP3 26/03/2015 26/03/2015 26/03/2015 15/0766-C-3	DLP5 26/03/2015 26/03/2015 26/03/2015 15/0766-C-4	DLP6 26/03/2015 26/03/2015 26/03/2015 15/0766-C-5
рН	P1	pH units	4.1	4.0	6.1	4.8	4.2
Conductivity	P2	µScm⁻¹	853	409	7,542	1,066	1,600
DO (membrane electrode)	P12	mg/L	7.5	4.0	2.9	3.9	5.1
*Redox Potential	P16	m∨		+245	+195	+144	+177
Alkalinity as CaCO3	C10	mg/L	NP	NP	130	2	NP
Bicarbonate HCO3	C10	mg/L	NP	NP	128	2	NP
Turbidity	P8	NTU	34	2222	9 <b>22002</b> 0	*****	
Suspended Solids	P4	mg/L	55	*****	(****	******	20222
Oil and Grease	C8	mg/L	<2	FEEEE	1. <del>7.7.1.1.1</del>	(55555)	22722
Total Phosphorus-P	C17	mg/L	0.25	*****	100000		
Total-N	C55	mg/L	0.42	****	:: <del>****</del> :	*****	*****
Chloride	C20	mg/L	38	26	2,360	300	<3
Calcium	M8	mg/L	92	30	72	7.6	94
Magnesium	M8	mg/L	12	4.1	108	18	22
Sodium	M8	mg/L	22	14	1,200	142	19
Potassium	M8	mg/L	6	<5	46	<5	8
Sulfur as Sulfate	M8	mg/L	369	128	178	25	892
Aluminium(Total)	M16	mg/L	24.2	8.89	0.13	0.45	57.1
Arsenic (Total)	M16	mg/L	0.003	0.002	<0.001	<0.001	0.017
Iron (Total)	M16	mg/L	5.61	5.14	3.66	17.7	265
Manganese (Total)	M16	mg/L	1.03	0.351	0.681	0.130	2.31



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

Lims1 Report No:	15/0766-C
Date Testing Completed:	08/04/2015
Date of Report:	08/04/2015

Sample Identification:			DLP7	SW3	SW 4	SW 9	SW 10
Date Taken:			26/03/2015	25/03/2015	25/03/2015	25/03/2015	26/03/2015
Date Received:			26/03/2015	26/03/2015	26/03/2015	26/03/2015	26/03/2015
Date Testing Commenced:			26/03/2015	26/03/2015	26/03/2015	26/03/2015	26/03/2015
Test	Method	Units	15/0766-C-6	15/0766-C-7	15/0766-C-8	15/0766-C-9	15/0766-C-1
рН	P1	pH units	7.1	3.7	3.7	4.2	4.2
Conductivity	P2	µScm⁻¹	3,446	1,834	1,426	763	779
DO (membrane electrode)	P12	mg/L	3.1	4.8	4.7	5.2	5.6
*Redox Potential	P16	mV	+78	*****			*****
Alkalinity as CaCO3	C10	mg/L	420	*****	1	Anna .	57555
Bicarbonate HCO3	C10	mg/L	423	****	REPRESE	*****	*****
Turbidity	P8	NTU	2000	54	48	16	14
Suspended Solids	P4	mg/L		23	24	5.8	8.0
Oil and Grease	C8	mg/L		****	(SECRET	20005	
Total Phosphorus-P	C17	mg/L		0.04	0.1	0.02	0.06
Total-N	C55	mg/L	<del>2000</del>	1.32	1.15	1.04	1.08
Chloride	C20	mg/L	780	5225	*****	5200000	
Calcium	M8	mg/L	18	*****	*****	:	*****
Magnesium	M8	mg/L	38		*****	; <del>====</del> (	*****
Sodium	M8	mg/L	651	22022	RESERVE:		220.42
Potassium	M8	mg/L	26	*****	(seene		*****
Sulfur as Sulfate	M8	mg/L	250	270/06	J <del>-111,</del>	(2000)	****
Aluminium (Total)	M16	mg/L	0.51		2 <b>42202</b>	TANKAN (	100000
Arsenic (Total)	M16	mg/L	<0.001	NYANA.	(Server)		****
Iron (Total)	M16	mg/L	2.62			HEESEN	****
Manganese (Total)	M16	mg/L	0.077	22222	****	1000000	

15/0766-C

08/04/2015

08/04/2015

Lims1 Report No:

Date of Report:

Date Testing Completed:



# **Tweed Laboratory Centre**

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunioe Sands Otly Lake, SW & DLP

Sample Description:	Dunioe Sands	Qtly Lake, SW	& DLP			
Sample Identification: Date Taken: Date Received: Date Testing Commenced: Test	Method	Units	Lake 2 26/03/2015 26/03/2015 26/03/2015 15/0766-C-11	Lake 3 26/03/2015 26/03/2015 26/03/2015 15/0766-C-12	Lake 4 26/03/2015 26/03/2015 26/03/2015 15/0766-C-13	Lake 5 26/03/2015 26/03/2015 26/03/2015 15/0766-C-14
pН	P1	pH units	4.0	4.0	4.0	4.0
Conductivity	P2	µScm⁻¹	859	859	860	864
DO (membrane electrode)	P12	mg/L	7.6	7.5	7.5	7.5
*Redox Potential	P16	m∨	+280	+297	+312	+316
Alkalinity as CaCO3	C10	mg/L	5555F		( <b>*****</b> )	
Bicarbonate HCO <sub>3</sub>	C10	mg/L	10111			
Turbidity	P8	NTU				
Suspended Solids	P4	mg/L	=15575			
Oil and Grease	C8	mg/L		45000	****	*****
Total Phosphorus-P	C17	mg/L		CHARAC.	Service:	
Total-N	C55	mg/L	<del>nnes</del>		::	
Chloride	C20	mg/L	W442	( <del></del>	-	
Calcium	M8	mg/L	****	RHARAN	*****	****
Magnesium	M8	mg/L	#####	( <del>ocone</del> :	lessons)	*****
Sodium	M8	mg/L		· · · · · ·		30007
Potassium	M8	mg/L	24424	(Caraba)	(MANUAL)	
Sulfur as Sulfate	M8	mg/L	50005	Same.	/ <del>*****</del> 5	*****
Aluminium(Total)	M16	mg/L				*****
Arsenic (Total)	M16	mg/L	*****	(*****	: HANNET	2222
Iron (Total)	M16	mg/L		( <del>enone</del> )	STRONGS	=nan-
Manganese (Total)	M16	mg/L			2002	



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#### **FINAL CERTIFICATE OF ANALYSIS**

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/0989-A

Page 1 of 2

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Date Taken:

24/04/2015

Fax: 02 6672 3896 & Adam Smith

**Date Testing Commenced:** 

24/04/2015

Date Received:

24/04/2015

**Date Testing Completed:** 

27/04/2015

Sample Description:

Dunloe Sands Lake - Algae

LIMS NO.

Sample/Site No

Sample/Site Description

15/0989-A/1

1

Lake

#### COMMENTS:

Results refer to samples as received at the Laboratory. ND = Not Detected.



Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Lake - Algae

Lims1 Report No:	15/0989-A
Date Testing Completed:	27/04/2015
Date of Report:	27/04/2015

		Algal Identification	<b>Method Code</b>	Units	Count
LIMS NO.	15/0989-A/1				
		Total Cyanophyta	B9	cells/mL	ND
		Total Cyanophyta Biovolume	B20	rm³/L	ND
		Chlorophyta	B9	cells/mL	8000



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NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/0989-C

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No of Samples:

10

Date Taken:

24/04/2015

**Date Testing Commenced:** 

24/04/2015

Date Received:

24/04/2105

**Date Testing Completed:** 

08/05/2015

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

SW 9

SW 10

# Sample/Site Identification

#### Sample/Site Description

,	u	C	•	•	 •	·	a	v	•	•	

1	Lake
2	DLP 1
3	DLP 3
4	DLP 5
5	DLP 6
6	DLP 7
7	SW 3
8	SW 4

#### **COMMENTS:**

9

10

NATA
TECHNICAL
COMPETENCE

Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Paul J Wright (Laboratory Coordinator) paulw@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

