

Annual Environmental Management Review (AEMR)

Dunloe Sands Quarry 2016 – Revision

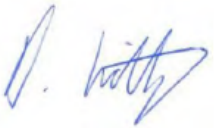
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Table 1 Site Details

<u>Name of operation</u>	Dunloe Sands Quarry
<u>Name of operator</u>	Holcim (Australia) Pty Ltd
<u>Development consent / project approval #</u>	Project Approval 06- 0030
<u>Name of holder of development consent / project approval</u>	Holcim (Australia) Pty Ltd
<u>Annual Review start date</u>	January 1, 2016
<u>Annual Review end date</u>	December 31, 2016
<p>I, Daniel Lidbetter, certify that this audit report is a true and accurate record of the compliance status of Dunloe Sand Quarry for the period of January 2016- December 2016 and that I am authorised to make this statement on behalf of Holcim (Australia) Pty Ltd.</p> <p><i>Note.</i></p> <p>a) <i>The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i></p> <p>b) <i>The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
<u>Name of authorised reporting officer</u>	Daniel Lidbetter
<u>Title of authorised reporting officer</u>	NSW Planning & Environment Coordinator
<u>Signature of authorised reporting officer</u>	
<u>Date</u>	March 31, 2017.

Resubmitted: March 2018

<u>Name of authorised reporting officer</u>	Alana White
<u>Title of authorised reporting officer</u>	Senior Environment and Community Liaison
<u>Signature of authorised reporting officer</u>	Alana White – e signature
<u>Date</u>	30 March 2018

1.0 Statement of compliance

See Table 2 for statement of commitments for the 2016 reporting period for the Dunloe Sand Quarry. Table 3 details the non-compliances identified within the reporting period.

Table 2 Statement of Commitments

Were all conditions of the relevant approval(s) complied with?	
DC #06_0030	No

Table 3 Non Compliances

Relevant approval	Condition #	Condition description (summary)	Compliance status	Where addressed in Annual Review
PA 06- 0030	Schedule 3, Condition 6	The Proponent shall ensure that dust generated by the project does not cause additional exceedances of the criteria listed in Tables 3 to 5 at any privately owned land.	Non-compliant	Section 6.2 (Air Quality)
PA 06- 0030	Schedule 3, Condition 7	The Proponent shall prepare and implement a Dust Monitoring Program for the project to the satisfaction of the Director-General.	Non-compliant	Section 6.2 (Air Quality)
PA 06- 0030	Schedule 3, Condition 9	The Proponent shall aim to meet the water quality objectives in Table 6 for water in the dredge ponds and in groundwater adjacent the dredge ponds, unless otherwise approved by the Director-General.	Non-compliant	Section 6.4 (Water Mgt)
PA 06- 0030	Schedule 3, Condition 10	The Proponent shall ensure that all excavated potential acid sulfate soil fines material is returned back to below the watertable as soon as possible to prevent oxidation.	Non-compliant	Section 10.2 (Re-interment of fines)
PA 06- 0030	Schedule 3, Condition 11	The Proponent shall ensure that all potential acid sulfate soil fines material is discharged into the pond at a depth of no less than 3 metres from the water surface, and that all fines are deposited to a final depth of at least 8 metres from the water surface, unless an alternative method(s) is approved by OOW and the Director-General.	Non-compliant	Section 10.2 (Re-interment of fines) and Section 11.1 (Potential Acid Sulfate Soil Mgt)
PA 06- 0030	Schedule 3, Condition 17	The Proponent shall ensure that the flood storage capacity of the site is no less than the pre-existing flood storage capacity at all stages of the project. Details of the available flood storage capacity shall be reported in the AEMR.	Non-compliant	Section 6.4 (Water Mgt)

Relevant approval	Condition #	Condition description (summary)	Compliance status	Where addressed in Annual Review
PA 06- 0030	Schedule 3, Condition 22	<p>The Blue-Green Algae Management Plan shall:</p> <p>a) be prepared by a suitably qualified blue-green algae expert, whose appointment has been approved by the Director-General;</p> <p>b) be consistent with extant guidelines for blue-green algae management including the NHMRC's Guidelines for Managing</p>	Non-compliant	Section 6.4 (Water Mgt)
PA 06- 0030	Schedule 3, Condition 24	<p>The Groundwater Monitoring Program shall include: a) detailed baseline data on groundwater levels and quality, based on statistical analysis;</p> <p>b) groundwater impact assessment criteria;</p> <p>c) a program to monitor groundwater levels and quality;</p> <p>d) a program to monitor groundwater level effects on vegetation, and on ground water supply to adjoining properties; and</p> <p>e) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.</p>	Non-compliant	Section 6.4 (Water Mgt)
PA 06- 0030	Schedule 3, Condition 26	<p>The Proponent shall:</p> <p>a) rehabilitate and revegetate the 15 ha hectares of land identified in the EA (see the revegetation plan in Appendix 2); and</p> <p>b) within 12 months of the commencement of quarrying operations, make suitable arrangements to provide appropriate long term security for the revegetation area to ensure it is managed for conservation purposes to the satisfaction of the Director-General.</p>	Non-compliant	Section 7.0 (Rehabilitation)
PA 06- 0030	Schedule 3, Condition 45	<p>The Proponent shall:</p> <p>a) provide annual production data to the DII using the standard form for that purpose; and</p> <p>b) include a copy of this data in the AEMR.</p>	Non-compliant	Section 4.0 (Operations Summary)

Relevant approval	Condition #	Condition description (summary)	Compliance status	Where addressed in Annual Review
PA 06- 0030	Schedule 5, Condition 5	Within 12 months of the date of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and relevant agencies.	Non-compliant	Section 9.0 (Independent Environmental Audit)
PA 06- 0030	Schedule 5, Condition 6	Within 2 years of the start of quarrying operations on site, and every 5 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project.	Non-compliant	Section 9.0 (Independent Environmental Audit)
PA 06- 0030	Schedule 5, Condition 10	<p>Within 1 month of the approval of any plan/strategy/program required under this approval (or any subsequent revision of these plans/strategies/programs), or the completion of any independent environmental audit or AEMR, the Proponent shall:</p> <p>a) provide a copy of the relevant document/s to Tweed Shire Council and relevant agencies; and</p> <p>b) ensure that a copy of the relevant document/s is made publicly available on site and/or at the Proponent's regional office, to the satisfaction of the Director-General</p>	Non-compliant	Section 9.0 (Independent Environmental Audit)
PA 06- 0030	Schedule 5, Condition 11	<p>During the project, the Proponent shall:</p> <p>a) make a summary of monitoring results required under this approval publicly available at the Proponent's regional office; and</p> <p>b) update these results regularly (at least every 3 months), to the satisfaction of the Director-General</p>	Non-compliant	Section 9.0 (Independent Environmental Audit)

Table 4 Compliance status key for Table 3

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

2.0 Introduction

Dunloe Sands Quarry was granted Project Approval (PA06_0030) Quarry on 24 November 2008, with a subsequent modification (Mod 1) to this approval granted on 28 August 2009. Dunloe Sands Quarry operations are located approximately 4.5 km south-southwest of Pottsville on the Pottsville Mooball Road.

The site is located adjacent to Mooball Creek, and is approximately 4km upstream of the creek mouth. Surrounding properties are currently used for agricultural purposes including sugar cane farming and grazing.

Holcim commenced operations on the site on August 1, 2016 with all previous responsibilities falling under the management of Ramtech Pty Ltd. Ramtech have previously been responsible for the commencement and operation of the site since Project Approval was granted in 2007.

Major milestones commenced in the last reporting period are outlined within this report including persons responsible at the time of these activities being commenced.

In accordance with Schedule 5, Condition 5 of the modified Development Consent the site is required to undertake an Annual Review of the site in the following manner:

5. ANNUAL REPORTING

Within 12 months of the date of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and relevant agencies. This report must:

- (a) identify the standards and performance measures that apply to the project;*
- (b) describe the works carried out in the last 12 months;*
- (c) describe the works that will be carried out in the next 12 months;*
- (d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years; (e) include a summary of the monitoring results for the project during the past year;*
- (f) include an analysis of these monitoring results against the relevant:*
 - impact assessment criteria/limits;*
 - monitoring results from previous years; and*
 - predictions in the EA;*
- (g) identify any trends in the monitoring results over the life of the project;*
- (h) identify any non-compliance during the previous year; and*
- (i) describe what actions were, or are being, taken to ensure compliance.*

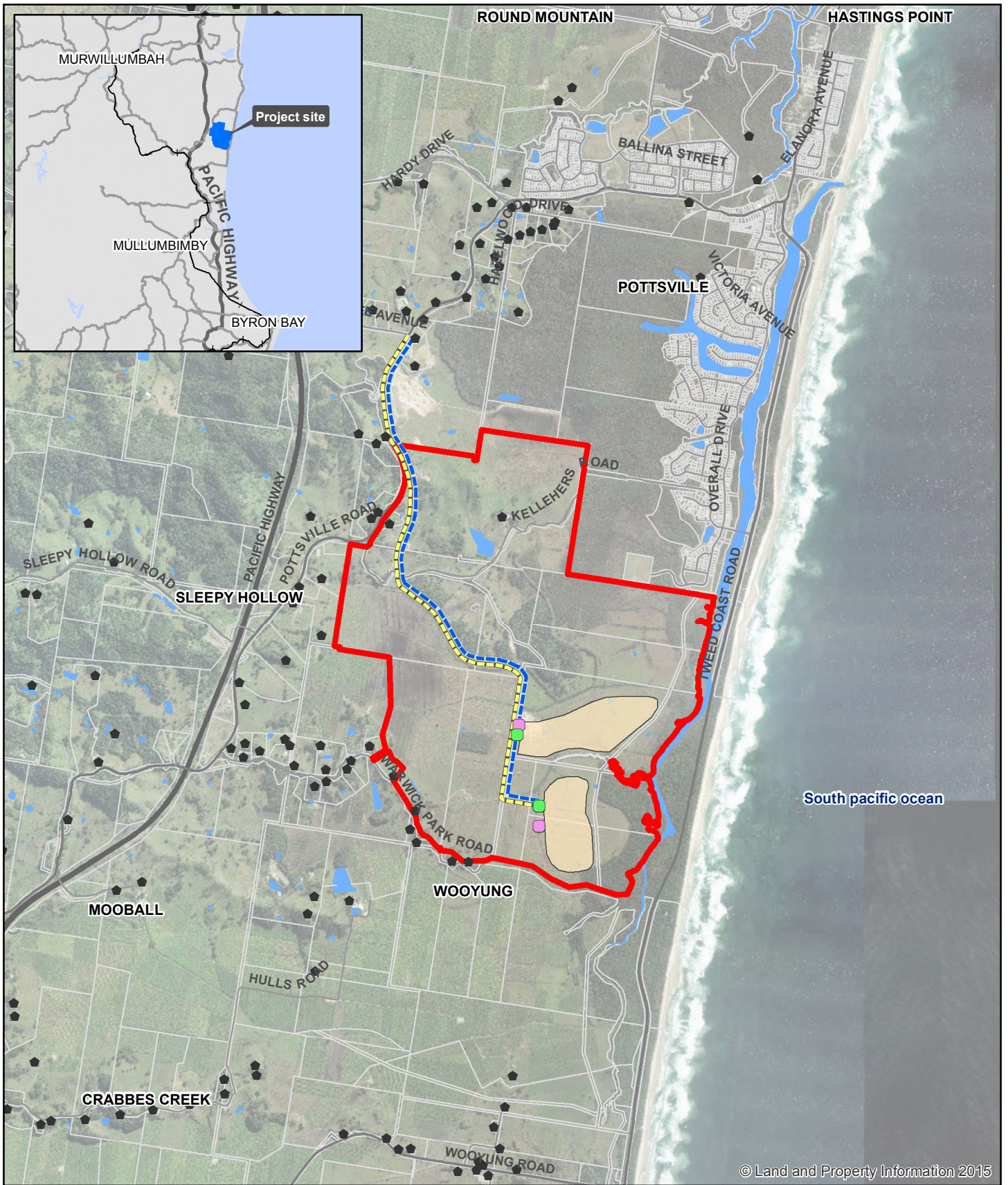
The reporting period for this annual return is the January 2016 to December 2016. This report is a revision of the original provided to Department of Planning and Environment (DPE) and aims to address the request for further information provided in July 2017. Holcim has had great difficulty in securing all of the information to provide to the DPE for this report due to the

change in ownership and staff turnover within Holcim. Holcim have provided all of the information available to them within the report and are committed to ensuring future annual returns are complete with all the information pertinent to the development consent and the operations of the site.

Figure 1 shows the extraction boundary with the site extraction activities in late 2017. Figure 2.1 is the site location within a regional context as well as the site plan.



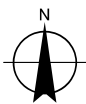
Figure 1 Extraction boundary and extraction activity



Legend

- Project boundary
- Sand extraction areas
- Incoming haul road
- Outgoing haul road
- Site office
- Washplant
- Existing dwelling house

Paper Size A4
 0 0.25 0.5 1
 Kilometers
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 56



Holcim (Australia) Pty Ltd
 Dunloe Sand Modification

Job Number | 22-18823
 Revision | A
 Date | 10 Apr 2017

Site location and layout

Figure 2-1

3.0 Approvals

The site operates under the following approvals listed in the table below:

Table 5 Approvals for Dunloe Sand Operations

Approval	Regulatory Authority
Project Approval 06_0030	NSW Department of Planning & Environment
30BL183086 30BL183082 30BL183081 30BL183080 30BL183079 30BL183078 30BL183077 30BL183076	NSW Office of water
EPL No. 13077	Environmental Protection Authority

This Annual Review has been prepared in accordance with Condition 6.3 (Annual Performance Monitoring) of the Development Consent and in accordance with the *Annual Review Guideline: post approvals requirements for state significance mining developments* (October 2015).

The EPL was transferred into Holcim Australia's name in September 2016.

4.0 Operations Summary

The Dunloe Quarry officially commenced operations under Holcim on August 1, 2016. Development activities undertaken at the site in 2016 included:

- Stripping of topsoil and overburden within the existing extraction limit boundary.
- Load and Haul Activities.
- Washing, screening and stockpiling of product.
- Overburden removal and stockpiling.
- Maintenance of rehabilitation undertaken in the north and eastern areas of the site.
- Load out and sales of topsoil, brickies loam and concrete sands to the local market.

Operating hours in 2016 were undertaken between 7am to 5pm, Monday to Friday and 7am-12pm on Saturdays. These timeframes were applied for all operations on-site with no works occurring outside the approved operating hours.

All activities took place within the approved operating hours in 2016.

Table 6 includes a summary of the operations undertaken during the reporting period against the development consent conditions regarding product transported from Dunloe Sand Quarry.

Table 6 Total Product Distributed (Dunloe Sand Quarry)

Material	Approved limit (specify source)	This reporting period (actual Tonnes)
Product Distributed- Total	300,000 Tonnes	65 730.300 Tonnes

Holcim understands the above is not as per the requirements within the specified format in Schedule 3 Condition 45. Unfortunately, we are limited by the information provided during the business transition. It is our full intention that future annual returns will be compliant against this requirement.

Next reporting period

Development activities proposed to be carried out at Dunloe Sands in 2017, include:

- Stripping of topsoil and overburden within the existing extraction limit boundary.
- Load and Haul Activities.
- Washing, screening and stockpiling of product.
- Overburden removal and stockpiling.
- Maintenance of rehabilitation undertaken north eastern area.
- Load out and sales of topsoil, brickies loam and concrete sands to the local market.

5.0 Actions required from previous Annual Review

The 2015 Annual Review (prepared by Planit Consultants) was submitted to the DP&E on behalf of the previous operators of the site (Ramtech Pty Ltd). The below is a summary of the comments provided.

Table 7 Actions from 2015 Annual Reviews

Consideration	Comment
The name/number of all relevant approvals held	Provided in Section 3.0 Approvals
Data for the reporting period 1 November 2014 to 31 December 2015, as committed to in the Ramtech's Corrective Action Plan dated 19 February 2016	Holcim does not have a copy for this corrective action plan.
Reporting and discussion of all relevant monitoring results(Schedule 5, Condition 5(f)) against: a. Monitoring results from previous years; and b. Prediction in the EA.	6.0 Environmental Performance 6.5 Summary of Environmental Performance

Consideration	Comment
Figures showing the regional context, development consent boundary, current operational disturbance footprint, and updated aerial photographs as background to these figures	2.0 Introduction
Information relating to limits of the approval to allow assessment of compliance, in particular, extraction depths, volume of sand material transported, heavy vehicle movements, hours of operation (Schedule 2, Conditions 6-8; Schedule 3, Condition 3).	At the time of the reporting period, systems and processes were being developed and put in place to document information across the Dunloe Sands site.
A table that outlines actions required from last years AEMR, and details the status of the actions	Holcim only has access to 2015 report comments.
Tabulated noise monitoring data for the full reporting period	See section 6.1 Noise
An update on the dust monitoring program that is committed to being developed (as per the Corrective Action Plan dated 19 February 2016). This should detail any dust monitoring data for the reporting period and include an update on compliance of the dust monitoring program in accordance with the Approval	Please note the EMP and EMS are currently under extensive review.
Groundwater monitoring levels for the reporting period (as per Schedule 3, Condition 24).	See appendices for all the monitoring data available to Holcim
A report on the performance of the rehabilitation or revegetation in relation to the rehabilitation objectives, the post rehabilitation land uses, and the results of monitoring.	7.0 Rehabilitation and Landscape Management
A discussion on incidents and non-compliances in accordance with Section 11 of the Guideline. Provide an action plan including dates to address any incidents or non-compliances. For example, this should include an update on non compliances following the Department's audit in 2015.	10.0 Incidents and non compliances
A title change to the report as Annual Environmental Management Report (AEMR) for the reporting period (1 November 2014 to 31 December 2015), and reflect this title in the introduction	Holcim understands this was altered in the heading of the report but not in the introduction.
The Quarry include a Statement of Compliance for all approvals, leases, consents and licences in accordance with Section 1 of the Department's Annual Review Guideline, 2015 (the Guideline)	6.5 Summary of Environmental Performance

Consideration	Comment
The Quarry review it's Corrective Action Plan dated 19 February 2016 and provide appropriate updates. For example, in relation to placing a copy of approved plans/strategies/programs, including management plans, AEMRs, IEAs, and monitoring results, on the company website	8.0 Community

The original 2016 annual return was submitted by Holcim with information provided by the previous owners. The below is the compendium of further information requested by the DPE, initiating the resubmission of the 2016 report. Please note, the considerations have been annotated.

Table 8 Actions from review of original 2016 annual return

Consideration	Comment
a) Outstanding actions from the previous AEMR – the Departments letter of 19 October 2016 requested a number of changes to be incorporated into future AEMR's. The following changes have not been incorporated into the 2016 AEMR as requested:	At the time of writing the 2016 AEMR it is apparent Holcim was unaware of the letter on the 19 October received by Ramtech.
i. The name/number of all relevant approvals held and details of the changes of any licences	See section 3.0 Approvals
ii. Reporting and discussion of all relevant monitoring results and a comparison against previous years	See section 6.0 Environmental Performance
iii. Figures showing the approved site boundary, its location in a regional context, a current aerial photograph, approved extraction area and rehabilitation area	See section 2.0 Introduction and section 7.0 Rehabilitation and Landscape Management
iv. A table that outlines actions required for last years AEMR and details the status of the actions and where each action is addressed within the AEMR	See section 5.0 Actions required from previous Annual Review
v. Tabulated noise monitoring data for the full reporting period with the raw data appended to the report	See section 6.1 Noise. The raw data that is available to Holcim has been provided in the appendices
vi. A report on the performance of the rehabilitation or revegetation. Include a comparison of monitoring results to previous year's results and against the	See section 7.0 Rehabilitation and

Consideration	Comment
<p>rehabilitation and revegetation objectives. Also, please list the identified improvements that were noting in the revised AEMR. The Departments review of the 2016 AEMR notes the poor documentation in the rehabilitation monitoring sheets.</p>	<p>Landscape Management</p>
<p>b) The Department requests the rehabilitation bond be submitted to the Director General for their satisfaction.</p>	<p>See Appendices for Rehabilitation Bond submitted to the DPE</p>
<p>c) The annual production is not submitted in the specified format</p>	<p>See section 4.0 Operations Summary</p>
<p>d) The AEMR in 2016 reported on monitoring data from December 2014 to June 2015. The current report covers the periods from 1 January 2016 to 31 December 2016. The Department requests the monitoring results for the period 1 July 2015 to December 2016 be included as part of this report.</p>	<p>See the appendices for all the data available to Holcim from 1 July 2015 to December 2016 at the time of submission. The data has been reviewed and there appears to be no anomalies or concerns.</p>
<p>e) Noncompliance with the analysis of samples for DLP locations as notified in Sasha Peterson's email dated August 2016 has not been included in the AEMR as advised by the Department 17 August 2016</p>	<p>At the time of resubmission, Holcim was unable to secure the email sent by Sasha to the Department regarding the analysis of samples for DLP.</p>
<p>f) DPE seeks further clarification on: i. Appendix 2 only includes blue green algae monitoring results for the first two quarters of 2016. Please advise of the status of the 2016 third and fourth quarter monitoring data. Frequency is also noted not to be as per the management plan</p>	<p>See section 6.4.6 Blue Green Algae for results. Field data sheets were unable to be located, however, results were electronically recorded in a site datasheet.</p> <p>The frequency of monitoring and the management plan is under review.</p>
<p>ii. Holcim Fines Management Action plan identifies that site staff will undertake monthly pond depth</p>	<p>See section 6.4.8 Internment pond</p>

Consideration	Comment
surveys. This was to commence in October 2016. The department requests a summary	monitoring
iii. pH levels recorded in the extraction pond ranged between 3.5 and 4.9, which is below interim target criteria. Please provide advice on how this issue is being addressed.	See section 6.4.1 Monthly Surface Water (Extraction Pond)
iv. The AEMR includes nest box monitoring records. No analysis or explanation of the data is included.	See section 7.0 Rehabilitation and Landscape Management
g) Please advise the status of the review of the environmental management and monitoring strategies/plans and programs as a result of the independent environmental audits	At the time of the AEMR submission, the EMP and EMS for Dunloe Sands was still under review. Significant effort has been exerted to ensure the EMS and EMP are not only in line with compliance expectations but also Holcim internal compliance requirements.
h) i. The unites of measurement and performance criteria and EA predictions be noted in tables ii. Monitoring data which is not within target criteria are highlighted iii. Graphs of monitoring data also include performance criteria and EA predictions as applicable	Due to the difficulties experienced with the reporting period Holcim will take this feedback on board for future AEMR's
i) Condition 4.1, 4.2 and 4.3 referred to in the original submission are not documented in the DA	Noted and removed.
j) The department requests the company's website includes the management plans for the site.	Completed. See section 8.0 Community

6.0 Environmental Performance

6.1 Noise

Noise monitoring has been undertaken at the site during the reporting period in accordance with the monitoring criteria listed in the table below:

A copy of all monitoring results undertaken in 2016 are attached as an Appendix to this report.

2. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1.

Receiver Location	Day L_{Aeq} (15 min) dB(A)
Residences on privately-owned land	48

Table 1: Noise Impact Assessment Criteria

Notes:

- Noise from the site is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the identified noise limits, except where otherwise specified below.
- Where it can be demonstrated that direct measurement of noise from the project is impractical, alternative means of determining compliance may be acceptable (see Chapter 11 of the NSW Industrial Noise Policy).
- The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where applicable.
- The identified noise emission limits apply under meteorological conditions of wind speed up to 3m/s at 10 metres above ground level, and temperature inversion conditions.

Figure 2: Noise monitoring criteria for Dunloe Sands (PA 06_0030).

The site undertook monitoring every month with all results registering in-audible above background from both locations. These results are in line with the expected criteria in the development consent and the EIS.

Historical Comparison

Table 9 contains the historical data for noise monitoring available to Holcim as of March 2018.

Table 9 Historical comparison: noise monitoring

	2015	2016
Monitoring event 1	No exceedance	No exceedance
Monitoring event 2	No exceedance	No exceedance
Monitoring event 3	No exceedance	No exceedance
Monitoring event 4	No exceedance	No exceedance
Monitoring event 5	No exceedance	No exceedance
Monitoring event 6	No exceedance	No exceedance
Monitoring event 7	No exceedance	No exceedance
Monitoring event 8	No exceedance	No exceedance
Monitoring event 9	No exceedance	No exceedance
Monitoring event 10	No exceedance	No exceedance
Monitoring event 11	No exceedance	No exceedance
Monitoring event 12	No exceedance	No exceedance

6.2 Air Quality

The site is required to monitor dust deposition in accordance with the criteria listed in the table below:

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	50 µg/m ³

Table 3: Short Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³

Table 4: Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Table 5: Long Term Impact Assessment Criteria for Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Figure 3: Air Quality Monitoring criteria (PA 06_0030).

Dust deposition monitoring was undertaken at 4 locations across the 2016 reporting period. All four monitoring points were found to be well below the annual average (4g/m²) and in compliance with the Development Consent (See Table 10).

Table 10 Dust Monitoring (Dust Deposition)

End Date	DDG 1	DDG 2	DDG 3	DDG 4
January	0.3	0.4	0.5	0.6
February	0.4	0.6	0.5	0.5
March	0.2	4.7	0.3	0.5
April	0.2	1.6	0.2	0.8
May	0.3	1.2	0.3	1.6
June	0.3	1.1	1.6	0.5

End Date	DDG 1	DDG 2	DDG 3	DDG 4
July	0.13	0.52	0.41	0.39
August	0.6	0.5	0.3	0.4
September	0.8	0.5	0.4	0.3
October	0.8	0.5	0.4	0.3
November	0.4	1.9	0.3	0.4
December	0.5	1.7	0.6	0.5
Annual Average	0.41	1.23	0.48	0.57
Allowable limit	4g/m2/ year	4g/m2/ year	4g/m2/ year	4g/m2/ year

The site was required to undertake PM10 monitoring in accordance with the condition above.

No monitoring was undertaken in 2016. DP&E advised Holcim of the requirement to undertake monitoring at the site, unless changes were made to the site Air Quality Management Plan. Holcim worked to procure a mobile PM10 monitor whilst an updated management plan was under review by DP&E. The updated plan proposed PM10 monitoring only when extraction exceeded 200,000 tpa.

The updated management plan was approved by the DP&E on November 15, 2016, prior to Holcim obtaining the mobile PM10 monitor.

The site has maintained dust suppression techniques throughout the reporting period in accordance with the requirements of the EMP. No issues associated with dust from operations were identified in 2016.

Historical Comparison

Holcim only has access to the dust deposition data from 2015 and 2016 for historical comparisons. As can be seen in Figure 2 and Figure 3 below, the data shows consistently low levels of dust being contributed across all monitoring locations.

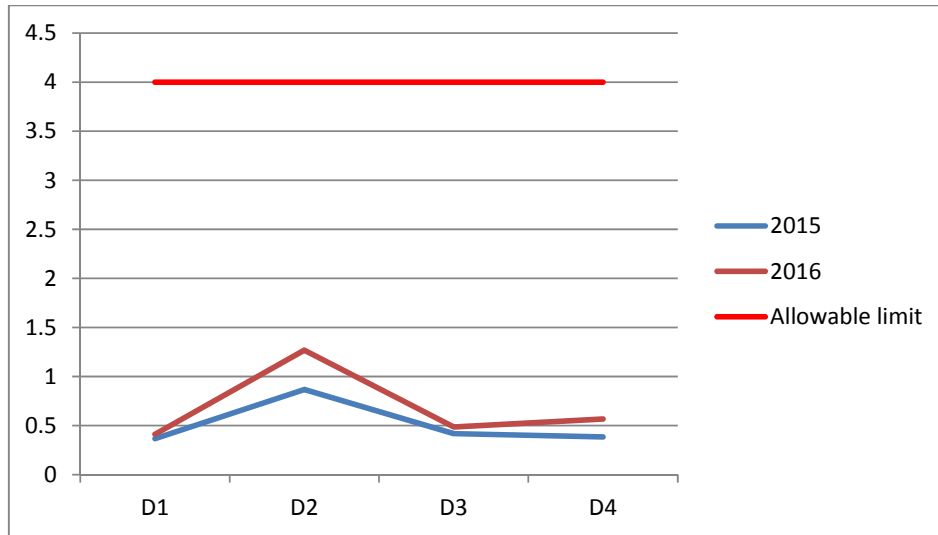


Figure 2 Historical comparison of DDG annual average data

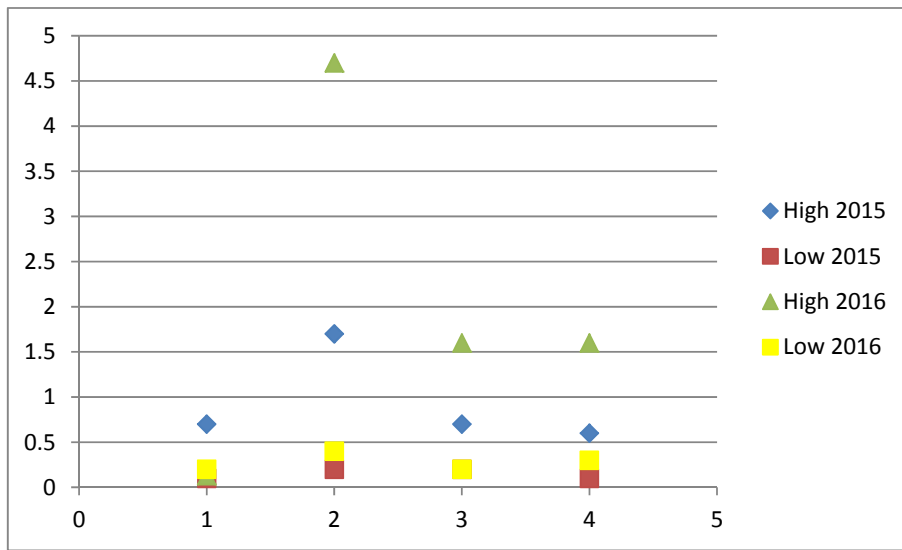


Figure 3 Historical comparison of highest and lowest records for DDG data

Comparison to the EA:

The results for depositional dust were within the predicted limits of the EIS predictions. The low levels of dust are also consistent with the environmental assessment undertaken for the site.

6.3 Traffic Management

The site has operated throughout 2016 in accordance with section 7.8 (Traffic Management) of the Dunloe Sands Environmental Management Plan (EMP).

Implementation Strategy	
•	Construction of a dedicated haulage road (sealed) to provide vehicular access between the sand extraction area and Pottsville-Mooball Road.
•	Average truck movements limited to 8 trips per hour.
•	All vehicles to observe speed limits for public roads.
•	No trucks are to leave the site via Warwick Park Road.
•	Appropriate advisory signage placed on public roads to notify of trucks entering Pottsville – Mooball Road.
•	Appropriate relevant advisory signage placed along the haulage road (especially approaches to the intersections with Kelleher's Road and Pottsville – Mooball Road).
•	Truck speed on the internal roads is to be limited to a maximum of 25km/h.
•	All loaded vehicles entering or leaving the site are to have their loads covered.
•	Holcim shall ensure that all loaded vehicles leaving the site are cleaned of materials that may fall on the road before they leave the site.

Figure 3: Traffic management strategy for Dunloe Sands (Dunloe Sands EMP 2016).

Holcim staff were notified during due diligence activities by representatives of Ramtech that operations prior to the acquisition by Holcim were based on a maximum of 8 movements per hour (ie - 8 in, 8 out). The DP&E compliance team has since notified Holcim this interpretation is incorrect and the site is only allowed 4 movements per hour (ie - 4 in, 4 out).

Holcim has operated in accordance with revised truck movements since direction was given by the DP&E on October 20, 2016. Holcim is currently undertaking an application to modify this condition to allow greater flexibility to hourly and daily movements.

6.4 Water Management

6.4.1 Monthly Surface Water (Extraction Pond)

The site has undertaken monthly extraction pond water monitoring in accordance with the criteria listed in the table below:

Monthly Monitoring		
Parameter	Interim Target Criteria	Baseline monitoring 9/06-8/07
pH	5.0 – 8.5	3.55-8.44 (6.49)
Electrical Conductivity (EC)	<5.50 mS/cm	0.286 - 45mS/cm (11.930mS/cm)
Dissolved Oxygen (DO)	>4.00 mg/L	0.81-7.49 (4.34)mg/L
Turbidity	<20 (NTU)	3-67 (14.4) NTU
Oil and Grease	10 mg/L	

Figure 4: Monthly monitoring criteria - extraction pond (Dunloe Sands EMP 2016).

Results obtained from monthly sampling in the extraction ponds (Appendix 13.2) shows the results to be within the baseline criteria obtained in preparation of the EMP. Results for pH have varied between 3.5 and 4.9 slightly below the interim target criteria and are included in Appendix 2 of this report.

6.4.2 Surface Water (Surrounding Environment)

The site has undertaken quarterly creek water monitoring within the surrounding environment in accordance with the criteria listed in the tables below:

<i>Pollutant</i>	<i>Unit of Measure</i>	<i>Interim Target Criteria</i>	<i>Baseline Monitoring 9/06-8/07</i>
pH	pH	5.5 – 7.5	3.55-8.44 (6.49)
Electrical Conductivity	uS/cm	1800-24000	286-45000 (11930)
Dissolved Oxygen	mg/L	>6	0.81-7.49 (4.34)
Turbidity	NTU	<20	3-67 (14.4)
Suspended Solids	mg/L	<25	1.5-48 (19)

Figure 5: Monthly monitoring criteria - surrounding environment (Dunloe Sands EMP 2016).

Results obtained from monthly sampling (Appendix 3.2) in the surrounding environment shows the results to be within the baseline criteria obtained during the preparation of the EMP and within the expectations of the EA. No discharges into the surrounding environment were observed during the reporting period.

6.4.3 Quarterly Surface Water (Extraction Pond)

The site has undertaken quarterly extraction pond water monitoring within the surrounding environment in accordance with the criteria listed in the tables below: Results obtained from quarterly chemical analysis shows the results to be generally in accordance with the baseline criteria and interim target criteria of the EMP. No discharges into the surrounding environment were observed during the reporting period.

Quarterly profile monitoring at 1 metre intervals have been undertaken throughout 2016 with no variations between depths identified during any monitoring events. The pH ranges have fluctuated between 5.2 and 3.6 within the baseline criteria outlined in the EMP.

Quarterly monitoring		
Quarterly monitoring shall include the above parameters as well as the parameters listed in the table below.		
Parameter	Interim Target Criteria	Baseline monitoring 9/06-8/07
Manganese	0.15 mg/L	0.01 – 0.56 mg/L
Magnesium	40 mg/L	0.8 – 173.0 (20) mg/L
Sodium	280 mg/L	7-1770 (213) mg/L
Potassium	17.5 mg/L	0 – 71 (12) mg/L
Bicarbonate	400 mg/CaCo3	-
Chloride	285 mg/L	15-3500 (356)mg/L
Sulphate	175 mg/L	9-753 (100) mg/L
Aluminium	0.75 mg/L	<0.01-4.96 (0.50) mg/L
Arsenic	<0.005 mg/L	<0.005 – 0.027 (0.01) mg/L
Iron	<7.5 ug/L	0.03-43 (6.12) ug/L
Chlorophyll a	2-10 ug/L	2-10 ug/L

Figure 6: Quarterly monitoring criteria - extraction pond (Dunloe Sands EMP 2016).

A copy of all extraction pond chemical analysis is included in Appendix 13.2 of this report.

6.4.4 Monthly Groundwater

The site has undertaken monthly groundwater monitoring within the surrounding environment in accordance with the criteria listed in the tables below:

Monthly Monitoring		
Parameter	Interim Target Criteria	Baseline Monitoring 9/06-8/07 Range (mean)
pH	4.2 – 7.0	3.58-7.54 (5.43)
Electrical Conductivity (EC)	<2.0 mS/cm	0.07-6.47 (1.24)
Dissolved Oxygen (DO)	>1.50 mg/L	0.16 – 4.83 (0.84)
REDOX Potential	Maximum (mg/L)	
Groundwater level	M (AHD)	0.25-1.52 (0.68)

Figure 7: Monthly monitoring criteria - groundwater (Dunloe Sands EMP 2016).

Groundwater monitoring was undertaken at DLP 1, DLP 3, DLP 5, DLP 6 and DLP 7 during the 2016 reporting period. Results obtained at each bore in 2016 have been consistent at each location with no trends identified in the data showing any substantial changes in results since the 2015 reporting period.

DLP3 and DLP 7 present conductivity levels above the maximum interim target of 2.00mS/cm² stated within the EMP. These sites have also expressed similar levels of EC within legacy background testing and are not causing any environmental impacts outside of the existing environment.

A copy of all monthly groundwater monitoring has been provided in Appendix 13.2 of this report.

6.4.5 Quarterly Groundwater

The site has undertaken quarterly groundwater monitoring within the surrounding environment in accordance with the criteria listed in the tables below:

Parameter	Interim Target Criteria	Baseline monitoring 9/06-8/07
Calcium	55	0.7-114 (26)
Manganese	0.15	0.01 – 0.56
Magnesium	40	0.8 – 173.0 (20)
Sodium	280	7-1770 (213)
Potassium	17.5	0 – 71 (12)
Bicarbonate	400	-
Chloride	285	15-3500 (356)
Alkalinity	185	0-534 (109)
Sulphate	175	9-753 (100)
Aluminium	0.75	<0.01-4.96 (0.50)
Arsenic	0.005	<0.005 – 0.027 (0.01)
Iron	7.5	0.03-43 (6.12)

Figure 8: Quarterly monitoring criteria - groundwater (Dunloe Sands EMP 2016).

Quarterly Groundwater monitoring was undertaken at DLP 1, DLP 3, DLP 5, DLP 6 and DLP 7 during the 2016 reporting period. Results at DLP 1 and DLP 5 are within the expected interim target criteria for these locations.

High Chloride levels identified at DLP 7 indicates a high level of saltwater intrusion at this point. This is explained as the bore is 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.

High Calcium and Magnesium results at DLP 3 are consistent with background testing and consistent with the sites location proximate to the adjacent tidal waterway.

Electrical Conductivity (EC) results at DLP 3 and DLP 7 indicate results trending in the levels observed during background testing. High sodium levels at both of these locations indicate a high level of saltwater intrusion at these points.

High Sodium levels are explained by the location of these groundwater bores 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.

DLP 7 sits immediately adjacent to the existing wetland, which 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. This trend has previously been identified in Annual Reports prepared under the previous operator and is considered to be consistent with the natural salinity levels in the local environment.

A copy of all Quarterly groundwater monitoring has been attached as Appendix 13.2 to this report.

6.4.6 Blue Green Algae

The site has undertaken Blue Green Algae monitoring within the extraction ponds at the site in accordance with the criteria listed in the tables below:

Algae and Blue-green algae	No.cells/mL (<i>M.aeruginosa</i>)	<50,000
	mm ³ /L (total biovolume)	<4

Figure 9: Monthly monitoring criteria - Blue Green Algae (Dunloe Sands EMP 2016).

Table 11 below shows the monitoring for blue-green algae undertaken at Dunloe Sands during the reporting period.

Table 11 Blue Green Algae Monitoring (Dunloe Sands)

Date	Cyanophyta	Chlorophyta
25/01/2016	Not Detected	34000
8/02/2016	Not Detected	0
24/02/2016	Not Detected	3700

Date	Cyanophyta	Chlorophyta
10/03/2016	Not Detected	1575
24/03/2016	Not Detected	7600
7/04/2016	Not Detected	9700
29/04/2016	Not Detected	11800
24/05/2016	Not Detected	5700
30/06/2016	Not Detected	28930
31/08/2016	840	61500
30/09/2016	Not Detected	920
4/10/2016	Not Detected	920
28/10/2016	Not Detected	29000
21/12/2016	Not Detected	10830

The cyanophyta results for 2016 remain not detected with the exception of monitoring undertaken on August 31, 2016. This one off Cyanophyta result is thought to be an outlier and has not been identified as a trend within the monitoring at the site.

It is noted that variations in Chlorophyta results are not identified as exceedances of the monitoring criteria listed in the EMP and the key to monitoring blue green algae activity generally lies with cyanophyta readings.

No visible algal blooms were noted by site staff during the 2016 reporting period.

6.4.7 Flood Storage Capacity

In accordance with the recommendation detailed in the IEA the site is required to undertake the following condition to confirm flood storage:

Schedule 3, Condition 17

The Proponent shall ensure that the flood storage capacity of the site is no less than the pre-existing flood storage capacity at all stages of the project. Details of the available flood storage capacity shall be reported in the AEMR.

The site has been constructed in accordance with the extraction plans approved by the Department of Planning & Environment. The entire northern extraction area has been bunded to a height of approximately 1 metre along the perimeter of disturbance.

No significant changes to the layout or the landform (with exception to the creation of the extraction ponds) has been created by the site since operations commenced with the flood storage capacity maintained in accordance with the original storage levels at the commencement of the project.

6.4.8 Internment pond monitoring

During the reporting period, starting in October 2016, staff at Dunloe Sands began monitoring the depth of the fines return pond (internment pond) to ensure the depth of sediment did not exceed the allowable limits. This was undertaken manually by boat using a counterweight device. Data was not recorded and no issues were identified throughout the period. Technological innovations were being investigated at the time of this report submission in the hope to provide greater data accuracy with respect to this survey and to ensure hard data is collected each survey.

6.5 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results are detailed in the table below.

Table 12 Environmental performance

Aspect	Approval criteria / EIS prediction	Performance during the reporting period	Trend / key management implications	Implemented/ proposed management actions
Noise	EIS predictions are all below development consent criteria.	Quarter 4 monitoring has met the Development Consent Criteria.	Meets criteria.	No action required.
Air quality	EIS predictions are all below development consent criteria.	Dust deposition results are within criteria of EPL, EIS and Development Consent. PM10 monitoring has not been undertaken.	Dust deposition has been consistent with EIS and previous Annual Review reporting.	PM10 monitor installed and operational for 2017 reporting period (in the event the site production >200,000T).
Surface Water	EIS predictions are all below development consent criteria.	Extraction ponds and creekline criteria meets EIS, EPL and Development Consent criteria.	Surface water consistent with previous trend data.	No action required.
Ground Water	EIS predictions are all below development consent criteria.	Criteria meets EIS, EPL and Development Consent criteria.	Groundwater consistent with trend data.	Groundwater assessment will be undertaken during the 2017 reporting period.

7.0 Rehabilitation and Landscape Management

As part of the site'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 Pty Ltd 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).

A copy of all rehabilitation works, checklists and photos showing work areas have been attached as Appendix 3 to this report.

At the time of reporting, there was not enough information from previous data sets to show any trends or significant changes in the revegetated areas. Further to this, when Holcim began managing the site and reviewed the monitoring record sheets, concerns the Department have regarding the quality of the detail were shared. This was to be addressed with Ramtech in 2017 with performance to be reviewed.

In 2018 or 2019, there is expected to be enough information to determine how progressive the rehabilitation is, whether it is as expected and what improvements, if any, can be made to ensure success in these areas. The data analysis will be provided in future annual returns.



Figure 4 Rehabilitation and disturbance area

Please see also the Rehabilitation Bond that was submitted to the DPE in 2016 attached in the Appendices.

Nest box surveys were undertaken during the reporting period. It was noted the microbat, rosella and cockatoo nest boxes were not being used. If this is a continued trend, a different nest box will be erected for these species with the positioning reviewed.

8.0 Community

Holcim has maintained community engagement measures during the reporting period by undertaking the following activities:

- Maintenance of a website (containing publicly available documents).
- A telephone number, email and postal address (on the website) for community complaints and feedback.
- A copy of the Complaints Register is maintained on the company website.
- All documents and items displayed on the website are regularly updated by Holcim staff.

A review of the Holcim Safety, Health & Environment (SHE) reporting database (INX) did not identify any complaints from external stakeholders during the 2016 reporting period. A copy of the register has been included as Attachment 4 to this report.

