

Attachment 1

Photographs of Works Carried Out in Last 12 Months

Photo 1 Lot 214 DP752039 Extraction Area



Photo 2 Lot 214 DP752039 Tailing Ponds



Photo 3 Lot 2 DP570966 Extraction Area



Photo 4 Cleared Sydney Hinterland Transitional Woodland Area



Photo 5 Tailings Ponds 9 and 10



Photo 6 Former Tailings Ponds 7 and 8 Overburden Stockpile Area



Photo 7 Clean Water Dam



Photo 8 Capping of Tailings Pond 5 and Soil Storage Area



Photo 9 Lot 2 DP233818 Rehabilitation Area



Photo 10 Lot 2 DP233818 Rehabilitation Area



Attachment 2

Weighbridge Verification

Test report reference number: 0005276

Calibration Sticker Reference: F4-16576

Verification: Y

In-Service Test:
Date of Test: 10/06/14

For in-service inspection record the verification/certification mark: F4-16576

Name of owner/user: PF FORMATION-test and verify w/bridge

Contact: DIANNA REA

Address of owner/user: 1774 WISEMAN FERRY RD

Phone: 02 4566 8314

Report Emailed from Site? N

DESCRIPTION OF INSTRUMENT:
Serial No: IN00542/7

Make / Model: TOLEDO 7560/5000

NSC No: 6/10B/46

Capacity: 60t

Min: 0.40t

VSI e=d= 0.02t

Class III

DESCRIPTION	Y/N		Y/N
Instrument complies with NMI certificate?	Y	The data plate is fixed on instrument?	Y
Instrument is being used appropriately?	Y	Is the instrument clean?	N
Is the instrument complete?	Y	Level-ind device fitted & Operates?	NA
Is the Instrument Operational?	Y	Mounted on a firm base?	Y
Is the instrument level?	Y	Mandatory marks are clear & permanent?	Y
Any apparent obstructions to Inst?	N		
Does the operator &/OR customer, have a clear and unobstructed view of the indicator & the weighing operation?			Y
Add indicating devices: Do the repeat the primary indication. Does price computation and/or, ticket/label comply with S1/0/A?			Y
If applicable, does the steelyard, tare bar or proportional weight comply with the mandatory requirements in respect to design and marking?			NA
Is the instrument adequately protected against abnormal dust, air movement, vibrations, atmospheric conditions and any other influence likely to affect its performance?			N
Suspended weighing instruments: does it hang freely & are all transparent covers in good repair?			NA

Repeatability Test: Pass or Fail? PASS	Zero Settings Pass or Fail? PASS	1. 41.16	2. 41.16	3. 41.14
Difference: 0.02				

Eccentricity Reading 1 - 12:					
1. 8.14	2. 8.14	3. 8.14	4. 8.14	5. 8.14	6. 8.14
7.	8.	9.	10.	11.	12.
Mass Used:					8.14

Eccentricity Test Pass or Fail? P

No. of Supports? 6

Comments: Corners read the same

Weighing performance using substitution load (clause 5.4.2)

Substitution Load 1: AWS WBTU
Substitution Load 2:
Substitution Load 3:

Method Used: Method A? A Method B?

MPE change points: 10.00t ; 40.00t

Available weights: 18.00t

WEIGHBRIDGE WEIGHT TEST:

Up:	Load	Make up of load:	MPE:	1:	1/2 e:	DL:	E:	Lsub:	(rounded)	P or F?
1.	2.00t	MASSES	0.01	2.00	0.01		1kg			PASS
2.	10.00t	MASSES	0.02	10.00	0.01		2kg			PASS
3.	18.00t	MASSES	0.02	18.00	0.01		4kg			PASS
4.	23.16t	SUB 1	0.02	23.16	0.01	23.16	3kg	23.157	3kg	PASS
5.	41.16t	MASSES + SUB	0.03	41.16	0.01	23.16	4kg	23.157	3kg	PASS

Over range blanking Pass or Fail? P

Down:	Load	Make up of load:	MPE:	1:	P or F?
1.	41.16	MASSES + SUB	0.03	41.16	P
2.	23.16	SUB 1	0.02	23.16	P
3.	18.00	MASSES	0.02	18.00	P
4.	10.00	MASSES	0.02	10.00	P
5.	2.00	MASSES	0.01	2.00	P

Discrimination (clause 5.5): P

Accuracy of tare setting (clause 5.7): P

Test Required:

Weight test Pass or Fail?: P

Sensitivity (clause 5.6): P

Test Required:

OVERALL RESULT?
Technicians Name:
ID No:

[illegible]

Attachment 3

EPA Licence Annual Return

Annual Return

ETRA PTY LTD



ANNUAL RETURN

LICENCE NO	3407
LICENCE HOLDER	ETRA PTY LTD
REPORTING PERIOD	30-Sep-2013 to 29-Sep-2014

If your licence has been transferred, suspended, surrendered or revoked by the EPA during this reporting period, cross out the dates above and specify the new dates to which this Annual Return relates below:

REVISED REPORTING PERIOD ____ / ____ / ____ to ____ / ____ / ____

(Note: the revised reporting period also needs to be entered in Section E)

THIS ANNUAL RETURN MUST BE RECEIVED BY THE EPA BEFORE 29-Nov-2014

Your Annual Return must be completed, including certification in Section E, and submitted to the EPA no later than 60 Days after the end of the reporting period for your licence.

Failure to submit this Annual Return within 60 days after the reporting period ends may result in:

- the issue of a Penalty Notice for \$1500 (individuals) or \$3000 (corporations);
- OR
- prosecution.

Please send your completed Annual Return by **Registered Post** to:

**Regulatory and Compliance Support Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232**

It is an offence to supply any information in this form to the EPA that is false or misleading in a material respect, or to certify a statement that is false or misleading in a material respect.

THERE IS A MAXIMUM PENALTY OF \$250,000 FOR A CORPORATION OR \$120,000 FOR AN INDIVIDUAL.

Details provided in this Annual Return will be available on the EPA's Public Register in accordance with section 308 of the *Protection of the Environment Operations Act 1997*.

Annual Return

ETRA PTY LTD



Use the checklist below to ensure that you have completed your Annual Return correctly.

(✓ the boxes)

CHECKLIST		
<input checked="" type="checkbox"/>	Section A:	All licence details are correct
<input checked="" type="checkbox"/>	Section B1:	You have entered the correct number in the complaints table
<input checked="" type="checkbox"/>	Section B2 – B3:	If there are tables, you have provided the required details
<input checked="" type="checkbox"/>	Section C:	You have answered question 1, and 2 if applicable
<input type="checkbox"/>	Section D:	If applicable, you have completed all load calculation worksheets
<input type="checkbox"/>	Section E:	You have answered question 1, 2, 3, 4, 5 and 6 if applicable
<input type="checkbox"/>	Section F:	You have answered question 1, 2 and 3 if applicable
<input type="checkbox"/>	Section G:	The Annual Return has been signed by appropriate person(s) and, if applicable, the revised reporting period entered
<input type="checkbox"/>	Make a copy of the completed Annual Return and keep it with your licence records	
<input type="checkbox"/>	Attach a cheque (unless you have paid separately) for the payment of the administrative fee for the next licence fee period	

Please send your completed Annual Return by **Registered Post** to:

**Regulatory and Compliance Support Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232**



A Statement of Compliance - Licence Details

ALL licence holders must check that the licence details in Section A are correct

If there are changes to any of these details you must advise the EPA and apply as soon as possible for a variation to your licence or for a licence transfer.

Licence variation and transfer application forms are available on the EPA website at: <http://www.epa.nsw.gov.au/licensing>, or from regional offices of the EPA, or by contacting us on telephone 02 9995 5700.

If you are applying to vary or transfer your licence you must still complete this Annual Return.

A1 Licence Holder

Licence Number 3407

Licence Holder ETRA PTY LTD

Trading Name (if applicable) PF FORMATION

ABN

A2 Premises to which Licence Applies (if applicable)

Common Name (if any) ETRA PTY LTD

Premises WISEMANS FERRY ROAD MAROOTA NSW 2756

A3 Activities to which Licence Applies

Extractive Activities

A4 Other Activities (if applicable)

Concrete Works

A5 Fee-Based Activity Classifications

Note that the fee based activity classification is used to calculate the administrative fee.

Fee-based activity	Activity scale	Unit of measure
Land-based extractive activity	> 100,000.00 - 500,000.00	T extracted, processed or stored

A6 Assessable Pollutants (Not Applicable)

Annual Return

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B Monitoring and Complaints Summary

B1 Number of Pollution Complaints

Number of complaints recorded by the licensee during the reporting period: If no complaints were received enter nil in the attached box, otherwise complete the table below.	Nil
---	-----

Pollution Complaint Category	Number of Complaints
Air	
Water	
Noise	
Waste	
Other	

B2 Concentration Monitoring Summary

For each monitoring point identified in your licence complete all the details for each pollutant listed in the tables provided below.

If concentration monitoring is **not** required by your licence, **no tables** will appear below.

Note that this does not exclude the need to conduct appropriate concentration monitoring of assessable pollutants as required by load-based licensing (if applicable).

Monitoring Point 1

Dust monitoring, Dust gauge labelled "1- School" on the Map faxed to the EPA on 5 August 2002

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Particulates - Deposited Matter	grams per square metre per month	12	12	1.34	2.32	3.17

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Monitoring Point 2

Dust monitoring, Dust gauge labelled 2 - intersection of Hitchcock and Wisemans Ferry Road

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Particulates - Deposited Matter	grams per square metre per month	12	12	1.55	2.85	4.67

Monitoring Point 3

Dust monitoring, Dust gauge labelled as "Jurds Paddock - 3 Por168" on the map faxed to the EPA on 5 August 2002

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Particulates - Deposited Matter	grams per square metre per month	12	12	1.55	3.07	6.35

B3 Volume or Mass Monitoring Summary

For each monitoring point identified in your licence complete the details of the volume or mass monitoring indicated in the tables provided below.

If volume or mass monitoring is not required by your licence, no tables will appear below.

Note that this does not exclude the need to conduct appropriate concentration monitoring of assessable pollutants as required by load-based licensing (if applicable).

C Statement of Compliance - Licence Conditions

C1 Compliance with Licence Conditions

(☒ the boxes)

-
- 1 Were all conditions of the licence complied with (including monitoring and reporting requirements)? ☒ Yes ☐ No

(✓ a box)

-
- 2 If you answered 'No' to question 1, please supply the following details for each non -compliance in the format, or similar format , provided on the following page.

Please use a separate page for each licence condition that has not been complied with.

- a) What was the specific licence condition that was not complied with?
- b) What were the particulars of the non -compliance?
- c) What were the date(s) when the non -compliance occurred, if applicable?
- d) If relevant, what was the precise location where the non -compliance occurred?

Attach a map or diagram to the Statement to show the precise location.

- e) What were the registration numbers of any vehicles or the chassis number of any mobile plant involved in the non -compliance?
- f) What was the cause of the non -compliance?
- g) What action has been, or will be, taken to mitigate any adverse effects of the non -compliance?
- h) What action has been, or will be, taken to prevent a recurrence of the non -compliance?

-
3. How many pages have you attached?

Each attached page must be initialised by the person(s) who signs Section G of this Annual Return



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ETRA PTY LTD



C2 Details of Non-Compliance with Licence

Licence condition number not complied with
Summary of particulars of the non-compliance (NO MORE THAN 50 WORDS)
If required, further details on particulars of non-compliance
Date(s) when the non-compliance occurred, if applicable
If relevant, precise location where the non-compliance occurred (attach a map or diagram)
If applicable, registration numbers of any vehicles or the chassis number of any mobile plant involved in the non-compliance
Cause of non-compliance
Action taken or that will be taken to mitigate any adverse effects of the non-compliance
Action taken or that will be taken to prevent a recurrence of the non-compliance

D Statement of Compliance - Load-Based Fee Calculation Worksheets

If you are not required to monitor assessable pollutants by your licence, no worksheets will appear below. Please go to Section E.

If assessable pollutants have been identified on your licence (see licence condition L2), complete the following worksheets for each assessable pollutant to determine your load-based fee for the licence fee period to which this Annual Return relates.

Loads of assessable pollutants must be calculated using any of the methods provided in the EPA's Load Calculation Protocol for the relevant activity. A Load Calculation Protocol would have been sent to you with your licence. If you require additional copies you can download the Protocol from the EPA's website or you can contact us on telephone 02 9995 5700.

You are required to keep all records used to calculate licence fees for four years after the licence fee was paid or became payable, whichever is the later date.

PENALTIES APPLY FOR SUPPLYING FALSE OR MISLEADING INFORMATION

D1 - D8 (Not Applicable)

E Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan (PIRMP) Under Section 153A of the POEO Act 1997

1 Have you prepared a PIRMP as required under s153A of the Protection of the Environment Operations Act 1997?

(✓ a box)

☒ Yes

☐ No

If you answered 'Yes' to question 1, please tick the appropriate box to indicate the following:

2 Is the PIRMP available at the premises?

(✓ a box)

☒ Yes

☐ No

3 Is the PIRMP available in a prominent position on a publicly accessible web site?

(✓ a box)

☒ Yes

☐ No

If the PIRMP is available on a publicly accessible web site please indicate clearly below the address of the web site where the PIRMP can be accessed:

Web site Address

www.ptformation.com.au

4 Has the PIRMP been tested?

(✓ a box)

☒ Yes

☐ No

If you answered 'Yes' to question 4 please indicate clearly below the date that the PIRMP was last tested:

The PIRMP was last tested on

13 / 10 / 2014

5 Has the PIRMP been updated?

(✓ a box)

☒ Yes

☐ No

If you answered 'Yes' to question 5 please indicate clearly below the date that the PIRMP was last updated:

The PIRMP was last updated on

13 / 10 / 2014

6 How many times has the PIRMP been activated in this reporting period?

Nil

If the PIRMP has been activated, please indicate clearly below the date/s when the PIRMP was activated:

The PIRMP was activated on

The EPA's guidelines for preparation of pollution incident response management plans are available at

<http://www.epa.nsw.gov.au/legislation/20120227egpreppirmp.htm>

F Statement of Compliance - Requirement to Publish Pollution Monitoring Data Under Section 66(6) of the POEO Act 1997

1 Are there any conditions attached to your licence that require pollution monitoring to be undertaken?

(✓ a box)

☒ Yes

☐ No

If you answered 'Yes' to question 1, please tick the appropriate box to indicate the following:

2 Do you operate a web site?

(✓ a box)

☒ Yes

☐ No

3 Is the pollution monitoring data published on your web site in accordance with the EPA's written requirements for publishing pollution monitoring data?

(✓ a box)

☒ Yes

☐ No

If you publish pollution monitoring data on a web site please indicate clearly below the address of the web site where the pollution monitoring data can be accessed:

Web site address

www.pformation.com.au

The EPA's written requirements for publishing pollution monitoring data are available at
<http://www.epa.nsw.gov.au/legislation/20120263reqpubpmdata.htm>

Note - if you do not maintain a web site, you must provide a copy of any monitoring data that relates to pollution, to any person requests a copy of the data at no charge to the person requesting the data.

Annual Return

ETRA PTY LTD



G Signature and Certification

This Annual Return may only be signed by a person(s) with legal authority to sign it as set out in the categories below. Please tick (✓) the box next to the category that describes how this Annual Return is being signed.

If you are uncertain about who is entitled to sign or which category to tick, please contact us on telephone 02 9995 5700.

If the licence holder is:	the Annual Return must be signed and certified:
an individual	<input type="checkbox"/> by the individual licence holder, or <input type="checkbox"/> by a person approved in writing by the EPA to sign on the licence holder's behalf
a company	<input type="checkbox"/> by affixing the common seal in accordance with Corporations Act 2001, or <input checked="" type="checkbox"/> by 2 directors, or <input type="checkbox"/> by a director and a company secretary, or <input type="checkbox"/> if a proprietary company that has a sole director who is also the sole company secretary – by that director, or <input type="checkbox"/> by a person delegated to sign on the company's behalf in accordance with the Corporations Act 2001 and approved in writing by the EPA to sign on the company's behalf.
a public authority (other than a council)	<input type="checkbox"/> by the Chief Executive Officer of the public authority, or <input type="checkbox"/> by a person delegated to sign on the public authority's behalf in accordance with its legislation and approved in writing by the EPA to sign on the public authority's behalf.
a local council	<input type="checkbox"/> by the General Manager in accordance with s.377 of the Local Government Act 1993, or <input type="checkbox"/> by affixing the seal of the council in a manner authorised under that Act.

It is an offence to supply any information in this form that is false or misleading in a material respect, or to certify a statement that is false or misleading in a material respect. There is a maximum penalty of \$250,000 for a corporation or \$120,000 for an individual.

I/We

- declare that the information in the Monitoring and Complaints Summary in section B of this Annual Return is correct and not false or misleading in a material respect, and
- certify that the information in the Statement of Compliance in sections A, C, D, E and F and any pages attached to Section C is correct and not false or misleading in a material respect.

If your licence has been transferred, suspended, surrendered or revoked by the EPA during this reporting period, cross out the dates below and specify the new dates to which this Annual Return relates below:

For the reporting period 30-Sep-2013 to 29-Sep-2014 or ____/____/____ to ____/____/____

SIGNATURE: [Signature]

NAME: Joshua Graham
(printed)

POSITION: Director

DATE: 29 / 10 / 2014

SIGNATURE: [Signature]

NAME: JOHN GRAHAM
(printed)

POSITION: DIRECTOR

DATE: 29 / 10 / 2014

SEAL(if signing under seal)

PLEASE ENSURE THAT ALL APPROPRIATE BOXES HAVE BEEN COMPLETED AND THAT THE CHECKLIST ON PAGE 2 OF THE ANNUAL RETURN HAS BEEN COMPLETED


Attachment 4

Monthly Environmental Operational Procedures Checklists

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota

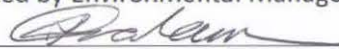
The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	Noise monitoring was carried out throughout the month during day and night time hours. Results were consistent with previous tests showing that quarry noise was mostly inaudible or audible but not measurable.
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for June 2014 showed low levels at Site's 1, 2 and 3.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 31 st July 2014	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota


The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for July 2014 showed low levels at Site's 1, 2 and 3.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 29 th August 2014	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota

The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	The noise compliance testing report for July 2013 to April 2014 has been prepared by Koikas Acoustics and is attached to the 2013 – 2014 AEMR.
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for August 2014 showed low levels at all sites.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	Water samples were collected downstream from Lot 198 and sent away for analysis. Results to be included in the next AEMR.
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	The Annual Groundwater Report has been prepared by Earth 2 Water and is Attached to the 2013 – 2014 AEMR.
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 30 th September 2014	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

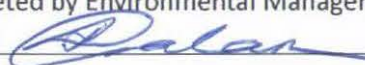
Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota

The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	Noise monitoring was carried out throughout the month. Results from testing were consistent with previous results, where quarry noise was predominantly inaudible or audible but not measurable.
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results showed low levels at locations 1 and 2 and a high result at site 3. There is no apparent reason for the high reading. The result was the highest recorded for the reporting period however the annual average for the reporting period was still below the EPA requirements.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	Pollution Incident Response Management Plan in place as per EPA requirements and is tested annually.
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	

Completed by Environmental Manager (Josh Graham)

Signed:

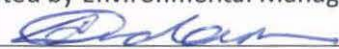


Date: 31st October 2014

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota


The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for October 2014 showed low levels at Sites 1 and 2 and a high result at Site 3. The high result at Site 3 was lower than the previous month but still above the target for the annual average. There is no apparent reason for the high result.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 28 th November 2014	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota

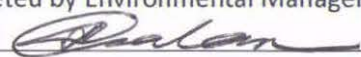
The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for November 2014 showed low levels at Sites 1 and 2 and a high result at Site 3. Quarry activities have continued in a routine fashion and are not considered to be the cause of the unusually high result.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	Water samples were collected downstream from Lot 198 on 2/12/14 and sent away for analysis. Results showed low levels of suspended solids.
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 24 th December 2014	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota

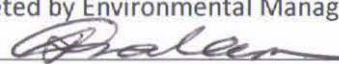
The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for December 2014 showed low levels at all locations.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 30 th January 2015	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota


The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for January 2015 showed low levels at all locations.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	Water samples were collected downstream of Lot 198 and sent away for analysis. Results from testing will be included in the next AEMR.
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 27 th February 2015	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota


The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	Noise monitoring was conducted last month at four locations. Results were consistent with previous results, showing that quarry noise was mostly inaudible or audible but not measurable.
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for February 2015 showed low levels at all locations.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 31 st March 2015	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota


The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2 A3-A5	2.1	Noise Management	✓	Nil	
A3 A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for March were low at Site's 1 & 2 and marginally higher at Site 3. The reason for a high result at site 3 is unknown, as operations have continued in a routine manner. The average for the reporting period is still within the EPA requirements.
A4 A10-A11	4.1	Access and Traffic	✓	Nil	
A5 A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	Heavy rainfall was experienced throughout the month and water was transferred within the site to prevent any discharges of sediment laden water.
A6 A16-A19	6.1	Water Management	✓	Nil	
A7 A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
A8 A25-A26	8.1	Social Impact Management	✓	Nil	
A9 A27-A28	9.1	Heritage Management	✓	Nil	
A10 A29-A31	10.1	Visual Amenity Management	✓	Nil	
A11 A32-A34	11.1	Waste Management	✓	Nil	
A12 A35-A36	12.1	Emergency Response Management	✓	Nil	
A13 A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 30 th April 2015	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota


The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	Noise monitoring was carried out at the nominated locations. Quarry noise was predominantly not audible and in some cases audible but not dominant. Results will be included in the annual Noise Management Plan.
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for April 2015 showed low levels at all locations.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
Completed by Environmental Manager (Josh Graham)				Signed:  Date: 29 th May 2015	

PF FORMATION – ENVIRONMENTAL OPERATIONAL PROCEDURES

Hitchcock Road Sand Extraction and Rehabilitation Project, Maroota

The chapter, page number and strategy point number are references to the approved Environmental Strategy Appendix A – Environmental Operational Procedures.