MURWILLUMBAH NSW 2484

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Qtly Lake, SW & DLP

 Lims1 Report No:
 15/0989-C

 Date Testing Completed:
 08/05/2015

 Date of Report:
 08/05/2015

Date of Keport.	00/03/2013

			T		T		
Sample Identification:			Lake	DLP1	DLP3	DLP5	DLP6
Date Taken:			24/04/2015	24/04/2015	24/04/2015	24/04/2015	24/04/2015
Date Received:			24/04/2015	24/04/2015	24/04/2015	24/04/2015	24/04/2015
Date Testing Commenced:			24/04/2015	24/04/2015	24/04/2015	24/04/2015	24/04/2015
Test	Method	Units	15/0989-C-1	15/0989-C-2	15/0989-C-3	15/0989-C-4	15/0989-C-5
pН	P1	pH units	4.3	4.1	6.6	3.7	4.0
Conductivity	P2	μScm <sup>-1</sup>	963	131	7,540	963	1,558
DO (membrane electrode)	P12	mg/L	8.5	2.7	4.8	4.8	2.5
*Redox Potential	P16	mV		+253	+246	+257	+226
Turbidity	P8	NTU	59	****	(HALLE)		20222
Suspended Solids	P4	mg/L	95		Same.	Saterne:	
Oil and Grease	C8	mg/L	<2				****
Total Phosphorus-P	C17	mg/L	0.1	*****		****	2222
Total-N	C55	mg/L	0.73	*****			****

Sample Identification:			DLP7	SW3	SW 4	SW9	SW 10
Date Taken:			24/04/2015	24/04/2015	24/04/2015	24/04/2015	24/04/2015
Date Received:			24/04/2015	24/04/2015	24/04/2015	24/04/2015	24/04/2015
Date Testing Commenced:			24/04/2015	24/04/2015	24/04/2015	24/04/2015	24/04/2015
Test	Method	Units	15/0989-C-6	15/0989-C-7	15/0989-C-8	15/0989-C-9	15/0989-C-10
pН	М	pH units	7.5	6.5	6.4	6.2	6.2
Conductivity	P2	μScm <sup>-1</sup>	3,438	12,467	12,416	4,344	4,381
DO (membrane electrode)	P12	mg/L	5.5	7.2	7.4	6.8	6.5
*Redox Potential	P16	mV	+53		(#####)	(44444)	20000
Turbidity	P8	NTU	(1896)413	7.8	22	29	25
Suspended Solids	P4	mg/L	55555	4.0	18	14	15
Oil and Grease	C8	mg/L	****			544444	(1997)
Total Phosphorus-P	C17	mg/L		0.15	0.02	0.03	0.03
Total-N	C55	mg/L	44444	0.46	0.45	0.86	0.87



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#### FINAL CERTIFICATE OF ANALYSIS

Client: Ramtech Pty Ltd

Address: 30-32 Lundberg Drive

MURWILLUMBAH

NSW 2484

Lims1 Report No: 15/1271-A

Attention: Steve Peterson Client Reference: PLUS HARD

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 Date Taken:
 29/05/2015
 Date Testing Commenced:
 29/05/2015

 Date Received:
 29/05/2015
 Date Testing Completed:
 29/05/2015

Sample Description: Dunloe Sands Lake Algae

LIMS NO. Sample/Site No Sample/Site Description

15/1271-A/1 1 Lake

#### **COMMENTS:**

Results refer to samples as received at the Laboratory, ND = Not Detected.

NATA
TECHNICAL

SHith

Dr Sally Hinton (Senior Technical Officer - Phycology) shinton@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

Sample Description:

Dunioe Sands Lake Algae

Lims1 Report No:	15/1271-A
Date Testing Completed:	29/05/2015
Date of Report:	29/05/2015

		Algal Identification	Method Code	Units	Count
LIMS NO.	15/1271-A/1				
		No Cyanophyta Detected	B9	cells/mL	ND
		Chlorophyta	B9	cells/mL	76,000
		Diatoms (Bacillariophyta)	B9	cells/mL	4,200



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#### FINAL CERTIFICATE OF ANALYSIS

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/1271-C

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Taken By:

Client

No of Samples:

6

Date Taken:

28/05/2015

**Date Testing Commenced:** 

29/05/2015

Date Received:

29/05/2015

**Date Testing Completed:** 

17/06/2015

Sample Description:

Dunloe Sands DLP & Lake Water Samples - Chemical

Sample/Site Sample/Site Description Identification

ion	
1	DLP 1
2	DLP 3
3	DLP 5
4	DLP 6
5	DLP 7
6	Lake

#### COMMENTS:

Results refer to samples as received at the Laboratory.



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Accreditation No: 12754 & 13538

Darryl Capiler (Senior Technical Office

(Senior Technical Officer – Chemistry) dcapner@tweed.nsw.gov.au



Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive

 ${\it MURWILLUMBAH}$ 

NSW 2484 Attention: Steve Peterson

Sample Description:

Dunloe Sands DLP & Lake Water Samples - Chemical

 Lims1 Report No:
 15/1271-C

 Date Testing Completed:
 17/06/2015

 Date of Report:
 17/06/2015

Sample Identification:			DLP1	DLP3	DLP5	DLP6	DLP7
Date Taken:			28/05/2015	28/05/2015	28/05/2015	28/05/2015	28/05/2015
Date Received:			29/05/2015	29/05/2015	29/05/2015	29/05/2015	29/05/2015
Date Testing Commenced:			29/05/2015	29/05/2015	29/05/2015	29/05/2015	29/05/2015
Test	Method	Units	15/1271-C-1	15/1271-C-2	15/1271-C-3	15/1271-C-4	15/1271-C-5
pН	P1	pH units	3.8	6.5	3.8	3.9	7.5
Conductivity	P2	μScm <sup>-1</sup>	164	7,483	611	2,153	3,417
DO (membrane electrode)	P12	mg/L	2.0	5.2	2.5	5.3	6.0
*Redox Potential	P16	m∨	+256	+182	+325	+279	+161
Turbidity	P8	NTU	****	****	*****	7 <b>02000</b>	2222
Suspended Solids	P4	mg/L	100000			34444	*****
Oil and Grease	C8	mg/L			22.52		2222
Total-N	C55	mg/L	*****	****	****		*****
Total Phosphorus-P	C17	mg/L	355000	*****	FERSE.		*****

Sample Identification:			Lake
Date Taken:			28/05/2015
Date Received:			29/05/2015
Date Testing Commenced:			29/05/2015
Test	Method	Units	15/1271-C-6
pН	P1	pH units	4.4
Conductivity	P2	μScm <sup>-1</sup>	927
DO (membrane electrode)	P12	mg/L	9.0
*Redox Potential	P16	m∨	*****
Turbidity	P8	NTU	52
Suspended Solids	P4	mg/L	85
Oil and Grease	C8	mg/L	<2
Total-N	C55	mg/L	0.44
Total Phosphorus-P	C17	mg/L	0.22



Tweed Laboratory Centre, 46 Enterprise Avenue, Tweed Heads South NSW 2486 Australia Phone: 07 5569 3103 Fax: 07 5524 2676 Email: samplereception@tweed.nsw.gov.au ABN: 90 178 732 496 (All correspondence: Tweed Shire Council PO Box 816 Murwillumbah NSW 2484) www.tweed.nsw.gov.au/tweedlab/

#### FINAL CERTIFICATE OF ANALYSIS

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive **MURWILLUMBAH** 

NSW 2484

Attention:

Steve Peterson

Lims1 Report No:

15/1484-A

Page 1 of 2

Client Reference:

PLUS HARD

COPY

Copy To:

Date of Report:

01/07/2015

All pages of this Report have been checked and approved. This document may not be reproduced except in full.

Taken By:

Client

No of Samples:

**Date Taken:** 

29/06/2015

Fax: 02 6672 3896 & Adam Smith

**Date Testing Commenced:** 

29/06/2015

**Date Received:** 

29/06/2015

**Date Testing Completed:** 

01/07/2015

Sample Description:

Dunloe Sands Lake - Algae

LIMS NO.

Sample/Site No

Sample/Site Description

15/1484-A/1

1

Lake

#### **COMMENTS:**

Results refer to samples as received at the Laboratory.

ND = Not Detected.