The site implemented a Community Consultative Committee under the operation of Ramtech Pty Ltd as part of the conditions of consent. All minutes from each of the meetings undertaken in 2016 have been uploaded on the Holcim webpage in the Dunloe Sand profile and attached in the link below:

<http://www.holcim.com.au/about-us/community-link/dunloe-sand-quarry-pottsville-nsw.html>

9.0 Independent Audit

The site undertook an Independent Environmental Audit (IEA) in 2016 in accordance with the timeframes of the Development Consent. All actions raised in IEA have been undertaken in accordance with the recommendations made by Consultants Mark Rigby & Associates (see Table 13).

Table 13 Independent Audit Recommendations Status

Condition No.	Recommendation	Status
Schedule 3, Condition 6	The Proponent shall ensure that dust generated by the project does not cause additional exceedances of the criteria listed in Tables 3 to 5 at any privately owned land.	<u>Complete</u> Dust deposition monitoring has been undertaken in 2016. Approval granted not to undertake PM10 until the site produces >200,000 T.

Condition No.	Recommendation	Status
Schedule 3, Condition 7	The Proponent shall prepare and implement a Dust Monitoring Program for the project to the satisfaction of the Director-General.	<u>Complete</u> Dust deposition monitoring has been undertaken in 2016. Approval granted not to undertake PM10 until the site produces >200,000 T.
Schedule 3, Condition 9	The Proponent shall aim to meet the water quality objectives in Table 6 for water in the dredge ponds and in groundwater adjacent the dredge ponds, unless otherwise approved by the Director-General.	<u>Complete</u> A surface water monitoring program is in place with VGT consultants commissioned to undertake all monitoring and sampling analysis for the 2017 reporting period.
Schedule 3, Condition 10	The Proponent shall ensure that all excavated potential acid sulfate soil fines material is returned back to below the watertable as soon as possible to prevent oxidation.	<u>Complete</u> All works associated with fines management have now been completed.
Schedule 3, Condition 11	The Proponent shall ensure that all potential acid sulfate soil fines material is discharged into the pond at a depth of no less than 3 metres from the water surface, and that all fines are deposited to a final depth of at least 8 metres from the water surface, unless an alternative method(s) is approved by OOW and the Director-	<u>Complete</u> The site has installed a pipe below the 3 metre mark in the returns pond and has also 'levelled' the returns pond. All material has been redistributed to a depth of 8 metres.
Schedule 3, Condition 17	The Proponent shall ensure that the flood storage capacity of the site is no less than the pre-existing flood storage capacity at all stages of the project. Details of the available flood storage capacity shall be reported in the AEMR.	<u>Complete</u> See section 6.4.7 (Flood Storage)
Schedule 3, Condition 22	The Blue-Green Algae Management Plan shall: a) be prepared by a suitably qualified blue-green algae expert, whose appointment has been approved by the Director-General;	<u>Complete</u> BGAMP is in place. A review of the BGAMP will be undertaken as part of the EMP review in the 2017 reporting period.
Schedule 3, Condition 24	The Groundwater Monitoring Program shall include: a) detailed baseline data on groundwater levels and quality, based on statistical analysis; b) groundwater impact assessment criteria;	<u>Complete</u> Groundwater monitoring program is in place with VGT consultants commissioned to undertake all monitoring and sampling analysis

Condition No.	Recommendation	Status
Schedule 3, Condition 26	The Proponent shall: a) rehabilitate and revegetate the 15 ha hectares of land identified in the EA (see the revegetation plan in Appendix 2); and	<u>Complete</u> Rehabilitation is being undertaken in accordance with the Landscape Management Plan.
Schedule 3, Condition 45	The Proponent shall: a) provide annual production data to the DII using the standard form for that purpose; and b) include a copy of this data in the AEMR	<u>Complete</u> Holcim has added Dunloe Sand to the accounting reporting list to DRE to align with all other NSW sites.
Schedule 5, Condition 5	Within 12 months of the date of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and relevant agencies.	<u>Complete</u> This AEMR includes information for past 12 months submitted in accordance with this condition.
Schedule 5, Condition 6	Within 2 years of the start of quarrying operations on site, and every 5 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project	<u>Complete</u> IEA has now been completed with the next IEA scheduled in 2021.
Schedule 5, Condition 10	Within 1 month of the approval of any plan/strategy/program required under this approval (or any subsequent revision of these plans/strategies/programs), or the completion of any independent environmental audit or AEMR, the Proponent shall:	<u>Complete</u> A copy of the IEA has been submitted to Tweed Shire Council in accordance with this condition.
Schedule 5, Condition 11	During the project, the Proponent shall: a) make a summary of monitoring results required under this approval publicly available at the Proponent's regional office; and	<u>Complete</u> Holcim has uploaded a summary of monitoring to the Dunloe Sand webpage on a quarterly basis since taking control of operation in August

10.0 Incidents and non compliance

10.1 PM10 Monitoring

Ramtech Pty Ltd received a PIN for not undertaking PM10 monitoring in 2016. Holcim were advised by the DP&E in writing that no PM10 monitoring would be required for the site unless sales volumes rose above 200,000t in a calendar year.

The site is not forecast to produce above 200,000t in the next reporting period, however, Holcim are aware of this requirement and will commence monitoring if required.

10.2 Re-internment of Fines

In accordance Conditions 10 & 11, Schedule 3 of Project Approval 06_0030, the site is required to undertake fines management in the following manner:

Fines Management

10. *The Proponent shall ensure that all excavated potential acid sulfate soil fines material is returned back to below the watertable as soon as possible to prevent oxidation. No potential acid sulfate soil shall be removed from the site, unless adequately neutralised in accordance with methods approved under the Soil and Water Management Plan.*

11. *The Proponent shall ensure that all potential acid sulfate soil fines material is discharged into the pond at a depth of no less than 3 metres from the water surface, and that all fines are deposited to a final depth of at least 8 metres from the water surface, unless an alternative method(s) is approved by OOW and the Director-General.*

Staff reviewed all obligations associated with Fines Management at Dunloe Sands in 2016 and commenced implementation of corrective actions detailed below, in order to ensure compliance with PA 06_0030.

Table 14 Re-internment of fines (Implementation Status)

<u>Corrective Action</u>	<u>Completion Date</u>	<u>Status</u>
All staff will undertake refresher training in dealing with PASS and re-internment activities of fines. Refresher training will be delivered in Acid Sulfate Soil Management.	October 31, 2016.	<u>Complete</u>
Site staff will undertake monthly pond depth surveys using the attached template (see Attachment 1) to ensure all fines are interned below a depth of approximately 8 metres (+/- 1 metre) on the bed of the pond).	October 31, 2016.	<u>Complete</u>
Excess fines removed from the existing pond required to be treated with lime to neutralise any PASS materials and stockpiled onsite, will be done in accordance with 7.4.3 Acid Sulfate Soil Management Plan.	November 30, 2016.	<u>Complete</u>
Staff will engage an earthmoving contractor to remove all existing fines (currently placed above 8 metres depth) from the pond using a long arm excavator.	November 30, 2016.	<u>Complete</u>
Staff will extend the existing discharge pipe into the pond and install a maneuverable pipe extension to ensure all fines are discharged below 3 metres and settle below 8 metres depth.	December 15, 2016.	<u>Complete</u>

<u>Corrective Action</u>	<u>Completion Date</u>	<u>Status</u>
<p>Staff will implement visual daily inspections at the discharge pipe and include these inspections into the existing Environmental Hazard & Housekeeping checklists to ensure:</p> <ul style="list-style-type: none"> - No fines build up around the pipe. - All material discharged from the pipe is below the 3 metre mark. 	December 15, 2016.	<u>Complete</u>

11.0 Other reportable information

11.1 Potential Acid Sulfate Soil Management

Under the operation of Holcim, the site has undertaken a number of improvement works to ensure the effective management of Acid Sulphate Soils (ASS) and Potential Acid Sulphate Soils (PASS) during extraction, processing and sales operations.

11.2 Reserve Development

Sand core drilling was undertaken in accordance with the EMP and has been developed in line with the following activities:

1. A minimum of 2 sand cores are drilled per hectare.
2. All samples are sent to Soil Surveys Australia Pty Ltd for immediate testing in accordance with the ASSMAC Guidelines.
3. Soil Surveys Australia Pty Ltd (NATA Accredited lab) test results provided a volume per m² for lime to be seeded across each hectare before stripping takes place.
4. Lime was spread across the reserve and then stripped to expose the loam and sand product.
5. Stockpiled topsoil is tested by a NATA accredited laboratory to confirm there is no presence of PASS.

Extraction

Excavation of loam, dredging and washing activities undertaken in accordance with the EMP and has been developed in line with the following activities:

1. Excavated loam is stockpiled and tested by NATA accredited laboratory to confirm there is no presence of PASS.
2. In the event that PASS is present in loam stockpiles a NATA accredited laboratory will provide a detailed report with liming rates for lime to be added by Holcim staff to screened loam to ensure no presence of PASS.
3. All dredged material is sent through the plant with fines re-interred below the 3

meter water mark at a depth of 10 metres in the returns pond.

4. Cardno test production sand stockpiles on a testing regime to ensure that no PASS are present in concrete sands.

Stockpiling & Sales

Holcim have developed and implemented a testing regime using a NATA accredited laboratory to ensure compliance with PASS requirements for all sales of sand materials. This process includes:

1. Routine sampling of sales material stockpiles at designated locations.
2. Implementation of a series of sales and production stockpiles to ensure any materials that have not been tested are isolated until tests confirm no presence of PASS thereafter sales loading occurs.

11.1 Development of a new site EMP

As part of the implementation of Holcim operating and environmental standards, work commenced in 2016 to review and update the site EMP.

The revised and updated EMP aims to simplify environmental management for site staff implementing the requirements of the plan as well as meeting the obligations of the Development Consent. With the assistance of GHD consultants, Holcim will submit a revised copy of the EMP to the Department of Planning & Environment in Quarter 2, 2017.

12.0 Activities to be completed in the next reporting period

Holcim staff will undertake the following works and improvement measures and projects in 2017 to ensure compliance with the consent and to ensure that effective environmental management controls are in place and operating in accordance with the requirements of the Consent.

Table 12 - Improvement Measure (Next reporting period)

Improvement Measure	Activities
Independent Environmental Audit	Staff will close out all actions associated with the 2016 IEA.
Progressive Rehabilitation	The site will continue to progressively rehabilitate available areas on the northern and eastern boundary
Development Application (Truck Movements Modification)	Application to modify the current Project Approval condition limiting truck movement to 4 (in and out) per hour.
EMP Review	Development of a new Environmental Management Plan with alignment to Holcim Australia's Environmental Management System.

13.0 Appendices

13.0 Appendices

13.1 2016 Noise Monitoring results (Planit Consultants)

MONTH	Result	MONTH	Result
a. January 2015 – Friday the 30 th		b. February 2015 – Thursday the 26 th	
c. March 2015 – Monday the 30 th		d. April 2015 – Thursday the 30 th	
e. May 2015 – Friday the 29 th		f. June 2015 – Monday the 29 th	
g. July 2015 Thursday the 30 th		h. August 2015 – Friday the 28 th	
i. September 2015 – Wednesday the 30 th		j. October 2015 – Friday the 30 th	
k. November 2015 – Saturday the 28 th		l. December 2015 – Tuesday the 22 nd	
m. January 2016 – 28 th – Thursday		n. February 2016 – Wednesday the 24 th	
o. March 2016 – Monday the 28 th		p. April 2016 – Thursday the 28 th	
q. May 2016 – Tuesday the 31 st		r. June 2016 – Wednesday the 29 th	
s. July 2016 – Monday the 25 th		t. August 2016 – Tuesday the 30 th	
u. September – Tuesday the 27 th		v. October – Friday the 28 th	
w. November 2016 – Monday the 21 st		x. December 2016 – Thursday the 15 th	
y. January 2017 – Thursday the 26 th		z. February 2017 – Thursday the 23 rd	

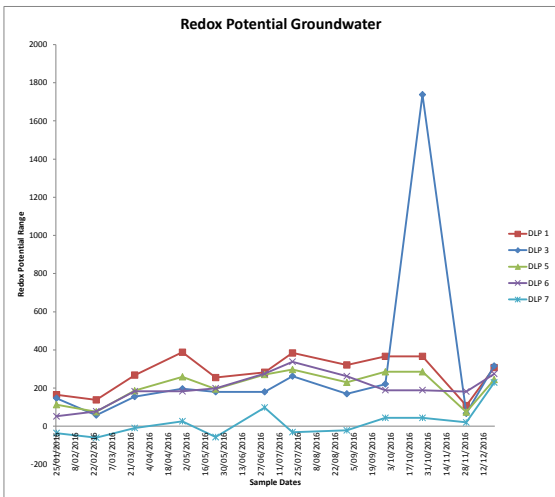
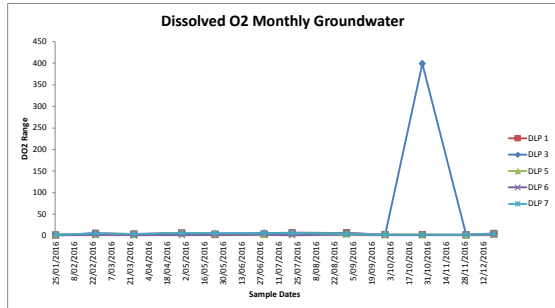
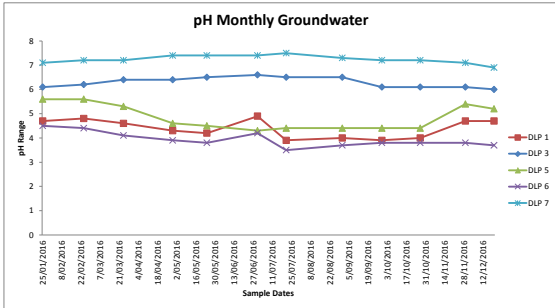
13.2 Water Monitoring (Surface & Groundwater)

Quarterly Groundwater Monitoring 2016

Date	Sample	Calcium	Magnesium	Sodium	Potassium	Sulfur as Sulfate	Aluminium (Total)	Arsenic (Total)	Iron (Total)	Manganese (Total)	Chloride	Alkalinity as CaCO ₃	Bicarbonate HCO ₃
24/03/2016	DLP 1	0.373	0.233	10.207	<5	9.403	0.272	0.001	4.224	0.007	17	2	2
24/03/2016	DLP 3	78.033	117.111	1284.977	44.191	176.114	0.07	0.001	2.183	0.626	2650	123	123
24/03/2016	DLP 5	2.898	3.881	42.045	<5	13.372	0.148	<0.001	4.597	0.022	112	6	6
24/03/2016	DLP 6	55.477	23.878	17.762	10.272	1382.076	94.142	0.026	428	3.75	23	<1	<1
24/03/2016	DLP 7	18.205	38.011	637.379	26.082	260.218	0.356	<0.001	1.772	0.084	738	363	363
30/06/2016	DLP 1	3.503	0.353	10.561	<5	9.538	0.471	0.001	2.508	0.014	NRR	NRR	NRR
30/06/2016	DLP 3	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR
30/06/2016	DLP 5	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR
30/06/2016	DLP 6	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR
30/06/2016	DLP 7	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR
31/08/2016	DLP 1	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR
31/08/2016	DLP 3	78	121	1350	46	170	NRR	0.001	3.33	0.541	2650	121	NRR
31/08/2016	DLP 5	2.2	2.8	57	<5	28	NRR	0.001	11.2	0.012	89	<1	NRR
31/08/2016	DLP 6	24	22	14	<5	1100	NRR	0.001	241	1.96	790	<1	NRR
31/08/2016	DLP 7	24	35	604	24	217	NRR	0.001	2.07	0.082	760	369	NRR
20/12/2016	DLP 1	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR	NRR
20/12/2016	DLP 3	76	114	1.280	43	182	NRR	0.001	2.4	0.541	2700	121	NRR
20/12/2016	DLP 5	2.3	2.9	47	<5	21	NRR	0.001	4.55	0.012	50	5	NRR
20/12/2016	DLP 6	21	22	16	9	1080	NRR	0.001	259	1.96	<1	<1	NRR
20/12/2016	DLP 7	18	38	648	25	263	NRR	0.001	1.85	0.082	372	372	NRR

Monthly Groundwater Monitoring 2016

Date	Sample	pH	Conductivity	DO (membrane electrode)	*Redox Potential
25/01/2016	DLP 1	4.7	95	1.6	165
24/02/2016	DLP 1	4.8	98	5.7	138
24/03/2016	DLP 1	4.6	104	3.8	268
29/04/2016	DLP 1	4.3	96	6.4	388
24/05/2016	DLP 1	4.2	106	2.7	255
30/06/2016	DLP 1	4.9	101.1	3.6	283
21/07/2016	DLP 1	3.9	142.2	6.8	384
31/08/2016	DLP 1	4	140	6.5	321
29/09/2016	DLP 1	3.9	151	2.5	366
27/10/2016	DLP 1	4	151	2.5	366
29/11/2016	DLP 1	4.7	116	1.9	108
20/12/2016	DLP 1	4.7	131	5.2	307.1
25/01/2016	DLP 3	6.1	7395	2.8	147
24/02/2016	DLP 3	6.2	7372	5.7	58
24/03/2016	DLP 3	6.4	7406	3.5	155
29/04/2016	DLP 3	5.4	7417	6.4	196
24/05/2016	DLP 3	6.5	7304	5.4	180
30/06/2016	DLP 3	6.6	7250.2	6.4	180
21/07/2016	DLP 3	6.5	6868.2	6.8	262
31/08/2016	DLP 3	6.5	7281	5.8	170
29/09/2016	DLP 3	6.1	7313	2.5	221
27/10/2016	DLP 3	6.1	7313	3.9	173.8
29/11/2016	DLP 3	6.1	7376	1.8	67
20/12/2016	DLP 3	6	7673	4	315.9
25/01/2016	DLP 5	5.6	376	3.1	113
24/02/2016	DLP 5	5.6	335	2.9	76
24/03/2016	DLP 5	5.3	412	2.4	186
29/04/2016	DLP 5	4.6	285	6.2	269
24/05/2016	DLP 5	4.5	300	4.7	195
30/06/2016	DLP 5	4.3	385.7	2.9	271
21/07/2016	DLP 5	4.4	321.5	5.2	297
31/08/2016	DLP 5	4.4	348	4.4	230
29/09/2016	DLP 5	4.4	399	2.6	285
27/10/2016	DLP 5	4.4	399	2.5	285
29/11/2016	DLP 5	5.4	5.4	1.6	74
20/12/2016	DLP 5	5.2	298	3.3	244.5
25/01/2016	DLP 6	4.5	2056	1.1	52
24/02/2016	DLP 6	4.4	2056	2.3	78
24/03/2016	DLP 6	4.1	2031	1.5	183
29/04/2016	DLP 6	3.9	1997	1.9	183
24/05/2016	DLP 6	3.8	1974	2.8	199
30/06/2016	DLP 6	4.2	1810.2	3.3	275
21/07/2016	DLP 6	3.5	1731.9	1.3	338
31/08/2016	DLP 6	3.7	1763	3.6	262
29/09/2016	DLP 6	3.9	1738	1.9	189
27/10/2016	DLP 6	3.8	1738	1.9	189
29/11/2016	DLP 6	3.8	3.8	2.3	182
20/12/2016	DLP 6	3.7	1752	2.1	274.7
25/01/2016	DLP 7	7.1	3344	1.8	-36
24/02/2016	DLP 7	7.2	3444	5.5	-60
24/03/2016	DLP 7	7.2	3399	4.1	-9
29/04/2016	DLP 7	7.4	3374	6.4	26
24/05/2016	DLP 7	7.4	3382	5.5	-57
30/06/2016	DLP 7	7.4	3404.7	5.7	88
21/07/2016	DLP 7	7.5	3169	6.5	-31
31/08/2016	DLP 7	7.3	3364	3.7	-22
29/09/2016	DLP 7	7.2	3558	2.4	44
27/10/2016	DLP 7	7.2	3558	2.4	44
29/11/2016	DLP 7	7.1	7.1	2.4	20
20/12/2016	DLP 7	6.9	3527	4.5	229.3



Quarterly Pond Monitoring 2016

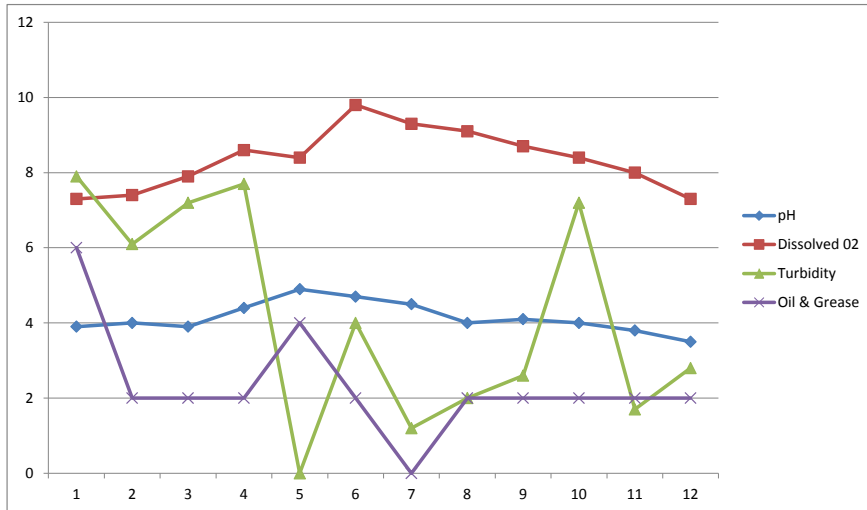
Test	24/03/2016	30/06/2016	29/09/2016	20/12/2016
Chlorophyll "a"	NRR	16	10	2
Ammonia	NRR	<0.02	<0.02	0.03
Calcium	112.707	57.453	NRR	NRR
Total Phosphorous	0.07	0.02	NRR	<0.02
Total N	0.12	0.31	NRR	0.19
Magnesium	14.14	7.218	7.9	9.3
Sodium	43.284	24.376	27	29
Potassium	9.315	5.389	6	7
Sulfate	382.371	185.144	220	251
Aluminium (total)	10.928	4.505	2.83	4.01
Arsenic (total)	0.002	0.002	0.002	0.001
Iron (total)	1.24	0.41	0.41	0.71
Manganese	0.881	0.555	0.393	0.476