CHAPTER Page No.	STRATEGY Point No.	MANAGEMENT CONTROLS	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
<u>A2</u> A3-A5	2.1	Noise Management	✓	Nil	
<u>A3</u> A6-A9	3.1, 3.2	Air Quality Management	✓	Nil	Deposited dust results for May 2015 showed low levels at Sites 1 and 3 and a marginally higher than normal result at Site 2. Quarry operations were routine throughout the month, the annual average is still below the EPL limits.
<u>A4</u> A10-A11	4.1	Access and Traffic	✓	Nil	
<u>A5</u> A12-A15	5.1, 5.2, 5.3	Erosion & Sediment Control	✓	Nil	Water samples were collected downstream from Lot 198, results showed low levels of Total Suspended Solids.
<u>A6</u> A16-A19	6.1	Water Management	✓	Nil	Dino Parisotto from Earth 2 Water attended the site and carried out the annual data logger downloads and sampling of the groundwater monitoring bores. The information will be included in the AEMR.
<u>A7</u> A20-A24	7.1, 7.2	Rehabilitation & Vegetation Offset Management	✓	Nil	
<u>A8</u> A25-A26	8.1	Social Impact Management	✓	Nil	
<u>A9</u> A27-A28	9.1	Heritage Management	✓	Nil	
<u>A10</u> A29-A31	10.1	Visual Amenity Management	✓	Nil	
<u>A11</u> A32-A34	11.1	Waste Management	✓	Nil	
<u>A12</u> A35-A36	12.1	Emergency Response Management	✓	Nil	
<u>A13</u> A37-A40	13.1, 13.2	Hazard, Risk and Safety Management	✓	Nil	
				Completed by Environmental Manager (Josh Graham) Signed:  Date: 30 th June 2015	

Attachment 5

Annual Environmental Operational Procedures

A2.3 Management controls - 2015

OPERATIONAL PHASE











Strategy 2.1: Ensure that the site operations are undertaken in a manner that minimises the impacts of noise and vibration.

Actions	Responsibility
2.1.1 Manage site activities so that any necessary high noise and vibration levels occur at times of least impact.	Quarry Manager <i>R.</i>
2.1.2 Advise neighbouring properties at least 24 hours in advance of the extent and expected duration of especially noisy activities.	Quarry Manager/ Environmental Manager <i>Polan</i>
2.1.3 Undertake all site activities incorporating noise attenuation measures such as restricting working hours for certain works required close to sensitive receptors	Quarry Manager <i>R.</i>
2.1.4 Ensure that panels and covers of silenced plant are kept shut and plant and equipment switched off when not in use.	Quarry Manager <i>R.</i>
2.1.5 Ensure that mechanical equipment is silenced by the best practical means using current technology, prior to use. Noise suppression devices should be fitted according to manufacturer's instructions. Residential class mufflers should be used where possible. Noise control kits should be fitted to noisy mobile equipment and shrouds provided around stationary equipment where necessary.	Quarry Manager <i>R.</i>
2.1.6 Working hours will be limited to 7.00am to 6.00pm, Monday to Saturday and at no time on Sundays and public holidays. A maximum of ten laden vehicles will be permitted to enter and leave the site between the hours of 6.00am and 7.00am, Monday to Saturday, excluding Sundays and public holidays.	Quarry Manager <i>R.</i>
2.1.7 Arrange for all plant and equipment to be inspected regularly to ensure that it is well maintained to minimise noise emissions.	Quarry Manager <i>R.</i>
2.1.8 Conduct compliance monitoring of noise levels at the defined locations and keep records of measurements.	Environmental Manager <i>Polan</i>
Performance indicator	Noise from operational activities does not exceed the guideline limits. <i>Noise surveys show that the site complies with the nominated noise criteria</i> Number of complaints received <i>Nil Polan</i>

A3.3 Management controls

OPERATIONAL PHASE

Strategy 3.1: Ensure that the site operations are undertaken in a manner that minimises and controls dust and vehicle emissions.

Actions	Responsibility
3.1.1 Conduct ambient air quality monitoring at identified sites	Environmental Manager 
3.1.2 Fit dust suppression equipment to all processing plant on site as required. This is to be regularly inspected and maintained in good working order at all times.	Quarry Manager/ Environmental Manager
3.1.3 Define haul road areas to prevent unnecessary vehicle movement into others	Quarry Manager 
3.1.4 Keep all unsealed trafficable areas and working areas damp to minimise dust emissions by spraying regularly with a water cart, water sprays or sprinklers. Frequency of spraying to be determined based on weather conditions, soil erodibility and the observation of any visible dust.	Quarry Manager/ Environmental Manager 
3.1.5 Apply speed controls to all unsealed areas (maximum speed of 20 km/h) and signpost accordingly.	Quarry Manager 
3.1.6 Vegetate all semi-permanent stockpiles with suitable groundcover and water where necessary until the vegetation is well established.	Quarry Manager 
3.1.7 Cease work on any extraction activity producing dust due to high winds that cannot be controlled by watering or other means. Work will not resume until the wind velocity decreases and any dust generation can be controlled by normal means.	Quarry Manager 
3.1.8 Ensure that all loaded trucks leaving the central processing plant on Lot 198 DP595538 have their payloads fully covered by a suitable material to prevent spillage.	Quarry Manager 
3.1.9 Construct dust screens such as earth bunds and vegetated barriers.	Quarry Manager 
3.1.10 A mechanical road sweeping unit and water cart will be maintained for use as required to keep all roads including the intersection of the haul road and Wisemans Ferry Road free from deposited material.	Quarry Manager 
3.1.11 No fires to be permitted on-site.	Quarry Manager 

Performance indicator Ambient air quality data compiled.

Dust generated from site activities to comply at all times with OEH specified air quality criteria.

Deposited dust results are within the nominated EPA criteria *Palen*

Monitoring

Dust monitoring at identified locations.

12 samples collected at 3 locations *Palen*

Compilation of a complaints register.

No complaints *Palen*

Reporting

Annual reporting in the AEMR. Monitoring results will be suitably summarised for posting on the PF Formation website.

Dust results included in 2015 AEMR *Palen*

Strategy 3.2: Minimise and control vehicle and plant exhaust emissions.

Actions	Responsibility
3.2.1 Inspect all exhausts from vehicles and plant/equipment to ensure that they are maintained at an acceptable level.	Quarry Manager <i>HW</i>
3.2.2 Regularly service all vehicles to ensure that exhaust emissions comply with the regulations. Maintain appropriate service records.	Quarry Manager <i>HW</i>
3.2.3 Identify any opportunities to minimise machinery use and ensure that all equipment used on the site is energy efficient.	Quarry Manager <i>HW</i>

Performance Indicator Vehicle and plant emissions comply with the regulations.

Monitoring

Regular vehicle and plant inspections.






Reporting

Annual reporting of inspection results in the AEMR.

A4.3 Management controls

OPERATIONAL PHASE

Strategy 4.1: Minimise the impact of operational traffic on the local community.

Actions	Responsibility
4.1.1 Ensure that the number of laden vehicle movements does not exceed a combined total of two hundred per day via the intersection of the haulage road and Wisemans Ferry Road. This is the total of laden vehicle movements allowed for PF Formation's combined extractive industry operations in The Hills Shire.	Quarry Manager/ Environmental Manager 
4.1.2 Undertake operations involving the transportation of material on the site only between 6.00am and 6.00pm, Monday to Saturday.	Quarry Manager/ Environmental Manager 
4.1.3 Allow a maximum of ten laden vehicles to enter and leave the site between 6.00am and 7.00am, Monday to Saturday only. Ensure that vehicles do not arrive at the site prior to 5.45am on any day.	Quarry Manager/ Environmental Manager 
4.1.4 Ensure that all vehicle loads leaving the site are suitably covered.	Quarry Manager/ Environmental Manager 
Performance Indicator	Minimum of complaints from the community. <u>No complaints.</u> 
Monitoring	Number and type of complaints received. Weighbridge records of arrival and departure times.
Reporting	Annual report on complaints received.







A4.4 Monitoring and reporting

The Environmental Manager will be responsible for the monitoring of complaints on traffic issues from the community. Annual reports will be compiled on community complaints and reported in the AEMR.



A5.3 Management controls


OPERATIONAL PHASE





Strategy 5.1: Provide for treatment of stormwater runoff from extraction areas, stockpiles and access roads.

Actions	Responsibility
5.1.1 Construct temporary erosion and sedimentation control structures such as detention basins and catch drains as appropriate to collect runoff from cleared land including extraction areas and access roads.	Quarry Manager/ Environmental Manager 
5.1.2 Erect silt traps and erosion control fencing as appropriate along extraction area boundaries and drainage lines.	Quarry Manager/ Environmental Manager 
5.1.3 Design sediment basins with a minimum storage capacity of 400 m ³ per hectare of catchment. Spillway capacity and stability will be designed as follows: <ul style="list-style-type: none"> • life of less than 5 years, adopt the 20 year t_c event • life between 5 and 10 years, adopt the 50 year t_c event • life greater than 10 years, adopt the 100 year t_c event. 	Quarry Manager 
5.1.4 Undertake regular inspections to assess stormwater control measures and conduct routine inspections to ensure that compliance with best practice guidelines and relevant legislation is achieved.	Quarry Manager/ Environmental Manager 
Performance indicator	Stormwater control measures are in place prior to commencement of extraction in the particular phase of development and are effective in reducing sedimentation to acceptable levels. 
Monitoring	Review effectiveness of the stormwater basins and treatment methods during and following major rainfall events.
Reporting	<i>Stormwater basins effective during significant storm events (April)</i> Report on effectiveness of control measures once sedimentation works completed and then on an annual basis. 

Strategy 5.2: Plan site operations to minimise opportunities for soil erosion and sedimentation.

Actions	Responsibility
5.2.1 Select locations for topsoil and material stockpiles on level ground and away from drainage lines. Install diversion drains up slope and sediment filter fences as appropriate	Quarry Manager/ Environmental Manager 
5.2.2 Provide training to operational personnel on the importance of erosion control measures and inform drivers of the damage that can be caused by to the environment by heavy vehicles	Quarry Manager/ Environmental Manager 
Performance indicator	Soil erosion control measures are incorporated in the operational activities on the site and are effective in reducing soil erosion.
Monitoring	Monitor suspended solid concentrations in stormwater runoff from the undisturbed parts of the site.
Reporting	Report on the effectiveness of soil erosion control measures prior to extraction.

Water samples collected downstream from Lot 198 show low levels of suspended solids. 
Strategy 5.3: Ensure that suspended solid levels in stormwater discharging from the site meets the guidelines for the protection of aquatic ecosystems (ANZECC 2000)

Actions	Responsibility
5.3.1 Keep areas of exposed land to a minimum compatible with operational requirements.	Quarry Manager 
5.3.2 Where practicable, provide silt fences to minimise erosion and sedimentation from exposed areas.	Quarry Manager/ Environmental Manager 
5.3.3 Stabilise exposed areas that are not in use with an appropriate cover crop and water until well established.	Quarry Manager/ Environmental Manager 
5.3.4 Construct sediment retention basins with a capacity of at least 300m ³ per hectare of catchment, which will necessitate regular cleaning out, and a minimum freeboard of one metre.	Quarry Manager 

5.3.5	Monitor erosion and sediment controls regularly and immediately following a rainfall event. Clear sediment when the traps have collected 60% of the capacity of the basin or where sediment build-up is less than 300mm below the spillway crest. Remove sediment to a location where further pollution to downslope lands and waterways will not occur.	Quarry Manager/ Environmental Manager <i>Prolan</i>
5.3.6	Undertake maintenance of erosion and sediment controls when any deterioration is identified or when replacement is necessary.	Quarry Manager/ Environmental Manager <i>Prolan</i>
5.3.7	Reuse stored stormwater for dust control and the watering of site vegetation.	Quarry Manager/ Environmental Manager <i>Prolan</i>
5.3.8	Seed material stockpiles where these are to remain unused for a period in excess of four weeks. Water the area when required until the vegetation is well established.	Quarry Manager/ Environmental Manager <i>Prolan</i>
5.3.9	Control vehicle movement on the site by the identification of the haul road and current working areas.	Quarry Manager <i>Prolan</i>

Performance indicator Acceptable control of sedimentation and erosion is achieved so that suspended solids levels in any stormwater leaving the site does not exceed ANZECC guidelines or other regulatory requirements.

Prolan

Monitoring Monitor suspended solids levels in stormwater following rainfall events. Compare results with other appropriate locations.

Samples collected quarterly Prolan

Reporting Report on suspended solid levels and performance of erosion and sedimentation control measures for inclusion in the relevant AEMR.

Results from downstream water testing included in 2015 AEMR

Prolan







A5.4 Monitoring and reporting

The Environmental Manager will be responsible for the monitoring of the effectiveness of the sediment and soil erosion control measures installed on-site, suspended solids levels in stormwater runoff and any off-site discharges. An annual report will be included in the AEMR.

A6.3 Management controls


OPERATIONAL PHASE

Strategy 6.1: Plan site operations to minimise potential impacts on groundwater

Actions	Responsibility
6.1.1 Restrict maximum depth of extraction to 2 metres above the wet weather high groundwater level as determined following at least 12 months site specific groundwater monitoring data.	Quarry Manager 
6.1.2 Ensure that the groundwater is not breached or contaminated. In the event that either should occur, operations are to cease and the Department of Water and the Department of Planning consulted to determine the basis on which extraction may recommence.	Quarry Manager 
6.1.3 The sediment retention basins are to accommodate the 100-year t _c event with the minimum basin capacities as follows: <ul style="list-style-type: none"> • Southern catchment (Basin 1) 19,400 m³ • Northern catchment (Basin 2) 7,800 m³ <p>The volume of these basins can be varied depending on the extent of the area exposed for extraction within each catchment.</p>	Quarry Manager 
6.1.4 Arrange for regular inspection of the capacity and stability of all retention basins and report on their effectiveness. <i>Quarry manager undertakes visual inspections.</i>	Quarry Manager/ Environmental Manager 
6.1.5 Install a minimum of two groundwater monitoring bores. One should be located within or near the extraction area and another at some location within the site beyond the area of any direct extraction influence. The location of these bores is to meet the requirements of the Department of Water and the Department of Planning.	Quarry Manager/ Environmental Manager 
Performance indicator	Maintenance of groundwater quality. Existing water levels and groundwater quality will be determined from data derived from the bores on the site. 

Monitoring









Regular monitoring of water levels and water quality data from the on-site bores.

Groundwater Management Plan included in 2015 AEMR 

A7.3 Management controls

OPERATIONAL PHASE

Strategy 7.1: Implement measures to ensure the protection of native vegetation, including threatened species.

Actions	Responsibility
7.1.1 Clearly identify and mark out all areas which are not to be disturbed.	Quarry Manager/ Environmental Manager 
7.1.2 Assess areas where trees are to be removed to determine the commercial value of any which are too large to mulch. Any with commercial value are to be marked and arrangements made for removal.	Environmental Manager 
7.1.3 Prepare an assessment of the species mix of the Sydney Hinterland Transition Woodland and arrange for purchase or collection of seeds. Mulch vegetation removed from the area and stockpile for later use. This will initially be used on the peripheral bunds followed by other areas of the site where the regrowth of the species mix is to be undertaken. Protect young plants from predation by feral pests.	Environmental Manager 
7.1.5 Restrict access to bushland to minimise the potential for damage. Suitably identify and mark out these areas to ensure that this prohibition is made clear.	Quarry Manager/ Environmental Manager 
7.1.6 Separate topsoil for use in rehabilitation works. <i>Topsoil is stockpiled separately.</i>	Quarry Manager/ Environmental Manager 
7.1.7 Incorporate flora and fauna issues (to the extent it is relevant) in the education program so that the site operatives are aware of the requirements of this EMP.	Environmental Manager 
7.1.8 Once each extraction phase is complete, initiate the rehabilitation and revegetation program as set out in the Landscape management Plan.	Quarry Manager/ Environmental Manager 
Performance indicator	All areas of significant flora and fauna habitat are protected prior to the start of extraction. 

Monitoring Ensure that all the above are implemented prior to the commencement of extraction activities in the area.

Monitor condition of flora and fauna habitats on a regular basis.








Reporting A report with appropriate maps identifying the areas under rehabilitation and extraction activity is to be prepared.

Prepare an annual report on the status of the flora of the site for inclusion in the AEMR.



Strategy 7.2: Undertake the rehabilitation of the site to achieve an agreed and acceptable landform with appropriate planting.

Actions	Responsibility
<p>7.2.1 Mulch all suitable plant material for reuse on the site as a seed and planting medium. Store all topsoil in appropriately marked low stockpiles for reuse in locations as close as possible to their source. Care should be taken to ensure that this does not become contaminated with the seeds of exotic species and weeds.</p>	<p>Environmental Manager</p> 
<p>7.2.2 Rehabilitate the site in stages leaving areas exposed for as short a time as possible. This should be undertaken in conformity with the approved Rehabilitation Plan with maximum final batter grades of 4(H):1(V) on north and west facing slopes and 3(H):1(V) on those facing south and east. Final slopes should be as gentle as possible depending on the availability of fill material.</p>	<p>Quarry Manager/ Environmental Manager</p> 
<p>7.2.3 Sow all stockpiles and exposed areas where no activity is to take place for more than four weeks with an appropriate vegetation cover.</p>	<p>Quarry Manager/ Environmental Manager</p> 

7.2.4	Undertake revegetation of the site on the following basis:	Environmental Manager
	<ul style="list-style-type: none"> re-establish the Sydney Hinterland Transition Woodland using seed and mulch collected from the area rehabilitate other areas to native species with a light sowing of cereal and allowing natural regeneration lime, fertilise and sow areas where improved grass cover is required suitably turf surfaces expected to experience high surface flows leaving the site 	
7.2.5	Establish a maintenance program aimed at promoting and protecting the growth of the rehabilitated areas.	Quarry Manager/ Environmental Manager
		

Performance Indicator	Completion of site rehabilitation in conformity with the approved Landscape Management Plan.
------------------------------	--

Monitoring	Regular site inspections to ensure that the following is achieved: <ul style="list-style-type: none"> rate of rehabilitation is in conformity with the staging program conservation zones and rehabilitated areas are being appropriately maintained vegetative covers are being established site works such as bunding and the establishment of re-vegetated areas are progressing in accordance with the Landscape Management Plan all sensitive flora and fauna habitat is being adequately protected from damage
-------------------	---

Reporting	Reports of site inspections and annual reviews in the AEMR.
------------------	---

A7.4 Monitoring and reporting

The Environmental Manager will be responsible for monitoring the effectiveness of the measures included for the protection of native vegetation on the site and the progress of site rehabilitation. Annual reports will be prepared by the Environmental Manager for inclusion in the AEMR.

A8.3 Management controls

OPERATIONAL PHASE

Strategy 8.1: Consider community feedback in determining operating procedures to minimise negative impacts.