Dr Sally Hinton (Senior Technical Officer - Phycology) shinton@tweed.nsw.gov.au

Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

15/1484-A

01/07/2015

01/07/2015

Lims1 Report No:

Date of Report:

Date Testing Completed:



# **Tweed Laboratory Centre**

Client:

Ramtech Pty Ltd

Address:

30-32 Lundberg Drive MURWILLUMBAH

Attention:

Steve Peterson

Sample Description:

Dunloe Sands Lake - Algae

		Algal Identification	Method Code	Units	Count
LIMS NO.	15/1484-A/1				
		No Cyanophyta Detected	В9	cells/mL	ND
		Chlorophyta	В9	cells/mL	211,000
		Diatoms (Bacillariophyta)	В9	cells/mL	6,300



# **Appendix D Regeneration Sheets**



19/1)16



Rehabilitation & Revegetation Management Plan Dunloe Park Sand Quarry Ramtech Pty Ltd

Area A - stage

	71 31 5	
	WARTERLY REHABILITATION M	
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?  No.	rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species - 5 - 7
Is there evidence of rubbish dumping within the rehabilitation zones?  Is there evidence of plant theft within the rehabilitation zone?  **No.**	What species?	What are the dominant species within each layer?  - Tree Casnarina glanca,  Melalenca guingmum,  - Shrub bankins  - ground covers rushes, Salges
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?  If yes, acknowledge below what works were undertaken to rectify/restore and the date	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph  Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala // ② Kangaroo/wallaby // ② Possums/gliders // ② Small mammal (i.e. bandicoot, echidna) // ② Reptiles (i.e.snakes/lizards) // ② Birds of prey // ② Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) // ② Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) // ③ Glossy Black Cockatoos // ② Other // ②	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair Poor (need replacement)	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?

# Rehabilitation & Revegetation Management Plan Dunloe Park Sand Quarry Ramtech Pty Ltd

PROFORMA FOR ASSESSING SITE CONDITION

PROJECT DESCRIPTION Note: where options are given, put an 'X' next to the appropriate term(s):

Overall (	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAI	Has the	Overall	Current	Type of	Site name	Project name:
ondition	major s, likely	S 24	rtain	n track target	one	LED DE	condition	Overall comments on site condition:	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	le:	name:
Score (r.					Area (ha)	SCRIP	of the si	s on site	nt condu	ds: Assist	0,	J.
anges fro (70% x 1)					% of site	TION O	te chang	condition	cted by:	ed Natura	Junta.	unloe
m 0-100% + (20% x					Locatio affectir	FSITE	ed since		Ton	ıl Regene	Sand	Park
6) Multipl 0.5) + (1C					Location and factors affecting outcomes	CONDI	last asses	refet	Tomy Radios	ration	9 6	Park Sound
y percent % x 0) = 8					tors	TION C	sment? Y	at .	101	•	Quan	J F
age of sit					8 &	omplete	ES or	5			١	miec )
te occupiec					Canopy cover (%)	table qua	₹0 <i>If</i>	reagetation shows postive growth			Area	
by each					Ground cover	terly, or	Yes, brief	Pa			1A	9
zone (A, I					cover	if conditi	ly descrit	vitise	D;		- SF	
3 or C), by					Problem weeds	ons have	e change		Date of current assessment:	Years since site commenced:	tage 1	
the cond					weeds	change	in this b	~	rent asse	site com		
ition ratii					Tree surviva Recruitment	since la	ox, and pr	2	ssment:	menced:	8	
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$					survival or iitment	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or NO If Yes, briefly describe changes in this box, and provide details in table below.	CST.	19/1			
zone (A =					Other o	nent. Als	ils in tabl	26/13	16	When w	Site ID:	Project ID:
1; $B = 0.5$					Other comments	o draw n	e below.	establishment of hative species.		When was this site last assessed?	\ <sub>1</sub>	Ë
; C = 0),	(describe)	(describe)		(should	Sugges	ар.		0		e last asse		1
	ibe)	be)		l be routir	Suggested maintenance			50		essed?		
				ıe: descri	enance:			hive				
				(should be routine: describe if necessary)				Spe.				
				issary)				sec.				

19/1/16



Rehabilitation & Revegetation Management Plan Dunloe Park Sand Quarry Ramtech Pty Ltd

Area IA - Stage 2

	111 =101 F	
	QUARTERLY REHABILITATION M	
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?  AID	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 6-8 m - Shrub species <u>i-2</u> - ground covers <u>4/m</u>
Is there evidence of rubbish dumping within the rehabilitation zones?  Is there evidence of plant theft within the rehabilitation zone?  Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person	What species? Setama  What management was undertaken to eradicate these weeds? Spot spraying  If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation	What are the dominant species within each layer?  - Tree Casuaring glanca, melalenca - Shrub Kanksia,  - ground covers Sedges, rushus a grass species  Have you noticed any new native plant species since the last monthly inspection?
If yes, acknowledge below what works were undertaken to rectify/restore and the date	management plan	If yes name the species or take a photograph  Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala WO Kangaroo/wallaby NO Possums/gliders NO Small mammal (i.e. bandicoot, echidna)  Reptiles (i.e.snakes/lizards) NO Birds of prey Oserhead Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) NO Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) fairy Glossy Black Cockatoos	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair Poor (need replacement)	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?



PROFORMA FOR ASSESSING SITE CONDITION

PROJECT DESCRIPTION Note: where options are given, put an 'X' next to the appropriate term(s):

-							_		-				-
Constitution Court (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997)	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or 1907 If Yes, briefly describe changes in this box, and	Overall comments on site condition:	Current assessment conducted by: 10mg Radio	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:	
					Area (ha)	SCRIP	n of the s	is on site	ent condi	nds: Assisi	D	D D	
,					% of site	TION C	ite chang	conditio	ucted by:	ted Natur	alse	100	
					Locatio affectir	)F SITE	ed since	revegetation	202	al Regene	halse Sanl	un se "Sand	2112
					Location and factors affecting outcomes	CONDI	last asses	getat	L Rad	ration			
					tors nes	TION C	sment? Y	0)	tes	(	05 8 77	Project	
					ເດ	omplete	ES or				Area		
					Canopy cover (%)	table qua	¥0	shows positive			ea //		
					Groun	arterly, oi	f Yes, brie	Po			1		
:					Ground cover	rif condi	fly descr	1. 1. 2.	Ļ		Stage	•	
					Probler	ions hav	ibe chang	Į.	Date of current assessment:	ears sinc	N-2	<b>.</b>	
-					Problem weeds	e change	es in this	giouth	rrent ass	E site con			
					Tree survival	ed since	box, and	7	essment:	Years since site commenced:			
•					Tree survival or Recruitment	last asse	provide details in table below.	4	19				
		-			Oth	ssment.	etails in t	esta	116	Whe	Site ID:	Proje	
1.0					Other comments	Also dra	able belo	blish		n was thi	₽	Project ID:	
0 5. 0 -	(0	(d.		(SI		w тар.	w.	Men		s site last	)	)	
9	(describe)	(describe)		(should be routine: describe if necessary)	Suggested maintenance			establishment of native specie		wnen was this site last assessed:			
				outine: d	naintenaı			Ma		"			
				escribe if	nce			JAN.					
				necessan				Spec					
				ح ا				70					





Area IA - stage 3

	17 Sloige 3100		
FORM A: ROUTINE C	QUARTERLY REHABILITATION M Weeds	ONITORING SHEET  Vegetation regeneration	
Has there been a fire within the last quarter?	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 6-8 m	
pasture areas require slashing or maintenance to reduce fire risk? NO	What species? Scharia	- Shrub species 1-2 m - ground covers 4/10  What are the dominant species within	
Is there evidence of rubbish dumping within the rehabilitation zones?	What management was undertaken to eradicate these	- Tree Casuanna glataca,  Melaleuca quin - Shrub Banksia, Cheese tiec Canopy sp. regrowth - ground covers grass species	
Is there evidence of plant theft within the rehabilitation zone?	weeds? Spot - spraying  If management was undertaken	- ground covers grouse speces  R Sedges  Have you noticed any new native	, mshes
zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	acknowledge that such was performed in accordance with the approved rehabilitation management plan.	plant species since the last monthly inspection?  If yes name the species or take a photograph	
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones	
Have you spotted native fauna within the rehabilitation zone during inspection?	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?/\sqrt{0}  Extent of other Weeds?/\sqrt{0}	
Koala No Kangaroo/wallaby NO Possums/gliders NO Small mammal (i.e. bandicoot, echidna)	What actions were undertaken to remove any illegal modifications?	Survival Rate of Plants?	
Reptiles (i.e.snakes/lizards)   Birds of prey   Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos)   Small tree and ground birds (i.e. finches, fairy wrens, treecreepers)   Glossy Black Cockatoos   Other   Other	Condition of fences  - Good  - Need minor repair  - Poor (need replacement)	If yes, what corrective action was performed (i.e. plant showed drought stress and so watering was undertaken, plant was dead so a replacement plant was pocket planted, canopy plant coverage was not achieved so relevant pioneer plants were pocket planted).	