Quarterly Creek Monitoring 2016

Date	Sample Description	pH	Conductivity	DO (membrane electrode)	Suspended Solids	Total Phosphorus-P	Total-N
24/03/2016	SW 3	3.8	2548	3.6	24	0.06	1.16
24/03/2016	SW 4	3.8	2721	5.5	25	0.06	1.15
24/03/2016	SW 9	6.1	4157	6.5	10	0.04	0.88
24/03/2016	SW 10	5.3	2967	7.1	4.8	0.04	0.77
30/06/2016	SW 3	5.5	1501.6	6.8	25	0.03	0.87
30/06/2016	SW 4	6.5	3468.2	8.4	10	0.02	0.7
30/06/2016	SW 9	6.6	2577.4	7.6	6.3	0.02	0.78
30/06/2016	SW 10	6.7	4893.3	7.1	4.8	0.02	0.61
29/09/2016	SW3	6.7	38 914	6.1	5.6	0.02	0.23
29/09/2016	SW4	6.9	37 551	9.6	66	0.02	0.34
29/09/2016	SW9	6.8	35 815	7.4	35	<0.02	0.26
29/09/2016	SW10	6.9	35 928	6.9	36	0.02	0.58
20/12/2016	SW3	7.4	36 425	7.1	6.2	<0.02	0.31
20/12/2016	SW4	6.9	17 005	6.9	8.5	0.03	0.49
20/12/2016	SW9	6.9	21 421	6.9	6.4	0.04	0.82
20/12/2016	SW10	6.9	7210	7.8	10	0.04	0.81

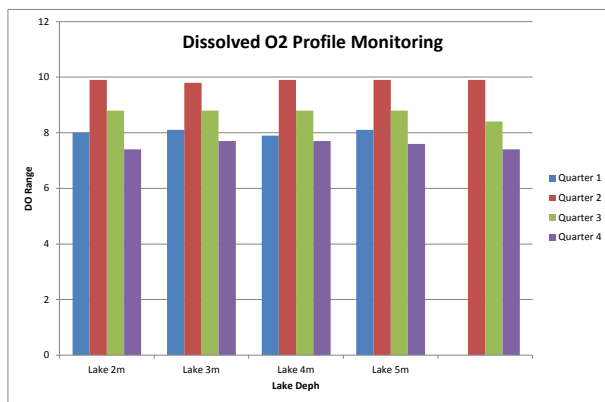
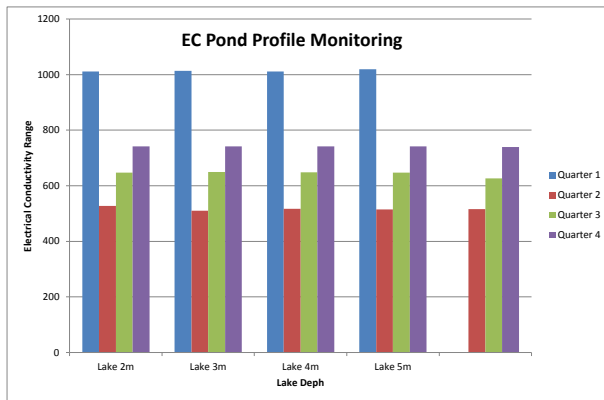
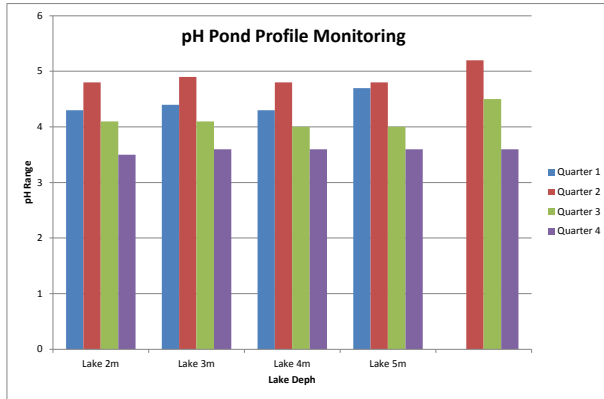
Monthly Pond Monitoring 2016

Date	pH	EC	Dissolved O2	Turbidity	Oil & Grease
25/01/2016	3.9	1002	7.3	7.9	6
24/02/2016	4	1021	7.4	6.1	2
24/03/2016	3.9	1060	7.9	7.2	2
29/04/2016	4.4	1037	8.6	7.7	2
24/05/2016	4.9	1029	8.4	-	4
30/06/2017	4.7	518.9	9.8	4	2
21/07/2016	4.5	546.4	9.3	1.2	0
31/08/2016	4	618	9.1	2	2
29/09/2016	4.1	651	8.7	2.6	2
27/10/2016	4	684	8.4	7.2	2
29/11/2016	3.8	714	8	1.7	2
20/12/2016	3.5	742	7.3	2.8	2



Quarterly Vertical Profile Monitoring 2016

Date	Sample Description	pH	Conductivity	DO (membrane electrode)
24/03/2016	Lake 2m	4.3	1011	8
24/03/2016	Lake 3m	4.4	1014	8.1
24/03/2016	Lake 4m	4.3	1011	7.9
24/03/2016	Lake 5m	4.7	1019	8.1
30/06/2016	Lake 2m	4.8	527.6	9.9
30/06/2016	Lake 3m	4.9	510.8	9.8
30/06/2016	Lake 4m	4.8	517.4	9.9
30/06/2016	Lake 5m	4.8	515.5	9.9
30/06/2016	Lake 6m	5.2	516.6	9.9
29/09/2016	Lake 2m	4.1	647	8.8
29/09/2016	Lake 3m	4.1	650	8.8
29/09/2016	Lake 4m	4	648	8.8
29/09/2016	Lake 5m	4	647	8.8
29/09/2016	Lake 6m	4.5	627	8.4
20/12/2016	Lake 2m	3.5	742	7.4
20/12/2016	Lake 3m	3.6	742	7.7
20/12/2016	Lake 4m	3.6	742	7.7
20/12/2016	Lake 5m	3.6	742	7.6
20/12/2016	Lake 6m	3.6	740	7.4



Blue Green Algae Monitoring (Pond) 2016

Date	Sample Description	Sm#	pH	Conductivity	DO (membrane electrode)	Turbidity	Suspended Solids	Total Phosphorus-P	Total-N
24/03/2016	SW 3	7	3.8	2548	3.6	54	24	0.06	1.16
24/03/2016	SW 4	8	3.8	2721	5.5	54	25	0.06	1.15
24/03/2016	SW 9	9	6.1	4157	6.5	13	10	0.04	0.88
24/03/2016	SW 10	10	5.3	2967	7.1	7.4	4.8	0.04	0.77
30/06/2016	SW 3	7	5.5	1501.6	6.8	31	25	0.03	0.87
30/06/2016	SW 4	8	6.5	3468.2	8.4	14	10	0.02	0.7
30/06/2016	SW 9	9	6.6	2577.4	7.6	19	6.3	0.02	0.78
30/06/2016	SW 10	10	6.7	4893.3	7.1	14	4.8	0.02	0.61

13.3 Rehabilitation Management



FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET

General Management	Weeds	Vegetation regeneration
<p>Has there been a fire within the last quarter? <u>NO</u></p> <p>Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? <u>NO</u></p> <p>Is there evidence of rubbish dumping within the rehabilitation zones? <u>NO</u></p> <p>Is there evidence of plant theft within the rehabilitation zone? _____</p> <p>Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic? <u>NO</u></p> <p>If yes, acknowledge below what works were undertaken to rectify/restore and the date <u> </u></p>	<p>Have any areas of weeds re-established within the rehabilitation zones during the last quarter? <u>NO</u></p> <p>What species? _____</p> <p>What management was undertaken to eradicate these weeds? _____</p> <p>If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan. _____</p>	<p>Natural regeneration is occurring in (record height range estimate):</p> <ul style="list-style-type: none"> - Tree species <u>3-5</u> - Shrub species <u>2m</u> - ground covers <u>1m</u> <p>What are the dominant species within each layer?</p> <ul style="list-style-type: none"> - Tree <u>Banksia integrifolia</u> - Shrub <u>Syzygium oleosum</u> - ground covers <u>Themeda australis</u> <p>Have you noticed any new native plant species since the last monthly inspection? <u>NO</u></p> <p>If yes name the species or take a photograph _____</p> <p>Acknowledge that the required routine photographs have been taken within the rehabilitation zones _____</p>
<p>Biodiversity</p> <p>Have you spotted native fauna within the rehabilitation zone during inspection? <u>YES</u></p> <p>If yes, what types?</p> <p>Koala _____</p> <p>Kangaroo/wallaby _____</p> <p>Possums/glidens _____</p> <p>Small mammal (i.e. bandicoot, echidna) _____</p> <p>Reptiles (i.e. snakes/lizards) _____</p> <p>Birds of prey <u>yes</u></p> <p>Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) _____</p> <p>Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) <u>yes</u></p> <p>Glossy Black Cockatoos _____</p> <p>Other _____</p>	<p>Modifications</p> <p>Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit? <u>NO</u></p> <p>What actions were undertaken to remove any illegal modifications? _____</p> <p>Condition of fences</p> <ul style="list-style-type: none"> - <u>Good</u> - Need minor repair - Poor (need replacement) 	<p>Are any of the following performance criteria exceeded (refer Section 4.5 below)?</p> <p>Declared Weeds? <u>NO</u></p> <p>Extent of other Weeds? <u>NO</u></p> <p>Survival Rate of Plants? <u>NO</u></p> <p>Condition of Plants? <u>NO</u></p> <p>Canopy Coverage? <u>NO</u></p> <p>Tree, Small Tree & Shrub Diversity? <u>NO</u></p> <p>Groundcover Coverage? <u>NO</u></p> <p>General Coverage/Success? <u>NO</u></p> <p>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).</p>



FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET

General Management	Weeds	Vegetation regeneration
<p>Has there been a fire within the last quarter? <u>NO</u></p> <p>Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? <u>NO</u></p> <p>Is there evidence of rubbish dumping within the rehabilitation zones? <u>NO</u></p> <p>Is there evidence of plant theft within the rehabilitation zone? <u>NO</u></p> <p>Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic? <u>NO</u></p> <p>If yes, acknowledge below what works were undertaken to rectify/restore and the date</p>	<p>Have any areas of weeds re-established within the rehabilitation zones during the last quarter? <u>NO</u></p> <p>What species? _____</p> <p>What management was undertaken to eradicate these weeds? _____</p> <p>If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan. _____</p>	<p>Natural regeneration is occurring in (record height range estimate):</p> <ul style="list-style-type: none"> - Tree species <u>3-5</u> - Shrub species <u>2</u> - ground covers <u>1m</u> <p>What are the dominant species within each layer?</p> <ul style="list-style-type: none"> - Tree <u>Bambusia integrifolia</u> - Shrub <u>Syzygium oleosum</u> - ground covers <u>Themeda australis</u> <p>Have you noticed any new native plant species since the last monthly inspection? <u>NO</u></p> <p>If yes name the species or take a photograph _____</p> <p>Acknowledge that the required routine photographs have been taken within the rehabilitation zones</p>
<p>Biodiversity</p> <p>Have you spotted native fauna within the rehabilitation zone during inspection? <u>YES</u></p> <p>If yes, what types?</p> <p>Koala _____</p> <p>Kangaroo/wallaby _____</p> <p>Possums/glidens _____</p> <p>Small mammal (i.e. bandicoot, echidna) _____</p> <p>Reptiles (i.e. snakes/lizards) <u>YES</u></p> <p>Birds of prey <u>YES</u></p> <p>Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) <u>YES</u></p> <p>Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) <u>YES</u></p> <p>Glossy Black Cockatoos _____</p> <p>Other _____</p>	<p>Modifications</p> <p>Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit? <u>NO</u></p> <p>What actions were undertaken to remove any illegal modifications? _____</p> <p>Condition of fences</p> <ul style="list-style-type: none"> - <u>Good</u> - Need minor repair - Poor (need replacement) 	<p>Are any of the following performance criteria exceeded (refer Section 4.5 below)?</p> <p>Declared Weeds? <u>NO</u></p> <p>Extent of other Weeds? <u>NO</u></p> <p>Survival Rate of Plants? <u>NO</u></p> <p>Condition of Plants? <u>NO</u></p> <p>Canopy Coverage? <u>NO</u></p> <p>Tree, Small Tree & Shrub Diversity? <u>NO</u></p> <p>Groundcover Coverage? <u>NO</u></p> <p>General Coverage/Success? <u>NO</u></p> <p>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).</p>



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ZONE 1C

FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET

General Management	Weeds	Vegetation regeneration
<p>Has there been a fire within the last quarter? <u>NO</u></p> <p>Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? <u>NO</u></p> <p>Is there evidence of rubbish dumping within the rehabilitation zones? <u>NO</u></p> <p>Is there evidence of plant theft within the rehabilitation zone? <u>NO</u></p> <p>Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic? <u>NO</u></p> <p>If yes, acknowledge below what works were undertaken to rectify/restore and the date _____</p>	<p>Have any areas of weeds re-established within the rehabilitation zones during the last quarter? <u>NO</u></p> <p>What species? _____</p> <p>What management was undertaken to eradicate these weeds? _____</p> <p>If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan. _____</p>	<p>Natural regeneration is occurring in (record height range estimate):</p> <ul style="list-style-type: none"> - Tree species <u>4-8</u> - Shrub species <u>2-4</u> - ground covers <u>0-1</u> <p>What are the dominant species within each layer?</p> <ul style="list-style-type: none"> - Tree <u>metelucea</u> - Shrub <u>Banksia</u> - ground covers <u>Austromyrtus Dulce</u> <p>Have you noticed any new native plant species since the last monthly inspection? <u>NO</u></p> <p>If yes name the species or take a photograph _____</p> <p>Acknowledge that the required routine photographs have been taken within the rehabilitation zones _____</p>
<p>Biodiversity</p> <p>Have you spotted native fauna within the rehabilitation zone during inspection? <u>YES</u></p> <p>If yes, what types?</p> <p>Koala _____</p> <p>Kangaroo/wallaby _____</p> <p>Possums/glidens <u>YES</u></p> <p>Small mammal (i.e. bandicoot, echidna) _____</p> <p>Reptiles (i.e. snakes/lizards) <u>YES</u></p> <p>Birds of prey <u>YES</u></p> <p>Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) _____</p> <p>Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) <u>YES</u></p> <p>Glossy Black Cockatoos _____</p> <p>Other _____</p>	<p>Modifications</p> <p>Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit? <u>NO</u></p> <p>What actions were undertaken to remove any illegal modifications? _____</p> <p>Condition of fences</p> <ul style="list-style-type: none"> - <u>Good</u> - Need minor repair - Poor (need replacement) 	<p>Are any of the following performance criteria exceeded (refer Section 4.5 below)?</p> <p>Declared Weeds? <u>NO</u></p> <p>Extent of other Weeds? <u>NO</u></p> <p>Survival Rate of Plants? <u>NO</u></p> <p>Condition of Plants? <u>NO</u></p> <p>Canopy Coverage? <u>NO</u></p> <p>Tree, Small Tree & Shrub Diversity? <u>NO</u></p> <p>Groundcover Coverage? <u>NO</u></p> <p>General Coverage/Success? <u>NO</u></p> <p>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).</p>

FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET

General Management	Weeds	Vegetation regeneration
<p>Has there been a fire within the last quarter? <u>NO</u></p> <p>Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? <u>NO</u></p> <p>Is there evidence of rubbish dumping within the rehabilitation zones? <u>NO</u></p> <p>Is there evidence of plant theft within the rehabilitation zone? <u>NO</u></p> <p>Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic? <u>NO</u></p> <p>If yes, acknowledge below what works were undertaken to rectify/restore and the date _____</p>	<p>Have any areas of weeds re-established within the rehabilitation zones during the last quarter? <u>NO</u></p> <p>What species? _____</p> <p>What management was undertaken to eradicate these weeds? _____</p> <p>If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan. _____</p>	<p>Natural regeneration is occurring in (record height range estimate):</p> <ul style="list-style-type: none"> - Tree species <u>4-8m</u> - Shrub species <u>1-3m</u> - ground covers <u>0-1m</u> <p>What are the dominant species within each layer?</p> <ul style="list-style-type: none"> - Tree <u>Melaleuca</u> - Shrub <u>Dumetia</u> - ground covers <u>Themeda crinitata</u> <p>Have you noticed any new native plant species since the last monthly inspection? <u>NO</u></p> <p>If yes name the species or take a photograph _____</p> <p>Acknowledge that the required routine photographs have been taken within the rehabilitation zones _____</p>
<p>Biodiversity</p> <p>Have you spotted native fauna within the rehabilitation zone during inspection?</p> <p>If yes, what types? <u>yes</u></p> <p>Koala _____</p> <p>Kangaroo/wallaby _____</p> <p>Possums/glidens _____</p> <p>Small mammal (i.e. bandicoot, echidna) _____</p> <p>Reptiles (i.e. snakes/lizards) _____</p> <p>Birds of prey <u>yes</u></p> <p>Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) <u>yes</u></p> <p>Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) <u>yes</u></p> <p>Glossy Black Cockatoos _____</p> <p>Other _____</p>	<p>Modifications</p> <p>Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit?</p> <p><u>NO</u></p> <p>What actions were undertaken to remove any illegal modifications? _____</p> <p>Condition of fences</p> <ul style="list-style-type: none"> - <u>Good</u> - Need minor repair - Poor (need replacement) 	<p>Are any of the following performance criteria exceeded (refer Section 4.5 below)?</p> <p>Declared Weeds? <u>NO</u></p> <p>Extent of other Weeds? <u>NO</u></p> <p>Survival Rate of Plants? <u>NO</u></p> <p>Condition of Plants? <u>NO</u></p> <p>Canopy Coverage? <u>NO</u></p> <p>Tree, Small Tree & Shrub Diversity? <u>NO</u></p> <p>Groundcover Coverage? <u>NO</u></p> <p>General Coverage/Success? <u>NO</u></p> <p>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).</p>



FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET

General Management	Weeds	Vegetation regeneration
<p>Has there been a fire within the last quarter? <u>NO</u></p> <p>Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? <u>NO</u></p> <p>Is there evidence of rubbish dumping within the rehabilitation zones? <u>NO</u></p> <p>Is there evidence of plant theft within the rehabilitation zone? <u>NO</u></p> <p>Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic? <u>NO</u></p> <p>If yes, acknowledge below what works were undertaken to rectify/restore and the date</p>	<p>Have any areas of weeds re-established within the rehabilitation zones during the last quarter? <u>NO</u></p> <p>What species? _____</p> <p>What management was undertaken to eradicate these weeds? _____</p> <p>If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan. _____</p>	<p>Natural regeneration is occurring in (record height range estimate):</p> <ul style="list-style-type: none"> - Tree species <u>4-8m</u> - Shrub species <u>1-3m</u> - ground covers <u>0-1m</u> <p>What are the dominant species within each layer?</p> <ul style="list-style-type: none"> - Tree <u>Melaleuca/Casuarina</u> - Shrub <u>Callistemon parvifolius</u> - ground covers <u>Anstrangium dufres</u> <p>Have you noticed any new native plant species since the last monthly inspection? <u>YES</u></p> <p>If yes name the species or take a photograph <u>Acacia melanocoma</u></p> <p>Acknowledge that the required routine photographs have been taken within the rehabilitation zones <u>YES</u></p>
<p>Biodiversity</p> <p>Have you spotted native fauna within the rehabilitation zone during inspection? <u>YES</u></p> <p>If yes, what types?</p> <p>Koala _____</p> <p>Kangaroo/wallaby _____</p> <p>Possums/glders _____</p> <p>Small mammal (i.e. bandicoot, echidna) _____</p> <p>Reptiles (i.e. snakes/lizards) <u>YES</u></p> <p>Birds of prey <u>YES</u></p> <p>Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) <u>YES</u></p> <p>Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) _____</p> <p>Glossy Black Cockatoos _____</p> <p>Other _____</p>	<p>Modifications</p> <p>Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit? <u>NO</u></p> <p>What actions were undertaken to remove any illegal modifications? _____</p> <p>Condition of fences</p> <p><u>Good</u></p> <ul style="list-style-type: none"> - Need minor repair - Poor (need replacement) 	<p>Are any of the following performance criteria exceeded (refer Section 4.5 below)?</p> <p>Declared Weeds? <u>NO</u></p> <p>Extent of other Weeds? <u>NO</u></p> <p>Survival Rate of Plants? <u>NO</u></p> <p>Condition of Plants? <u>NO</u></p> <p>Canopy Coverage? <u>NO</u></p> <p>Tree, Small Tree & Shrub Diversity? <u>NO</u></p> <p>Groundcover Coverage? <u>NO</u></p> <p>General Coverage/Success? <u>NO</u></p> <p>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).</p>