Actions	Responsibility
8.1.1 Maintain an <i>open door policy</i> . Widely publish contact phone number and provide an early response to all queries, comments and requests for information.	Quarry Manager/ Environmental Manager <i>Polan</i>
8.1.2 Provide access to all relevant environmental management documentation and monitoring results on the PF Formation web site.	Environmental Manager <i>Polan</i>
8.1.3 Organise and manage bi-annual meetings of the Community Consultative Committee to discuss issues in relation to environmental management of sand extraction on the site.	Environmental Manager <i>Polan</i>
8.1.4 Establish a complaints register incorporating date and time, type of communication, contact details of the complainant, nature of the complaint and response taken. <i>Complaints register kept at Neighbridge.</i>	Quarry Manager/ Environmental Manager <i>Polan</i>
Performance indicator	Minimal complaints from the community. <i>Nil quarry complaints</i> <i>Polan</i>
Monitoring	Number and type of responses and complaints raised by the community and improved performance.
Reporting	Annual reporting of community responses and complaints together with an assessment of any changes put in place to minimise any future difficulties for inclusion in the AEMR.



A8.4 Monitoring and reporting

The Environmental Manager will be responsible for the monitoring of the effectiveness of the measures included in response to community concerns. Annual reports will be prepared by the Environmental Manager for the AEMR.

A9.3 Management controls

OPERATIONAL PHASE


Strategy 9.1: Protect items of heritage value during site operations.

Actions	Responsibility
9.1.1 Cease all work if an archaeological or heritage item is identified during extraction operations and consult the National Parks and Wildlife Service, the Deerubbin Aboriginal Land Council or the Heritage Office to determine any appropriate course of action prior to recommencement of the work. Obtain any required permits and submit together with supporting information. Notify the Hills Shire Council to ensure compliance with the conditions of approval.	Quarry Manager/ Environmental Manager 
9.1.2 Undertake additional survey work required for submittal of application to destroy artefact scatters located in the later stages of the development. Comply with the reasonable requirements of the National Parks and Wildlife Service, the Deerubbin Aboriginal Land Council and the Heritage Office arising out of any additional studies and notify the Hills Shire Council to ensure compliance with the conditions of the approval.	Environmental Manager 

Performance Indicator	Any item of heritage significance is protected during site operations.
------------------------------	--

Monitoring	The protection of any heritage items identified during site operations is to be monitored.
-------------------	--

Reporting	Any heritage item identified during site operations is to be documented.
------------------	--

No heritage items were identified.













A9.4 Monitoring and reporting

The Environmental Manager will be responsible for the reporting of any heritage items identified during the course of site activities. Annual reports will be prepared by the Environmental Manager.

A10.3 Management controls

OPERATIONAL PHASE











Strategy 10.1: Ensure that impacts on visual amenity are minimised during site activities and following completion.

Actions	Responsibility
10.1.1 Clearly mark all vegetation to be retained.	Quarry Manager/ Environmental Manager 
10.1.2 Construct peripheral bunding within the established setbacks. These should be a minimum of three metres high with slopes ranging from 3(H):1(V) to 6(H):1(V) depending on the location using overburden stripped from the site	Quarry Manager/ Environmental Manager 
10.1.3 Undertake screen planting works to the peripheral areas to an agreed specification using mulch to allow for native plant regeneration. Reinforce this species mix using appropriate plantings at specified intervals.	Environmental Manager 
10.1.4 Undertake a tree planting program within areas defined in the Landscape Management Plan to establish a dense plantation using an appropriate mix of species reflecting that of the existing community.	Environmental Manager 
10.1.5 Re-establish the landform of the extraction areas to that shown in the Landscape Management Plan.	Quarry Manager 
10.1.6 Complete the rehabilitation of the site in conformity with the proposals set out in the Landscape Management Plan.	Quarry Manager 
10.1.7 Remove all temporary fencing when no longer required.	Quarry Manager 
10.1.8 Re-establish vegetation in areas suitable for agricultural/horticultural uses.	Quarry Manager 
10.1.9 Remove all site infrastructure including the slurry plant and its associated pipelines. Restore those areas affected by the plant and rehabilitate.	Quarry Manager 
10.1.10 Remove all waste materials and dispose of in an appropriate manner.	Quarry Manager 
10.1.11 Review Quarry Closure Plan and prepare proposals for future use of the area.	<i>Operations/Environmental</i> Quarry Manager 

A11.3 Management controls

OPERATIONAL PHASE

Strategy 11.1: Appropriate management and disposal of wastes generated during site operations.

Actions	Responsibility
11.1.1 Clearly delineate waste handling areas.	Quarry Manager 
11.1.2 Define specific areas for the collection of materials for reuse and recycling and clearly label.	Quarry Manager 
11.1.3 Process cleared vegetation on site for use as mulch within the landscape program.	Environmental Manager 
11.1.4 Store all topsoil in stockpiles for later use in site rehabilitation.	Environmental Manager 
11.1.5 Provide bins or skips for the collection and storage of recyclable material and waste. General construction waste will be stored in a skip located at the workshop on Lot 198 DP595538. Waste food will be removed on a daily basis and stored in a vermin proof bin for collection by waste contractor. Paper waste generated from site offices, plastics and glass are to be collected separately for recycling.	Quarry Manager 
11.1.6 Separate hazardous wastes (including empty drums, rags, soil contaminated with oil) from non-hazardous wastes and manage in accordance with the relevant legislation.	Quarry Manager 
11.1.7 Temporarily store liquid wastes (chemicals, oils and greases) in an appropriately bunded area and dispose of via a licensed contractor. Direct washdown water to an appropriate settlement basin if quality is acceptable. Otherwise, store and dispose as a liquid waste.	Quarry Manager 
11.1.8 Retain copies of current licences of all waste removal contractors on site.	Quarry Manager 
11.1.9 Keep all documentation relating to waste removal and disposal on file at the site. This documentation includes dockets for the removal and disposal of waste at a licensed facility.	Quarry Manager 
11.1.10 Progressively separate and stockpile waste material in designated areas for collection. Adequately secure waste disposal areas to prevent access by wildlife.	Quarry Manager 

11.1.11 Review all waste licences and monitor terms and conditions for compliance.

Environmental
Manager



11.1.12 Recycle or dispose of any materials and waste remaining on the site following completion of extraction operations. All should be disposed of in an appropriate manner.

Environmental
Manager



Performance Indicator

Effective use of waste recycling area and maximisation of material reuse.

Appropriate removal of all waste from the site on completion.

Monitoring

Regular review of recycling opportunities, quantities and cost savings.

Reporting

Annual report on waste management, reuse and recycling on the site.

2015 AEMR 


A11.4 Monitoring and reporting

The Quarry Manager will be responsible for conducting regular waste audits, monitoring the currency of any waste disposal contracts and documentation relating to transport and disposal of wastes. The Quarry Manager will also monitor the quantities and costs/savings associated with the effective management of waste materials.

A12.3 Management controls

OPERATIONAL PHASE

Strategy 12.1: Ensure that procedures and controls are implemented to prevent, or if necessary, control any potential environmental emergency

Actions		Responsibility	
12.1.1	Ensure that all personnel on site during operations have been trained in appropriate procedures including site induction, materials handling and response procedures.	Quarry Manager	
12.1.2	Develop and put in place emergency response procedures. Appoint appropriate individuals as emergency services liaison officers.	Quarry Manager	
12.1.3	Establish an emergency response table listing contact details of all relevant parties required in an environmental emergency.	Quarry Manager	
12.1.4	Establish a Register of Environmentally Hazardous Materials to be stored and used on site.	Quarry Manager	
12.1.5	Ensure that appropriate safety and spill response equipment has been made available.	Quarry Manager	
12.1.6	Clearly label all materials to be used and stored on site.	Quarry Manager	
12.1.7	Review and update emergency response procedures bi-annually.	Quarry Manager	
12.1.8	Ensure that appropriate safety and response equipment is available at all times.	Quarry Manager	
Performance indicator		Emergency response procedures, controls and training adequate for potential emergencies.	
Monitoring		Regular monitoring of response procedures and equipment.	
Reporting		Annual report on incidents.	








A12.4 Monitoring and reporting

The Quarry Manager will be responsible for maintaining the currency of the emergency procedures and reporting on incidents.

A13.3 Management controls

OPERATIONAL PHASE

Strategy 13.1: Minimise the risks associated with the storage and handling of hazardous materials.

Actions	Responsibility
13.1.1 Obtain a licence to keep dangerous goods from WorkCover NSW for all materials stored on site which require licensing	Quarry Manager N/A
13.1.2 Establish a Register of Hazardous Materials setting out details of quantities, storage and specific handling requirements for all relevant materials stored on site.	Quarry Manager/ Environmental Manager P.I.R.M.P 
13.1.3 Obtain Material Safety Data Sheets for all hazardous materials stored on site.	Quarry Manager/ Environmental Manager 
13.1.4 Provide appropriate storage and secondary containment facilities for all hazardous materials stored on site. All bunded areas must be designed to contain at least 110% of the volume of materials permanently stored within the area. Temporary facilities should have drip trays.	Quarry Manager 
13.1.5 Appoint a Safety Officer for the development.	Quarry Manager
13.1.6 Locate all flammable material storage areas at least ten metres from possible ignition sources.	Quarry Manager/ Environmental Manager 
14.1.7 Clearly label the contents of all above ground storage areas.	Quarry Manager/ Environmental Manager 
13.1.8 Secure all hazardous and dangerous goods storage areas and display appropriate signage. Segregate all incompatible material.	Quarry Manager/ Environmental Manager 
13.1.9 Train all personnel in the handling and safety procedures required for the hazardous materials stored and used on site during Staff Safety Meetings.	Quarry Manager/ Environmental Manager 
Performance Indicator Storage and handling of hazardous materials complies with legislative requirements and demonstrates due diligence.	

Monitoring	Regular review of compliance with legislative requirements for the storage and handling of hazardous materials.
Reporting	AEMR.

Strategy 13.2: Ensure that procedures are implemented and facilities made available for clean up in the event of a pollution incident.

Actions	Responsibility
13.2.1 Emergency Response Plan in place (see Chapter 12).	Quarry Manager
13.2.2 Provide a mobile spill control kit containing appropriate absorbent materials, neutralising chemicals and other spill containment equipment.	Quarry Manager
13.2.3 Provide personal protective equipment and instruct personnel on its use.	Quarry Manager
13.2.4 Clean up any spills beyond the bunded area immediately and dispose of the contaminated material in an appropriate manner.	Quarry Manager
13.2.5 Contact the relevant authorities in the event of a leak or spill. Follow any instructions provided. Remediate any contamination to the satisfaction of the regulatory authorities.	Quarry Manager
13.2.6 Collect any spills or hazardous wastes that cannot be recycled and arrange for disposal by a licensed waste contractor. Maintain all records of waste removal on site.	Quarry Manager

Performance Indicator	All pollution incidents contained and cleaned up without impact on the environment or injury to personnel. All incidents recorded.
Monitoring	Stormwater and soil contamination monitoring undertaken following any spill and subsequent clean up.
Reporting	Report on all pollution events and the results of any clean up.

Attachment 6

Noise Compliance Testing Hitchcock Road Sand Project



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NOISE COMPLIANCE TESTING OF PF FORMATION EXTRACTIVE INDUSTRY OPERATIONS

HITCHCOCK ROAD SAND PROJECT

(MAY 2014 - JUNE 2015)

Date: Thursday, 27th August 2015
File Reference: 1933C20150827mfcMarootaS1-4v4

Koikas Acoustics Pty Ltd
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DOCUMENT CONTROL SHEET

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Issue Date	27 th August 2015
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NOISE COMPLIANCE TESTING
OF PF FORMATION EXTRACTIVE INDUSTRY OPERATIONS
HITCHCOCK ROAD SAND PROJECT
(MAY 2014 - JUNE 2015)

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Appendix A - Aerial photograph

NOISE COMPLIANCE TESTING
OF PF FORMATION EXTRACTIVE INDUSTRY OPERATIONS
HITCHCOCK ROAD SAND PROJECT
(MAY 2014 - JUNE 2015)

1.0 CONSULTANT'S BRIEF

Koikas Acoustics Pty Ltd was engaged by PF Formation Trust to undertake noise compliance testing during the sand extraction operations for Hitchcock Road Sand Project in Maroota.

The assessment provides the following:

- a discussion of the applicable noise criteria at each site, and
- attended noise monitoring survey results.

Sand extractions have been undertaken in this area for many years. Koikas Acoustics has been advised that there have been no noise complaints received from the local community in regards to the sand mining extraction works since periodic noise surveys commenced.

All monitoring procedures were done in accordance with the requirements of the Project Approval of 3rd February 2009 and EPA Licence 3407.

Some measurements of sleep disturbance could not be taken 1 metre from a bedroom window. Sound level measurements were taken from the boundary. Measurements taken from the boundary were closer to the noise source and therefore louder compared to if measurements were taken outside a bedroom window.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

The Hitchcock Road Sand Project site is bounded by:

- Old Northern Road along the east,
- Wisemans Ferry Road to the west (intersecting with the Old Northern Road to the north), and
- other rural properties to the south.

Refer to Figure 1 below for the project site extraction area.



Figure 1. Hitchcock Road Sand Project Site Area

Details of the topography are attached as a rendered aerial photograph in the Hitchcock Road Sand Extraction and Rehabilitation Project, revised Maroota Noise Management Plan (Approved 15/11/2011) and the Project Approval dated 3rd February 2009 signed by the NSW Minister for Planning.

2.2 HOURS OF OPERATION

The hours of operation are specified in the project approval as shown in Table 1 below.

Table 1. Hours of Operation		
Activity	Day	Time [Hours]
Construction	Monday to Friday	0700 – 1800
	Saturday	0800 – 1300
	Sunday and Public Holiday	None
Quarrying and processing including overburden removal	Monday to Saturday	0700 – 1800
	Sunday and Public Holiday	None
Product Transportation	Monday to Saturday	0600 – 1800
	Sunday and Public Holiday	None
Maintenance	Monday to Saturday	0700 – 1800
	Sunday and Public Holiday	None

2.3 AMBIENT NOISE PROFILE OF THE NOISE MONITORING SITES (RECEIVERS)

The assessment site is located in a rural-residential area. The main roads passing through this area being Old Northern Road and Wisemans Ferry Road carry light and heavy vehicles.

During the daytime, the perceived intrusiveness of noise of cars and trucks traversing along these roads whilst residents are inside or outside their homes is expected to be significantly greater compared to the noise of sand mining extraction activities.

The rustling of leaves with slight wind speeds would normally raise background noise levels. For periods when the wind is calm, background noise levels would typically be that of distant noise emanating from trucks and cars, and the sound of insects and birds.

2.4 MONITORING LOCATIONS

Noise monitoring was conducted in the Maroota area at the following locations:

1. Tornatola property Hitchcock Road (driveway);
2. Pignataro property (corner of Wisemans Ferry Road and Old Northern Road)
3. Jurds property (back of fire shed, adjacent to Old Northern Road)
4. Maroota Public School (rear of school)

The site locations are attached as an aerial photo in **Appendix A**.

3.0 NOISE CRITERIA

The noise criteria are specified in the project approval, EPA Licence 3407 and approved Noise Management Plan.

3.1 BACKGROUND NOISE

The noise criterion has been derived from previous noise surveys by undertaking long term ambient noise level measurements at a representative site. The background noise level was determined over consecutive 15 minute periods for a duration of at least one week. From this data of $L_{A90,15 \text{ minutes}}$ noise levels, the 10 percentile lowest background noise levels were determined for each of the days. The *rating background level* was then determined by calculating the median value of the daily 10 percentile background noise levels for each of the three specific time periods: daytime, evening and night time.

The rating background level result is used to determine the noise criteria applicable for the surrounding residential properties in accordance with the EPA's Industrial Noise Policy (INP) assessment procedures.

The background noise level $L_{A90, 15 \text{ minutes}}$ is normally determined in the absence of extraneous noise such as traffic, wind, rain, conversation, birds chirping, insect noise and unnatural increases in noise from distant sources due to local air movement. The EPA defines such sources as *incidental noise* which can cause the masking of offensive noise from a specific source. When traffic or other incidental noises cannot be excluded, then it is considered that these noise sources are part of the background noise.

3.2 EPA INDUSTRIAL NOISE POLICY

The INP defines two criteria, the Intrusive Noise Criterion and the Amenity Noise Criterion. The EPA requires that compliance with both the intrusive and amenity criteria be achieved for the purpose of controlling the intrusive nature of the industrial noise in the short term and also maintaining the noise level amenity of the area for residences and other land uses.

For the purpose of applying the INP the following time periods apply:

- Daytime 7am to 6pm Monday to Saturday

- 8am to 6pm Sunday
- Evening 6pm to 10pm Monday to Sunday
- Night-time 10pm to 7am Monday to Saturday
10pm to 8am Sunday

3.2.1 Intrusive Noise Criterion

The intrusiveness of an industrial noise source is generally considered acceptable by people if the equivalent continuous (A-weighted) noise level ($L_{Aeq, 15 \text{ minutes}}$) does not exceed the background noise level by more than 5 dB. The intrusive noise criterion is defined as:

$$L_{Aeq, 15 \text{ minutes}} = (\text{rating background level}) L_{90, \text{Period}} + 5\text{dB}$$

When the noise source contains annoying characteristics such as prominent tonal, impulsive, intermittent, irregular and dominant low frequency components, adjustments are made.

3.2.2 Noise Amenity Criterion

In order to limit the continuing increase in noise, the EPA has nominated recommended acceptable and maximum ambient noise levels for various receiver sites from industrial noise.

Table 2.1 of the EPA=s INP (below) specifies the following acceptable and maximum recommended $L_{Aeq, \text{Period}}$ noise levels for this project specific type area. In this case, the area is described as being Rural.

The EPA refers to rural as:

Rural—means an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic. Such areas may include:

- an agricultural area, except those used for intensive agricultural activities
- a rural recreational area such as resort areas
- a wilderness area or national park
- an area generally characterised by low background noise levels (except in the immediate vicinity of industrial noise sources).

This area may be located in either a rural, rural-residential, environment protection zone or scenic protection zone, as defined on a council zoning map (Local Environmental Plan (LEP) or other planning instrument).

Table 2.1 of the EPA INP

Type of Receiver	Indicative Noise Amenity	Time of Day	Recommended LAeq, Period	
			Acceptable	Recommended Maximum
Residential	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Schools	All	Noisiest 1 hour period when in use	35	40
Commercial	All Areas	Day	65	70
		Evening		
		Night		
Industrial	All Areas	Day	70	75
		Evening		
		Night		

Table 2.2 of the EPA INP (below) specifies the modification to the acceptable noise level to account for the existing level of industrial noise when additional industrial noise sources are proposed for the site:

Table 2.2 of the EPA INP

Total existing LAeq noise level from industrial sources, dB(A)	Maximum LAeq noise level from new sources alone, dB(A)
Acceptable noise level plus 2	If existing noise level is <i>likely</i> to decrease in future: acceptable noise level minus 10 If existing noise level is <i>unlikely</i> to decrease in future: existing level minus 10
Acceptable noise level plus 1	Acceptable noise level minus 8
Acceptable noise level	Acceptable noise level minus 8
Acceptable noise level minus 1	Acceptable noise level minus 6
Acceptable noise level minus 2	Acceptable noise level minus 4
Acceptable noise level minus 3	Acceptable noise level minus 3
Acceptable noise level minus 4	Acceptable noise level minus 2
Acceptable noise level minus 5	Acceptable noise level minus 2
Acceptable noise level minus 6	Acceptable noise level minus 1
< Acceptable noise level minus 6	Acceptable noise level

The amendments to the EPA INP (2006) state that both the predicted amenity noise level criterion and the intrusive noise level criteria need to be satisfied, which supersedes the requirement of assessing only the most stringent of the two noise criterion. In clearly obvious cases, one or the

other noise criterion is considered. In this case, the intrusive noise criterion has been considered as it is clearly the most stringent due to the low Rating Background Level (RBL).

3.3 NOMINATED NOISE CRITERIA

The criterion that applies at each of the monitoring sites is based on EPA licence 3407 for location 1, 2 and 4. The criterion that applies at Jurds property (Location 3) is as per the Table 9.1 of the approved Noise Management Plan. The Operational Noise Assessment criterion levels are summarised below in Table 2.

Site Location	Day [LAeq,15 mins]	Night [LAeq,15 mins]	Night [LA1,1 min]
1. Tornatola Property Hitchcock Road	39	38	52
2. Pignataro property	40	37	52
3. Jurds property	39	35	45
4. Maroota Public School	40	N/A	N/A

It is noted that in accordance with EPA licence 3407, noise monitoring at 4 locations (listed in Table 2) are required instead of 8 receiver locations shown in Table 8.1 of the approved Noise Management Plan.

Noise criteria shown in Table 8.1 and 9.1 of the approved Noise Management Plan and the Minister of Planning project approval are extracted and shown below. This noise criteria shown in the tables below will also be applicable for this report.