# Rehabilitation & Revegetation Management Plan Dunloe Park Sand Quarry Ramtech Pty Ltd

PROFORMA FOR ASSESSING SITE CONDITION

PROJECT DESCRIPTION Note: where options are given, put an 'X' next to the appropriate term(s):

Overall Condition	C = Poor major problems, likely to fail	B = Uncertain significant problems	A = OK on track towards target	Rating/ zone	DETAILED D	Has the condition	Overall comments on site condition: 人といそ	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
n Score ( ducts: e.g.				Area (ha)	ESCRIF	on of the	its on site	ent cond	nds: Assis		( <sub>2</sub> )
ranges fro				% of site	O NOIT	site chang	condition	ucted by:	ted Natura	Dwale	unloe
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$				Location and factors affecting outcomes	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since	Has the condition of the site changed since last assessment? YES or NO If Yes, briefly describe changes in this box, and	revegetation Shows a Possitive	Tomy Rodos	al Regeneration	ce Sand Quar	Park Sand
of site occupied				Canopy cover (%)	ete table quan	. or NO If )	· Fag		(	L. As	Project
by each zone (A,				Ground cover	terly, or if condi	íes, briefly desci	St. ve			A	
, B or C), by the con				Problem weeds	tions have change	ibe changes in this l	growth	Date of current assessment:	rears since site commenced	Stage 3	
dition rating for each				Tree survival or Recruitment			+ establish	essment:	imenced:		
zone $(A = 1; B = 0.5;$				Other comments	last assessment. Also draw map	provide details in table below.	Joe trans	16	when was this site last assessed?	Sife ID:	Project ID:
C = 0), %	(describe)	(describe)	(should be routine: describe if necessary)	Suggested maintenance	. de		stablishment of native species.		last assessed?		,



Rehabilitation & Revegetation Management Plan Dunloe Park Sand Quarry Ramtech Pty Ltd

Area 18 - Stage 1

FORM A. BOUTING OHARTERI V REHABILITATION MONITORING OHEET										
FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET										
General Management	Weeds	Vegetation regeneration								
Has there been a fire within the last quarter? $N^{0}$ Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? $N^{0}$	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 6-2 \( \times \) - Shrub species 1-2 \( \times \) - ground covers 4/\( \times \)								
Is there evidence of rubbish dumping within the rehabilitation zones?  Is there evidence of plant theft within the rehabilitation zone?  **No**  **No*	What species? 1 x Camphor Lamrel Supling  What management was undertaken to eradicate these weeds? pulled out	What are the dominant species within each layer?  - Tree Casaaring, She sak, Cucalypting melalisanca anim - Shrub canopy regrowth + tuckurab - ground covers sedges, ruskes, grass sp. bracken								
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?  Alo  If yes, acknowledge below what works were undertaken to rectify/restore and the date	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph   Acknowledge that the required routine photographs have been taken within the rehabilitation zones								
Biodiversity  Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds? / Camphor Lower Extent of other Weeds? / Camphor Lower Extent of Plants? / Condition of Plants? / Canopy Coverage? / Canopy Coverage / Canopy Coverag								

Overall Condition and add the produ	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DE	Has the condition	Overall comments on site condition:	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
Score (r					Area (ha)	SCRIP	of the s	s on site	nt condu	ds: Assist	Dunlos	Dunhe
anges fro					% of site	TION C	ite chang	condition	ıcted by:	ed Natur	-31	
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$					Location and factors affecting outcomes	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since	Has the condition of the site changed since last assessment? YES or 1902 If Yes, briefly describe changes in this box, and	- 10	torny Rades	al Regeneration	Sand Querry - Hea	Park Sand Project
of site occupied					Canopy cover (%)	ete table quar	or NO) If	onstrate			18 -	
by each zone (¿					Ground cover	terly, or if conc	res, briefly desc	s posi		O	Stage 1	
, B or C), by the con					Problem weeds	itions have change	ribe changes in this l	tive grace	Date of current assessment:	Years since site commenced: $\oint$		
dition rating for each					Tree survival or Recruitment	d since last assess	box, and provide deta	-8	essment:   <i>a</i>   )	ımenced:		
zone $(A = 1; B = 0.5;$					Other comments	last assessment. Also draw map	provide details in table below.	tablishment	16	When was this site last assessed?	Site ID:	Project ID:
C = 0), %	(describe)	(describe)		(should be routine: describe if necessary)	Suggested maintenance	jp.		establishment of native species.		last assessed?		



Area 1B - Stage 2

FORM A: ROUTINE C	QUARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  No  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?  NO	established within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species <u>6 - 8 m</u> - Shrub species <u>7 - 2 m</u> - ground covers <u>&lt; 1 m</u>
Is there evidence of rubbish dumping within the rehabilitation zones? $NO$ Is there evidence of plant theft within the rehabilitation zone? $NO$	What species? What management was undertaken to eradicate these weeds? What management was undertaken to eradicate the weeks? What management was undertaken the weeks? What management was undertaken to eradicate the weeks? What management was undertaken to eradicate the weeks? What management was undertaken to eradicate the weeks white was undertaken to eradicate the weeks white was undertaken to eradicate the was unde	What are the dominant species within each layer?  - Tree glanca, she -oak, encally so Melaleusa que - Shrub tuckenso, banks. or - ground covers brucken
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph  No.
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair Poor (need replacement)	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?

Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or 😡 If Yes, briefly describe changes in this box, and provide details in table below	Overall comments on site condition:	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
n Score (I					Area (ha)	ESCRIF	n of the s	ts on site	ent condi	nds: Assis	Dunloe	Du
ranges fro					% of site	TION C	site chang	condition	ucted by:	ted Natur	se S	Dualoe's Sand
om 0-1009 ) + (20% x					Locatio affectin	)F SITE	ed since	etatic	Ja.	al Regene	Sand	Sand
6) Multipl 0.5) + (10					Location and factors affecting outcomes	CONDI	last asses	1 0	Jamy Rodos	ration	Quarry	Project
y percenta; % x 0) = 80%					tors	TION Cor	sment? YES	repetation shows positive growth a establi	Mos	, (	7	8
ge of site c %					Canopy cover (%)	mplete tab	· or NO	s po			hea	
ccupied t				_	ру г (%)	ile quarte	If Y	svit s			B	
by each zo					Ground cover	erly, or if	es, briefly	9			18 - Stage	
ne (A, B						conditio	describe	Jour 1	Dat	Yea		
or C), by t					Problem weeds	ıs have c	changes i	7	Date of current assessment:	Years since site commenced:		
he condit						hanged	n this bo	6	nt assess	te comm		
ion rating					Tree survival or Recruitment	since las	ς, and pro	tabl:	ment:	enced:		
for each					val or nt	t assessi	vide deta	shme	1/1/30!			
zone (A =					Other o	nent. Als	ils in tabl	7	9	When w	Site ID:	Project ID:
1; B = 0.5					Other comments	o draw n	e below.	lishment of native species.		When was this site last assessed?		₽
i; $C=0$ ),	(describe)	(describe)		(shoul	Sugges	ар.		nati		e last ass	ĺ	1
   	ribe)	ibe)		(should be routine: describe if necessary)	Suggested maintenance			8		essed?		
				ine: descr	ntenance			per				
				ibe if nec				, S.				
				essary)								

19/1/16

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Rehabilitation & Revegetation Management Plan Dunloe Park Sand Quarry Ramtech Pty Ltd

Area 18 - stage 3

	QUARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
General Management	vveeus	vegetation regeneration
Has there been a fire within the last quarter?  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?	established within the rehabilitation zones during the last quarter? MIDOC QTASS	Natural regeneration is occurring in (record height range estimate):  - Tree species
Is there evidence of rubbish dumping within the rehabilitation zones?	What species? <u>Setane</u> What management was undertaken to eradicate these	What are the dominant species within each layer?  - Tree glance, she-pak,
Is there evidence of plant theft within the rehabilitation zone?	weeds? Spot - sprny	- ground covers brucken,
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph  NA.
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala No Kangaroo/wallaby No Small mammal (i.e. bandicoot, echidna)  Reptiles (i.e.snakes/lizards) No Birds of prey No Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) No Small tree and ground birds (i.e.	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?
finches, fairy wrens, treecreepers) weeks Glossy Black Cockatoos NO	Poor (need replacement)	replacement plant was pocket planted, canopy plant coverage was not achieved so relevant pioneer plants were pocket planted).