FORM A: ROUTINE QUARTERLY REHABILITATION MONITORING SHEET

General Management	Weeds	Vegetation regeneration
<p>Has there been a fire within the last quarter? <u>NO</u></p> <p>Do the bushfire trails or adjacent pasture areas require slashing or maintenance to reduce fire risk? <u>NO</u></p> <p>Is there evidence of rubbish dumping within the rehabilitation zones? <u>NO</u></p> <p>Is there evidence of plant theft within the rehabilitation zone? <u>NO</u></p> <p>Does it appear that the rehabilitation zone has been utilized for stockpiling, vehicle parking, building waste dumping, cattle grazing or person traffic? <u>NO</u></p> <p>If yes, acknowledge below what works were undertaken to rectify/restore and the date _____</p>	<p>Have any areas of weeds re-established within the rehabilitation zones during the last quarter? <u>NO</u></p> <p>What species? _____</p> <p>What management was undertaken to eradicate these weeds? _____</p> <p>If management was undertaken acknowledge that such was performed in accordance with the approved rehabilitation management plan. _____</p>	<p>Natural regeneration is occurring in (record height range estimate):</p> <ul style="list-style-type: none"> - Tree species <u>5-8m</u> - Shrub species <u>2-3m</u> - ground covers <u>1m</u> <p>What are the dominant species within each layer?</p> <ul style="list-style-type: none"> - Tree <u>Banksia integrifolia</u> - Shrub _____ - ground covers <u>Anastrophyllum elucis</u> <p>Have you noticed any new native plant species since the last monthly inspection? <u>NO</u></p> <p>If yes name the species or take a photograph _____</p> <p>Acknowledge that the required routine photographs have been taken within the rehabilitation zones _____</p>
<p>Biodiversity</p> <p>Have you spotted native fauna within the rehabilitation zone during inspection? <u>YES</u></p> <p>If yes, what types?</p> <p>Koala _____</p> <p>Kangaroo/wallaby _____</p> <p>Possums/glders <u>YES</u></p> <p>Small mammal (i.e. bandicoot, echidna) _____</p> <p>Reptiles (i.e. snakes/lizards) <u>YES</u></p> <p>Birds of prey <u>YES</u></p> <p>Large nectar feeding birds (i.e. lorikeets, parrots, cockatoos) <u>YES</u></p> <p>Small tree and ground birds (i.e. finches, fairy wrens, treecreepers) <u>YES</u></p> <p>Glossy Black Cockatoos _____</p> <p>Other _____</p>	<p>Modifications</p> <p>Have there been any structural additions (eg. new tracks, buildings) to the rehabilitation zones since the last visit? <u>NO</u></p> <p>What actions were undertaken to remove any illegal modifications? _____</p> <p>Condition of fences</p> <ul style="list-style-type: none"> - <u>Good</u> - Need minor repair - Poor (need replacement) 	<p>Are any of the following performance criteria exceeded (refer Section 4.5 below)?</p> <p>Declared Weeds? <u>NO</u></p> <p>Extent of other Weeds? <u>NO</u></p> <p>Survival Rate of Plants? <u>NO</u></p> <p>Condition of Plants? <u>NO</u></p> <p>Canopy Coverage? <u>NO</u></p> <p>Tree, Small Tree & Shrub Diversity? <u>NO</u></p> <p>Groundcover Coverage? <u>NO</u></p> <p>General Coverage/Success? <u>NO</u></p> <p>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).</p>



PROFORMA FOR ASSESSING SITE CONDITION
PROJECT DESCRIPTION *Note: where options are given, put an 'X' next to the appropriate term(s):*

Project name: DUNLOE PARK SAND PROJECT
 Site name: ZONE 1 A + B
 Type of on-grounds: Assisted Natural Regeneration
 Current assessment conducted by: DAVE WOODLEE
 Overall comments on site condition: ~~Zone Regeneration~~ zone Regeneration beyond expectations.
 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.
Many More seedlings (double up and reaching 1m or higher)

DETAILED DESCRIPTION OF SITE CONDITION *Complete table quarterly, or if conditions have changed since last assessment. Also draw map.*

Rating/ zone	Area (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				A	A	A	A		(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%) <i>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% x 1) + (20% x 0.5) + (10% x 0) = 80%</i>									80%



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

Project name: DUNLOE PARK SAND PROJECT Project ID: 06-0030

Site name: ZONE 1C Site ID: _____

Type of on-grounds: Assisted Natural Regeneration Years since site commenced: _____

When was this site last assessed? _____

Current assessment conducted by: Paul Woodree Date of current assessment: _____

Overall comments on site condition: Condition of Zone very good minimal weed infestation and good regrowth through whole zone

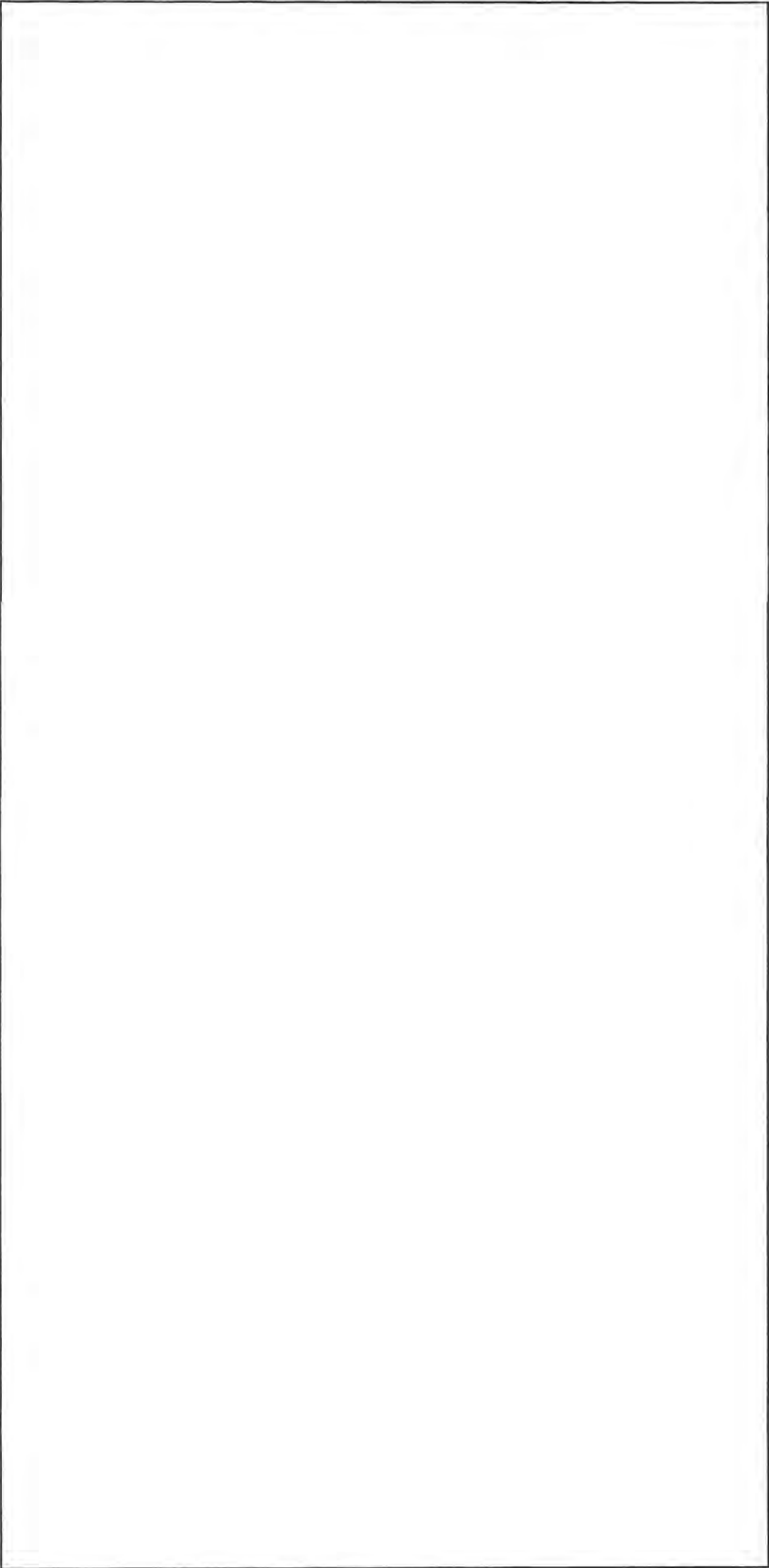
Has the condition of the site changed since last assessment? YES or NO If Yes, briefly describe changes in this box, and provide details in table below.

DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map.

Rating/zone	Area (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 (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% x 1) + (20% x 0.5) + (10% x 0) = 80%									80%



MAP OF SITE CONDITION *Note: also describe the condition of the site (previous page).*
Draw a map of the site, showing variation in outcomes as zones (Zone A = OK, Zone B = Uncertain, Zone C = Poor).
Include an approximate scale (e.g. 0-100 m) and North arrow.





PROFORMA FOR ASSESSING SITE CONDITION
PROJECT DESCRIPTION *Note: where options are given, put an 'X' next to the appropriate term(s):*

Project name: DUNLOE PARK SAND QUARRY		Project ID: 06_0030
Site name: ZONE 2C		Site ID: _____
Type of on-grounds: Assisted Natural Regeneration		When was this site last assessed?
Current assessment conducted by:	Years since site commenced:	Date of current assessment:
Overall comments on site condition:		
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.		

DETAILED DESCRIPTION OF SITE CONDITION *Complete table quarterly, or if conditions have changed since last assessment. Also draw map.*

Rating/ zone	Area (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 (ranges from 0-100%) <i>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% x 1) + (20% x 0.5) + (10% x 0) = 80%</i>								 %



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

Project name: DUNLOE PARK SAND PROJECT

Site name: ZONE 2A + B

Type of on-grounds: Assisted Natural Regeneration

Current assessment conducted by: David Woodlee

Overall comments on site condition: Regrowth getting well ahead planted Regeneration species growing above target growth!

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.

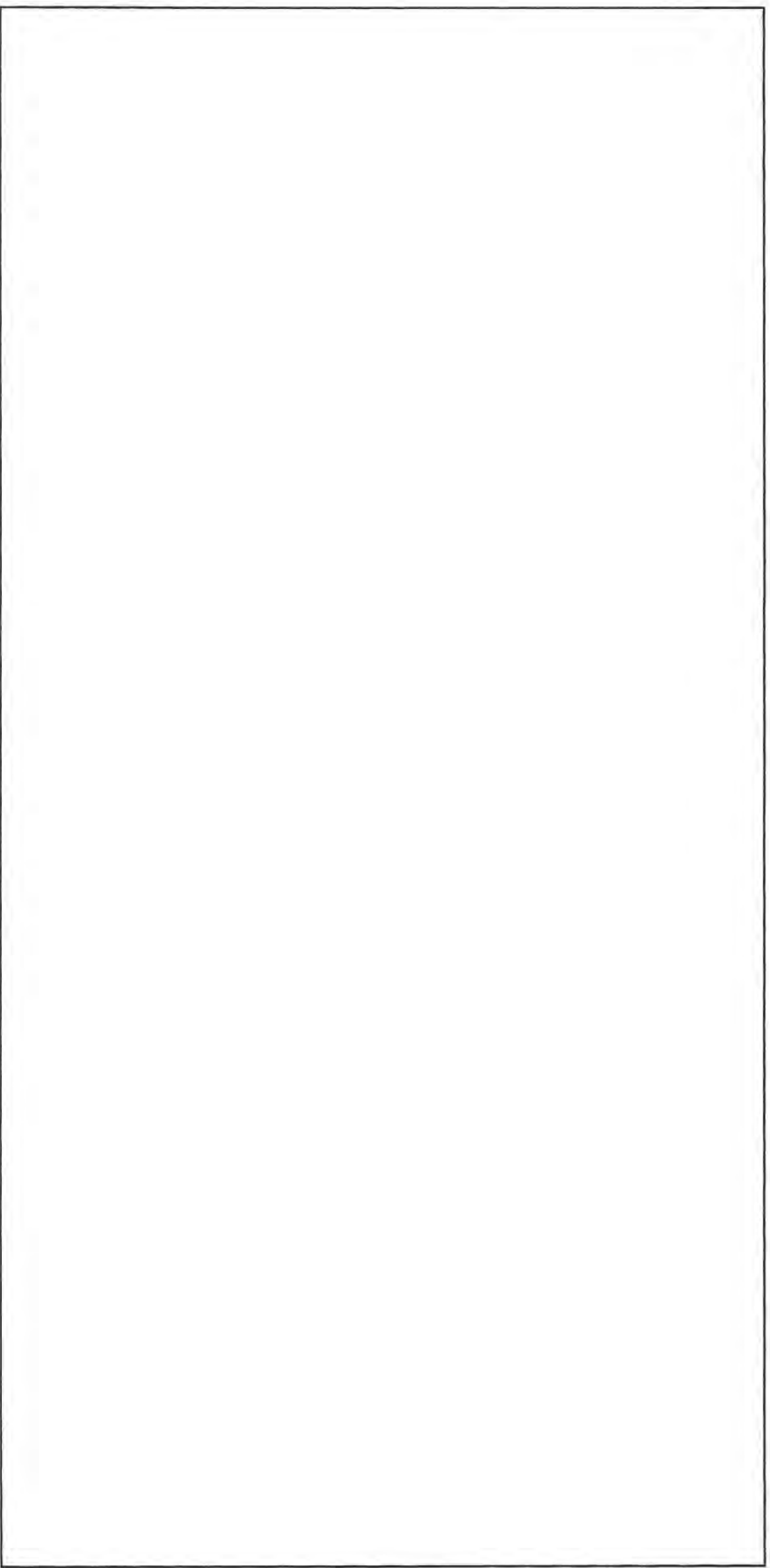
DETAILED DESCRIPTION OF SITE CONDITION									
Rating/ zone	Area (ha)	% of site	Location and factors affecting outcomes	Canopy cover (%)	Ground cover	Problem weeds	Tree survival or Recruitment	Other comments	Suggested maintenance
A = OK on track towards target				✓	✓	✓	✓		(should be routine: describe if necessary)
B = Uncertain significant problems									(describe)
C = Poor major problems, likely to fail									(describe)
Overall Condition Score (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% x 1) + (20% x 0.5) + (10% x 0) = 80%									81%



PLAN
CONSULTING

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

MAP OF SITE CONDITION *Note: also describe the condition of the site (previous page).*
Draw a map of the site, showing variation in outcomes as zones (Zone A = OK, Zone B = Uncertain, Zone C = Poor).
Include an approximate scale (e.g. 0-100 m) and North arrow.





PROFORMA FOR ASSESSING SITE CONDITION
PROJECT DESCRIPTION *Note: where options are given, put an 'X' next to the appropriate term(s):*

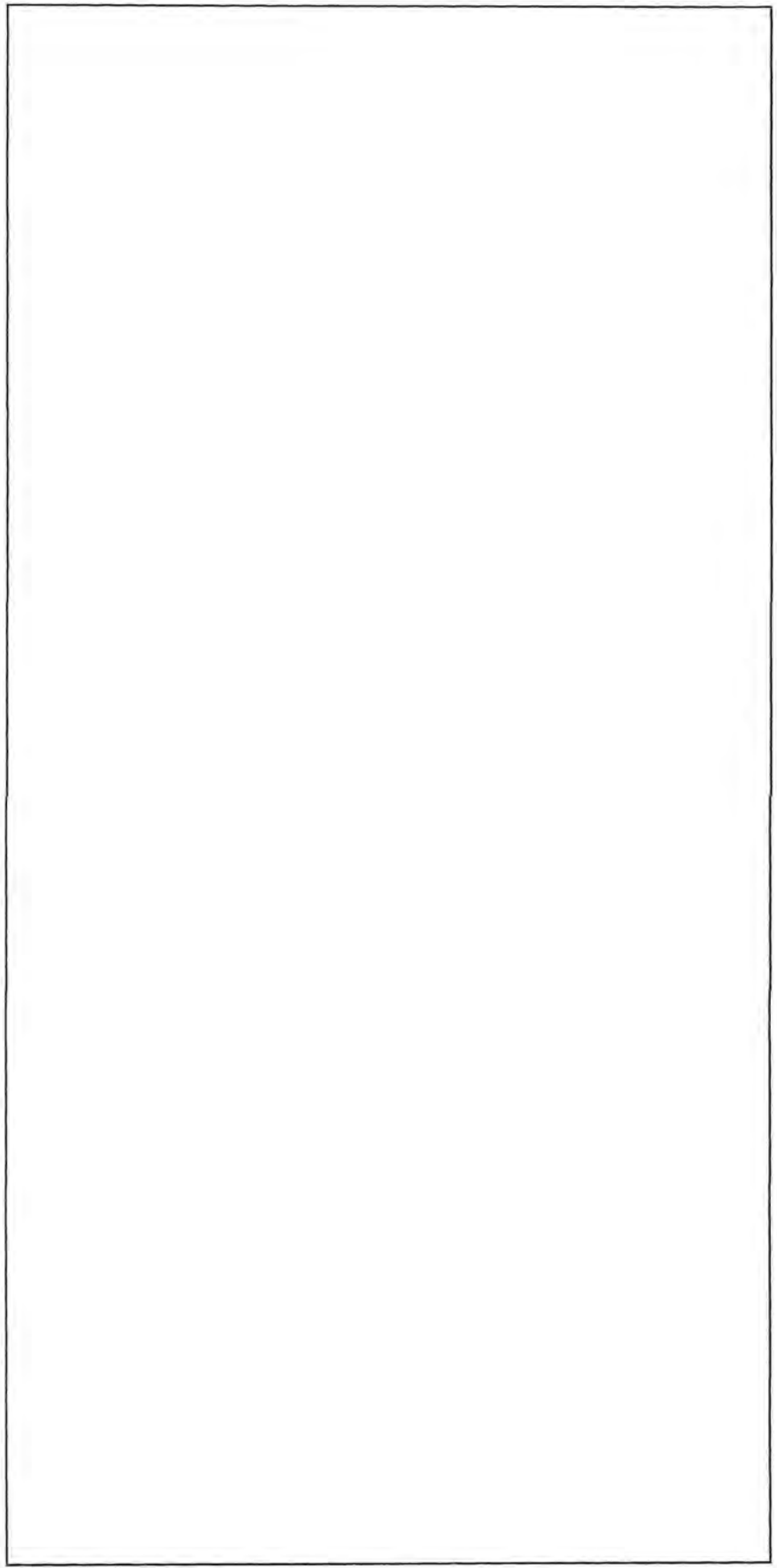
Project name: DUNLOE PARK SAND QUARRY		Project ID: 06_0030
Site name: ZONE 3		Site ID: _____
Type of on-grounds: Assisted Natural Regeneration		When was this site last assessed? _____
Current assessment conducted by: Dave Woodlee	Date of current assessment: _____	
Overall comments on site condition: <i>Planted species going well, weed control on track and Natural Regrowth starting to get to a good size above 4-5m.</i>		
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.		

DETAILED DESCRIPTION OF SITE CONDITION Complete table quarterly, or if conditions have changed since last assessment. Also draw map.

Rating/ zone	Area (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 (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% x 1) + (20% x 0.5) + (10% x 0) = 80%									80%



MAP OF SITE CONDITION *Note: also describe the condition of the site (previous page).*
Draw a map of the site, showing variation in outcomes as zones (Zone A = OK, Zone B = Uncertain, Zone C = Poor).
Include an approximate scale (e.g. 0-100 m) and North arrow.





PROFORMA FOR MONITORING FOREST STRUCTURE

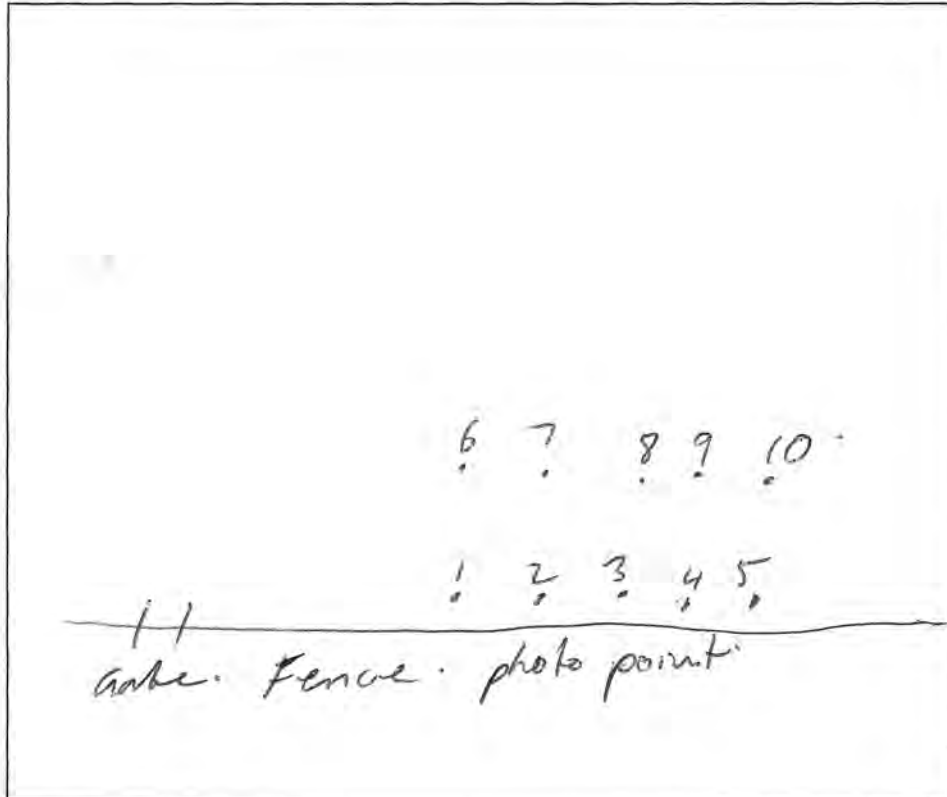
Project name: DUNLOE PARK SAND	Project ID: 06_0030
Site name: PROJECT ZONE 3	Site ID:
Assessed by: DAVE NOODLEE	Date:

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):	LAT: -28.434045
Datum:	LONG: 153.552573
Compass bearing / direction of transect (from 0 m point)	
Landform (e.g. plateau, crest, upper slope, mid-slope, lower slope, stream bank, floodplain)	
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	

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.



Site name:	Date:
<p>GROUND COVER, CANOPY COVER and CANOPY HEIGHT For each survey plot, lay out a 50 m transect. Then survey quadrats centred on the 5 m, 25 m and 45 m points</p>	



Ground cover = proportion of ground covered by (a) vegetation within 1 m of ground (categorised by life form), (b) leaf litter and fine woody debris, (c) coarse woody debris, d) rock, (e) soil, or (f) other. At the 5 m, 25 m and 45 m points, define a 1 m x 1 m quadrat, using four 1 m sticks. Looking down at the quadrat from 1 m, estimate the % of ground covered by each type (as would be seen on a photo: total must add to 100%).