Noise assessment location ¹	Day	Night	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
R1 - Hammond	41	35	45
R2 - Hitchcock	40	35	45
R5 - Pignataro	42	35	45
R6 - Camilleri	40	35	45
R7 - Maroota public school	36(LAeq(1 hour))	N/A	N/A
R8 - Portelli	39	35	45
R9 - Young	39	35	45
R2 - Tornatola	39	35	45

Note 1: The identifying numbers for the assessment locations have been changed from those in **Table 2.1** in order to be consistent with those shown in **Figure 4.7** in the EA.

Table 9.1 Noise impact assessment monitoring locations

Noise assessment location	Day	Night ¹	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
R2 – Tornatola (Hitchcock Road intersection)	39	35	45
R3 – Jurd (near Fire Station)	39	35	45
R5 – Pignataro (Wisemans Ferry Road intersection)	42	35	45
R7 – Maroota public school	36(L _{Aeq} (1 hour))	N/A	N/A

Note 1: Night time is defined as the period between 10.00pm and 7.00am. Activities on the site start at 6.00am and are completed by 6.00pm. There is no activity on the site during the evening period.

Furthermore, the cumulative noise criteria in Schedule 3 Condition 6 of the project approval 06_0104 has also been considered.

Schedule 3 Condition 6 Cumulative noise criteria

The proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General.

- L_{Aeq}(11 hour) 50 dB(A) – Day
- L_{Aeq}(4 hour) 45 dB(A) – Evening
- L_{Aeq}(9 hour) 40 dB(A) – Night

Considering all the relevant and applicable noise criteria shown above, Koikas Acoustics has adopted the lowest criteria (most stringent) for each monitoring location for each particular time period (day and night). The adopted noise criteria are shown in Table 3:

Table 3. Revised Operational Noise Criterion Levels in dB(A) (Ref.: EPA Licence 3407 and approved Noise Management Plan)

Site Location	Day [L _{Aeq} ,15 mins]	Night [L _{Aeq} ,15 mins]	Night [L _{A1} ,1 min]
1. Tornatola Property Hitchcock Road	39	35	45
2. Pignataro property	42	35	45
3. Jurds property	39	35	45
4. Maroota Public School	36	N/A	N/A

4.0 NOISE SURVEYS

4.1 NOISE MONITORING PROCEDURES

All noise methodologies and equipment used comply with the following Australian Standards:

- *AS1259.2-1990 "Acoustics - Sound Level Meters - Integrating - Averaging", and*
- *ISO 1996.2-2007 "Acoustics – Description, measurement and assessment of environmental noise" Part 2: Determination of environmental noise levels.*

All sound and noise level measurements were A-frequency and Fast-time weighted.

4.2 ATTENDED NOISE MONITORING

Attended noise monitoring was conducted on the following days at each monitoring location below:

At location 1 Tornatola Property Hitchcock Road (@ driveway)

24 th July 2014	Night-time hours
28 th July 2014	Daytime hours
27 th October 2014	Daytime hours
28 th October 2014	Night-time hours
4 th February 2015	Night-time hours
6 th February 2015	Daytime hours
21 st May 2015	Daytime hours
22 nd May 2015	Night-time hours

At location 2 Pignataro Property (corner of Wisemans Ferry Road and Old Northern Road)

24 th July 2014	Night-time hours
28 th July 2014	Daytime hours
27 th October 2014	Daytime hours
28 th October 2014	Night-time hours
6 th February 2015	Daytime/Night-time hours
22 nd May 2015	Night-time hours
25 th May 2015	Daytime hours

At location 3 Jurds Property (back of fire shed, adjacent to Old Northern Road)

25 th July 2014	Night-time hours
28 th July 2014	Daytime hours
27 th October 2014	Daytime hours
30 th October 2014	Night-time hours
6 th February 2015	Daytime hours
9 th February 2015	Night-time hours
22 nd May 2015	Night-time hours
25 th May 2015	Daytime hours

At location 4 Maroota Public School (rear of school)

5 th August 2014	Daytime hours
27 th October 2014	Daytime hours
6 th February 2015	Daytime hours
25 th May 2015	Daytime hours

The noise measurements taken from July 2014 to February 2015 were conducted with a 01dB Stell Integrating Sound Level Meter and calibrated with a Luton – 94 dB/1000 Hertz Sound Level Calibrator.

The noise measurements taken in May 2015 were conducted with a Class 1 Svan 971 S/N 40412 Sound Level Meter and calibrated with a Svantek SV 33 Class 1 Acoustic Calibrator.

5.0 NOISE SURVEY RESULTS

Table 4, 5, 6 and 7 refers to the measured noise levels obtained at locations 1,2,3 and 4 respectively for each monitoring period. It is noted, that in all cases the measured L_{Aeq} was dominated by environmental and intermittent noise sources unrelated to the quarry noise. The exceeding levels are therefore not that of quarry activities.

Table 4. Location 1 Tornatola Property Hitchcock Road - Noise Survey Results					
Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
24 th July 2014 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	38 $L_{Aeq,15min}$ 49 $L_{A1,1min}$	--	3 4	Noise dominated by road traffic. See also Note 6.
28 th July 2014 Daytime hours	39 $L_{Aeq, 15min}$	44 $L_{Aeq,15min}$	--	5	Road traffic noise level of 54 dB(A). See also Note 1.
27 th October 2014 Daytime hours	39 $L_{Aeq, 15min}$	48 $L_{Aeq,15min}$	37	9	Noise dominated by road traffic and natural sounds. See also Note 4.
28 th October 2014 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	48 $L_{Aeq,15min}$ 51 $L_{A1,1min}$	35	13 6	Car noise level of 45 dB(A). Truck noise level of 55 dB(A). See also Note 4.
4 th February 2015 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	50 $L_{Aeq,15min}$ 47 $L_{A1,1min}$	39	15 2	Noise dominated by road traffic and natural sounds. See also Note 1.
6 th February 2015 Daytime hours	39 $L_{Aeq, 15min}$	44 $L_{Aeq,15min}$	35	5	Noise dominated by road traffic and natural sounds. See also Note 1.
21 st May 2015 Daytime hours	39 $L_{Aeq, 15min}$	43 $L_{Aeq,15min}$	38	4	Noise dominated by road traffic and natural sounds. An electrical motor from another property was operating. See also Note 1.
22 nd May 2015 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	53 $L_{Aeq,15min}$ 63 $L_{A1,1min}$	47	18 18	Noise dominated by road traffic and natural sounds. See also Note 1.

Table 5. Location 2 Pignataro Property - Noise Survey Results					
Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
24 th July 2014 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	50 $L_{Aeq,15min}$ 47 $L_{A1,1min}$	38	15 2	Road traffic noise level of 50-56 dB(A). See also Note 6.
28 th July 2014 Daytime hours	42 $L_{Aeq, 15min}$	48 $L_{Aeq,15min}$	32	6	Road traffic noise level of 51-55 dB(A). See also Note 3.
27 th October 2014 Daytime hours	42 $L_{Aeq, 15min}$	47 $L_{Aeq,15min}$	34	5	Noise dominated by road traffic. See also Note 1.
28 th October 2014 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	51 $L_{Aeq,15min}$ 53 $L_{A1,1min}$	41	16 8	Road traffic noise level of 54-59 dB(A). See also Note 3.
6 th February 2015 Daytime hours	42 $L_{Aeq, 15min}$	48 $L_{Aeq,15min}$	34	6	Noise dominated by road traffic. See also Note 1.
6 th February 2015 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	52 $L_{Aeq,15min}$ 55 $L_{A1,1min}$	43	17 10	Road traffic noise level of 54-58 dB(A). See also Note 3.
22 nd May 2015 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	58 $L_{Aeq,15min}$ 68 $L_{A1,1min}$	45	23 23	Road traffic noise level of 60-65 dB(A). See also Note 1.
25 th May 2015 Daytime hours	42 $L_{Aeq, 15min}$	61 $L_{Aeq,15min}$	43	19	Road traffic noise level of 60-70 dB(A). See also Note 1.

KOIKAS ACOUSTICS PTY LTD

Date: 27th August 2015

Reference: 1933C20150827mfcMarootaS1-4v4

Prepared For: PF Formation Trust

Noise Compliance Testing: Hitchcock Road Sand Project (May 2014 - June 2015)

Table 6. Location 3 Jurds Property - Noise Survey Results

Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
25 th July 2014 Night-time hours	35 LAeq,15min 45 LA1,1min	54 LAeq,15min 67 LA1,1min	42	19 22	Road traffic noise level of 60-65 dB(A). See also Note 4 .
28 th July 2014 Daytime Hours	39 LAeq, 15min	53 LAeq,15min	35	14	Road traffic noise level of 54-57 dB(A). See also Note 3 .
27 th October 2014 Daytime Hours	39 LAeq, 15min	60 LAeq,15min	39	21	Road traffic noise level of 65-75 dB(A). Quarry noise of 38-42 dBA during lulls in traffic. See also Note 5 .
30 th October 2014 Night-time hours	35 LAeq,15min 45 LA1,1min	59 LAeq,15min 63 LA1,1min	41	24 18	Road traffic noise level of 60-65 dB(A). See also Note 3 .
6 th February 2015 Daytime Hours	39 LAeq, 15min	58 LAeq,15min	31	19	Noise dominated by road traffic and natural sounds. See also Note 4 .
9 th February 2015 Night-time hours	35 LAeq,15min 45 LA1,1min	51 LAeq,15min 57 LA1,1min	34	16 12	Noise dominated by road traffic and natural sounds. See also Note 4 .
22 nd May 2015 Night-time hours	35 LAeq,15min 45 LA1,1min	52 LAeq,15min 62 LA1,1min	38	17 17	Road traffic noise level of 60 dB(A). See also Note 3 .
25 th May 2015 Daytime Hours	39 LAeq, 15min	56 LAeq,15min	34	17	Noise dominated by road traffic. See also Note 3 .

Table 7. Location 4 Maroota Public School - Noise Survey Results

Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
5 th August 2014 Daytime hours	36 LAeq, 15min	42 LAeq,15min	36	6	Noise dominated by road traffic. See also Note 3 .
27 th October 2014 Daytime hours		45 LAeq,15min	41	9	Road traffic noise level of 50 dB(A). Other quarry noise level of 43-45 dB(A). See also Note 7 .
6 th February 2015 Daytime hours		41 LAeq,15min	38	5	See Note 2 .
25 th May 2015 Daytime hours		44 LAeq,15min	41	8	See Note 7 .

Note 1. Dominant noise source is that of traffic and birds chirping or natural sounds such as wind and rustling of leaves (during lulls in traffic). Quarry noise was not audible.

Note 2. Dominant noise source is that of traffic and birds chirping or insect noise (during lulls in traffic). Quarry noise audible but not measurable.

Note 3. Dominant noise source is that of traffic and birds chirping or natural sounds such as wind and rustling of leaves (during lulls in traffic). Quarry noise was audible but not measurable.

Note 4. Dominant noise source is that of traffic and/or birds chirping or insects (during lulls in traffic). Quarry noise was audible but not measurable.

- Note 5.** Dominant noise source is that of traffic and/or birds chirping (during lulls in traffic). Quarry noise was audible and measurable during lulls in traffic.
- Note 6.** Dominant noise source is that of traffic. Quarry noise was not audible even during lulls in traffic. Therefore quarry noise was not measurable.
- Note 7.** Dominant noise source is that of road traffic and birds chirping. Noise from other quarries operation can be heard during lulls in traffic. Subject quarry noise was not audible and not measureable.

On account of the large distances which sound travels from the sand mining extraction activities to the surrounding residential premises, it is often not measureable because it is either less than the prevailing background noise or because it is inaudible. At all the noise monitoring sites, the noise emanating from the Hitchcock Road Sand Project currently has minimal contribution compared to other noise sources such as traffic noise, birds chirping, insect noise, rustling of leaves and other quarry operation.

The noise criteria nominated by EPA Licence 3407 and Minister of Planning approval for the hours of operation was therefore not exceeded.

6.0 CONCLUSIONS

Koikas Acoustics was requested to undertake noise level surveys around the Hitchcock Road Sand Project sand mining extraction and processing quarry (from May 2014 to June 2015) and ascertain whether the noise from the extraction and processing works currently exceed the nominated noise criteria as nominated by EPA licence 3407 and the project approval.

The results of the noise surveys show that the site extraction works are currently comply with all the nominated noise criteria (including cumulative noise criteria).

At most sites, quarry activities are either just audible or inaudible and in most of cases, the noise emanating from the site was found not to be measureable on account of that the natural noise (which includes birds chirping, insects, rustling of leaves) and un-natural noise (being cars and trucks traversing along the main roads).

There are no noise mitigation measures necessary to be implemented for the subject quarry sites.

Koikas Acoustics therefore certifies that the subject Maroota Hitchcock Road Sand Project currently complies with the nominated noise criteria despite that the measured noise levels (predominantly that of traffic and other natural sound sources) are currently producing sound levels in excess of the nominated noise criteria.

APPENDIX A - AERIAL PHOTOGRAPH

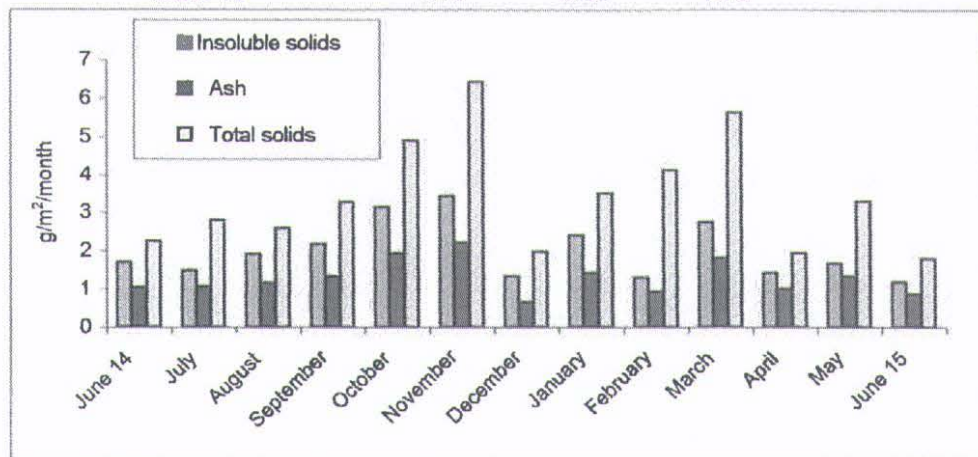


Attachment 7

Monthly Dust Monitoring Results 2014-2015

Dust Monitoring
MARROTA Site 1
Maroota Public School

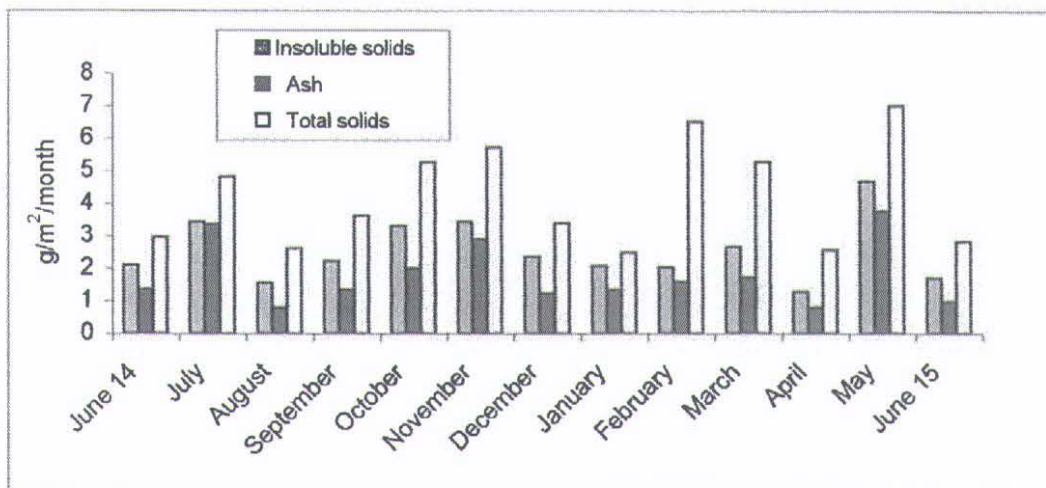
	Insoluble solids	Ash	Total solids
June 14	1.70	1.03	2.24
July	1.49	1.07	2.79
August	1.91	1.14	2.58
September	2.16	1.32	3.26
October	3.13	1.93	4.89
November	3.43	2.20	6.41
December	1.32	0.64	1.97
January	2.39	1.43	3.51
February	1.29	0.92	4.12
March	2.75	1.81	5.62
April	1.42	1.01	1.94
May	1.66	1.32	3.30
June 15	1.18	0.85	1.79



* NSW-EPA - Approved Methods and Guidance- For the Modelling and Assessment of Air Pollutants in New South Wales - AUGUST 2001(pg 11)

Dust Monitoring
MAROOTA Site 2
Hitchcock Road

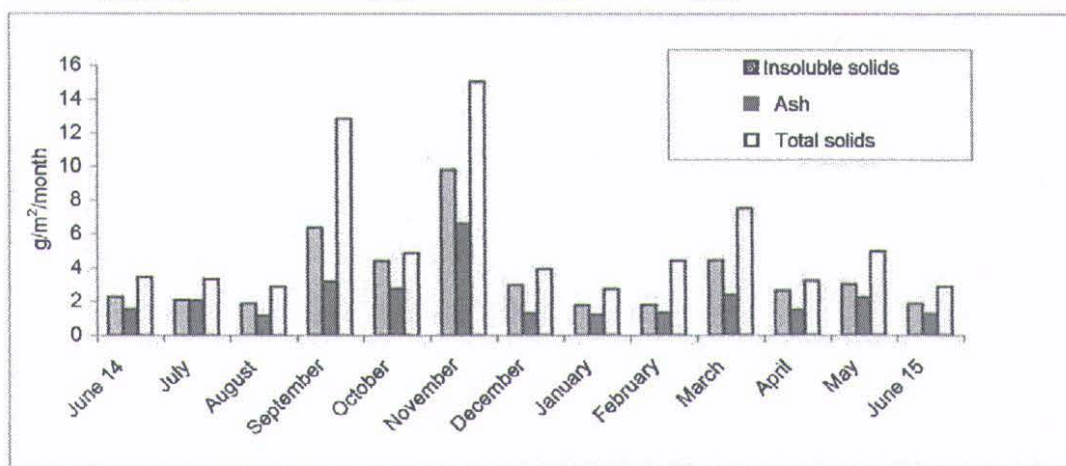
	Insoluble solids	Ash	Total solids
June 14	2.11	1.36	2.96
July	3.44	3.36	4.83
August	1.55	0.80	2.63
September	2.22	1.34	3.62
October	3.31	2.00	5.26
November	3.43	2.89	5.72
December	2.36	1.23	3.41
January	2.08	1.35	2.48
February	2.04	1.60	6.52
March	2.66	1.73	5.28
April	1.29	0.80	2.57
May	4.70	3.76	7.02
June 15	1.71	0.99	2.83



* NSW-EPA - Approved Methods and Guidance- For the Modelling and Assessment of Air Pollutants in New South Wales - AUGUST 2001(pg 11)

Dust Monitoring
MAROOTA Site 3
Jurd's House

	Insoluble solids	Ash	Total solids
June 14	2.27	1.52	3.43
July	2.08	2.03	3.32
August	1.85	1.13	2.87
September	6.35	3.16	12.81
October	4.40	2.73	4.85
November	9.80	6.56	15.02
December	2.95	1.27	3.91
January	1.74	1.2	2.73
February	1.79	1.31	4.41
March	4.42	2.37	7.50
April	2.63	1.51	3.21
May	3.02	2.23	4.98
June 15	1.87	1.24	2.88



* NSW-EPA - Approved Methods and Guidance- For the Modelling and Assessment of Air Pollutants in New South Wales - AUGUST 2001(pg 11)

Attachment 8

PM10 Dust Action Plan

Background

As Dixon Sands have a PM10 monitoring location at Maroota on the property adjoining the Maroota Public School they have agreed to contact us in the event the rolling 24-hour average PM10 result nears or exceeds $42 \mu\text{g}/\text{m}^3$ in working hours. (This is after Dixon's themselves are notified by their consultants.) We have agreed to the following Plan in the event we become aware of high PM10 dust recordings in the Maroota area. The aim is to determine whether PF Formation operations could be a source or contributor to the high results and if this is the case and if there could be a potential impact on the school to take measures to reduce this potential impact.