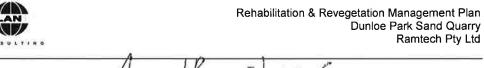
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or 🔞 If Yes, briefly describe changes in this box, and	Overall comments on site condition:  Reserved	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
Score (r.					Area (ha)	SCRIP	of the si	s on site	nt condu	ds: Assist		٦
anges fro (70% x 1)					% of site	TION O	te chang	condition	cted by:	ed Natura	Juntos	)unloc
m 0-1009 + (20% x					Locatio affectin	FSITE	ed since	father	102/	ıl Regenei	e Sand	Par
6) Multipl 0.5) + (10					Location and factors affecting outcomes	CONDI	ast asses	) (	Torry Kados	ation		k Sa
y percent % x 0) = 8					tors	TION C	sment? YI	Mary	ados		anny	ond
age of sit 0%					ខ ជ	omplete	ES or (	7			Y N	Pace
e occupie					Canopy cover (%)	table qua	150 If	Conesestation Show Positive growth			7	-
d by each					Groun	rterly, or	Yes, brie	ځ			× -	
zone (A,					Ground cover	if condit	fly descri	Q 3	0		Stage	
B or C), b					Problem weeds	ions hav	be change	7	Date of current assessment	rears since sine commenced:	W	
y the con					weeds	change	s in this I	*	rrent asse	s site con		
dition rat					Tree survival or Recruitment	d since I	ox, and p	5	essment:	imenced		
ing for eac					vival or nent	ast asses	provide details in table below.	ablishment of native species	19			
th zone (A					Other	sment. /	tails in ta	nen	1116	wnen	Site ID:	Project ID:
= 1; B = C					Other comments	lso draw	ble below	0	7	when was this site last assessed:	;; ;;	<u>.</u>
.5; C = 0)	(des	(des		(sho	-	тар.		2		site last a		
%	(describe)	(describe)		uld be rou	Suggested maintenance			3		ssessed?	;	
*				ıtine: des	intenanc			7				
				(should be routine: describe if necessary)	Ō			Ecie				
				ecessary)								



Area 1B - Stage 4

FORM A: ROUTINE C	QUARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 6-18 M - Shrub species 2-3 M - ground covers 4 / M
Is there evidence of rubbish dumping within the rehabilitation zones?	What species? Coastal morning glary  What management was undertaken to eradicate these weeds? cut t Sprayed	What are the dominant species within each layer?  - Tree 4/auca, Melaleuca, encarget sp Shrub Banksias + fuckerod - ground covers grass species
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection? $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  - Good  - Need minor repair  - Poor (need replacement)	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?

Project name: Dunloe Palk Sand Project		Project ID:	
Send Or		Site ID:	
ll Regeneration	commenced:	When was this site last assessed?	ast assessed?
6			
Current assessment conducted by: Tom Rodos Date of current assessment:	assessment: $ a $	716	
	11	101-1	
Power tation demonstrated positive grow	growth	+ establish	establishment of notice
	C	Species	12
Has the condition of the site changed since last assessment? YES or NO2 If Yes, briefly describe changes in this box, and provide details in table below.	his box, and provide deta	ils in table below.	
DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	nged since last assessı	nent. Also draw ma <sub>l</sub>	2.
Rating/ zone Area % of Location and factors Canopy (ha) site affecting outcomes cover (%) Ground cover Problem weeds	ds Recruitment	Other comments	Suggested maintenance
A = OK on track towards target			(should be routine: describe if necessary)
B = Uncertain			
significant problems			(describe)
C = Poor major problems, likely to fail			(describe)
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone ( $A$ , $B$ or $C$ ), by the condition rating for each zone ( $A$ = 1; $B$ = 0.5; $C$ = 0), and add the products: e.g. ( $70\% \times 1$ ) + ( $20\% \times 0.5$ ) + ( $10\% \times 0$ ) = $80\%$	condition rating for each	zone $(A = 1; B = 0.5; C$	C = 0), %



Area 1B, stage 5

FORM A: ROUTINE C	QUARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter? $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 6 - 8 - Shrub species 2 - 3 - 5 - ground covers 4 - 6
Is there evidence of rubbish dumping within the rehabilitation zones?  Is there evidence of plant theft within the rehabilitation zone?	What species? Stand  What management was undertaken to eradicate these weeds? Spot-spraying	What are the dominant species within each layer?  - Treeglanca + melalence!  - ShrubBanksh.  - ground coverssedges, lamadr.  grasses
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?
Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) $\Lambda_{II}$ Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) $NO$ Glossy Black Cockatoos $NO$ Other Phesent Cancol	Condition of fences  - Good  - Need minor repair  - Poor (need replacement)	performed (i.e. plant showed drought stress and so watering was undertaken, plant was dead so a replacement plant was pocket planted, canopy plant coverage was not achieved so relevant pioneer plants were pocket planted).



Project name:	)unlee	e Park Sound		Profes	, ·		Project ID:	
Site name:	) is 5 00	Sand Quarry	Trea	18 -5	Stage S		Site ID:	
Type of on-grounds: Assisted Natural Regeneration	isted Natu	- 1			Year's since site commenced:	menced:	When was this site last assessed?	last assessed?
Current assessment conducted by:	ducted by	: Torra Radios			Date of current assessment:	ssment:   d /	11)6	
Overall comments on site condition:	te conditio		\	>	. />	-	1 1	
	*	Reverse fation	Kemor	demonstrates positive	65 the	growth	* establis	+ establishman of native
Has the condition of the	site chan	Has the condition of the site changed since last assessment? YES or Ю If Yes, briefly describe changes in this box, and provide details in table below.	or Mos If Y	es, briefly descr	ibe changes in this b	ox, and provide deta	ils in table below.	
DETAILED DESCR	IPTION (	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	ete table quart	erly, or if cond	tions have change	d since last assess	ment. Also draw ma	9
Rating/ zone (ha)	% of site	Location and factors affecting outcomes	Canopy cover (%)	Ground cover	Problem weeds	Tree survival or Recruitment	Other comments	Suggested maintenance
A = OK on track towards target								(should be routine: describe if necessary)
B = Uncertain								
significant problems								(describe)
C = Poor major problems, likely to fail								(describe)
Overall Condition Score and add the products: e	(ranges fr	Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone ( $A$ , $B$ or $C$ ), by the condition rating for each zone ( $A$ = 1; $B$ = 0.5; $C$ = 0), and add the products: e.g. ( $70\% \times 1$ ) + ( $20\% \times 0.5$ ) + ( $10\% \times 0$ ) = $80\%$	f site occupied	by each zone (A	, B or C), by the cond	lition rating for each	zone $(A = 1; B = 0.5;$	C = 0), %



Area | c - stage 1

	QUARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?	established within the rehabilitation zones during the	Natural regeneration is occurring in (record height range estimate):
Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? No	last quarter?No	- Tree species 5 - 7 m - Shrub species 2 - 4 m - ground covers 450 cm
Is there evidence of rubbish dumping within the rehabilitation	What species?	What are the dominant species within each layer?
zones?	What management was undertaken to eradicate these	- Tree <u>Casuarina gla</u> uca - Shrub <u>Banksia</u>
Is there evidence of plant theft within the rehabilitation zone?	weeds? <i>N/fl</i>	- ground covers salt marsh,
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Biodiversity	Modifications	Are any of the following performance criteria exceeded (refer Section 4.5
Have you spotted native fauna within		below)?
the rehabilitation zone during inspection?	buildings) to the rehabilitation zones since the last visit?	Declared Weeds?
If yes, what types?	No	Extent of other Weeds? Survival Rate of Plants? Condition of Plants?
KoalaKoalaKoala		Canopy Coverage?
Possums/gliders <u>No</u>	What actions were undertaken to	Diversity? Groundcover Coverage?
Small mammal (i.e. bandicoot, echidna)	remove any illegal modifications?	General Coverage/Success? 100
Reptiles (i.e.snakes/lizards) was drogged Birds of prey NO Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) NO Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) was Glossy Black Cockatoos NO. Other NO.	Condition of fences - Good - Need minor repair - Poor (need replacement)	If yes, what corrective action was performed (i.e. plant showed drought stress and so watering was undertaken, plant was dead so a replacement plant was pocket planted, canopy plant coverage was not achieved so relevant pioneer plants were pocket planted).