Ground Cover	Plot		
	5 m	25 m	45 m

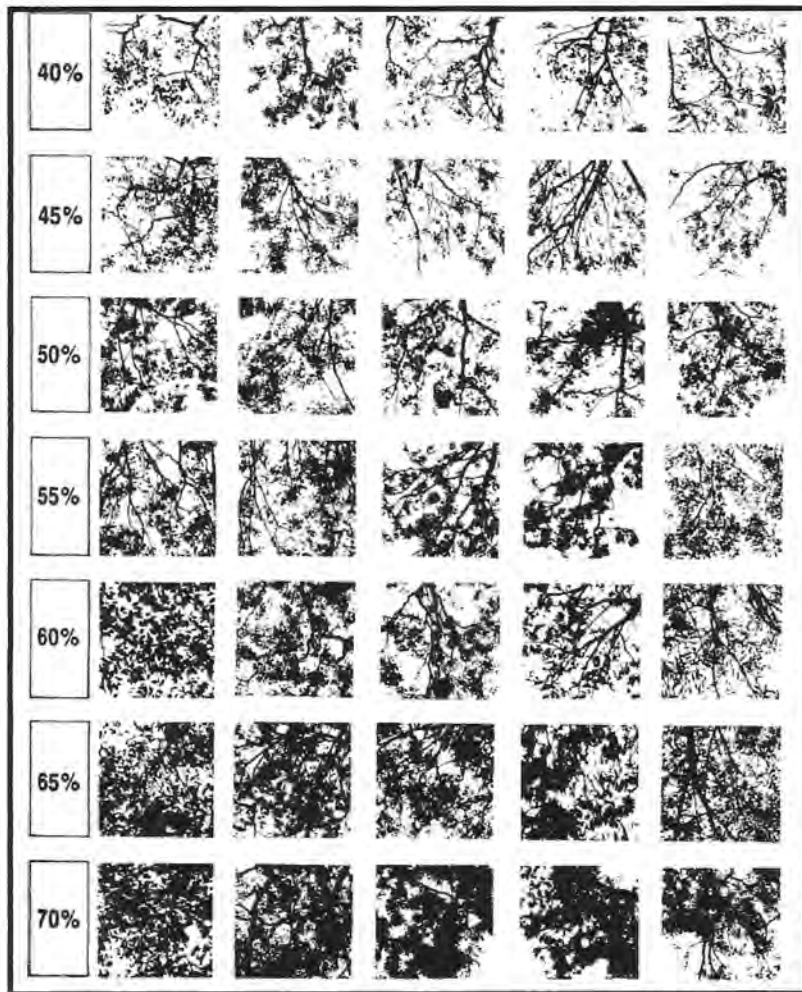
Location of quadrat:	5 m	25 m	45 m
a) Vegetation within 1 m of the ground			

Grass (and sedges)	100%	25%	%
Herbs (soft-stemmed plants)	%	%	%
Ferns	%	%	10 %
Vines and scramblers	%	%	5 %
Tree seedlings and shrubs	%	15%	10 %
Moss (and liverworts and lichens)	%	%	%
b) Leaf litter and fine woody debris <10 cm diameter	%	15%	25 %
c) Coarse woody debris >10 cm diameter	%	15%	%
d) Bare rock	%	%	%
e) Bare soil	%	30%	50 %
f) Other (including tree trunks, roots, etc.)	%	%	%
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		
	5 m	25 m	45 m
Location of quadrat:			
Visual estimate of canopy (foliage) cover	15%	60%	60%
Canopy (foliage) cover calculated from photo	20%	60%	55%
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		
	5 m	25 m	45 m
Location of quadrat:			
Canopy height (tallest trees in canopy)	5m	8m	8m
Height of emergent trees (if present)	1m	4m	1m

Site name: _____ Date: _____

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



Woody debris = fallen logs and branches lying on or within 1 m of the ground.									
<i>Tally the number of times logs are intercepted by the 50 m transect, by diameter class at the point of intersection. If a log is intercepted by the transect more than once, it is tallied each time, by diameter at each of the points of intersection</i>									
Tally intercepts with fallen logs by diameter class on each transect	Fine woody debris <10 cm dia		Coarse woody debris (CWD) > 10 cm diameter						
	2.5-5 cm	5-10 cm	10-20	20-30	30-40	40-50	50-75	75-100	>100
50 m transect	12	5						2	

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 slope, mid-slope, lower slope, stream bank, floodplain)	
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	

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.



Site name:	Date:
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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:

Banksia integrifolia

Midstorey:

Casuarina

Understorey/ Ground cover:

Blady grass

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

Banksia integrifolia

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

No

Any other comments on the site? Mark an 'X' here _____ and add extra page(s) as required.

PROFORMA FOR MONITORING FOREST STRUCTURE

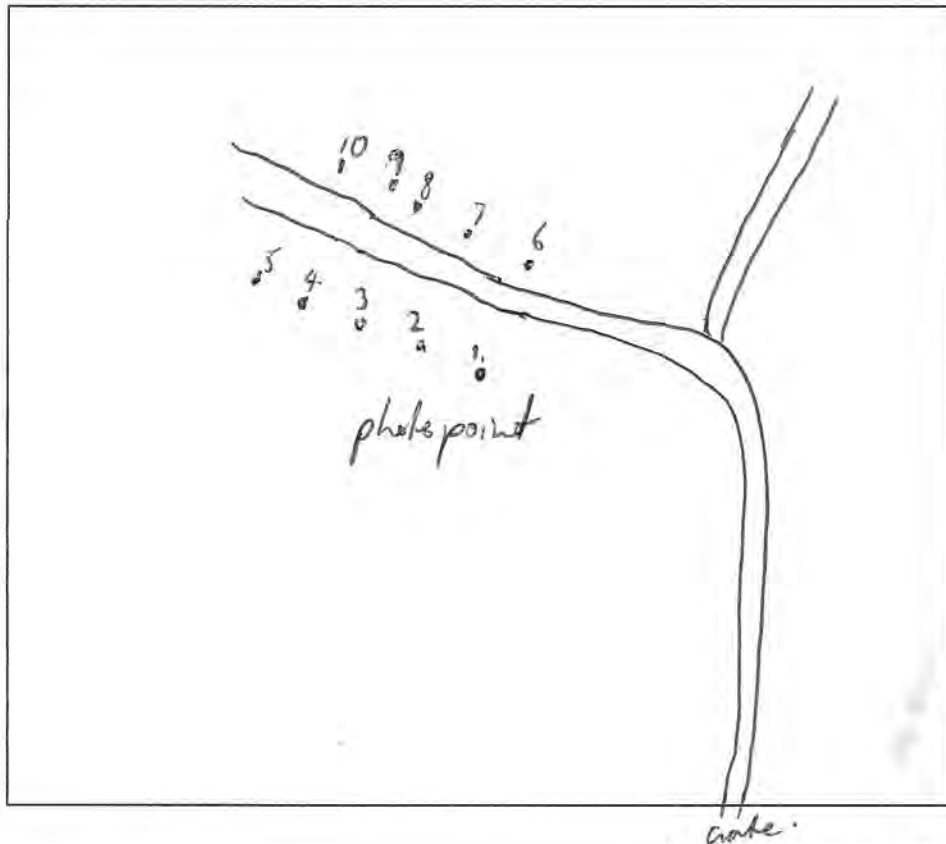
Project name: <i>DUNLOE PARK SAND</i>	Project ID: <i>06_0030</i>
Site name: <i>PROJECT ZONE 2</i>	Site ID:
Assessed by: <i>DAVE WOODLEE</i>	Date:

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):	<i>LAT: -28.421486</i>
Datum:	<i>WGS 84</i>
Compass bearing / direction of transect (from 0 m point)	
Landform (e.g. plateau, crest, upper slope, mid-slope, lower slope, stream bank, floodplain)	
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	

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.



Site name:	Date:
GROUND COVER, CANOPY COVER and CANOPY HEIGHT	
<i>For each survey plot, lay out a 50 m transect. Then survey quadrats centred on the 5 m, 25 m and 45 m points</i>	



Ground cover = proportion of ground covered by (a) vegetation within 1 m of ground (categorised by life form), (b) leaf litter and fine woody debris, (c) coarse woody debris, d) rock, (e) soil, or (f) other. *At the 5 m, 25 m and 45 m points, define a 1 m x 1 m quadrat, using four 1 m sticks. Looking down at the quadrat from 1 m, estimate the % of ground covered by each type (as would be seen on a photo: total must add to 100%).*

Ground Cover	Plot		
Location of quadrat:	5 m	25 m	45 m

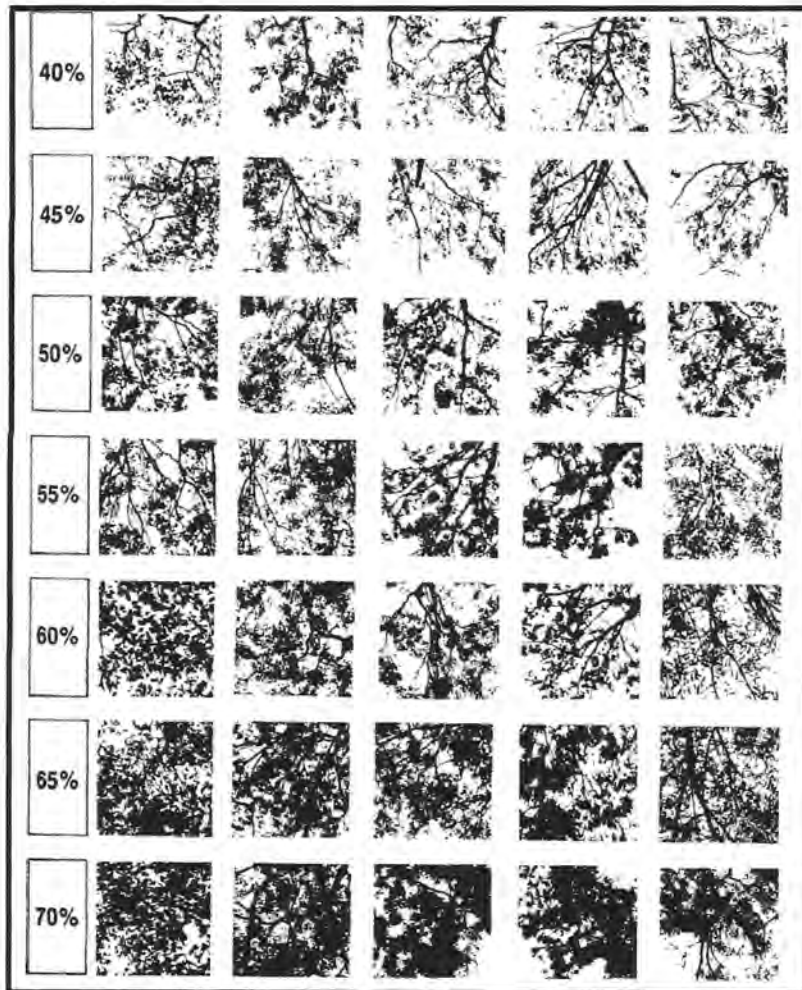
a)
Vegetation within 1 m of the ground

Grass (and sedges)	100 %	100 %	100 %
Herbs (soft-stemmed plants)	%	%	%
Ferns	%	%	%
Vines and scramblers	%	%	%
Tree seedlings and shrubs	%	%	%
Moss (and liverworts and lichens)	%	%	%
b) Leaf litter and fine woody debris <10 cm diameter	%	%	%
c) Coarse woody debris >10 cm diameter	%	%	%
d) Bare rock	%	%	%
e) Bare soil	%	%	%
f) Other (including tree trunks, roots, etc.)	%	%	%
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		
	5 m	25 m	45 m
Location of quadrat:			
Visual estimate of canopy (foliage) cover	40%	40%	40%
Canopy (foliage) cover calculated from photo	40%	40%	40%
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		
	5 m	25 m	45 m
Location of quadrat:			
Canopy height (tallest trees in canopy)	8m	8m	6m.
Height of emergent trees (if present)	1m	1m	1m.

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

Woody debris = fallen logs and branches lying on or within 1 m of the ground.									
<i>Tally the number of times logs are intercepted by the 50 m transect, by diameter class at the point of intersection. If a log is intercepted by the transect more than once, it is tallied each time, by diameter at each of the points of intersection</i>									
Tally intercepts with fallen logs by diameter class on each transect	Fine woody debris <10 cm dia		Coarse woody debris (CWD) > 10 cm diameter						
	2.5-5 cm	5-10 cm	10-20	20-30	30-40	40-50	50-75	75-100	>100
50 m transect	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 slope, mid-slope, lower slope, stream bank, floodplain)	
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	

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.



Site name:	Date:
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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:

Casuarina.

Midstorey:

Casuarina.

Understorey/ Ground cover:

Grass.

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

Casuarina.

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

Any other comments on the site? Mark an 'X' here _____ and add extra page(s) as required.

PROFORMA FOR MONITORING FOREST STRUCTURE

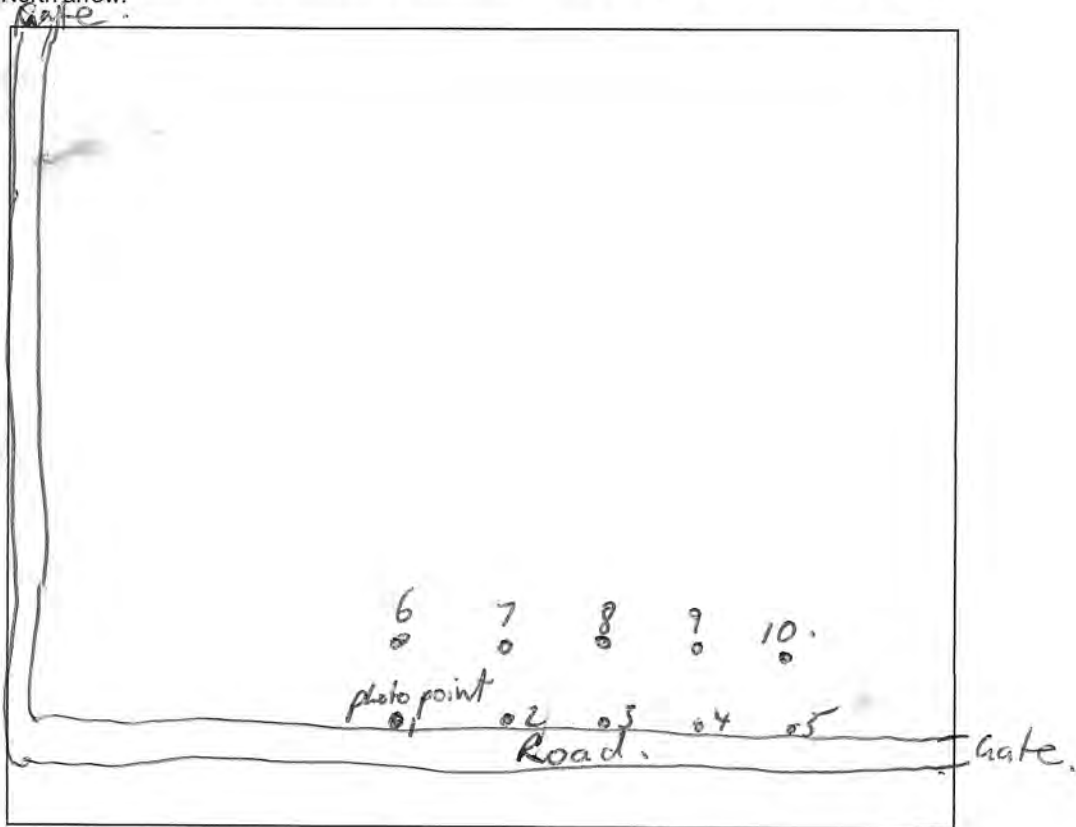
Project name: DUNLOE PARK SAND	Project ID: 06_0030
Site name: PROJECT ZONE 1	Site ID:
Assessed by: DAVE NOODLEE	Date:

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):	LAT: -28.415761
Datum:	LDN: 153.555592
Compass bearing / direction of transect (from 0 m point)	
Landform (e.g. plateau, crest, upper slope, mid-slope, lower slope, stream bank, floodplain)	
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	

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.



Site name:	Date:
<p>GROUND COVER, CANOPY COVER and CANOPY HEIGHT For each survey plot, lay out a 50 m transect. Then survey quadrats centred on the 5 m, 25 m and 45 m points</p>	



Ground cover = proportion of ground covered by (a) vegetation within 1 m of ground (categorised by life form), (b) leaf litter and fine woody debris, (c) coarse woody debris, d) rock, (e) soil, or (f) other. At the 5 m, 25 m and 45 m points, define a 1 m x 1 m quadrat, using four 1 m sticks. Looking down at the quadrat from 1 m, estimate the % of ground covered by each type (as would be seen on a photo: total must add to 100%).

Ground Cover	Plot		
Location of quadrat:	5 m	25 m	45 m

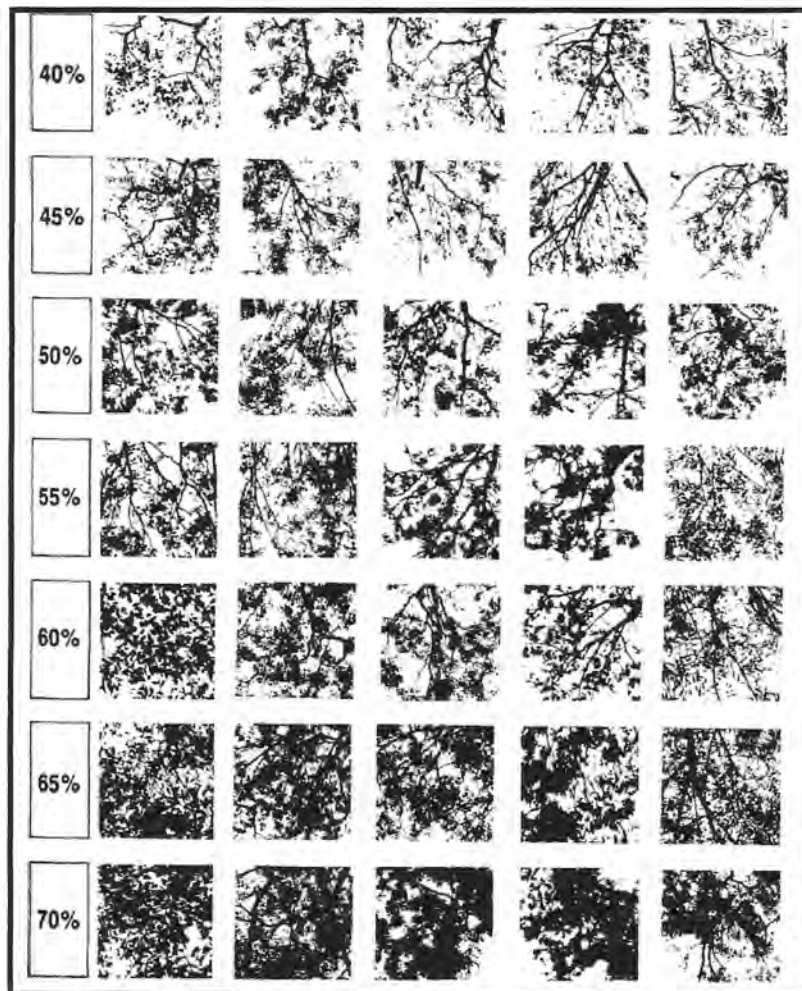
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Grass (and sedges)	20 %	10 %	20 %
Herbs (soft-stemmed plants)	0 %	0 %	0 %
Ferns	60 %	40 %	50 %
Vines and scramblers	10 %	5 %	0 %
Tree seedlings and shrubs	5 %	20 %	15 %
Moss (and liverworts and lichens)	0 %	0 %	0 %
b) Leaf litter and fine woody debris <10 cm diameter	5 %	10 %	10 %
c) Coarse woody debris >10 cm diameter	0 %	15 %	5 %
d) Bare rock	0 %	0 %	0 %
e) Bare soil	0 %	0 %	0 %
f) Other (including tree trunks, roots, etc.)	0 %	0 %	0 %
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		
	5 m	25 m	45 m
Location of quadrat:			
Visual estimate of canopy (foliage) cover	50%	60%	50%
Canopy (foliage) cover calculated from photo	55%	58%	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		
	5 m	25 m	45 m
Location of quadrat:			
Canopy height (tallest trees in canopy)	10m	8m	8m
Height of emergent trees (if present)	4m	5m	4m

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

Woody debris = fallen logs and branches lying on or within 1 m of the ground.

Tally the number of times logs are intercepted by the 50 m transect, by diameter class at the point of intersection. If a log is intercepted by the transect more than once, it is tallied each time, by diameter at each of the points of intersection

Tally intercepts with fallen logs by diameter class on each transect	Fine woody debris <10 cm dia		Coarse woody debris (CWD) > 10 cm diameter						
	2.5-5 cm	5-10 cm	10-20	20-30	30-40	40-50	50-75	75-100	>100
50 m transect	20				4			1	0

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 slope, mid-slope, lower slope, stream bank, floodplain)	
Slope (: e.g. flat/steep)	
Aspect (compass bearing / direction of fall of slope)	

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.

Site name: _____ Date: _____

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:

Metelucea / Casuarina.
as well as a couple of big Eucalyptus robusta.

Midstorey:

Callistemon salignus.

Understorey/ Ground cover:

Broken fern


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


Mainly Metelucea and casuarina.


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


No.

Any other comments on the site? Mark an 'X' here _____ and add extra page(s) as required.

ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		POSSUM BOX 1	
Inspected by		Name: SASHA PETERSON Signature: 	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	N	STICKS PRESENT	
Native Fauna Present	N		
Eggs Present	N/A		
Number of eggs	N/A		
Colour/description of eggs	N/A		
Nest present	Y	STICKS PRESENT	
Partial nest present	Y		
Hatchlings/fledglings present	N/A		
Box empty but scats/trace present	N		
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	N		
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?:			


ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		KINGFISHER BOX	
Inspected by		Name: SASHA PETERSON Signature: 	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	Y	EMPTY BUT SCATS	PRESENT.
Native Fauna Present	N		
Eggs Present	N		
Number of eggs	N	NO EGGS PRESENT	
Colour/description of eggs	N		
Nest present	N		
Partial nest present	N		
Hatchlings/fledglings present	N		
Box empty but scats/trace present	Y		
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	Y	GENERAL WEAR + TEAR.	NEW BOX INSTALLED.
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?: NEW NEST BOX INSTALLED.			

ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		OWL BOX	
Inspected by		Name: SASHA PETERSON	Signature: 
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	Y		
Native Fauna Present	N		
Eggs Present	N		
Number of eggs	N		
Colour/description of eggs	N		
Nest present	Y	PARTIAL PRESENT	
Partial nest present	Y		
Hatchlings/fledglings present	N		
Box empty but scats/trace present	N	SCATS PRESENT	
Box occupied by pest species (i.e. bees, myna, black rat etc)	N	NO PEST SPECIES EVIDENT	
Roof, hinges and/or supports broken or in need of repair/replacement	N	BOX IN GOOD CONDITION.	
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?:			
<p>OWL SIGHTED IN ZONE 3 WHERE BOX IS LOCATED. BELIEVED TO BE BARN OWL SIGHTED. POSSIBLY EASTERN GRASS OWL. FUTURE INSPECTIONS WILL HOPEFULLY PROVIDE CONFIRMATION OF EXACT SPECIES.</p>			


ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		GLIDER BOX 2	
Inspected by		Name: SASHA PETERSON	Signature: 
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	N	NESTING MATERIALS PRESENT	
Native Fauna Present	N		
Eggs Present	NA		
Number of eggs	N/A		
Colour/description of eggs	N/A		
Nest present	Y		
Partial nest present	Y		
Hatchlings/fledglings present	N/A		
Box empty but scats/trace present	N	TRACE PRESENT	
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	N	BOX IN GOOD CONDITION	
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?:			



ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		GLIDER BOX 1	
Inspected by		Name: SASHA PETERSON Signature: SP	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	N	NESTING MATERIALS PRESENT	
Native Fauna Present	N		
Eggs Present	N/A		
Number of eggs	N/A		
Colour/description of eggs	N/A		
Nest present	Y		
Partial nest present	Y		
Hatchlings/fledglings present	N/A		
Box empty but scats/trace present	N	TRACE PRESENT	
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	N		
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?:			


ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		MICROBAT BOX	
Inspected by		Name: SASHA PETERSON Signature: 	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	Y		
Native Fauna Present	N		
Eggs Present	N/A		
Number of eggs	N/A		
Colour/description of eggs	N/A		
Nest present	N		
Partial nest present	N		
Hatchlings/fledglings present	N		
Box empty but scats/trace present	N		
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	Y	CURRENT BOX REPLACED	
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?: NEW NEST BOX INSTALLED.			



ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		COCKATOO BOX 1	
Inspected by		Name: SASHA PETERSON Signature: 	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	N		
Native Fauna Present	N		
Eggs Present	N		
Number of eggs	N		
Colour/description of eggs	N		
Nest present	Y		
Partial nest present	Y		
Hatchlings/fledglings present	N		
Box empty but scats/trace present	N	TRACE PRESENT	
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	N		
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?:			



ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		COCKATOO BOX 2	
Inspected by		Name: SASHA PETERSON Signature:	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	N		
Native Fauna Present	N		
Eggs Present	N		
Number of eggs	2		
Colour/description of eggs	2		
Nest present	Y		
Partial nest present	Y		
Hatchlings/fledglings present	2		
Box empty but scats/trace present	2		
Box occupied by pest species (i.e. bees, myna, black rat etc)	2		
Roof, hinges and/or supports broken or in need of repair/replacement	2		
Evidence of warping	2		
Evidence of vandalism	2		
Other comments/maintenance performed?:			

ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		ROSELLA BOX	
Inspected by		Name: SASHA PETERSON Signature: 	
Inspection date		07/12/16	
Element	N/Y?	Comments/description	Action Required
Empty Box	Y		
Native Fauna Present	N		
Eggs Present	N		
Number of eggs	N		
Colour/description of eggs	N		
Nest present	N		
Partial nest present	N		
Hatchlings/fledglings present	N		
Box empty but scats/trace present	N		
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	N		
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?: NO SIGNS OF USE.			



ROUTINE FAUNA BOX MONITORING FORM			
Location/Number of Fauna Box			
Description of Fauna Box		POSSUM BOX 2	
Inspected by		Name: SASHA PETERSON	Signature:
Inspection date		07/12/10	
Element	N/Y?	Comments/description	Action Required
Empty Box	N		
Native Fauna Present	N		
Eggs Present	N/A		
Number of eggs	N/A		
Colour/description of eggs	N/A		
Nest present	Y	STICKS IN BOX	
Partial nest present	Y		
Hatchlings/fledglings present	N/A		
Box empty but scats/trace present	N	scats	
Box occupied by pest species (i.e. bees, myna, black rat etc)	N		
Roof, hinges and/or supports broken or in need of repair/replacement	N		
Evidence of warping	N		
Evidence of vandalism	N		
Other comments/maintenance performed?:			

Work Log 2016

Date: 13/01/2016

Activities Performed:

- Spraying out for supplementary planting
- Set up and installation up of mulch mats, and plant guards
- Planting of 400 Eucalyptus swamp mahogany, forest red gum in Zone 1.

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 10/02/2016

Activities Performed:

- Spray out for supplementary planting
- Set up and installation up of mulch mats, and plant guards
- Planting of 600 mixed eucalyptus species in Zone 1

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 17/02/2016

Activities Performed:

- Fixing tree guards
- Monitoring and logging of species present
- Preparation of biodiversity study and report for revegetation area 1

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 04/03/2016

Activities Performed:

- Spray out for supplementary planting
- Set up and installation up of mulch mats, and plant guards
- Planting of 840 Eucalyptus trees

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 10/03/2016

Activities Performed:

- Spray out for supplementary planting
- Set up and installation up of mulch mats, and plant guards
- Planting of 1000 eucalyptus trees

- Undertake visual monitoring, record photographs of the sites, assess site condition and fill out routine quarterly rehabilitation monitoring forms for Zones 1 and 2.

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Sasha Peterson – Ramtech Pty Ltd.

Date: 30/06/2016

Activities Performed:

- Undertake visual monitoring, record photographs of the sites, assess site condition and fill out routine quarterly rehabilitation monitoring forms for Zones 1 and 2.

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Sasha Peterson – Ramtech Pty Ltd.

Date: 08/07/2016

Activities Performed:

- Spray out in preparation for supplementary planting in Zone 2

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 27/07/2016

Activities Performed:

- Site preparation for new plantings – including brush cutting, assembling tree guards and mulch mats in Zone 2.

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 15/08/2016

Activities Performed:

- Supplementary planting of 1050 trees in Zone 2

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 30/08/2016

Activities Performed:

- Planting of Eucalyptus robusta, Eucalyptus intermedia, Eucalyptus teriticornis, Leptospernum polygalifolia, Callistemon salignus along Haul Road (approximately 200 plants in total).

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Date: 26/09/2016

Activities Undertaken:

- Undertake visual monitoring, record photographs of the sites, assess site condition and fill out routine quarterly rehabilitation monitoring forms for Zones 1 and 2.

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Sasha Peterson – Ramtech Pty Ltd.

Date: 29/12/2016

Activities Undertaken:

- Undertake visual monitoring, record photographs of the sites, assess site condition and fill out routine quarterly, six monthly and yearly rehabilitation monitoring forms for Zones 1 and 2.

Work Performed By:

David Woodlee – Bush to Sea Landscaping, Bush Regeneration and Property Management.

Sasha Peterson – Ramtech Pty Ltd.

14.0 Additional Appendices accompanying AEMR resubmission



ORIGINAL

ANZ

ABN 11 005 357 522

TSC Operations-Australia Guarantees
Level 14, 100 Queen Street
Melbourne, VIC 3000
Tel: 1300 091 233
Fax: 1300 072 851
SWIFT: ANZBAU3MXXX
www.anz.com

Guarantee
No. GOP17433723418

Beneficiary:
NSW Department of Planning
and Environment
ABN 38 755 709 681
380 Pitt Street, Sydney, NSW 2000 Australia

Applicant:
Holcim (Australia) Pty Ltd
ABN 87 099 732 297
Level 2, 18 Little Cribb Street
Milton QLD 4064 Australia

Date of issue:
December 22, 2016

Guarantee Amount:
Not Exceeding AUD 507,800.00
Five Hundred Seven Thousand Eight Hundred
Australian Dollars

Special Conditions:
Description of Contract / Agreement:
Australia and New Zealand Banking Group Limited ('ANZ') asks the Beneficiary to accept this bank guarantee ('Undertaking') in connection with a contract or agreement between the Beneficiary and Applicant for:
Dunloe site - Rehabilitation bond.
Full Contract Name: Project Approval 06_0030
Relevant Clause in Contract requiring a Bank Guarantee - Schedule 3, Condition 30 & 31.

Guarantee Amount
In consideration of the Beneficiary accepting this Undertaking and its terms, ANZ undertakes unconditionally to pay the Beneficiary on written demand from time to time any sum or sums up to an aggregate amount not exceeding: Australian Dollars Five Hundred Seven Thousand Eight Hundred Only (AUD 507,800.00) ('Amount').

Undertaking:
ANZ will pay the Amount or any part of it to the Beneficiary upon presentation of this original Undertaking (accompanied by a written demand) at ANZ Trade & Supply Chain, 18/242 Pitt St Sydney, NSW 2000 without reference to the Applicant and even if the Applicant has given ANZ notice not to pay the money, and without regard to the performance or non-performance of the Applicant or Beneficiary under the terms of the contract or agreement.

By accepting this Undertaking, the Beneficiary acknowledges and agrees that ANZ may rely entirely on any demand or notice as presented to it and has no responsibility or obligation to investigate the authenticity or correctness of the matters stated in a demand or notice, the signatures on the same, the positions of such signatories or the capacity or entitlement of the Beneficiary to give and execute the demand or notice.

ORIGINAL

Any alterations to the terms of the contract or agreement or any extensions of time or any other forbearance by the Beneficiary or Applicant will not impair or discharge ANZ's liability under the Undertaking.

This Undertaking remains in force until the first to occur of:

- The Beneficiary notifies ANZ in writing that the Undertaking is no longer required.
- This original Undertaking is returned to ANZ Trade and Supply Chain, Level 14, 100 Queen Street, Melbourne, Victoria 3000
- ANZ has paid to the Beneficiary the Amount or the balance outstanding of the Amount.
- 4.00pm on the 30th day of December 2021, in the State or Territory of presentation ('Expiry date'). If the Expiry date is not a business day in the State or Territory, then the Expiry date shall be deemed to occur on the next business day.

Notwithstanding anything stated in this Undertaking, ANZ has the right to terminate it at any time by paying the Beneficiary the Amount or the balance outstanding of the Amount, or any lesser amount that the Beneficiary may require.

This Undertaking is personal to the Beneficiary. The Beneficiary cannot assign, transfer, charge or otherwise deal with its rights under this Undertaking and ANZ will not recognise any purported assignment, transfer, charge or other dealing.

This Undertaking will be governed by the laws of the place of presentation.

Executed at Melbourne for and on behalf of Australia and New Zealand Banking Group Limited ABN 11 005 357 522

Regards,

Authorised Signature(s)

JANE BOLLE

Sarath Weerakoon



Date	Location	pH	EC	DO	Turbidity	TSS	Total P	Total-N
		pH	µScm-1	mg/L	NTU	mg/L	mg/L	mg/L
Dec-11	SW3	6	253	8.4		8	0.03	0.05
Mar-12	SW3	5.4	227	5.5		11	0.02	0.96
Jun-12	SW3	6	314	7.8	36	12	0.05	0.7
27/09/2012	SW3	6.7	17676	7.6	10	5.2	0.03	0.52
Dec-12	SW3	6.7	25765	6		14	0.04	0.7
Mar-13	SW3	6.7	3489	6.8		8.4	0.03	0.53
Jun-13	SW3	6	692	7.2		48		
Sep-13	SW3	7	17686	7.3		14	0.02	0.38
12/12/2013	SW3	7.1	25681	5.8		13	0.02	0.34
Mar-14	SW3	3.7	1753	2.9		42	0.05	1.54
31/03/2014	SW3	3.7	1753	2.9	77	42	0.05	1.54
25/06/2014	SW3	5.7	19911	8.9	14	9	<0.02	0.76
Aug-14	SW3	7.9	41455	8.4		5.8	<0.02	0.2
29/09/2014	SW3	7.9	41455	8.4	6.2	5.8	<0.02	0.2
15/12/2014	SW3	7.7	30732	7.9	9.9	35	0.03	0.36
26/03/2015	SW3	3.7	1834	4.8	54	23	0.04	1.32
24/04/2015	SW3	6.5	12467	7.2	7.8	4.0	0.15	0.46
17/09/2015	SW3	6.7	15704	7.3	33	20	0.02	0.45
11/12/2015	SW3	6.5	15038	6.8	13	24	<0.02	0.41
24/03/2016	SW3	3.8	2548	3.6	54	24	0.06	1.16
30/06/2016	SW3	5.5	1501.6	6.8	31	25	0.03	0.87
29/09/2016	SW3	6.7	38914	6.1		5.6	0.02	0.23
20/12/2016	SW3	7.4	36425	7.1		6.2	<0.02	0.31
		3.7	227	2.9	6.2	4		0.05
		7.9	41455	8.9	77	48		1.54
		6.13	15359.72	6.59	28.83	17.61		0.64

Dec-11	SW4	6.4	1504	5.3		12	0.03	0.63
Mar-12	SW4	6	458	6.8		6.7	0.03	0.81
Jun-12	SW4	6.2	805	8.6	26	7.7	0.04	0.78
27/09/2012	SW4	7	23790	7	5.1	10	<0.02	0.27
Dec-12	SW4	7	30543	5.7		9.4	<0.02	0.39
Mar-13	SW4	7.6	29821	7		9.6	0.02	0.54
Jun-13	SW4	5.9	890	7.4		16		
Sep-13	SW4	6.8	16825	7.2		8.8	0.02	0.41
12/12/2013	SW4	6.7	17021	5.5		15	0.03	0.51
Mar-14	SW4	3.8	1354	2.5		41	0.04	1.43
31/03/2014	SW4	3.8	1354	2.5	76	41	0.04	1.43
25/06/2014	SW4	6.5	25363	8.4	12	8	<0.02	0.5
Aug-14	SW4	7.1	22190	8.4		6	<0.02	0.31
29/09/2014	SW4	7.1	22190	8.4	9.8	6	<0.02	0.31
15/12/2014	SW4	8	29257	10	11	33	0.05	0.86
26/03/2015	SW4	3.7	1426	4.7	48	24	0.1	1.15
24/04/2015	SW4	6.4	12416	7.4	22	18	0.02	0.45
17/09/2015	SW4	6.7	8008	7.3	19	11	0.02	0.48
11/12/2015	SW4	7.7	39859	7.5	4.2	9.5	0.02	0.24
24/03/2016	SW4	3.8	2721	5.5	54	25	0.06	1.15
30/06/2016	SW4	6.5	3468.2	8.4	14	10	0.02	0.7
29/09/2016	SW4	6.9	37551	9.6		66	0.02	0.34
20/12/2016	SW4	6.9	17005	6.9		8.5	0.03	0.49
		3.7	458	2.5	4.2	6		0.24
		8	39859	10	76	66		1.43
		6.28	15035.62	6.87	25.09	17.49		0.64
Dec-11	SW9	6.4	657	7.8		13	0.03	0.53
Mar-12	SW9	6.1	704	6.5		36	0.09	1.31
Jun-12	SW9	6.1	575	5.4	25	10	0.04	0.6
27/09/2012	SW9	7.3	13557	9.4	4.8	13	0.02	0.53
Dec-12	SW9	6.8	17219	6.9		9.4	0.04	0.76
Mar-13	SW9	6.7	3708	7.3		6.8	0.03	0.43
Jun-13	SW9	4.9	305	6.5		27		
Sep-13	SW9	7	2753	9.9		29	0.13	1.34
12/12/2013	SW9	6.8	10096	5.2		20	0.05	0.81
Mar-14	SW9	4.6	1431	2.1		40	0.13	1.64
31/03/2014	SW9	4.6	1431	2.1	30	40	0.13	1.64
25/06/2014	SW9	6.6	18376	7.9	60	16	0.05	0.67
Aug-14	SW9	7.1	10705	9.3		20	0.03	0.6
29/09/2014	SW9	7.1	10705	9.3	36	20	0.03	0.6
15/12/2014	SW9	8	26966	10	33	37	0.05	1.52
26/03/2015	SW9	4.2	763	5.2	16	5.8	0.02	1.04
24/04/2015	SW9	6.2	4344	6.8	29	14	0.03	0.86
17/09/2015	SW9	6.6	7381	6.8	34	14	0.03	0.83
11/12/2015	SW9	7.1	5694	5.2	22	28	0.05	0.81
24/03/2016	SW9	6.1	4157	6.5	13	10	0.04	0.88
30/06/2016	SW9	6.6	2577.4	7.6	19	6.3	0.02	0.78
29/09/2016	SW9	6.8	35815	7.4		35	<0.02	0.26
20/12/2016	SW9	6.9	21421	6.9		6.4	0.04	0.82
		4.2	305	2.1	4.8	5.8		0.26
		8	35815	10	60	40		1.64
		6.37	8753.93	6.87	26.82	19.86		0.88

Dec-11	SW10	6.2	492	7.5		23	0.04	0.54
Mar-12	SW10	5.7	546	4.3		31	0.03	0.73
Jun-12	SW10	6.4	805	6.7	45	22	0.07	0.86
27/09/2012	SW10	7.4	12749	9.4	7.7	14	0.04	0.84
Dec-12	SW10	6.7	19403	6.9		7.4	0.03	0.71
Mar-13	SW10	6.8	1025	5.6		16	0.05	0.77
Jun-13	SW10	4.8	302	5.7		30		
Sep-13	SW10	7.8	2870	15		45	0.29	2.15
12/12/2013	SW10	6.8	15775	5		10	0.03	0.56
Mar-14	SW10	4.6	1454	2.2		40	0.13	1.63
31/03/2014	SW10	4.6	1454	2.2	32	40	0.13	1.63
25/06/2014	SW10	6.5	17312	7.6	37	15	0.04	0.72
Aug-14	SW10	7.2	9164	11		30	0.11	1.06
29/09/2014	SW10	7.2	9164	11	46	30	0.11	1.06
15/12/2014	SW10	7.6	26936	12	33	44	0.07	1.38
26/03/2015	SW10	4.2	779	5.6	14	8.0	0.06	1.08
24/04/2015	SW10	6.2	4381	6.5	25	15	0.03	0.87
17/09/2015	SW10	6.5	6756	7	37	21	0.04	0.98
11/12/2015	SW10	6.8	17660	5.7	5.4	9	<0.02	0.33
24/03/2016	SW10	5.3	2967	7.1	7.4	4.8	0.04	0.77
30/06/2016	SW10	6.7	4893.3	7.1	7.1	4.8	0.02	0.61
29/09/2016	SW10	6.9	35928	6.9		36	0.02	0.58
20/12/2016	SW10	6.9	7210	7.8		10	0.04	0.81
		23	23	23	12	23		22
		4.2	23	2.2	5.4	4.8		0.33
		7.8	35928	15	46	45		2.15
		6.34	8696.75	7.21	24.72	22.00		0.94

Date	Location	D1	D2	D3	D4
		g/m2/month	g/m2/month	g/m2/month	g/m2/month
17/07/2015	Dunloe Sands	0.3	0.2	0.7	0.4
19/08/2015	Dunloe Sands	0.3	0.3	0.2	0.2
17/09/2015	Dunloe Sands	0.5	1.6	0.4	0.5
21/10/2015	Dunloe Sands	0.1	0.6	0.2	0.1
25/11/2015	Dunloe Sands	0.3	1.7	0.6	0.5
16/12/2015	Dunloe Sands	0.7	0.8	0.4	0.6
Jan-16	Dunloe Sands	0.3	0.4	0.5	0.6
Feb-16	Dunloe Sands	0.4	0.6	0.5	0.5
Mar-16	Dunloe Sands	0.2	4.7	0.3	0.5
Apr-16	Dunloe Sands	0.2	1.6	0.2	0.8
May-16	Dunloe Sands	0.3	1.2	0.3	1.6
Jun-16	Dunloe Sands	0.3	1.1	1.6	0.5
Jul-16	Dunloe Sands	0.13	0.52	0.41	0.39
Aug-16	Dunloe Sands	0.6	0.5	0.3	0.4
Sep-16	Dunloe Sands	0.8	0.5	0.4	0.3
Oct-16	Dunloe Sands	0.8	0.5	0.4	0.3
Nov-16	Dunloe Sands	0.4	1.9	0.3	0.4
Dec-16	Dunloe Sands	0.5	1.7	0.6	0.5
30/01/2017	Dunloe Sands	0.3	0.2	0.5	0.3
27/02/2017	Dunloe Sands	0.3	0.2	0.2	0.3
22/03/2017	Dunloe Sands	0.2	0.1	2.4	0.3
19/04/2017	Dunloe Sands	0.2	0.9	1	0.3
17/05/2017	Dunloe Sands	0.8	0.8	1.4	0.7
14/06/2017	Dunloe Sands	0.2	0.2	0.2	0.2
12/07/2017	Dunloe Sands	0.3	0.1	0.2	0.3
9/08/2017	Dunloe Sands	0.1	0.1	0.2	0.5
6/09/2017	Dunloe Sands	0.5	0.2	0.5	0.5
4/10/2017	Dunloe Sands	0.7	0.6	2.4	0.9
1/11/2017	Dunloe Sands	0.5	0.3	0.8	0.5
29/11/2017	Dunloe Sands	0.1	0.2	0.3	0.1
28/12/2017	Dunloe Sands	0.4	0.3	0.2	0.2
		0.1	0.1	0.2	0.1
		0.8	4.7	2.4	1.6
		0.38	0.79	0.60	0.46