Plan

In the event PF Formation are contacted by Dixon Sands advising that the PM10 result is near or exceeds the trigger then:

1. John Graham, Peter Watt, Joshua Graham, Luke Graham and Peter Cummins (management team) are all to be advised by telephone/two-way immediately.
2. The current wind direction is to be assessed by them at the weather monitoring station.
3. If the wind direction is from our operations to the Dixon monitoring location then action must be taken to reduce PF Formation's PM10 emissions.
4. The management team are to advise all staff to assess all dust generating activities for all areas that could impact the Maroota Public School except for activities solely undertaken to reduce dust impacts.
5. The management team is to evaluate the conditions, liaise with Dixon Sands regarding the status of the rolling 24-hour PM10 average and undertake necessary dust suppression activities such as watering roads, exposed areas and stockpiles.
6. If the dust levels have not reduced to allowable levels within 1 hour of ceasing dust generating activities and it is within school hours plus 30 minutes then all dust generating activities within the relevant area must stop.

Attachment 9

Summary of Weather Conditions

PF FORMATION WEATHER CHART

JUL 14

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/07/2014	4	16	0-0	W-ESE	1026.2	NIL	FINE/CLOUDY
2/07/2014	4	16	0-0	ESE-ESE	1028.7	NIL	FINE
3/07/2014	4	17	0-0	SE-NE	1028.2	NIL	FINE
4/07/2014	9	19	8-11	WNW-WNW	1023.8	NIL	FINE
5/07/2014	7	15	0-8	WNW-SW	1017.2	NIL	FINE/CLOUDY
SUNDAY							
7/07/2014	5	17	0-3	W-SW	1016.3	NIL	FINE
8/07/2014	5	17	0-0	SW-NW	1017.8	NIL	FINE
9/07/2014	8	18	0-5	N-WNW	1010.9	5	FINE
10/07/2014	7	15	0-14	WNW-SSW	1007.5	NIL	FINE
11/07/2014	8	16	0-0	WNW-SW	1018.8	NIL	FINE
12/07/2014	6	14	11	WNW-W	1020.8	NIL	FINE
SUNDAY							
14/07/2014	3	15	0-0	ESE-ESE	1033.2	NIL	FINE/CLOUDY
15/07/2014	9	13	0-0	E-WNW	1028.1	NIL	RAIN/CLOUDY
16/07/2014	10	16	0-6	NW-W	1016.1	NIL	RAIN
17/07/2014	8	16	0-27	WNW-W	1015.4	NIL	CLOUDY
18/07/2014	7	13	5-10	S-SW	1011.1	NIL	CLOUDY
19/07/2014	7	12	0-21	SW-S	1022.4	NIL	FINE/CLOUDY
SUNDAY							
21/07/2014	8	15	0-0	ESE-ESE	1028.3	NIL	CLOUDY
22/07/2014	7	16	0-0	ESE-S	1025.9	NIL	FINE/CLOUDY
23/07/2014	6	16	0-0	NE-NW	1026	NIL	FINE/CLOUDY
24/07/2014	6	15	0-0	NE-WNW	1023.5	NIL	FOG/CLOUDY
25/07/2014	10	17	5-5	WNW-N	1023	NIL	FOG/CLOUDY
26/07/2014	12	12	3-6	NE-NW	1024.9	10	RAIN
SUNDAY							
28/07/2014	8	17	0-0	NW-NW	1023.6	NIL	CLOUDY
29/07/2014	12	20	8-14	NW-WNW	1020.8	NIL	CLOUDY
30/07/2014	12	21	0-14	N-NW	1019.8	NIL	FINE
31/07/2014	13	22	0-47	NW-NW	1016.7	NIL	FINE

PF FORMATION WEATHER CHART

AUG 14

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/08/2014	16	14	6-21	NW-SW	1006.9	NIL	FINE/WINDY
2/08/2014	5	12	0-11	W-SW	1022.6	NIL	FINE/WINDY
SUNDAY							
4/08/2014	4	18	0-0	NE-NE	1035.9	NIL	FINE
5/08/2014	5	18	0-0	NE-SE	1033.6	NIL	FINE
6/08/2014	4	19	0-2	NNE-NE	1034.5	NIL	FINE
7/08/2014	4	16	0-5	N-SW	1030.9	NIL	CLOUDY
8/08/2014	5	17	0-0	E-N	1032	NIL	FINE
9/08/2014	7	15	0-11	NE-NW	1031.3	NIL	FINE/WINDY
SUNDAY							
11/08/2014	5	12	0-3	SW-ESE	1025.9	NIL	FINE/CLOUDY
12/08/2014	6	12	0-6	S-ESE	1030.7	NIL	RAIN /CLOUDY
13/08/2014	7	14	0-0	S-NE	1033.9	5	CLOUDY
14/08/2014	4	15	0-2	NE-ESE	1036.3	NIL	CLOUDY
15/08/2014	6	17	0-2	ESE-E	1033.3	NIL	CLOUDY
16/08/2014	7	13	0-0	NE-SW	1025.1	NIL	CLOUDY
SUNDAY							
18/08/2014	10	13	0-6	WNW-SW	1004.9	20	CLOUDY/RAIN
19/08/2014	11	13	5-11	SW-S	1015.8	60	RAIN
20/08/2014	9	14	0-0	SW-S	1025.6	5	RAIN/CLOUDY
21/08/2014	8	15	2-10	ESE-ESE	1030.3	2	RAIN/CLOUDY
22/08/2014	10	15	3-0	SW-ESE	1032.3	10	RAIN
23/08/2014	10	15	0-6	SE-S	1031.6	NIL	CLOUDY
SUNDAY							
25/08/2014	7	19	0-3	NE-ESE	1027	15	FINE
26/08/2014	10	13	0-8	ESE-ESE	1023.9	2	CLOUDY
27/08/2014	12	14	8-3	S-S	1025.8	25	RAIN
28/08/2014	10	16	0-0	ESE-ESE	1028	20	RAIN
29/08/2014	8	15	3-8	ESE-S	1028.5	5	CLOUDY/RAIN
30/08/2014	11	12	8-6	SW-SE	1025.1	NIL	CLOUDY/RAIN
SUNDAY							

PF FORMATION WEATHER CHART

SEP 14

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/09/2014	9	22	0-5	E-N	1018.7	NIL	CLOUDY
2/09/2014	13	15	0-2	SW-SW	1011.3	NIL	CLOUDY/HAIL
3/09/2014	9	15	13-19	SW-SW	1014.8	15	RAIN /WINDY
4/09/2014	9	15	3-5	S-S	1017.4	NIL	CLOUDY
5/09/2014	9	15	0-8	S-ESE	1022	NIL	CLOUDY
6/09/2014	9	12	0-0	S-SE	1029	NIL	RAIN
7/09/2014	SUNDAY						
8/09/2014	9	18	0-0	NNE-E	1031.1	15	FOG/CLOUDY
9/09/2014	10	22	0-6	N-NW	1020.8	NIL	CLOUDY
10/09/2014	13	22	0-13	SW-W	1009.9	10	RAIN/CLOUDY
11/09/2014	9	24	0-0	W-NW	1017.7	NIL	CLOUDY
12/09/2014	12	16	0-0	S-ESE	1026	NIL	CLOUDY
13/09/2014	11	17	0-0	ESE-SW	1026.8	NIL	RAIN
14/09/2014	SUNDAY						
15/09/2014	11	21	0-0	ESE-E	1019.9	NIL	CLOUDY
16/09/2014	13	23	0-11	NNE-W	1012.9	NIL	CLOUDY
17/09/2014	13	19	2-14	SW-SW	1014.2	NIL	CLOUDY
18/09/2014	7	18	0-0	SW-NNE	1019.2	NIL	CLOUDY
19/09/2014	5	18	0-0	ESE-N	1023.7	NIL	FINE/CLOUDY
20/09/2014	6	17	0-0	NW-S	1024	NIL	FINE
21/09/2014	SUNDAY						
22/09/2014	11	21	0-0	NNE-NE	1033.3	NIL	CLOUDY
23/09/2014	8	21	0-5	NE-E	1031.7	NIL	FINE
24/09/2014	10	25	0-13	NNE-WNW	1025.02	NIL	FINE
25/09/2014	16	17	0-0	NE-ESE	1012.5	NIL	RAIN
26/09/2014	11	19	0-0	S-NE	1018.1	8	FOG/CLOUDY
27/09/2014	11	18	0-5	S-SW	1021.1	NIL	FINE/CLOUDY
28/09/2014	SUNDAY						
29/09/2014	17	30	5-8	WNW-NW	1016.4	NIL	CLOUDY
30/09/2014	21	32	13-26	NW-WNW	1014.4	NIL	CLOUDY

PF FORMATION WEATHER CHART

OCT 14

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/10/2014	16	20	5-3	S-S	1015.4	NIL	FINE
2/10/2014	7	23	0-2	ESE-N	1024.3	NIL	FINE
3/10/2014	11	20	0-3	ESE-NE	1022	NIL	FINE/CLOUDY
4/10/2014	14	20	0-6	WNW-WNW	1022.1	NIL	CLOUDY
5/10/2014	SUNDAY						
6/10/2014	MONDAY	LABOUR DAY					
7/10/2014	24	28	10-10	WNW-SSW	1007.3	NIL	CLOUDY
8/10/2014	13	18	3-3	S-NE	1018.2	NIL	CLOUDY
9/10/2014	13	22	0-0	ESE-NNE	1023.2	NIL	CLOUDY
10/10/2014	10	24	0-0	NE-ESE	1020.3	NIL	FINE
11/10/2014	12	25	0-0	NNE-WNW	1016.7	NIL	FINE
12/10/2014	SUNDAY						
13/10/2014	19	23	0-5	WNW-NW	1008.4	NIL	CLOUDY
14/10/2014	13	16	0-0	ESE-S	1009.5	15	CLOUDY
15/10/2014	10	15	8-10	SW-SSW	1013	25	RAIN
16/10/2014	7	22	0-0	ESE-SW	1019.5	NIL	FINE
17/10/2014	9	17	0-8	ESE-S	1023.7	NIL	CLOUDY
18/10/2014	8	18	0-5	ESE-NE	1031.4	NIL	CLOUDY
19/10/2014	SUNDAY						
20/10/2014	16	17	5-5	ESE-ESE	1026.5	5	CLOUDY
21/10/2014	13	17	0-8	ESE-S	1033.6	NIL	CLOUDY
22/10/2014	11	23	0-2	NE-NE	1029	NIL	CLOUDY/FINE
23/10/2014	13	30	0-0	NNE-ESE	1018.9	NIL	CLOUDY
24/10/2014	17	29	16-8	W-N	1021.3	NIL	CLOUDY
25/10/2014	17	28	0-0	SW-SW	1013.9	NIL	FINE
26/10/2014	SUNDAY						
27/10/2014	17	31	0-28	NE-WNW	1010.3	NIL	CLOUDY
28/10/2014	13	26	0-11	NE-S	1013.1	NIL	FINE
29/10/2014	14	26	0-0	SSW-NE	1017.4	NIL	FINE
30/10/2014	13	30	0-0	NNE-ESE	1016.5	NIL	FOG/FINE
31/10/2014	14	35	0-6	E-WNW	1014.2	NIL	FINE

PF FORMATION WEATHER CHART

NOV 14

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/11/2014	24	33	8-19	WNW-WNW	1005.6	NIL	FINE
2/11/2014	SUNDAY						
3/11/2014	9	21	0-5	ESE-NE	1025.4	NIL	CLOUDY
4/11/2014	14	24	0-5	NE-NW	1024.9	NIL	CLOUDY
5/11/2014	15	23	0-6	NNE-S	1018.1	NIL	FOG/CLOUDY
6/11/2014	14	21	0-0	ESE-ESE	1015.5	25	RAIN/CLOUDY
7/11/2014	13	23	0-3	ESE-ESE	1019.7	NIL	FINE/CLOUDY
8/11/2014	13	22	0-5	NE-NW	1023.8	NIL	FINE
9/11/2014	SUNDAY						
10/11/2014	17	21	0-6	SW-S	1019	NIL	CLOUDY
11/11/2014	15	20	0-0	ESE-ESE	1020.5	NIL	CLOUDY
12/11/2014	14	23	0-2	ESE-S	1020.8	NIL	CLOUDY
13/11/2014	15	26	0-0	NE-SW	1019	NIL	CLOUDY
14/11/2014	16	38	0-8	NNE-NE	1013.4	NIL	FOG/CLOUDY
15/11/2014	18	21	0-0	S-N	1011.9	NIL	CLOUDY
16/11/2014	SUNDAY						
17/11/2014	13	27	0-6	SW-NNE	1013.5	4	FINE
18/11/2014	15	26	8-2	S-N	1017.3	NIL	CLOUDY
19/11/2014	15	24	0-5	ESE-NNE	1022.1	NIL	CLOUDY
20/11/2014	18	35	0-5	N-W	1015.9	NIL	FOG/FINE
21/11/2014	22	38	0-11	NNW-W	1007.6	NIL	CLOUDY
22/11/2014	18	24	2-2	ESE-NE	1014.8	NIL	CLOUDY
23/11/2014	SUNDAY						
24/11/2014	21	28	8-14	E-S	1013.6	NIL	CLOUDY
25/11/2014	21	23	6-2	N-E	1011.6	4	CLOUDY
26/11/2014	16	23	0-5	NE-NE	1020.3	NIL	CLOUDY
27/11/2014	17	18	0-5	ESE-ESE	1020.8	NIL	CLOUDY
28/11/2014	16	24	0-0	E-ESE	1024.4	NIL	CLOUDY
29/11/2014	13	25	0-0	SE-NW	1020.5	NIL	FINE
30/11/2014	SUNDAY						

PF FORMATION WEATHER CHART

DEC 14

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/12/2014	18	28	6-0	NW-E	1011.9	18	CLOUDY/RAIN
2/12/2014	18	32	0-2	WNW-WNW	1012.7	10	CLOUDY/RAIN
3/12/2014	20	31	3-18	NNE-NW	1013.9	5	CLOUDY/RAIN
4/12/2014	19	28	0-2	NE-N	1013.7	4	CLOUDY/RAIN
5/12/2014	19	29	6-0	NE-E	1008.8	2	CLOUDY/RAIN
6/12/2014	19	24	0-0	N-N	1007.9	15	CLOUDY/RAIN
7/12/2014	SUNDAY						
8/12/2014	18	22	0-2	W-WNW	1009	70	RAIN
9/12/2014	19	25	0-0	ESE-ESE	1015.3	15	RAIN
10/12/2014	18	24	0-0	NE-S	1016	NIL	CLOUDY
11/12/2014	20	17	6-13	SW-SW	1007.8	15	RAIN
12/12/2014	14	20	0-3	S-ESE	1016.5	35	RAIN
13/12/2014	14	20	0-8	S-SE	1019.1	NIL	CLOUDY
14/12/2014	SUNDAY						
15/12/2014	18	28	0-6	NNE-WNW	1013.2	NIL	FINE
16/12/2014	17	30	0-8	NE-NE	1007.6	NIL	FINE
17/12/2014	21	23	8-0	NE-NE	1002.1	NIL	FINE
18/12/2014	16	26	0-6	SE-WNW	1010.4	NIL	CLOUDY
19/12/2014	16	23	0-0	ESE-S	1011.6	NIL	FINE
20/12/2014	14	22	0-0	SE-NW	1018.8	NIL	CLOUDY
21/12/2014	SUNDAY						
22/12/2014	17	30	0-0	NE-S	1016.9	NIL	FINE
23/12/2014	19	22	0-2	NNE-SW	1015.5	4	RAIN
24/12/2014	22	26	0-2	WNW-S	1012.1	5	RAIN
25/12/2014	CHRISTMAS	DAY					
26/12/2014							
27/12/2014							
28/12/2014							
29/12/2014							
30/12/2014							
31/12/2014							

PF FORMATION WEATHER CHART

JAN 15

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/01/2015	CLOSED						
2/01/2015	CLOSED						
3/01/2015	CLOSED						
4/01/2015	CLOSED						
5/01/2015	19	25	0-3	SE-SE	1019.8	2	CLOUDY
6/01/2015	19	26	0-3	SSE-SEE	1021.5	NIL	FINE
7/01/2015	18	29	0-10	N-NE	1020	NIL	FINE
8/01/2015	19	27	0-5	NE-NE	1019	NIL	FINE
9/01/2015	20	33	0-5	NE-NE	1011.9	NIL	FINE
10/01/2015	CLOSED						
11/01/2015	CLOSED						
12/01/2015	18	22	0-19	SSE-S	1015.3	38	RAIN
13/01/2015	18	27	0-8	N-NW	1006.8	NIL	FINE
14/01/2015	23	30	0-10	NW-NW	1000.4	NIL	FINE
15/01/2015	18	27	0-10	SW-NW	1005.3	NIL	FINE
16/01/2015	18	29	0-5	N-NW	1009.2	NIL	FINE
17/01/2015	19	29	0-6	N-NW	1008.6	NIL	FINE
18/01/2015	SUNDAY						
19/01/2015	19	28	0-5	S-SE	1013.6	2	RAIN
20/01/2015	16	22	0-4	N-NW	1015.5	NIL	CLOUDY
21/01/2015	18	28	0-4	E-SE	1010.4	6.5	CLOUDY /FINE
22/01/2015	19	29	0-3	NE-SE	1013.9	NIL	FINE
23/01/2015	20	31	0-4	N-E	1010.7	NIL	FINE
24/01/2015	21	28	0-8	SE-NW	1007.4	NIL	FINE
25/01/2015	SUNDAY						
26/01/2015	ANZAC DAY						
27/01/2015	16	18	0-9	S-SE	1010.5	50	RAIN
28/01/2015	16	18	0-8	SSW-S	1012.8	33	RAIN
29/01/2015	13	20	0-3	SE-SW	1013.4	NIL	CLOUDY/FINE
30/01/2015	11	22	0-1	SSE-S	1011	NIL	FINE
31/01/2015	14	23	0-0	SE-NW	1008.3	NIL	CLOUDY/FINE

PF FORMATION WEATHER CHART

FEB 15

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/02/2015	SUNDAY						
2/02/2015	16	23	0-0	SW-SE	1015.7	10	CLOUDY
3/02/2015	18	24	0-0	S-NNE	1021.7	NIL	CLOUDY
4/02/2015	14	23	0-0	E-NNE	1016.3	NIL	CLOUDY
5/02/2015	17	22	0-8	SW-ESE	1022.7	10	RAIN
6/02/2015	15	24	0-0	ESE-NNE	1027.9	NIL	CLOUDY
7/02/2015	17	22	0	N-S	1026	NIL	CLOUDY FINE
8/02/2015	SUNDAY						
9/02/2015	20	23	0-0	ESE-ESE	1022.8	NIL	CLOUDY
10/02/2015	20	27	0-2	ESE-ESE	1024.4	NIL	CLOUDY
11/02/2015	19	29	0-0	NE-ESE	1023.8	NIL	FINE
12/02/2015	19	28	0-0	NE-ESE	1021.5	NIL	FOG/FINE
13/02/2015	19	26	0-0	S-SW	1024.2	10	RAIN
14/02/2015	18	25	0-0	SE-SW	1023.8	NIL	FINE
15/02/2015	SUNDAY						
16/02/2015	18	29	0-2	E-E	1017.6	10	CLOUDY
17/02/2015	17	28	0-0	NE-NE	1019.1	NIL	CLOUDY
18/02/2015	17	28	0-6	NE-NE	1019.9	NIL	FINE
19/02/2015	18	26	0-0	E-E	1021.7	NIL	CLOUDY
20/02/2015	18	24	0-2	NE-WNW	1018.2	NIL	FOG/CLOUDY
21/02/2015	19	23	0-0	SW-NE	1016.2	NIL	RAIN
22/02/2015	SUNDAY						
23/02/2015	20	25	0-0	NE-S	1017.6	9	RAIN
24/02/2015	20	24	0-14	NE-SE	1015.3	NIL	FOG/CLOUDY
25/02/2015	19	19	0-10	SW-SE	1015.7	NIL	CLOUDY
26/02/2015	17	24	0-0	S-WNW	1011.7	NIL	RAIN/CLOUDY
27/02/2015	18	27	0-0	ESE-NNE	1010.6	4	CLOUDY
28/02/2015	17	23	0-0	SE-NW	1010.6	NIL	FINE