Overa and aa	C = Po proble to fail	significant problems	B = Un	A = OH toward	Rating	DET/	Has th	Overa	Curre	Type		Site name:	Projec
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$	C = Poor major problems, likely to fail	cant ms	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES of No If Yes, briefly describe changes in this box, and	Overall comments on site condition: $S_1$	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration		ame:	Project name:
ו Score (ה ucts: e.g.					Area (ha)	SCRIP	n of the si	s on site	ent condu	ıd <b>s:</b> Assist	- LANCE	3	$\supset$
anges fro (70% x 1)					% of site	TION O	ite change	condition	cted by:	ed Natura		lack	200
m 0-100% + (20% x 0					Location affecting	F SITE	ed since la	Site		l Regener		500	porte
) Multiply ).5) + (10%					Location and factors affecting outcomes	CONDIT	ast assess	der	Tomy Kades	ation	- 1	20	
/ percenta // x 0) = 80					ors es	ION Co	ment? YES	demonstrates a positive	ades			Querra	Sand
ge of site %					Canopy cover (	mplete ta	Or/No	Stracke					Porce
occupied					Canopy cover (%)	ble quari	ð If Y	\$				Nen	4
by each z					Ground cover	erly, or if	es, brieft	7			(	71	
one (A, B						conditio	y describe	intise	Dat		Yea	٠. ا	
or C), by					Problem weeds	ns have (	changes		Date of current assessment:	2	Years since site commenced:	Max )	
the condi					-	changed	in this bo	Increas	ent assess		ite comm		
tion rating					Tree survival or Recruitment	since las		<b>%</b>	ment:		enced:		
for each					val or	t assessi	provide details in table below.	~ ·	19/1)				
zone (A =					Other c	ment. Als	ils in tabl		16		When w	Site ID:	Project ID:
1; B = 0.5					Other comments	o draw m	below.	native specie			When was this site last assessed?		
; C = 0),	(describe)	(describe)		(should	Sugges	ар.		. v			e last asse	,	
%	ibe)	be)		be routin	Suggested maintenance			Pac			ssed?		
				ıe: descrit	:enance			26/3					
				(should be routine: describe if necessary)				and go					
				ssary)				4 5					



Area 1 C - stage 2

	QUARTERLY REHABILITATION M	ONITODING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter? NO  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? NO	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 6 8 6 6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7
Is there evidence of rubbish dumping within the rehabilitation zones?	What species?	What are the dominant species within each layer?  - Tree
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?  If yes, acknowledge below what works were undertaken to rectify/restore and the date	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph  Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Biodiversity  Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?  Extent of other Weeds?  Survival Rate of Plants?  Condition of Plants?  Canopy Coverage?  Tree, Small Tree & Shrub  Diversity?  Groundcover Coverage?  General Coverage/Success?  If yes, what corrective action was performed (i.e. plant showed drought stress and so watering was undertaken, plant was dead so a replacement plant was pocket planted, canopy plant coverage was not achieved so relevant pioneer

Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or Ю If Yes, briefly describe changes in this box, and		Overall comments on site condition:		Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
ndition produce	ajor ikely		ai n	rack	т —	D DE	ndition		nments		-grounc		ne:
Score (ra					Area (ha)	SCRIP!	of the sit	τ Λ	on site o		ls: Assiste	Dunke	g
inges fro (70% x 1)					% of site	TION O	te chang	A	ondition		ed Natura	3	Dunloe
m 0-100% + (20% x (					Location affectin	FSITE	ed since l	h		Y	ıl Regener	San	Park
6) Multip 0.5) + (10					Location and factors affecting outcomes	CONDI	ast asses	mo.	John Rador		ation	A Q	1 1
ly percen )% x 0) = {					tors:	TION	isment? Y	nstra	adox		(	guary	Sand Project
tage of s 80%					0.0	omplete	'ES o	2				,	20
ite occup					Canopy cover (%)	table qu	Ø	2				Gren	2
ied by ea				_	Gro	arterly,	If Yes, b	Pasi				5	
ch zone (					Ground cover	or if con	riefly des	Sike Remonstrates a positive increase				Stage	
4, B or C					Prob	ditions h	cribe cha	1 DC .	Date of	7	Years si	67	
, by the					Problem weeds	ave char	nges in th	reas	Date of call ellt assessifiellt.	k	Years since site commenced:		
condition					ts Tree	nged sin	nis box, a	*	a session		commen		
rating fo					Tree survival or Recruitment	ce last a	ınd provic	J'	3110.		ced:		
or each z					- P	ssessm	de detail:	Jat	1111	<u> </u>			
one (A =					Other co	ent. Also	provide details in table below	£ /	0		When wa	Site ID:	Project ID:
1; B = 0.5					Other comments	o draw m	below.	notive species gra			When was this site last assessed?	,	ן
; C = 0),	(describe)	(describe)		(shoul	Sugge	ар.		5,65			e last ass		
%	ribe)	ibe)		d be rout	Suggested maintenance			10			essed?		
				:ine: desc	ntenanc			36/					
				cribe if n	Ф			2/1/2					
				(should be routine: describe if necessary)				of to					
						Į Į				$\perp$			



Area 1C - Stage 3

	10 stage 3	
	QUARTERLY REHABILITATION M	
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  No Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?  No Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?	established within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species 368 m - Shrub species 224 m - ground covers 4 50 cm
Is there evidence of rubbish dumping within the rehabilitation zones?  Is there evidence of plant theft within the rehabilitation zone?  **No**  **No**  **No**  **No**  **Index of plant theft within the rehabilitation zone?  **No**  **No*	What species? Nhat management was undertaken to eradicate these weeds? Nhat management was undertaken to eradicate these weeds?	What are the dominant species within each layer?  - Tree
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala //  Kangaroo/wallaby //  Possums/gliders //  Small mammal (i.e. bandicoot, echidna)  Reptiles (i.e.snakes/lizards) //  Birds of prey //  Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) //  Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) //  Glossy Black Cockatoos //  Other //  Other //  Index	buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?

Overall Condition and add the produ	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DE	Has the condition	Overall comments on site condition:	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
Score (r					Area (ha)	SCRIP	of the si	s on site	nt condu	ds: Assist	Dun	Ď.
anges fro (70% x 1)					% of site	TION C	te chang	condition	cted by:	ed Natura	2	mo loe
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$					Location and factors affecting outcomes	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or 😥 If Yes, briefly describe changes in this box, and	Site shows positive growth + establishment	tom Rudes	al Regeneration		Park Sand Prove
of site occupied					Canopy cover (%)	ete table quan	or (50 If )	7			o 16-	Ž-
by each zone (A					Ground cover	terly, or if condi	es, briefly descr	granth		0	stage -	
, B or C), by the con					Problem weeds	tions have change	ribe changes in this	153 t	Date of current assessment	Years since site commenced:	5	
dition rating for each					Tree survival or Recruitment	d since last assess		ablishment	essment: $(q/)$	nmenced:		
zone $(A = 1; B = 0.5;$					Other comments	ment. Also draw me	provide details in table below.	of to	91)	When was this site last assessed?	Site ID:	Project ID:
C = 0), %	(describe)	(describe)		(should be routine: describe if necessary)	Suggested maintenance	jo.		of mative species.		last assessed?		





Area 24 - Stage 3

	NIADTERI V DELIADUITATIONIA	ONITODING SUFET	
	QUARTERLY REHABILITATION M		
General Management	Weeds	Vegetation regeneration	
Has there been a fire within the last quarter?  NO  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?  NO	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species S M Shrub species 2 - 4 / ground covers C / M	
Is there evidence of rubbish dumping within the rehabilitation zones?	What species? What management was undertaken to eradicate these weeds? Wh	What are the dominant species within each layer?  - Tree Casnano - Shrub Banks	(A (V)
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph	
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones	
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala NO Kangaroo/wallaby NO Possums/gliders NO Small mammal (i.e. bandicoot, echidna)	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?	
Birds of prey	Condition of fences  - Good  - Need minor repair  - Poor (need replacement)	If yes, what corrective action was performed (i.e. plant showed drought stress and so watering was undertaken, plant was dead so a replacement plant was pocket planted, canopy plant coverage was not achieved so relevant pioneer	já

Project name: Dun loe	Park Sand Project	c_				Project ID:	
Site name: Dan oe	Sand Quarry -	grea 2	1 - Sto	Stage 3		Site ID:	
Type of on-grounds: Assisted Natural Regeneration	Regeneration		Yea	Years since site commenced:	nenced:	When was this site last assessed?	ast assessed?
Current assessment conducted by:	Tomy Rudes		Dat	Date of current assessment:	sment:  4 )	16	
Overall comments on site condition:	1	-		>	,		
	Site demon	demonstrates a positive	a po		TO TOP SE	in goodh	the q establishmen
Has the condition of the site changed since last assessment? YES on Ng If Yes, briefly describe changes in this box, and provide details in table below.	d since last assessment? YES o	√N9 If Yes,	briefly describe	changes in this bo	x, and provide detail	s in table below.	
DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map.	SITE CONDITION Complete	table quarterly	, or if conditio	ns have changed	since last assessm	nent. Also draw map	· ·
Rating/ zone Area % of (ha) site	Affecting outcomes	Canopy cover (%)	Ground cover	Problem weeds	Tree survival or Recruitment	Other comments	Suggested maintenance
A = OK on track towards target							(should be routine: describe if necessary)
B = Uncertain							
significant problems							(describe)
C = Poor major problems, likely to fail							(describe)
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$	n 0-100%) Multiply percentage of s + (20% x 0.5) + (10% x 0) = 80%	ite occupied by	each zone (A, B	or C), by the condi	tion rating for each z	one $(A = 1; B = 0.5; C)$	( = 0), ( ), %



Aven 2B. Stage)

FORM A: ROUTINE C	WARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?	Have any areas of weeds reestablished within the rehabilitation zones during the last quarter?	Natural regeneration is occurring in (record height range estimate):  - Tree species
Is there evidence of rubbish dumping within the rehabilitation zones?	What species?	What are the dominant species within each layer?  - Tree <u>Casnarina Clanca</u> - Common Read, Sudges - Shrub <u>as above</u> - ground covers <u>as above</u>
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph  N
If yes, acknowledge below what works were undertaken to rectify/restore and the date	-	Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair Poor (need replacement)	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?