Date	Location	pH	EC	DO	*Redox Potential	Alkalinity as CaCO3	Bicarbonate as CaCO3	Cl	Turbidity	TSS	Chlorophyll 'a'	Oil and Grease	Total P	Total-N	Ammonia	Ca	Mg	Na	K	Sulfur as Sulfate	Al (Total)	Arsenic (Total)	Fe (Total)	Mn (Total)	
			µS/cm-1	mg/L	mV	mg/L	mg/L	mg/L	mg/L	NTU	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
30/05/2012	Lake	5.8	133	8.9					190	84		<2	0.09	0.66											
27/06/2012	Lake	6	143	9.4		3	2	8	34	23		4	0.04	0.38		13	1.5	6.3	<5	41	1.21	<0.005	1.01	0.03	
26/07/2012	Lake	7	164	9.4					18	15		2	0.02	0.33											
27/08/2012	Lake	5.7	188	9.3	168				100	70		2	0.04	0.44											
27/09/2012	Lake 1	4.6	214	8.2		<1	<1	10	7.8	11		<2	0.02			22	1.9	9	<5	65	0.47	<0.005	0.41	0.05	
29/10/2012	Lake	4.2	246	8.5					2.9	4		<2	<0.02	0.09											
25/11/2013	Lake	5.9	478	7					18	26		<2	0.04	0.33											
12/12/2013	Lake	4.7	568	7.7	160	2	1	22	33	54		<2	0.06	0.48		75	8.6	15	5	244	8.92	<0.005	3.49	0.64	
30/01/2014	Lake	4.4	650	7.9					31	41		<2	0.03	0.37											
24/02/2014	Lake	4.4	780	7.7					40	45		<2	0.04	0.25											
31/03/2014	Lake	4.9	800	7.5					70	63		<2	0.04	0.55											
28/04/2014	Lake	4.4	874						33	30		<2	0.03	0.17											
28/05/2014	Lake	4.1	895	9.2					42	30		<2	<0.02	0.27											
25/06/2014	Lake	3.8	916	9.4		<1	<1	35	72	53		<2	0.08	0.37		109	16	23	6	413	26	<0.005	12	1.05	
30/07/2014	Lake	4.3	917						79	44		<2	0.02	0.44											
29/08/2014	Lake	4.5	960						138	187		5	0.05	0.81											
29/09/2014	Lake	3.8	971	8		<1	<1		68	58			0.03	0.58											
28/11/2014	Lake	4	998	8.3					70	101		<2	0.07	0.5											
15/12/2014	Lake	4.4	1005	8		NP	<1	40	119	167		<2	0.14	0.31		159	18	29	7	394	33	0.008	11	1.23	
22/01/2015	Lake 1	4.4	1029	7.4	204				78	96		<2	0.05	0.32											
25/02/2015	Lake 1	4.2	960	7					85	89		<2	0.08	0.6											
26/03/2015	Lake 1	4.1	853	7.5		NP	NP	38	34	55		<2	0.25	0.42		92	12	22	6	369	24.2	0.003	5.61	1.03	
24/04/2015	Lake	4.3	963	8.5					59	95		<2	0.1	0.73											
28/05/2015	Lake	4.4	927	9					52	85		<2	0.22	0.44											
17/09/2015	Lake	4.5	928	8.9		NP		35	56	61	6	<2	0.1	0.43	0.08	117	13	25	8	361	19.3	0.003	6.7	0.953	
21/10/2015	Lake	4.4	955	7.8					56	100		<2	0.08	0.28											
25/11/2015	Lake	3.7	996	7.7					5.1	4		<2	0.03	0.16											
11/12/2015	Lake 1	4.2	956	6.8		<1	<1	45	20	39		<2	0.39	0.57		111	13	29	9	429	14.3	0.004	2.54	0.896	
25/01/2016	Pond	3.9	1002	7.3					7.9			6													
24/02/2016	Pond	4	1021	7.4					6.1			2													
24/03/2016	Pond	3.9	1060	7.9					7.2			2	0.07	0.12		112.71	14.14	43.28	9.32	382.38	10.93	0.002	1.24	0.88	
29/04/2016	Pond	4.4	1037	8.6					7.7			2													
24/05/2016	Pond	4.9	1029	8.4							16	2	0.02	0.31	<0.02	57.45	7.218	24.38	5.39	185.14	4.51	0.002	0.41	0.56	
30/06/2016	Pond	4.7	518.9	9.8					4			0													
21/07/2016	Pond	4.5	546.4	9.3					1.2			0													
31/08/2016	Pond	4	618	9.1					2			2													
29/09/2016	Pond	4.1	651	8.7					2.6		10	2			<0.02			7.9	27	6	220	2.83	0.002	0.41	0.39
27/10/2016	Pond	4	684	8.4					7.2			2													
29/11/2016	Pond	3.8	714	8					1.7			2													
20/12/2016	Pond	3.5	742	7.3					2.8		2	2	<0.02	0.19	0.03		9.3	29	7	251	4.01	0.001	0.71	0.48	
30/01/2017	Pond	3.6	758	7.2					2.6			<2													
27/02/2017	Pond	3.5	858	7.7					2.4			<2													
22/03/2017	Pond	3.4	979	8.2		<5		67	2.2			<5.0	<0.05	0.01	0.013		10	46	7	260	5.6	<0.001	1.7	0.57	
19/04/2017	Pond	6.5	84	7.6					400			<5.0													
17/05/2017	Pond	5.9	101	8.1					230			<5.0													
14/06/2017	Pond	4.8	115	9.5		<5		8	100			<5.0	0.07	0.07	0.03		2	7	2	25	0.17	<0.001	0.04	0.12	
12/07/2017	Pond	4.3	153	9.2					5.5			<5.0													
9/08/2017	Pond	4.2	171	9.9					3.4			<5.0													
6/09/2017	Pond	4.2	183	6.6		<5		11	3.2			<5.0	<0.05	0.3	<0.005		2	8	2	47	0.35	<0.001	0.085	0.18	
4/10/2017	Pond	4.3	229	8.6					1.6			<5.0													
1/11/2017	Pond	4.1	271	8					2.9			<5.0													
29/11/2017	Pond	4.3	303	7.6					4			<5.0													
28/12/2017	Pond	4.1	339	7.8		<5		16	1			<5.0	<0.05	<0.1	<0.005		3.7	11	3	84	0.6	<0.001	0.12	0.23	
		3.4	84	6.6	160			8	1	4	2					13	1.5	6.3		25	0.17	0.04	0.03		
		7	1060	9.9	204			67	400	187	16					159	18	46		429	33	12	1.23		
		4.45	653.48	8.22	177.33			27.92	46.54	61.79	8.50					86.82	8.77	22.12		235.66	9.78		2.97	0.58	

Date	Location	pH	EC	DO (membrane electrode)	*Redox Potential	Turbidity	TSS	Total Phosphorus-P	Total-N
		pH	µScm-1	mg/L	mV	NTU	mg/L	mg/L	mg/L
27/06/2012	Lake 2m	6.1	144	9.4	257				
27/09/2012	Lake 2m	4.6	214	8.2		2.2	4.5	0.02	
26/03/2015	Lake 2m	4.0	859	7.6	280				
17/09/2015	Lake 2m	4.5	915	8.8	185				
11/12/2015	Lake 2m	4.2	952	7.2		19	44	0.13	0.13
24/03/2016	Lake 2m	4.3	1011	8					
30/06/2016	Lake 2m	4.8	527.6	9.9					
29/09/2016	Lake 2m	4.1	647	8.8					
20/12/2016	Lake 2m	3.5	742	7.4					
		9	9	9	3	2	2	2	1
		3.5	144	7.2	185	2.2	4.5	0.02	0.13
		6.1	1011	9.9	280	19	44	0.13	0.13
		4.46	667.96	8.37	240.67	10.60	24.25	0.08	0.13
27/06/2012	Lake 3m	6.1	144	9.5	267				
27/09/2012	Lake 3m	4.6	214	8.2		14	30	0.03	
26/03/2015	Lake 3m	4.0	859	7.5	297				
17/09/2015	Lake 3m	4.5	915	8.7	200				
11/12/2015	Lake 3m	4.2	949	7.2		19	96	0.07	0.07
24/03/2016	Lake 3m	4.4	1014	8.1					
30/06/2016	Lake 3m	4.9	510.8	9.8					
29/09/2016	Lake 3m	4.1	650	8.8					
20/12/2016	Lake 3m	3.6	742	7.7					
		9	9	9	3	2	2	2	1
		3.6	144	7.2	200	14	30	0.03	0.07
		6.1	1014	9.8	297	19	96	0.07	0.07
		4.49	666.42	8.39	254.67	16.50	63.00	0.05	0.07
27/06/2012	Lake 4m	6.2	144	9.6	264				
27/09/2012	Lake 4m	4.6	213	8.2		5.8	9.2	0.02	
26/03/2015	Lake 4m	4.0	860	7.5	312				
17/09/2015	Lake 4m	4.5	915	8.7	200				
11/12/2015	Lake 4m	4.2	952	7.5		16	102	0.06	0.06
24/03/2016	Lake 4m	4.3	1.11	7.9					
30/06/2016	Lake 4m	4.8	517.4	9.9					
29/09/2016	Lake 4m	4	648	8.8					
20/12/2016	Lake 4m	3.6	742	7.7					

		9	9	9	3	2	2	2	1
		3.6	1.11	7.5	200	5.8	9.2	0.02	0.06
		6.2	952	9.9	312	16	102	0.06	0.06
		4.47	554.72	8.42	258.67	10.90	55.60	0.04	0.06
27/06/2012	Lake 5m	6.5	144	9.5	261				
26/03/2015	Lake 5m	4.0	864	7.5	316				
17/09/2015	Lake 5m	4.4	913	8.7	210				
11/12/2015	Lake 5m	4.1	954	7.7		12	22	0.06	0.06
24/03/2016	Lake 5m	4.7	1019	8.1					
30/06/2016	Lake 5m	4.8	515.5	9.9					
29/09/2016	Lake 5m	4	647	8.8					
20/12/2016	Lake 5m	3.6	742	7.6					
		8	8	8	3	1	1	1	1
		3.6	144	7.5	210	12	22	0.06	0.06
		6.5	1019	9.9	316	12	22	0.06	0.06
		4.51	724.81	8.48	262.33	12.00	22.00	0.06	0.06
30/06/2016	Lake 6m	5.2	516.6	9.9					
29/09/2016	Lake 6m	4.5	627	8.4					
20/12/2016	Lake 6m	3.6	740	7.4					
		3	3	3					
		3.6	516.6	7.4					
		5.2	740	9.9					
		4.43	627.87	8.57					

Date	Location	pH	EC	DO	*Redox Potential	Alkalinity as CaCO3	Bicarbonate as CaCO3	Cl	Total P	Total-N	Ammonia	Ca	Mg	Na	K	Sulfur as Sulfate	Al (Total)	Arsenic (Total)	Fe (Total)	Mn (Total)
		pH	µScm-1	mg/L	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Dec-11	DPL1							13				0.2	0.4	4	<5	3.5		<0.005	1.34	<0.01
Mar-12	DPL1							17				0.2	0.4	5.4	<5	4.8		<0.005	1.32	<0.01
30/05/2012	DPL1	4.2	98	3.3	435															
Jun-12	DPL1	4.2	105	3.8	405	<1	<1	20				0.6	0.6	11	<5	5.3		<0.005	2.49	<0.01
26/07/2012	DPL1	4.3	87	5.1	374															
27/08/2012	DPL1	4.2	98	2.1	365															
27/09/2012	DPL1	4.2	94	2.6	305	<1	<1	15				0.5	0.3	8.4	<5	6.7		<0.005	3.25	<0.01
29/10/2012	DPL1	4.6	96	5.8	208															
Dec-12	DPL1							36				1	0.7	6.3	<5	4.9		<0.005	4.32	<0.01
Mar-13	DPL1							12				0.2	0.1	9.2	<5	7.3		<0.005	1.68	<0.01
Jun-13	DPL1							19				0.1	<0.1	0.1	<5	5.9		<0.005	1.5	<0.01
Sep-13	DPL1							16				0.4	0.2	7.5	<5			<0.005	5.82	<0.01
12/12/2013	DPL1	4.8	86	3.5	91	3	2	20				0.4	0.2	0.2	<5	6.2		<0.005	3.83	0.02
29/01/2014	DPL1	4	279	5.7	264															
24/02/2014	DPL1	4.6	76	3.8	242															
31/03/2014	DPL1	4.9	72	6.3	136	3	2	15				0.6	0.1	0.1	<5	3.5		<0.005	2.44	<0.01
24/04/2014	DPL1	4	75		204															
28/05/2014	DPL1	4.2	95		307															
25/06/2014	DPL1	4.1	98	2	350	<1	<1	16				0.5	0.3	9.7	<5	6.4		<0.005	0.76	<0.01
30/07/2014	DPL1	4.1	112	3.9	174	<1	<1	19				0.4	0.2	11	<5	7.7	0.77	<0.005	0.62	<0.01
29/08/2014	DPL1	4.4	97	4.3	185	NP	NP	20				0.2	<0.1	9.6	<5	4.3		<0.005	3.93	<0.01
29/09/2014	DPL1	4	108	3.5	177															
28/11/2014	DPL1	4.7	81	3.3	110															
15/12/2014	DPL1	4.6	94	1.5	160	NP	<1	15				1.6	0.4	10	<5	6.1	0.32	<0.005	2.55	0.02
22/01/2015	DPL1	4.8	80	3.8	110															
25/02/2015	DPL1	4.2	110	1.1	160															
26/03/2015	DPL1	4	109	4	245	NP	NP													
24/04/2015	DPL1	4.1	131	2.7	253															
28/05/2015	DPL1	3.8	164	2	256															
17/09/2015	DPL1	4.1	135	3.9	195	NP		18			<0.02	0.7	0.8	12	<5	10	0.64	<0.001	0.95	0.017
21/10/2015	DPL1	4.3	116	2.9	217															
25/11/2015	DPL1	4.2	102	6.1	170															
11/12/2015	DPL1	4.6	86	2.4	232	1	1	14				0.3	0.2	11	<5	10	0.32	<0.001	3.21	0.009
25/01/2016	DPL1	4.7	95	1.6	165															
24/02/2016	DPL1	4.8	98	5.7	138															
24/03/2016	DPL1	4.6	104	3.8	268	2	2	17				0.37	0.23	10.21	<5	9.403	0.727	0.001	4.224	0.007
29/04/2016	DPL1	4.3	96	6.4	388															
24/05/2016	DPL1	4.2	106	2.7	255															
30/06/2016	DPL1	4.9	101.1	3.6	283							3.503	0.353	10.561	<5	9.636	0.471	0.001	2.508	0.14
21/07/2016	DPL1	3.9	142.2	6.8	384															
31/08/2016	DPL1	4	140	6.5	321															
29/09/2016	DPL1	3.9	151	2.5	366															
27/10/2016	DPL1	4	151	2.5	366															
29/11/2016	DPL1	4.7	116	1.9	108															
20/12/2016	DPL1	4.7	131	5.2	307.1															
30/01/2017	DPL1	4.2	121																	
27/02/2017	DPL1	4.6	103																	
22/03/2017	DPL1	4.4	116			<5		18	0.09	1.1	0.056		<0.5	12	1	12	0.48	<0.001	4.8	0.018
19/04/2017	DPL1	4.2	180																	
17/05/2017	DPL1	4.4	135																	
14/06/2017	DPL1	4.3	197			<5		22	<0.05	0.5	0.039		1	14	1	39	1.6	<0.001	13	0.039
12/07/2017	DPL1	4.1	137																	
9/08/2017	DPL1	4.3	123																	
6/09/2017	DPL1	4	124			<5		18	<0.05	1.2	0.031		<0.5	11	1	10	0.73	<0.001	3.4	0.017

21/07/2016	DPL7	7.5	3159	6.5	-31.00															
31/08/2016	DPL7	7.3	3364	3.7	-22.00	369		760			24	35	604	24	217		0.001	2.07	0.082	
29/09/2016	DPL7	7.2	3558	2.4	44.00															
27/10/2016	DPL7	7.2	3558	2.4	44.00															
29/11/2016	DPL7	7.1	7.1	2.4	20.00															
20/12/2016	DPL7	6.9	3527	4.5	229.3	372		372			18	38	648	25	263		0.001	1.85	0.082	
30/01/2017	DPL7	6.9	3471																	
27/02/2017	DPL7	7.1	3174																	
22/03/2017	DPL7	7	3430			350		360	0.1	2.1	0.19		36	830	29	710	0.33	<0.001	1.8	0.076
19/04/2017	DPL7																			
17/05/2017	DPL7	6.9	3440																	
14/06/2017	DPL7																			
12/07/2017	DPL7	7	3360																	
9/08/2017	DPL7	7	3480																	
6/09/2017	DPL7	7	3380			390		640	0.1	2.9	0.67		38	940	31	350	0.33	<0.001	1.3	0.065
4/10/2017	DPL7	7	3450																	
1/11/2017	DPL7	6.9	3440																	
29/11/2017	DPL7	6.8	344																	
28/12/2017	DPL7	6.9	3410			380		720	0.1	3.6	2.4		38	930	30	250	0.33	<0.001	1.4	0.063
No of Samples		50	50	37	39	17		23	3	3	4	20	23	23		22	9		23	
Minimum		4.6	7.1	1.7	-60	1		15	0.1	2.1	0.06	0.3	0.2	9.9		4.2	0.04		0.28	
Maximum		7.6	3558	6.5	320	550		780	0.1	3.6	2.4	24	43	940		710	0.62		2.62	
Average		7.16	3206.28	3.77	94.57	375.00		###	0.10	2.87	0.83	16.98	35.70	547.84		254.25	0.36		1.41	

Date	DPL1	DPL3	DPL5	DPL6	DPL7
Nov-13	0.61	0.57	0.67	0.59	0.61
Apr-14	0.61	0.58	0.68	0.61	0.62
Nov-14	1.30	1.90	1.20	1.40	1.90
Dec-14	1.20	1.80	1.20	1.40	1.80
Jan-15	1.10	1.40	0.90	1.20	1.40
Feb-15	0.30	1.00	0.20	0.80	1.50
Mar-15	0.70	1.00	0.40	1.00	1.20
Apr-15	0.90	1.00	0.80	1.20	1.40
May-15	1.10	1.70	0.80	1.40	1.20
Jun-15	1.40	1.40	0.80	1.20	1.30
Jul-15	1.00	1.50	1.10	1.10	1.00
Aug-15	1.30	1.50	0.90	1.10	1.60
Sep-15	1.30	1.80	1.30	1.20	1.70
Oct-15	1.40	1.70	1.10	1.20	1.80
Nov-15	1.20	1.40	1.20	1.30	1.70
Dec-15	1.10	1.20	0.90	1.20	1.60
22/03/2017	1.58	1.28	1.38	1.95	1.20
19/04/2017	1.53	1.46	1.51	1.26	
17/05/2017	1.64	1.44	1.54	1.51	1.51
14/06/2017	0.89			1.08	
12/07/2017	1.69	1.52	1.60	1.54	1.47
9/08/2017	1.83	1.60	1.68	1.77	1.69
6/09/2017	1.90	1.61	1.67	1.85	1.80
4/10/2017	1.91	1.54	1.61	1.81	1.69
1/11/2017	1.92	1.64	1.72	1.81	1.72
29/11/2017	1.93	1.65	1.74	1.81	1.77
28/12/2017	1.94	1.66	1.74	1.97	1.78
Minimum	0.3	0.57	0.2	0.59	0.61
Maximum	1.94	1.9	1.74	1.97	1.9
Average	1.31	1.42	1.17	1.34	1.48

Date	Location	Cyanophyta	Chlorophyta	Diatoms (Bacillariophyta)	Dinophyta (Dinoflagellates)	Euglenophyta (Euglenoids)
		cells/mL	cells/mL	cells/mL	cells/mL	cells/mL
30/11/2011	Lake	240				
22/12/2012	Lake	800				
2/02/2012	Lake	<100				
20/02/2012	Lake	700				
28/02/2012	Lake	14375				
27/03/2012	Lake	1200				
30/05/2012	Lake	<100				
27/06/2012	Lake	130	0.01			
26/07/2012	Lake	16360	2520			
27/08/2012	Lake	24640	3720			
27/09/2012	Lake	68000	35000			
29/10/2012	Lake	<100	7900			
28/11/2012	Lake	<100	80670			
24/12/2012	Lake	<100				
17/01/2013	Lake	<100				
1/02/2013	Lake	<100				
15/02/2013	Lake	<100				
8/03/2013	Lake	<100	215			
30/05/2013	Lake	<100	880			
30/06/2013	Lake	<100				
30/07/2013	Lake	<100	34000			
28/08/2013	Lake	<100	205			
30/09/2013	Lake	<100				
25/10/2013	Lake	<100	17430			
25/11/2013	Lake				480	
12/12/2013	Lake	1150	39500			
19/12/2013	Lake		22000			
9/01/2014	Lake		123000			
29/01/2014	Lake		34000			
31/03/2014	Lake			295		
28/04/2014	Lake		7700	45		
29/05/2014	Lake	ND	7600			
26/06/2014	Lake	ND	52000			
31/07/2014	Lake	ND	28000			
28/10/2014	Lake	ND	168000			
28/11/2014	Lake	ND	123000	260	60	
16/12/2014	Lake	ND	106500	220	35	
22/01/2015	Lake	ND	37000			
26/02/2015	Lake	ND				
26/03/2015	Lake	ND	8750			
24/04/2015	Lake	ND	8000			
29/05/2015	Lake	ND	76000	4200		
29/06/2015	Lake	ND	211000	6300		
21/10/2015	Lake	ND	18330	65	35	155
26/11/2015	Lake	ND	4850		5	
11/12/2015	Lake	ND	11900	30	10	
25/01/2016	Lake	ND	34000			
8/02/2016	Lake	ND	0			
24/02/2016	Lake	ND	3700			
10/03/2016	Lake	ND	1575			

24/03/2016	Lake	ND	7600			
7/04/2016	Lake	ND	9700			
29/04/2016	Lake	ND	11800			
24/05/2016	Lake	ND	5700			
30/06/2016	Lake	ND	28930			
31/08/2016	Lake	840	61500			
30/09/2016	Lake	ND	920			
4/10/2016	Lake	ND	920			
28/10/2016	Lake	ND	29000			
21/12/2016	Lake	ND	10830			
30/01/2017	Lake	ND	1480			
27/02/2017	Lake	ND	640			
22/03/2017	Lake	ND	175			
19/04/2017	Lake	ND	600			
17/05/2017	Lake	ND	2820			
14/06/2017	Lake	ND	1830			
12/07/2017	Lake	ND	5260			
9/08/2017	Lake	ND	41500			
6/09/2017	Lake	ND	99800			
4/10/2017	Lake	ND	128000			
1/11/2017	Lake	ND	38600			
29/11/2017	Lake	ND	8150			
28/12/2017	Lake	ND	1890			
Number of Samples		11	57	8	6	1
Minimum			0	30	5	155
Maximum			211000	6300	480	155
Average			31694.6	1426.9	104.2	155.0