PF FORMATION WEATHER CHART

MAR 15

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/03/2015	SUNDAY						
2/03/2015	17	21	3-0	S-ESE	1018.8	3	CLOUDY
3/03/2015	14	30	0-6	NNE-N	1016.9	NIL	FINE
4/03/2015	19	29	0-0	ESE-NNE	1013.7	NIL	CLOUDY
5/03/2015	17	26	0-14	NNE-S	1005.6	NIL	CLOUDY
6/03/2015	14	27	2-Aug	WNW-WNW	1009.7	NIL	CLOUDY
7/03/2015	14	24	0-0	NE-NE	1013.5	NIL	CLOUDY
8/03/2015	SUNDAY						
9/03/2015	19	31	0-0	ESE-S	1012.1	NIL	CLOUDY
10/03/2015	19	25	0-0	S-ESE	1016.7	NIL	CLOUDY
11/03/2015	19	29	0-0	ESE-NE	1017.2	NIL	CLOUDY
12/03/2015	19	27	0-0	NNE-S	1014.9	50	CLOUDY
13/03/2015	18	17	0-0	S-ESE	1018.8	8	RAIN
14/03/2015	15	20	0-5	SW-SW	1019.7	NIL	FINE
15/03/2015	SUNDAY						
16/03/2015	12	22	0-6	S-S	1018.5	NIL	CLOUDY
17/03/2015	13	22	0-0	E-NE	1016.6	NIL	FINE/CLOUDY
18/03/2015	18	31	0-2	NE-SW	1008.4	NIL	CLOUDY
19/03/2015	17	28	0-0	SW-WNW	1010.9	NIL	FOG/FINE
20/03/2015	18	29	0-2	WNW-WNW	1011	NIL	CLOUDY
21/03/2015	16	17	0-0	S-SE	1023.9	NIL	RAIN
22/03/2015	SUNDAY						
23/03/2015	16	26	0-8	NE-NE	1019.9	10	CLOUDY
24/03/2015	20	22	0-0	SE-SE	1010.9	NIL	RAIN
25/03/2015	14	22	0-0	S-ESE	1016.1	15	CLOUDY
26/03/2015	14	25	0-8	SE-WNW	1018.2	NIL	CLOUDY
27/03/2015	11	25	0-0	SW-SW	1021.9	NIL	CLOUDY
28/03/2015	10	20	0-2	SW-SW	1023.3	NIL	FINE
29/03/2015	SUNDAY						
30/03/2015	16	21	0-0	SE-NNE	1023.9	NIL	CLOUDY
31/03/2015	16	22	0-0	SE-NE	1025.5	NIL	FOG /CLOUDY

PF FORMATION WEATHER CHART

APR 15

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/04/2015	17	24	0-0	SE-SW	1025.3	5	FOG/FINE
2/04/2015	18	27	0-2	SE-WNW	1018.6	NIL	FOG/CLOUDY
3/04/2015	GOOD	FRIDAY					
4/04/2015	EASTER	SATURDAY					
5/04/2015	EASTER	SUNDAY					
6/04/2015	EASTER	MONDAY					
7/04/2015	12	19	0-8	N-W	1008.4	65	FOG/CLOUDY
8/04/2015	14	20	0-6	NW-SW	1010.4	NIL	CLOUDY
9/04/2015	13	19	5-0	S-SE	1021.5	NIL	CLOUDY
10/04/2015	13	19	0-0	SW-ESE	1025.4	NIL	CLOUDY
11/04/2015	14	19	0-0	SW-SW	1024.3	NIL	CLOUDY/RAIN
12/04/2015	SUNDAY						
13/04/2015	13	20	0-2	SE-ESE	1023.7	NIL	CLOUDY
14/04/2015	12	21	0-5	SE-N	1024.1	NIL	CLOUDY
15/04/2015	13	26	0-0	NE-NE	1024.8	NIL	CLOUDY
16/04/2015	19	28	8-0	NW-SW	1023	25	CLOUDY
17/04/2015	18	22	0-2	SE-NNE	1024.3	5	RAIN
18/04/2015	19	24	5-Nov	NW-NW	1018.8	NIL	CLOUDY
19/04/2015	SUNDAY						
20/04/2015	10	13	5-May	SW-SW	1025.4	8	RAIN
21/04/2015	13	13	Oct-15	SW-SW	1020.3	160	RAIN
22/04/2015	14	15	0-0	S-SW	1014.5	117	RAIN
23/04/2015	15	19	0-0	S-SE	1013.2	27	CLOUDY
24/04/2015	14	24	0-6	E-NW	1009.2	NIL	CLOUDY
25/04/2015	ANZAC	DAY					
26/04/2015	SUNDAY						
27/04/2015	9	18	0-0	SW-SW	1019	5	CLOUDY
28/04/2015	8	16	0-0	SW-ESE	1026.1	NIL	CLOUDY
29/04/2015	10	17	0-0	SE-ESE	1037.7	NIL	CLOUDY
30/04/2015	12	17	0-0	S-S	1031.7	5	RAIN

PF FORMATION WEATHER CHART

MAY 15

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/05/2015	13	19	0-0	S-ESE	1028.6	5	RAIN
2/05/2015	15	18	0-0	SE-SE	1021.7	NIL	RAIN/CLOUDY
3/05/2015	SUNDAY						
4/05/2015	16	20	0-0	SW-NE	1017.3	40	CLOUDY
5/05/2015	16	24	0-5	NW-NW	1011.3	NIL	FINE
6/05/2015	13	19	0-0	NW-W	1013.9	NIL	FINE
7/05/2015	9	17	0-11	NW-NW	1019.2	NIL	FINE
8/05/2015	7	19	0-0	NW-NW	1020.7	NIL	FINE
9/05/2015	7	16	0-3	SW-W	1018.8	NIL	FINE
10/05/2015	SUNDAY						
11/05/2015	15	19	6-6	SW-SW	1011.4	NIL	CLOUDY
12/05/2015	10	20	0-3	W-SW	1016.3	NIL	FINE
13/05/2015	13	13	11-8	SW-SW	1016.2	NIL	FINE
14/05/2015	4	15	0-0	W-ESE	1025.1	NIL	FINE
15/05/2015	8	17	0-5	SW-ESE	1031.8	NIL	CLOUDY
16/05/2015	12	20	0-0	S-SW	1036.4	NIL	CLOUDY
17/05/2015	SUNDAY						
18/05/2015	11	16	0-0	SE-ESE	1032.9	NIL	CLOUDY
19/05/2015	13	19	0-0	SE-NE	1023.3	NIL	CLOUDY
20/05/2015	16	21	0-6	NW-WNW	1016.5	2	CLOUDY
21/05/2015	11	19	0-0	NW-ESE	1019.4	NIL	CLOUDY
22/05/2015	13	13	0-16	SW-SW	1017.4	NIL	RAIN
23/05/2015	10	15	10-0	SW-SW	1029	NIL	CLOUDY
24/05/2015	SUNDAY						
25/05/2015	8	17	0-0	S-WNW	1033	20	CLOUDY
26/05/2015	6	13	0-0	NW-SW	1030.8	NIL	CLOUDY
27/05/2015	9	17	0-0	SW-W	1026.6	NIL	CLOUDY
28/05/2015	9	20	0-0	W-WNW	1024.1	NIL	FINE/CLOUDY
29/05/2015	16	18	0-0	NW-NW	1020.8	NIL	CLOUDY
30/05/2015	9	16	0-6	SW-NW	1023.7	NIL	CLOUDY
31/05/2015	SUNDAY						

PF FORMATION WEATHER CHART

JUN 15

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/06/2015	9	13	0-13	NW-SW	1014.3	NIL	CLOUDY
2/06/2015	2	13	0-0	SW-W	1025.8	NIL	FINE
3/06/2015	3	12	0-0	W-ESE	1024.6	NIL	FINE
4/06/2015	4	15	0-0	SW-N	1023.8	NIL	CLOUDY
5/06/2015	7	14	0-0	NW-S	1019.6	NIL	CLOUDY
6/06/2015	9	15	0-0	SW-SW	1028.1	NIL	FINE/CLOUDY
7/06/2015	SUNDAY						
8/06/2015	QUEEN'S	BIRTHDAY					
9/06/2015	14	21	0-0	WNW-WNW	1021.1	NIL	CLOUDY
10/06/2015	10	11	0-0	SE-SW	1029.2	RAIN	CLOUDY
11/06/2015	10	14	0-0	SE-SW	1036.9	10	CLOUDY
12/06/2015	11	16	0-0	NW-ESE	1035.5	NIL	CLOUDY
13/06/2015	11	16	0-0	E-NW	1032.6	NIL	CLOUDY
14/06/2015	SUNDAY						
15/06/2015	10	15	0-0	S-SW	1028.9	NIL	CLOUDY
16/06/2015	12	14	0-6	NE-N	1024.5	5	FOG/RAIN
17/06/2015	14	15	0-8	NE-WNW	1014.4	10	RAIN
18/06/2015	9	16	0-0	WNW-ESE	1014.5	5	RAIN/CLOUDY
19/06/2015	9	11	3-0	SW-S	1017.5	20	RAIN
20/06/2015	6	11	0-8	S-ESE	1024.3	5	CLOUDY
21/06/2015	SUNDAY						
22/06/2015	5	16	0-0	ESE-N	1031.4	NIL	FINE
23/06/2015	7	18	0-11	WNW-N	1027.9	NIL	CLOUDY
24/06/2015	12	17	0-0	N-WNW	1024.6	NIL	CLOUDY
25/06/2015	13	17	0-5	N-SW	1022.7	NIL	CLOUDY
26/06/2015	10	16	0-0	ESE-WNW	1032.2	4	FOG/CLOUDY
27/06/2015	7	13	0-0	WNW-WNW	1035.6	NIL	FOG/FINE
28/06/2015	SUNDAY						
29/06/2015	9	16	0-0	NW-SW	1034.4	NIL	CLOUDY
30/06/2015	7	15	0-0	SW-WNW	1030.2	NIL	CLOUDY

Attachment 10

Groundwater Report



PF Formation

Groundwater Report: Hitchcock Road Site, Maroota, NSW. Annual Groundwater Management Plan 2014-2015.

Report E2W-0224 R001

27 July 2015



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earth₂water
Pty Ltd
Environmental & Groundwater Consulting

Client: PF Formation

**Project: Groundwater Report
Hitchcock Road Site, Maroota
2014-2015 Annual Groundwater Management Plan**

Prepared for:
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Report: 27 July 2015
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Appendices

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Appendix C:	Previous Bore Hydrographs (URS, 2013)

1 INTRODUCTION

Earth2Water Pty Ltd (E2W) was engaged by PF Formation (PF) to provide the Groundwater Report (Maroota 2013-2015 Annual Groundwater Management Plan) for Hitchcock Road Site, Maroota (Figure 1). The water sampling and downloading of loggers (8) was conducted in consultation with Joshua Graham (PF) on 30 June 2015. URS Australia Pty Ltd (URS) was previously (finished 2013) retained by PFF to prepare the groundwater component of the report.

PF Formation (PFF) is required under the Development Approval conditions set for the Maroota Hitchcock Road property area (Figure 1) to prepare an annual Water Management Plan (WMP) report to the *Department of Planning and Environment* (DPE). The WMP is part of the overall Environmental Management Plan and addresses the surface water and groundwater aspects of the sand extraction operations at the site.

The WMP for the year July 2014 to June 2015 also includes the monitoring data collected from 1996 to 30 June 2015 for the Hitchcock Road site and for Portion 198.

2 GROUNDWATER MONITORING NETWORK

At the Hitchcock Road site, groundwater is monitored at five locations:

1. Monitoring bore PF167MW1, located in Portion 167;
2. Monitoring bore PF166MW1, located in Portion 166;
3. Supply dam PF167DAM, located in Portion 167 (not utilised for 2014-2015);
4. Monitoring bore PFL2HitchMW1, located in Lot 2; and
5. Monitoring bore PFP214MW1, located in Portion 214.

In addition, groundwater pumpage and chemical records are also collected from one of the two water supply bores in Portion 198 (i.e. PF198PB1. The Bore PF198PB2 has been treated with iron-floc chemicals due to clogging, Figure 1). Groundwater monitoring has been carried out at the sites since 1996. Initially, water levels in bores PF166MW1 and PF167MW1 were measured manually at weekly intervals together with chemical field parameters such as pH and Electrical Conductivity (EC). The manual measurements continued until December 1998. In January 1999, the two bores were equipped with Dataflow Systems automatic data loggers.

Data loggers have been downloaded quarterly between January 1999 and June 2000. Since June 2000, the dataloggers have been downloaded biannually. In January 2006, the old style Dataflow dataloggers were replaced with Solinst Levellogger 3001 units, capable of storing 40 000 readings in the memory, with a battery life span of around 10 years. The new Solinst dataloggers allow data annual downloading, a monitoring interval started on July 2006.

Groundwater samples for chemical analysis have been collected on the same day (30 June 2015 from PF198PB1) from the monitoring and pumping bores. The analytical results have been plotted on individual graphs that are continuously updated to assess possible trends with time (URS, 2013).

Water samples from five bores (PF167MW1, PF166MW1, PFL2HitchMW1, PFP214MW1 and PF198PB1) were collected by E2W (Dino Parisotto) and PF (Joshua Graham) on 30 June 2015 and submitted for chemical analysis under Chain of Custody procedures to Australian Laboratory Services Pty Ltd. The laboratory reports are presented in Appendix B.

A groundwater sample from bore PF198PB1 (30 June 2015) was operational and pumping (*Note: in July 2013 the pump was out of service*). The analytical list for all bores, which was discussed and agreed upon with the DLWC (now the NSW Office of Water) has included:

- pH, Electrical Conductivity and Total Dissolved Solids;
- Calcium, Magnesium, Sodium and Potassium;
- Chloride, Sulphate, Bicarbonate; and
- Oil & Grease.

2.1 Monitoring Bore PF167MW1

Groundwater monitoring at bore PF167MW1 commenced in March 1996. The data between March 1996 and December 1998 (manual collection) have been plotted in the graph of Figure 2, together with EC and rainfall records collected by PF. An automated weather station has been installed by PF in 2010. Occasionally missing data from this station were integrated with data from the BoM Maroota station No.67014.

Figure 2 (2013-2015) presents the combined Solinst datalogger records for bore PF167MW1 (previous records are presented in Appendix C).

Previous minor data gaps exist and a slight difference between the manual data and the start of the automatic recording is evident in the previous data, which are due to the time intervening between the end of the manual and start of the automatic recording methods (URS, 2013).

2.2 Monitoring Bore PF166MW1

Groundwater monitoring at bore PF166MW1 (Figure 3 shows 2013 to 2015 monitoring data) commenced in March 1998 in the same manner as for bore PF167MW1. The data between March 1998 and December 1998 (manual collection) have been plotted in the graph of Figure 4 (Appendix C), together with EC and rainfall records collected by PF.

2.3 Monitoring Bore PFP214MW1

Bore PFP214MW1 was installed in March 2009 as part of an extended groundwater monitoring network following the Development Approval for Portion 214, located at the southern boundary of the Hitchcock Road site.

A datalogger was installed in the bore in early April 2009 (Solinst Levelogger Gold 3001, serial no. 51040540). Bore PFP214MW1 hydrograph is presented in Figure 4 (showing 2013 to 2015 monitoring data).

2.4 Monitoring Bore PFL2HitchMW1

Bore PFL2HitchMW1 was also installed in March 2009. This bore is located midway along the eastern boundary of the Hitchcock Site and monitors the full sequence of the Maroota Sand. A

datalogger was installed in the bore in early April 2009 (Solinst Levellogger Gold 3001, serial no. 510405840). Bore PFL2HitchMW1 hydrograph is presented in Figure 5 (including 2013 to 2015 monitoring data).

2.5 Portion 167 Dam

At the early stages of the site development, an excavation (PF167DAM) was carried out to the top of the Hawkesbury Sandstone to an approximate level of 178m AHD. The excavation collects groundwater and surface water run-off and was eventually licensed by the DLWC (No.10BL157308) as part of the water supply of the operation. Water levels measured against surveyed pegs have been collected at the dam since September 1996 and pumpage records kept since January 1997.

Water quality in the dam is not monitored because the dam collects incident rainfall, run-off and groundwater and, as a result, water quality would vary according to the proportion of each component at the time of measurement.

Due to high rainfall in 2014-2015 (1321.5 mm) no monitoring or pumping was required from the Portion 167 Dam (i.e. no plots are produced for this monitoring period).

2.6 Portion 198 Water Supply Bores

The two water supply bores in Portion 198 (PF198PB1 and PF198PB2) have been monitored manually since their installation in March 1998. Groundwater samples have been collected quarterly for the last four quarters to March 2000, biannually up to July 2006 and annually since then. Pumpage records are collected and totalised weekly. (*Note: Pump in bore PF198PB1 was out of service for most of the year 2012-2013 so that no pumpage data are available for this time*).

Water quality data have been plotted for selected parameters and the graph (5) and the laboratory reports in Appendix B.

The bore was operational and sampling from PF198PB1 discharge outlet occurred on 30 June 2015. No sample was collected from PF198PB2 due to chemical treatment arising from bore clogging (Iron floc).

3 GROUNDWATER DATA ASSESSMENT

3.1 Groundwater Levels

Groundwater levels in the Maroota Sand measured in the monitoring bores indicate that the aquifer is variable and contains numerous perched water tables. The plots of bore PF167MW1, which taps the full saturated thickness of the Maroota Sand, and bore PF166MW1, which taps an unconfined aquifer perched at a higher elevation, indicate a general rapid response to periods of sustained rainfall (Appendix C). Records for the two new monitoring bores, PFP214MW1 and PFL2HitchMW1, indicate a moderate response to rainfall.

The yearly rainfall for the year 2010 (1015.1mm), for the year 2011 (1115.4 mm) and for the year 2012 (984 mm) have been considerably above the long term average of 910.3 mm (to June

2013). Rainfall for the year July 2013- June 2014 has been just 595.5 mm, indicating that the rainfall for year is below the yearly long term average (Note: These rainfall data are reported from the BOM weather station No. 67014 located on Old Telegraph Road).

Rainfall for July 2014 to June 2015 was 1321.5 mm and above the annual average. The above average rainfall for 2014-2015 and high monthly rainfall during April 2015 (422 mm) has stabilised water levels associated with the previous year of low rainfall and subsequently caused a rising of the water table in all bores.

3.2 Bore PF167MW1

After a significant rain event in June 2007, the water level rose by 4.5 m to a level similar to the highest recorded value in mid-2000 (Figure 2, and Appendix C).

Since June 2011 to 2014, after a period of variable and a slow decline, the water level in this bore has been rising steadily following the above average rainfall up to 2013 (2014 is below annual average). The current level from rainfall in 2014-2015 is similar in the year 198 to 2000. Water levels were stable in 2014 and then rose sharply (approximately 1.5 m, 183.8 mAHD) after the high recharge event of April 2015 (rainfall 422 mm, Figure2).

3.3 Bore PF166MW1

Since March 2011, the water level in this bore has been rising steadily, although it shows a slight fall during a low rainfall period in the second half of 2012, followed by a rise as a result of the high rainfall at the beginning of 2013. Bore PF166MW1 taps a perched aquifer with variable responses to major and sustained rainfall events and periods (Figure 3, Appendix C).

The water level (2014) decline during 2014 and then rises steadily in 2015 due to the above average rainfall and high April 2015 rainfall (422 mm, Figure 3).

3.4 Bore PFP214MW1

Bore PFP214MW1 taps the full thickness of the Maroota Sand at the southern edge of the quarry area. Since its installation in March 2009, the water level has shown a slow declining trend up to end of February 2011. Since that time the water level has risen in response to the above average rainfall (Figure 4, Appendix C).

Water levels fluctuated slightly (<1m) in 2014 and then began to rise (<1 m, 183.1 mAHD) after the high recharge event of April 2015 (rainfall 422 mm, Figure 4).

3.5 Bore PFL2HitchMW1

Bore PFL2HitchMW1 is the deepest bore in the Hitchcock Road site, as it is located in the vicinity of the former trigonometric station, which is the highest elevation on the site and taps the full thickness of the Maroota Sand aquifer.

The hydrograph shows that after an initial settlement period after drilling, the water level stabilised at an RL level of 189.6 m AHD without any significant response to the rainfall events until September 2012, after which time it shows a steady rise in response to the above average rainfall (Figure 5, Appendix C).

Since 2013, the water level shows a slight consistent decline to approximately December 2014, followed by a stable to gently rising water table after April 2015 (Figure 5).

3.6 PF167Dam

Water levels in the PF167DAM, which was originally excavated to the base of the Maroota Sand within the deep palaeochannel, have been kept above 180 m AHD over the year to June 2011 period by regulating pumpage so as not to exceed this level (Figure 6 & 7, Appendix C). Due to the above average rainfall of the last three years there have been long periods when no water was extracted from this site.

The rainfall recorded at the BOM station since 2010 has been above the long term annual average of 910.3 mm. No water levels have been recorded at this site during the 2011 – 2013, 2014 - 2015 years, as the dam and the pump have been under water for most of the recording period due to the above average rainfall and resulting run-off experienced in the Maroota area during the 2001-2013 and, in particular, during the period May-June 2013 when the water level peaked briefly at 189 m AHD, returning to 180 m AHD at the end of June 2013.