Overall Condition and add the produ	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DE	Has the condition	Overall comments on site condition:	Current assessment conducted by:	Type of on-grounds: Assisted Natural Regeneration	Site name:	Project name:
Score (r.					Area (ha)	SCRIP	of the si	s on site	nt condu	ds: Assist	Danles	Par
anges fro (70% x 1)					% of site	TION O	ite chang	condition	cted by:	ed Natura	20	Onclase
m 0-100%) Mui + (20% x 0.5) +					Location and factors affecting outcomes	F SITE CON	ed since last a:	. 0	Jonn	al Regeneration	Sand	Pa /x
$(10\% \times 0) = 80\%$					factors comes	IDITION Comp	ssessment? YES	site demonstrates positive	Roder		anony.	Sand a
of site occupied		11.			Canopy cover (%)	lete table quan	or NØ) If Y	tetes		d	State	
by each zone (A					Ground cover	terly, or if cond	res, briefly desc	postive			J. Wall	Dr. A.
, B or C), by the con					Problem weeds	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since	Has the condition of the site changed since last assessment? YES or NØ) If Yes, briefly describe changes in this box, and	, In CHEASE	Date of current assessment:	Years since site commenced	gner 2B	
dition rating for each					Tree survival or Recruitment		box, and provide deta		essment: 19/1/16	nmenced:	- Struct	ii)
Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$				>	Other comments	last assessment. Also draw map	provide details in table below.	native Sp		When was this site last assessed?	Site ID:	Project ID:
C = 0),	(describe)	(describe)		(should be routine: describe if necessary)	Suggested maintenance	jo.		in native species growth +		last assessed?		



Area 2C - Stage

	QUARTERLY REHABILITATION M	ONITORING SHEET
General Management	Weeds	Vegetation regeneration
Has there been a fire within the last quarter?  **No**  Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk?  **NO**  **NO**	established within the rehabilitation zones during the	Natural regeneration is occurring in (record height range estimate):  - Tree species 5 6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
Is there evidence of rubbish dumping within the rehabilitation zones?  Is there evidence of plant theft within the rehabilitation zone?	What species? as above  What management was undertaken to eradicate these weeds? pulled out	What are the dominant species within each layer?  - Tree Banks: a to Cashar no gland, encored and covers grass
Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic?	If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan.	Have you noticed any new native plant species since the last monthly inspection?  If yes name the species or take a photograph
If yes, acknowledge below what works were undertaken to rectify/restore and the date		Acknowledge that the required routine photographs have been taken within the rehabilitation zones
Have you spotted native fauna within the rehabilitation zone during inspection?  If yes, what types?  Koala	Modifications Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?  What actions were undertaken to remove any illegal modifications?  Condition of fences  Need minor repair Poor (need replacement)	Are any of the following performance criteria exceeded (refer Section 4.5 below)?  Declared Weeds?

Overall Condition Score (ranges from 0-100%) Multiply percentage of site occupied by each zone (A, B or C), by the condition rating for each zone (A = 1; B = 0.5; C = 0), and add the products: e.g. $(70\% \times 1) + (20\% \times 0.5) + (10\% \times 0) = 80\%$	C = Poor major problems, likely to fail	significant problems	B = Uncertain	A = OK on track towards target	Rating/ zone	DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map	Has the condition of the site changed since last assessment? YES or NO If Yes, briefly describe changes in this box, and		Over all colliments on site colonicol.	Current assessment conducted by: form Kahu	Type of oir-grounds, Assisted natural negetication	Time of on around	Site name:	Project name:
Score (ra					Area (ha)	SCRIP	of the si			nt condu	ASSIST	A. A.	0	On
anges fro					% of site	TION C	te chang		כפוימוניסו	cted by:	1 0 10	Nation	L 1	Ounlos
m 0-1009 + (20% x					Locatio affectir	F SITE	ed since	112	-/-	102	, regerie	l Dariana		Pork
6) Multipl 0.5) + (10					Location and factors affecting outcomes	CONDI	ast asses	2 in	3	Ros	9	ation		
y percent % x 0) = 8					tors	TION C	sment? Y	N T Z	SE SE	5			Quarry	Sand Projec
age of sit					8 2	omplete	ES or	4	10/10	5		(	3	3,0
te occupiec					Canopy cover (%)	table qua	NO If	district + Moss & of	J.				- Area	9-
d by each				,	Groun	rterly, or	Yes, brie	Sus	emo				2c	
zone (A,					Ground cover	if condit	fly descri	4	STIME	P		7		
B or C), b				2 8	Problem weeds	ions have	be change	visous a establishment	2	Date of current assessment:		Years since site commenced:	- Stage	•
y the con					weeds	change	s in this t	61.sh	j	rent asse	0	site con	,	
dition rat					Tree survival or Recruitment	d since I	ox, and p	ment	~ Phate	ssment:		menced:		
ing for eac					vival or nent	ast asses	provide details in table below.	4	(0)	14/11				
h zone (A					Other	sment. A	ails in tal	spe	4	5		When	Site ID:	Project ID:
= 1; B = C					Other comments	iso draw	ble below.	2125	+ Sincress for both species			When was this site last assessed?		# D:
1.5; C = 0)	(de	(des		(sho		тар.		0	62			ite last a	t	ì
, %	(describe)	(describe)		uld be ro	Suggested maintenance			Site	25	>		ssessed?		
%				utine: de	aintenan			8	6 of					
				scribe if r	Će .				~ SP					
				(should be routine: describe if necessary)					cies					
				ary)					73					



# PROFORMA FOR MONITORING FOREST STRUCTURE

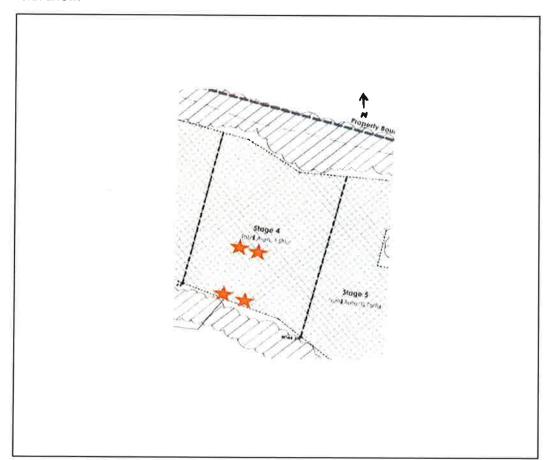
Project name:	Dun	lac Parla	Sand	Proces	Project ID:
Site name:	Dunla	oe Sand	Quan	1	Site ID:
Assessed by:	Ton	ny Rudos	)		Date: 19/1/16

# **LOCATION OF MONITORING PLOTS**

Provide details and also mark on the map of the site	Plot
Location at 0 m point of plot (grid / GPS coordinates):	28.250.75-153.3319.81E
Datum:	73 23 25 5
Compass bearing / direction of transect (from 0 m point)	StoN
<b>Landform</b> (e.g. plateau, crest, upper slope, mid-slope, lower slope, stream bank, floodplain)	Plain
Slope (: e.g. flat/steep)	Flat.
Aspect (compass bearing / direction of fall of slope)	Flat

# **MAP OF MONITORING PLOTS**

In the box, insert a map of the site showing the location of monitoring plots (mark 0 m point) in relation to notable features of the site (e.g. property boundaries, roads, waterways). Also show notable features of the monitoring plots (e.g. non-standard layout, presence of remnant trees) and location of any landscape photopoints. Include a scale bar (e.g. 0-100 m) and North arrow.