During July 2013 the water level peaked at 209 m AHD, however in October 2013 the level reached 188m AHD (low rainfall). Total pumpage from the dam (PF167) was 30.395 ML for the 2013-2014 operational period. No pumpage occurred during 2014-2015 which had above average rainfall (1321.5 mm)

It should be noted that the quarry area is internally draining and, therefore, collects all incident rainfall on the site.

Although water is pumped from the dam for a variety of purposes, such as dust suppression and irrigation of rehabilitated areas and, more recently, for sand slurring, records show that water levels return rapidly to the average values indicated above, even after higher levels are experienced after heavy rainfall and consequent run-off.

Figure 6 (appendix C) shows these combined effects upon the water level in the dam. The records suggest that the Maroota Sand aquifer at the site is capable of sustaining the required pumpage even under the low rainfall recharge conditions and the additional demand posed upon it in the wider Maroota area by the many groundwater users.

3.7 Groundwater Quality

Water quality in bores PF167MW1 and PF166MW1 has been monitored for pH and EC since monitoring started. Since June 1999 groundwater quality has been analysed for a range of analytical parameters and for Oil and Grease to obtain background data.

Since July 2009, groundwater quality data have also become available from the newly installed monitoring bores, PFP214MW1 and PFL2HitchMW1. Historical and recent analytical results for the other samples from the monitoring sites are summarised in Tables 3-1 to 3-6, and have been plotted in the graphs (1 -5). The laboratory reports are presented in Appendix B.

The graphs (1 &2) show EC time series trends with water levels and rainfall for the initial monitoring period (March 1996 to January 1999 for bore PF167MW1 and March 1998 to January 1999 for bore PF166MW1), before the installation of the dataloggers (refer to Appendix C for previous graphs presented in URS 2013). The EC graphs show a sympathetic

variation with rainfall, indicating the effects of dilution generated by recharge (decrease in EC) and by lower water table. In the latter case, the improved EC is interpreted as the effect of aquifer recharge by fresher water.

The graphs (1 to 5) confirm the dependence of the aquifer upon rainfall to maintain storage and supply. No analysis has been carried out of the water from the Portion 167 Dam because extraneous influences, such as direct rainfall and run-off, make the water in the dam not representative of the groundwater at that site.

Groundwater quality has also been monitored at bores PF198PB1 (Graph-5) and PF198PB2 (Graph-6 in previous years, Appendix C), the two processing plant water supply bores. The water in these bores is derived from the Hawkesbury Sandstone aquifer. Water quality records are summarised in Tables 3-5 and 3-6 and have been graphed (Refer to Graphs 1 to 5, and also Appendix C, URS 2013).

The waters in the Maroota Sand aquifer monitoring bores are similar and have a characteristic rain composition, with low pH, low TDS and a Sodium-Chloride type. The samples were also analysed for Oil and Grease to monitor the possible effect of the sand extraction operations. Concentrations of Oil & Grease were not detected in any bores for the June 2015 or the previous August 2014 monitoring events (*Note: previous detections were considered anomalous by URS*).

The deep Hawkesbury Sandstone pumping bores groundwater display a slightly different character from that in the shallow Maroota Sand aquifer in the Hitchcock Road area and from the shallow Hawkesbury Sandstone aquifer in other areas of Maroota. The deeper groundwater has a slightly higher TDS, pH and Bicarbonate content (PF198PB1 & 2) than the shallower Maroota Sand groundwater; however, its overall low salinity content and sodium-chloride rain composition indicate a dynamic groundwater regime with regular and rapid rainfall recharge.

Increasing EC/TDS trend is evident in two bores (PFL2HitchMW1, PF214MW-1) from 2013 to 2015, and inferred to relate to variable aquifer characteristics and rainfall recharge patterns.

Overall, all the site monitoring bores in both the Hawkesbury Sandstone and in the Maroota Sand show a marginal decrease in Total Dissolved Solids over time, the deeper bores showing a more constant character.

3.8 Quality Control

The laboratory quality control samples (laboratory duplicates, procedure blanks and control spikes) returned results within the required limits and acceptance criteria. The quality control data generated by the laboratory are presented with the laboratory certificates in Appendix B.

Based on the evaluation of the data, it is assessed that the accuracy and precision of the analytical data generated in the sampling round, as reported by the analytical laboratory, are acceptable as a basis for interpretation.

3.9 Portion 167 dam

Records of pump operation have been kept from PF167DAM since January 1997. Figure 7 (in Appendix C) shows the monthly summary of the pumpage from the dam and Table 3-7 shows the annual totals. Due to the above average rainfall over previous years (2011-2013 and 2014-

2015) no pumping has been necessary from this source, however below average rainfall has occurred in early 2014, with some pumping necessary. No pumping occurred from July 2014 to June 2015.

(The licensed limit for the Portion 167 dam is 50 ML/year which are not exceeded for 2015).

3.10 Water Supply Bores, Portion 198

Pumping records for the two water supply bores in Portion 198 for the year July 2014 to June 2015 are tabulated in Table 3-8. In previous year (2013-2014), total pumpage (33.6 ML) was still significantly below the combined annual allocation of 60 ML. This lower consumption rate is due to the non-operational status of bore PF198PB1 for part of the year 2013, and overall improved efficiency of the plant (including in 2014).

During 2014 to 2015 and given the above average rainfall the available pumping records (PB1 & 2) indicate a usage of 21.8 ML. Groundwater usage is significantly below the combined annual allocation of 60 ML (Table 3-8).

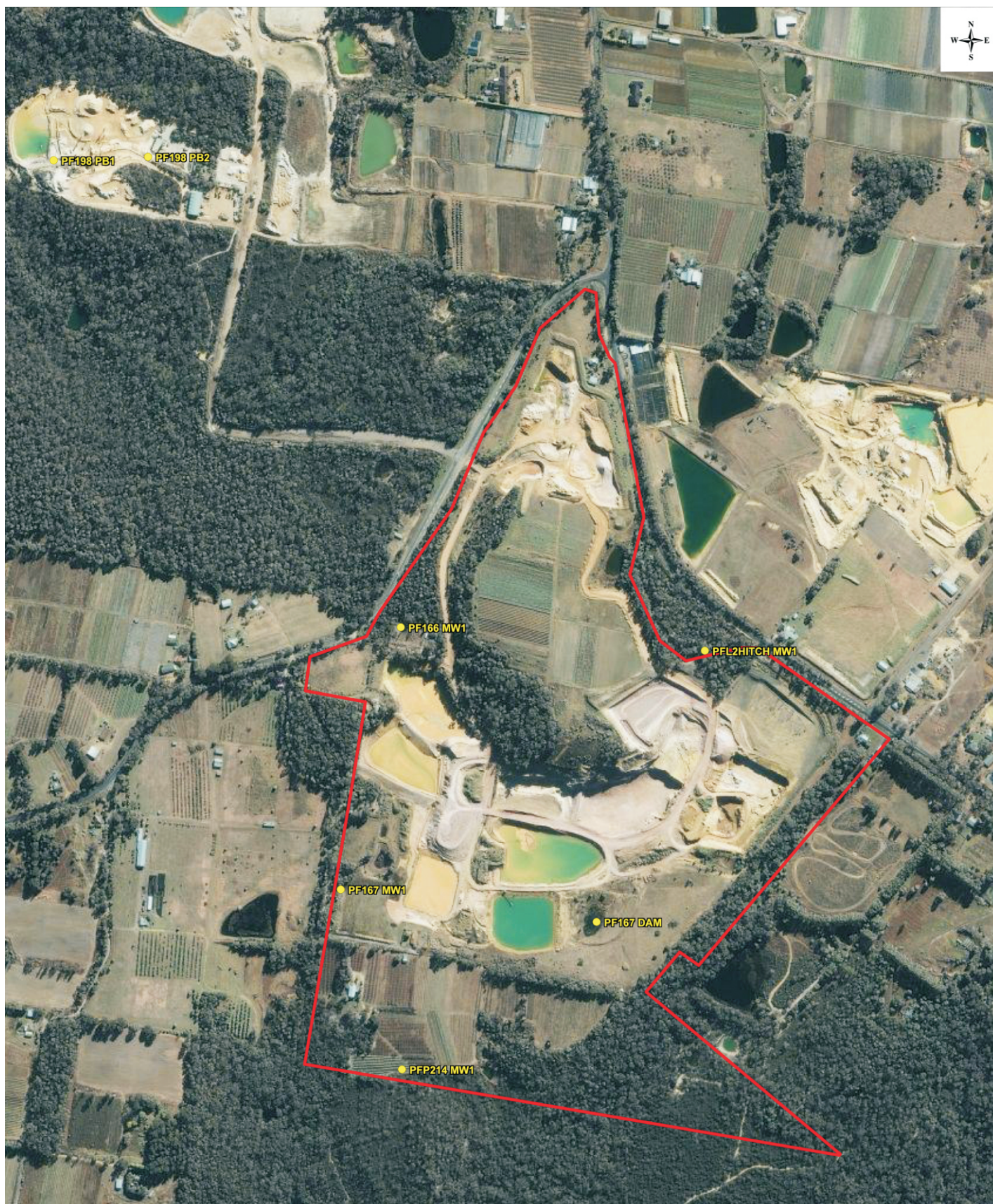
4 CONCLUSIONS

The assessment of the data collected on the groundwater levels and quality in the Maroota Hitchcock Road site, some of which represent the oldest data available to the groundwater study carried out by the DLWC (now Office of Water) in the area, indicate that:

- Water levels in the Maroota Sand aquifer general respond to the rainfall pattern (the rainfall in 2014/2015 was above the annual average).
- Water quality in the Maroota Sand aquifer varies with rainfall recharge (slight increasing EC/TDS trends are visible in two deep bores (PFL2HitchMW1, PF214MW1) due to variations in aquifer characteristics and rainfall from 2013 to 2015).
- No water was pumped from the dam in Portion 167 due to the above average annual rainfall recharge.
- Groundwater pumpage occurred from the two deep water supply bores in Portion 198 (21.8 ML in 2014-2015). The pumpage records for 2014-2015 were 6.1 ML and 15.7 ML for PF198PB1, and PF198PB2, respectively.
- The chemical composition of the groundwater in the deep aquifer of the Hawkesbury Sandstone (water supply bores in Portion 198) has an overall character that indicates that recharge occurs readily.
- The current sand extraction operations in the Hitchcock Road area operate in a manner that does not appear to have an adverse impact upon the groundwater sustainability, and meet the DA Approval Conditions.

The data collected during the year are available to the NSW Office of Water for their continued study in the area.

FIGURES



LEGEND

- Site Boundary
- Groundwater Monitoring Location

Source: URS

Date: June 2015

Reference: E2W_224_07.cdr

0 254.4
metres

SITE LOCATION

PF FORMATION - Hitchcock Road Site (GMP), Maroota

Figure 1

Figure 2: Monitoring Data at Bore PF167MW1 (2013-2015)

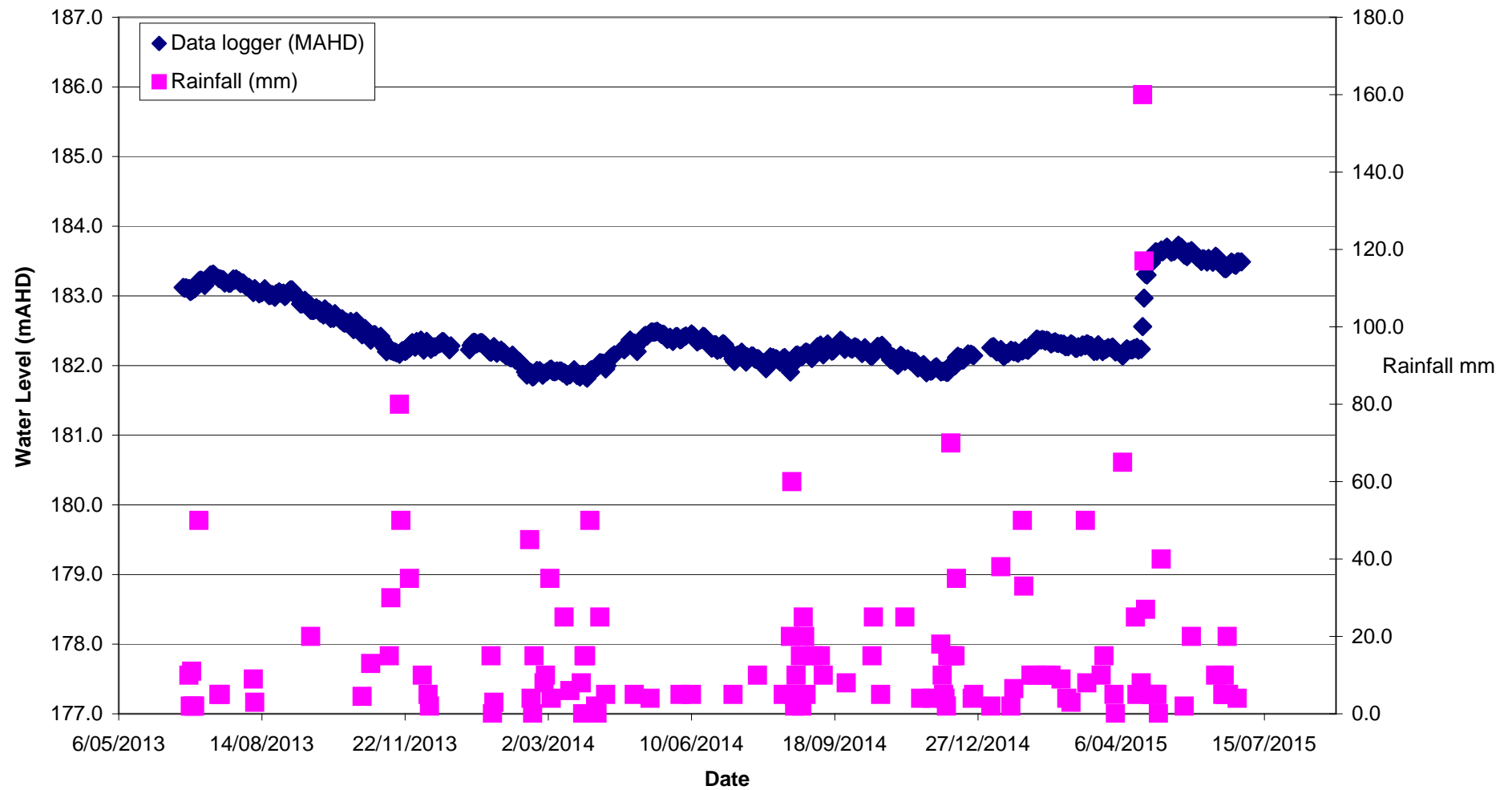


Figure 3: Monitoring Data at Bore PF166MW1 (2013-2015)

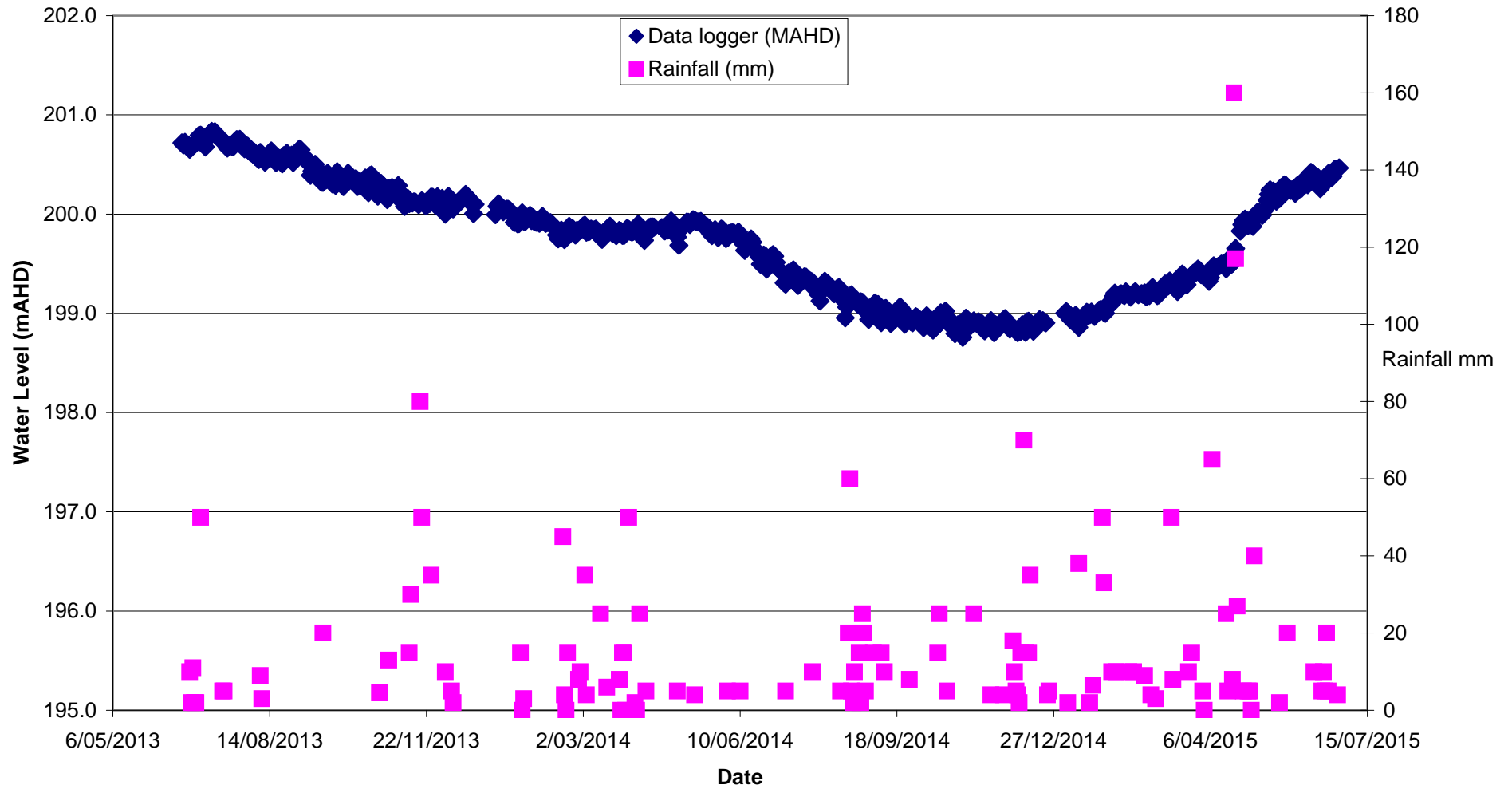


Figure 4: Monitoring Data at Bore PF214MW1 (2013-2015)