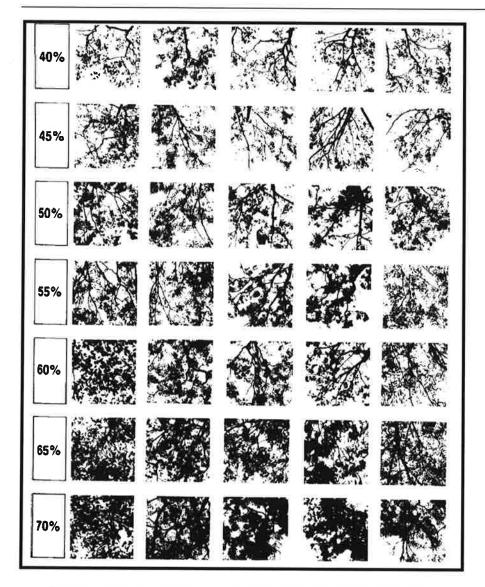


GROUND COVER, CANOPY COVER and CANOPY HEIGHT		Date: /	9////	6
For each survey plot, lay out a 50 m transect. Then survey quadra points	is centrea on	tne 5 m, 2	o m and	1 45 II
<b>Ground cover</b> = proportion of ground covered by (a) vegetation with form), (b) leaf litter and fine woody debris, (c) coarse woody debris $m$ , $25 m$ and $45 m$ points, define a $1 m \times 1 m$ quadrat, using four $1 m$ , estimate the % of ground covered by each type (as wout to 100%).	s, d) rock, (e) <i>m sticks. Loo</i>	soil, or (f) o king down	other. A at the q	t the 5 uadrai
Ground Cover				Plot
Location of quadrat:	5 m	25 m		45 m
a) Vegetation within 1 m of the ground				j
Grass (and sedges)	So %	40%	30	%
Herbs (soft-stemmed plants)	10 %	10 %	10	%
Ferns	5 %	z %	0	%
Vines and scramblers	/ %	0 %	0	%
Tree seedlings and shrubs	25 %	20%	WIN	30%
Moss (and liverworts and lichens)	0 %	0 %	D	%
b) Leaf litter and fine woody debris <10 cm diameter	4 %	10%	5	%
c) Coarse woody debris >10 cm diameter	5 %	10%	5	%
d) Bare rock	0 %	0 %	0	%
e) Bare soil	0 %	0 %	0	%
f) Other (including tree trunks, roots, etc.)	0 %	0 %	ಲ	%
TOTAL (must add up to 100%)	100%	100%		100%

Canopy (foliage) cover = projective cover of ecologically dominant layer above ground level (shade cast by foliage and stems, if the sun was overhead, assessed (approximately) above the entire 10 m x 10 m quadrat around each point. It can be estimated by eye (although this can be very subjective) or from a photo. 1. Estimate foliage cover visually, e.g. by comparison with reference photos. 2. Take a wide-angled digital photo looking up from the centre of each 10 x 10 m quadrat, and use to calculate foliage cover). Record the number of each photo for later reference.

Canopy (foliage) cover		Plot	
Location of quadrat: 18 - Stange 4	5 m	25 m	45 m
Visual estimate of canopy (foliage) cover	S	60	50
Canopy (foliage) cover calculated from photo	5	60	50
Record number of canopy photo for reference			





# **CANOPY COVER PHOTOGRAPHS PER WALKER AND HOPKINS (1990)**

Canopy height The height of the tallest tree in the canopy of each 10 m x 10 m quadrat (the canopy is the layer of foliage forming the 'roof' of the forest: it may be broken by gaps or incomplete). In some sites, it may be necessary to distinguish canopy trees from emergents: i.e. trees projecting well above the canopy with crowns exposed on all sides Note: Estimating height is difficult. Use a clinometer & tape measure, or range finder, or other measure. Alternatively, place a 2.5 m pole against a tree, & standing at a distance, estimate height in multiples of 2.5 m.

Canopy height		Plot	
Location of quadrat: 1B - Stage 4	5 m	25 m	45 m
Canopy height (tallest trees in canopy)	8	4	6
Height of emergent trees (if present)	8	4	6

January 2009 Page 78

		/	,
Site name:	118 stage V	Date:	116
			1 1

**SPECIAL LIFE FORMS:** Record **presence** of life forms in each 10 m x 10 m quadrat centred on the 5 m, 25 m and 45 m points. If life forms are present on site, but not in quadrats, record in last column. Do not count no. of individuals.

Special Life Forms			Plot		
Location of quadrat:		5 m	25 m	45 m	
<b>Strangler figs</b> Figs with network of roots around stem of host tree, rooted in ground			$\sim$	~	N
Hemi-epiphytes Climbing plants adhering to tree trunks, rooted in ground, e.g. <i>Pothos</i> , climbing pandanus			N	$\sim$	$\sim$
Vines Climbing woody-stemmed plants dependent on trees for support, and rooted	Slender (stem <5 cm diam.)	У	$\sim$	N	У
in the ground	Robust (stem >5 cm diam.)	N	N	N	N
Vine towers Dense columns of vines growing over and smothering tree crowns and stems			N	N	N
Vine tangles Dense masses of interwoven vine midstorey	e stems in understorey or	~	N	N	N
Thorny scramblers Thicket-forming vines or shrubs, often spiny, e.g. Calamus,	Individual plants present	~	N	N	$\sim$
lantana, cockspur, raspberry, other vines (e.g. <i>Eleagnus, Maesa</i> )	Thickets present	N	N	N	N
Palm trees Palms with stems >2 m high			N	1/	N
Understorey palms with stems <2 m high, e.g. walking stick palms (also includes juvenile palm trees)			N	N	N
Tree ferns Ferns with stems usually >0.5 m high		N	N	N	N
<b>Ground ferns</b> Ferns or fern-like plants without stems, growing on the ground		y	У	y	У
Clumping epiphytic ferns e.g. staghorns, basket ferns			N	N	N
Other epiphytes Growing on trees, e.g. trailing ferns, orchids, not rooted on ground			N	N	~
Cordylines 'Palm-lilies': shrubs to 5 m high, occasionally branched, with long leaves		N	N	N	N
Herbs with long wide leaves e.g. gingers, cu	njevoi, bananas	N	W	N	N
Herbs with long strap-like leaves e.g. lilies,	mat-rush	シ	У	У	У
Cycads Plants with leathery palm-like foliage borne on stout stems or growing on	Stout stems, e.g. Lepidozamia	~	~	N	N
foliage borne on stout stems or growing on ground (subterranean stems)	Ground cycads, e.g. Bowenia	N	N	N	N
Pandanus Shrub / small tree with serrated strap-like leaves				1	,
Pandanus Shrub / small tree with serrated st	rap-like leaves	N	N	1	N

Tally intercepts with fallen logs by diameter class on each transect	<10 cm c	ody debris dia 5-10 cm	10-20	20-30	30-40	(CWD) >	10 cm d	75- 100	>10
						Ì		75-	>10



# FORM D: PROFORMA FOR MONITORING FLORISTIC COMPOSITION

Project name:	Project ID:
Site name:	Site ID:
Assessed by:	Date:
LOCATION OF MONITORING PLOTS	
Provide details and also mark on the map of the site	Plot
Location at 0 m point of plot (grid / GPS coordinates):	
Datum:	
Compass bearing / direction of transect (from 0 m point)	
Landform (e.g. plateau, crest, upper słope, mid-słope, lowe słope, stream bank, floodplain)	er
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	
In the box, insert a map of the site showing the location of in relation to notable features of the site (e.g. property bot show notable features of the monitoring plots (e.g. non-star trees) and location of any landscape photopoints. Include North arrow.	undaries, roads, waterways). Also ndard layout, presence of remnant e a scale bar (e.g. 0-100 m) and



Site name:	13 - Stage	4
		17

Date: 20/1/16

**GENERAL COMMENTS** on the composition of vegetation at the site (e.g. dominant or notable species, variation across the site): record by strata as follows:

# Canopy/ Ecologically Dominant Layer:

- She - oak
- Casnarina glanca
- Encalyptus regrowth
- Melalueca quinquinerivia
- Callistemor Salignus

# Midstorey:

- regrowth of the above species - Bantaia - Inches

# **Understorey/ Ground cover:**

- Grasses - lomandra - Bracken

**RECRUITMENT:** What species are common recruits to the site? Any other comments about recruitment?

NA

Does this site have any WEED or MAINTENANCE ISSUES that need attention?

- minor grass intrusion

Any other comments on the site? Mark an 'X' here  $\cancel{N}$  and add extra page(s) as required.