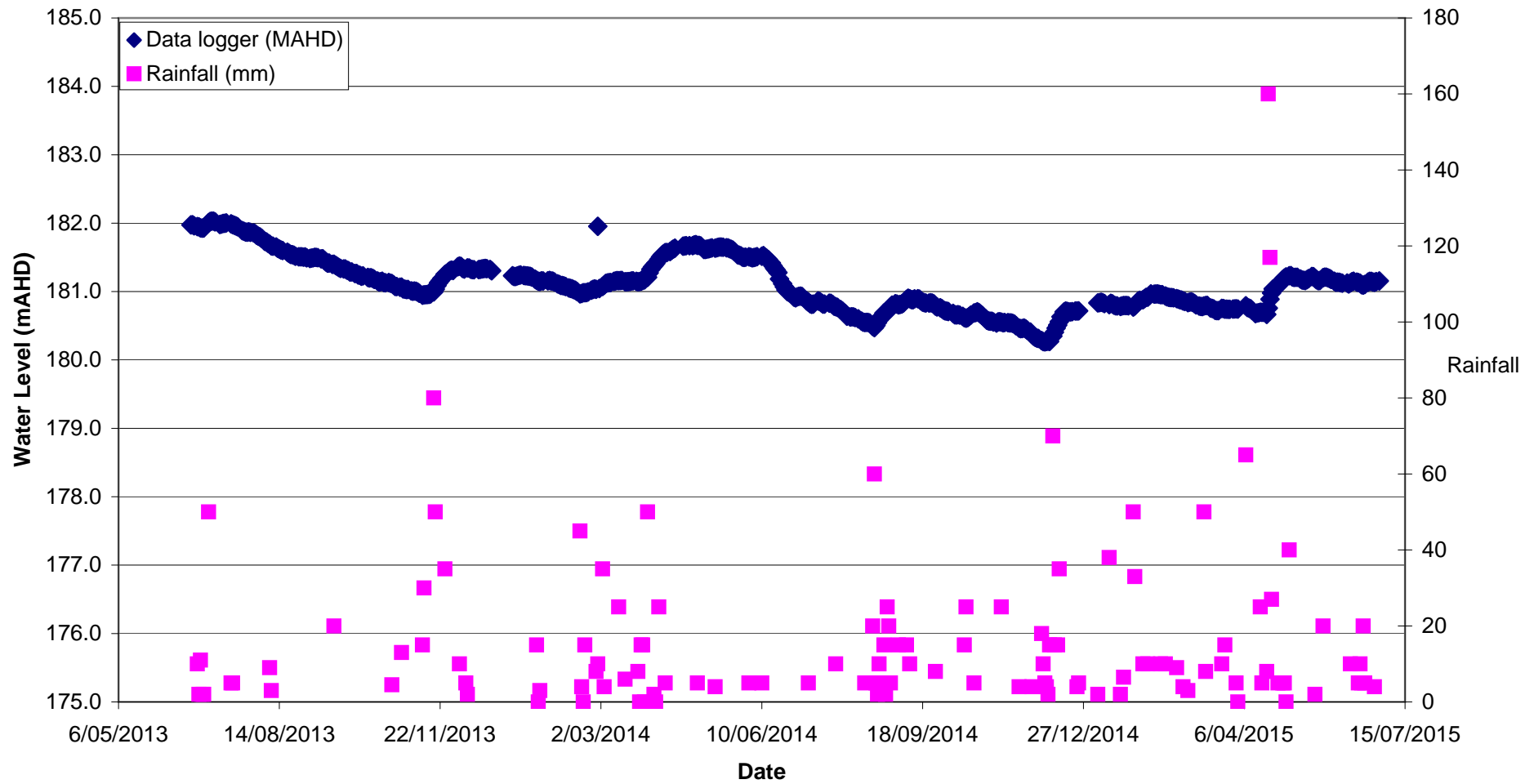
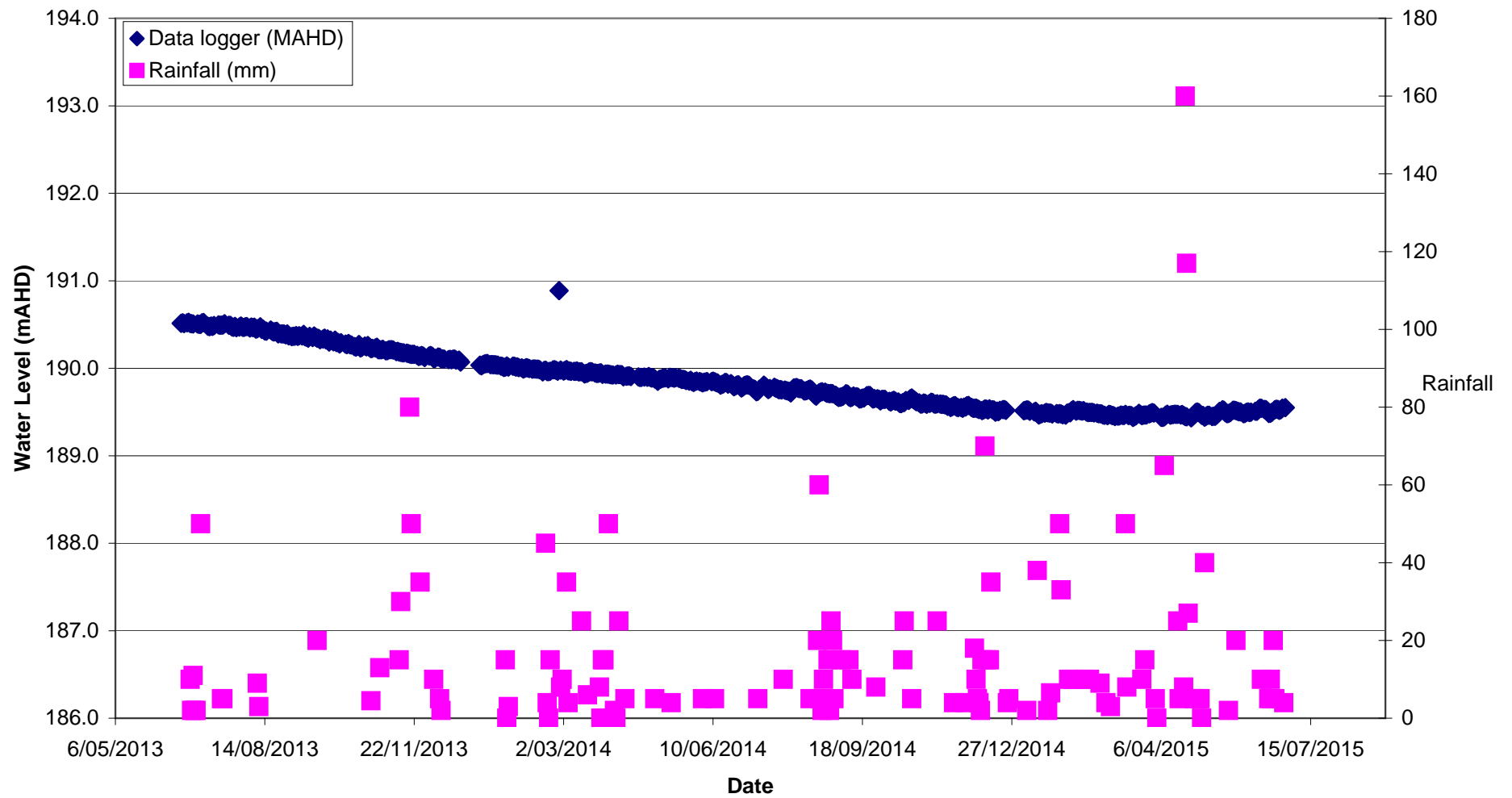
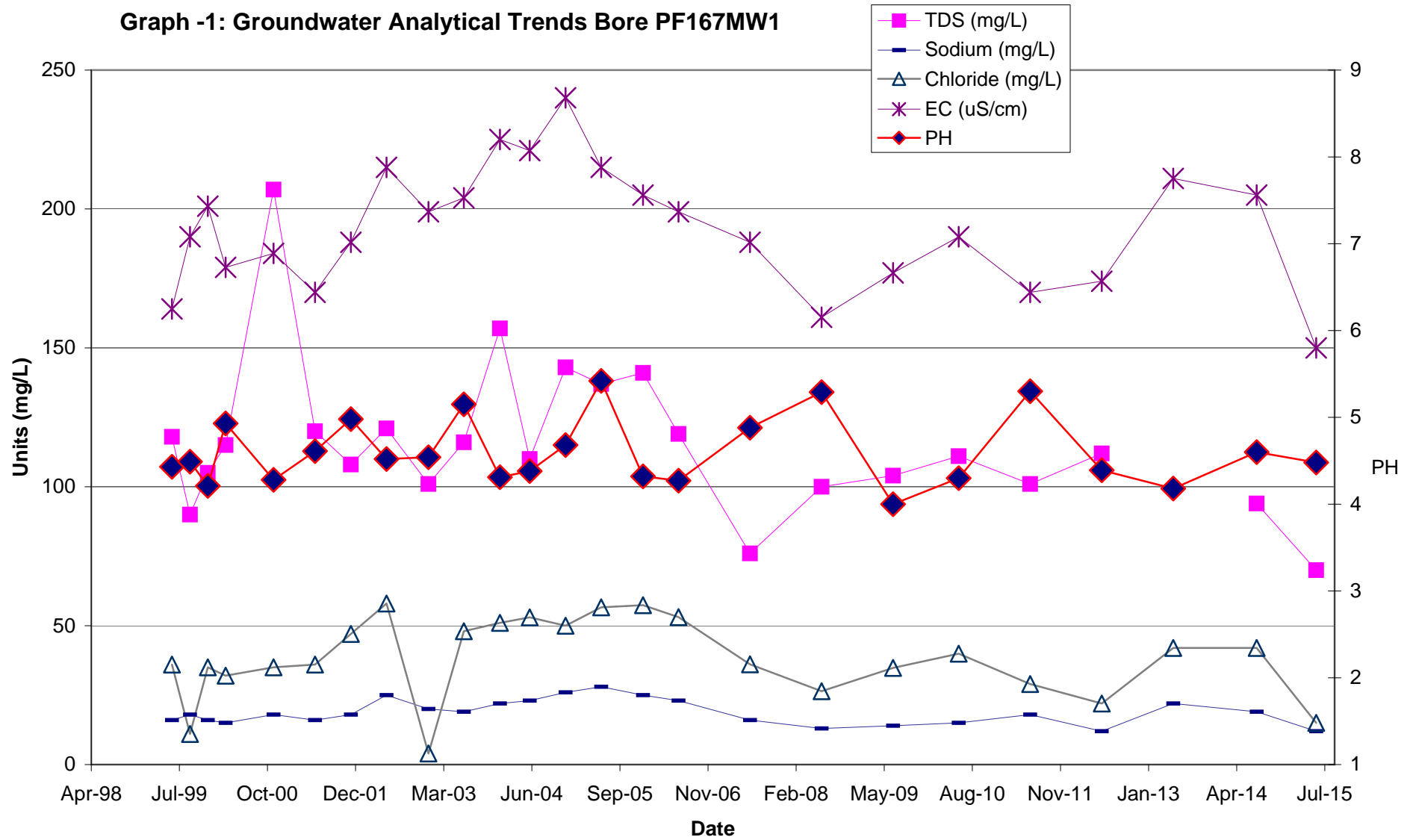


Figure 5: Monitoring Data Bore PFL2HitchMW1 (2013-2015)

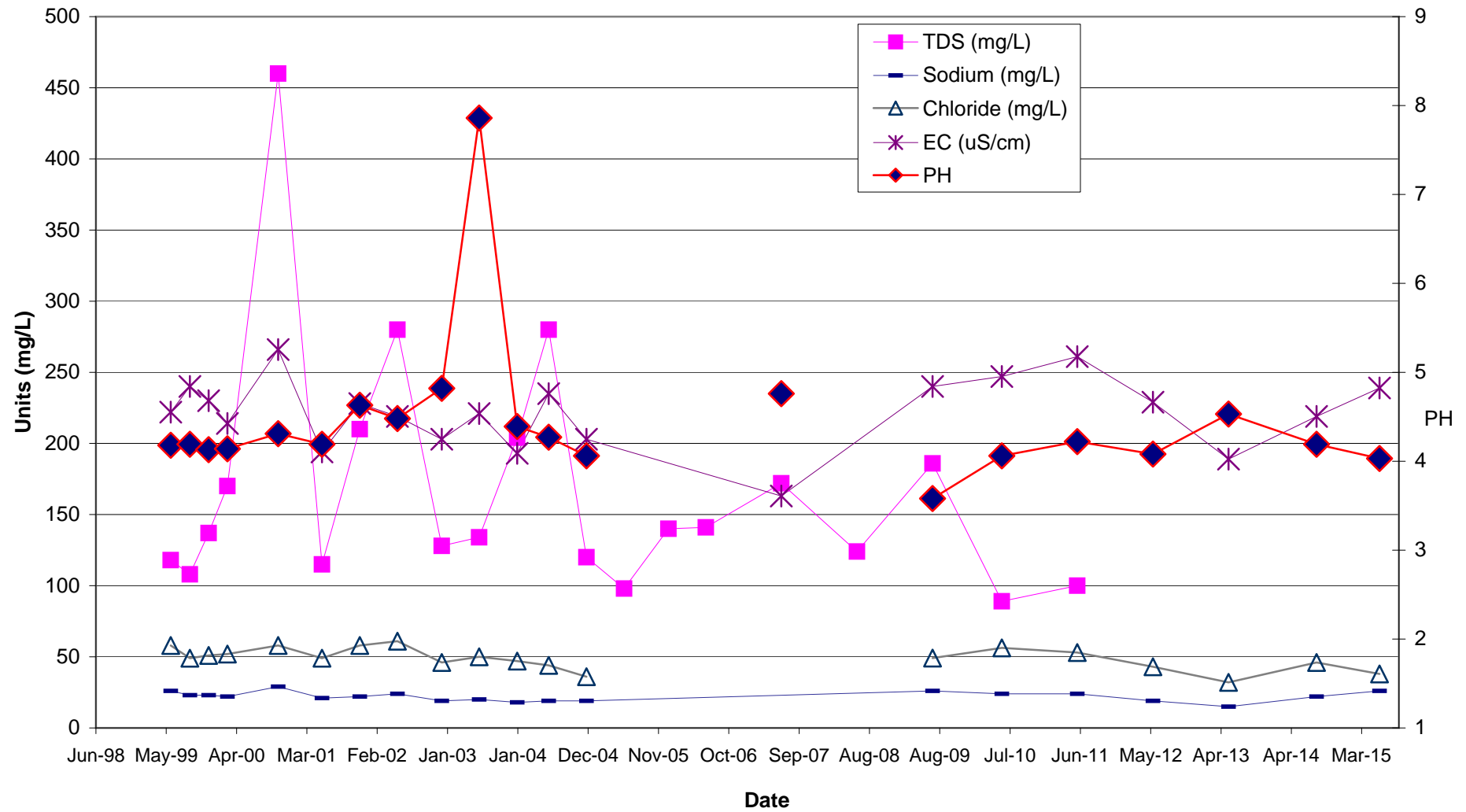


GRAPHS

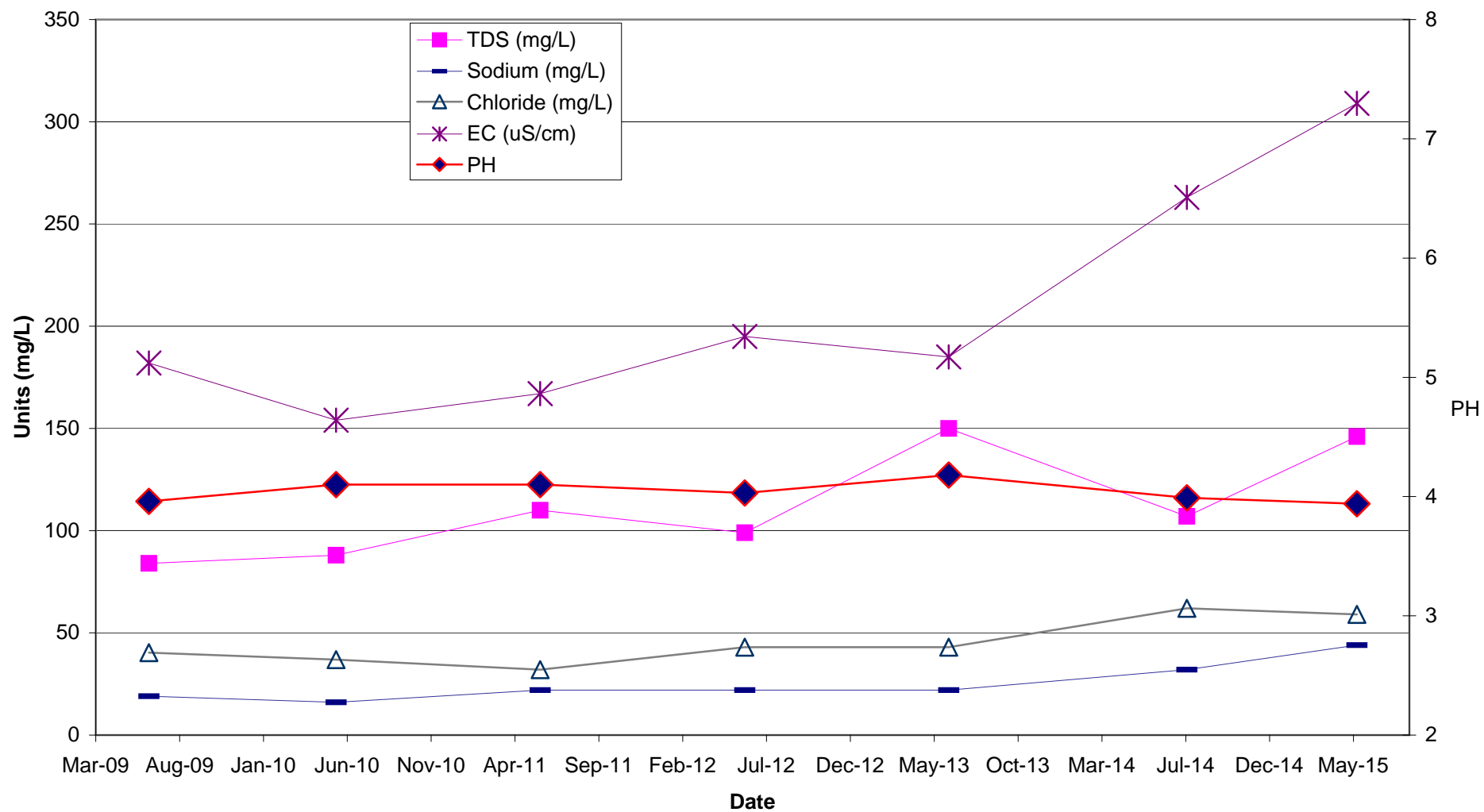
Graph -1: Groundwater Analytical Trends Bore PF167MW1



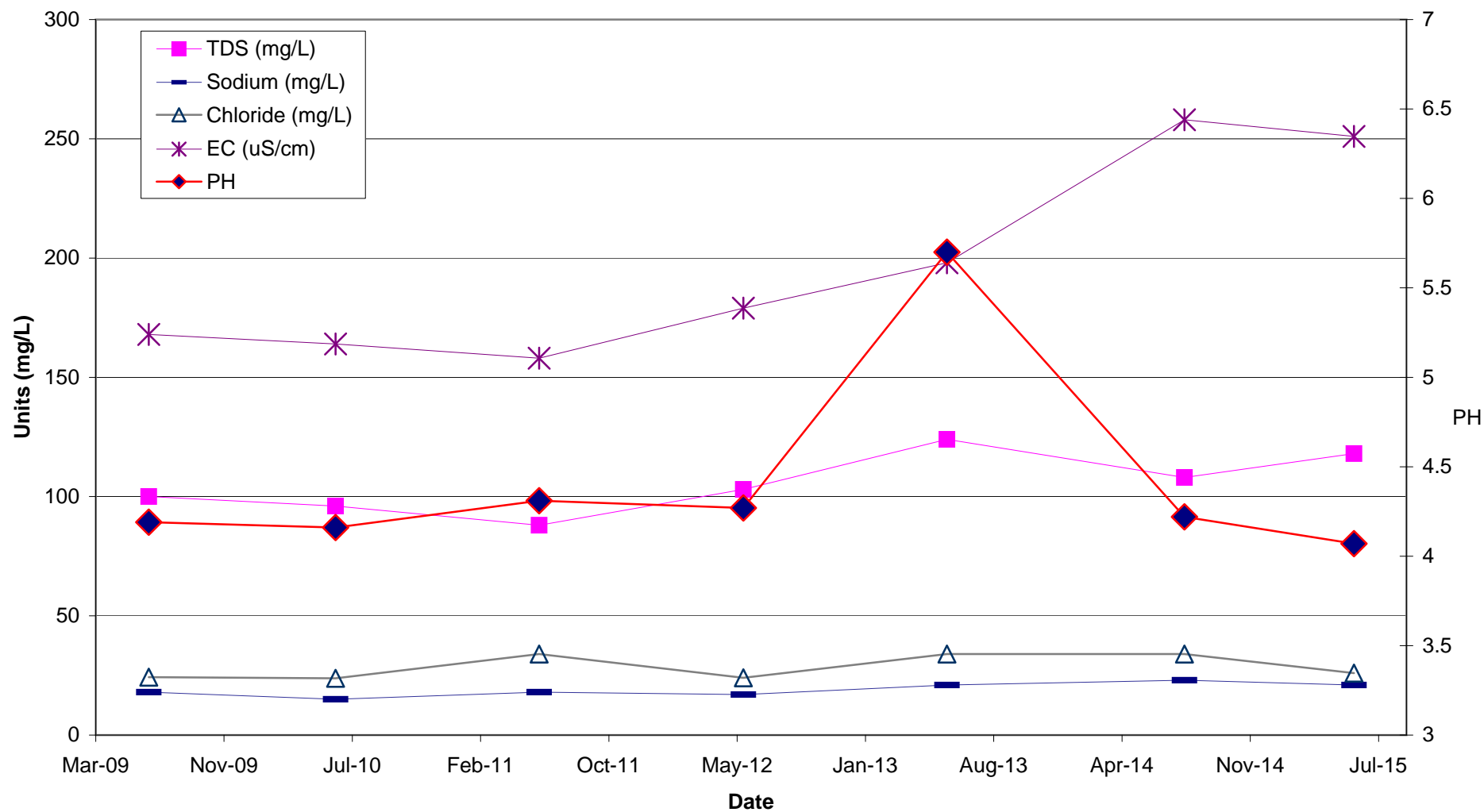
Graph -2: Groundwater Analytical Trends Bore PF166MW1



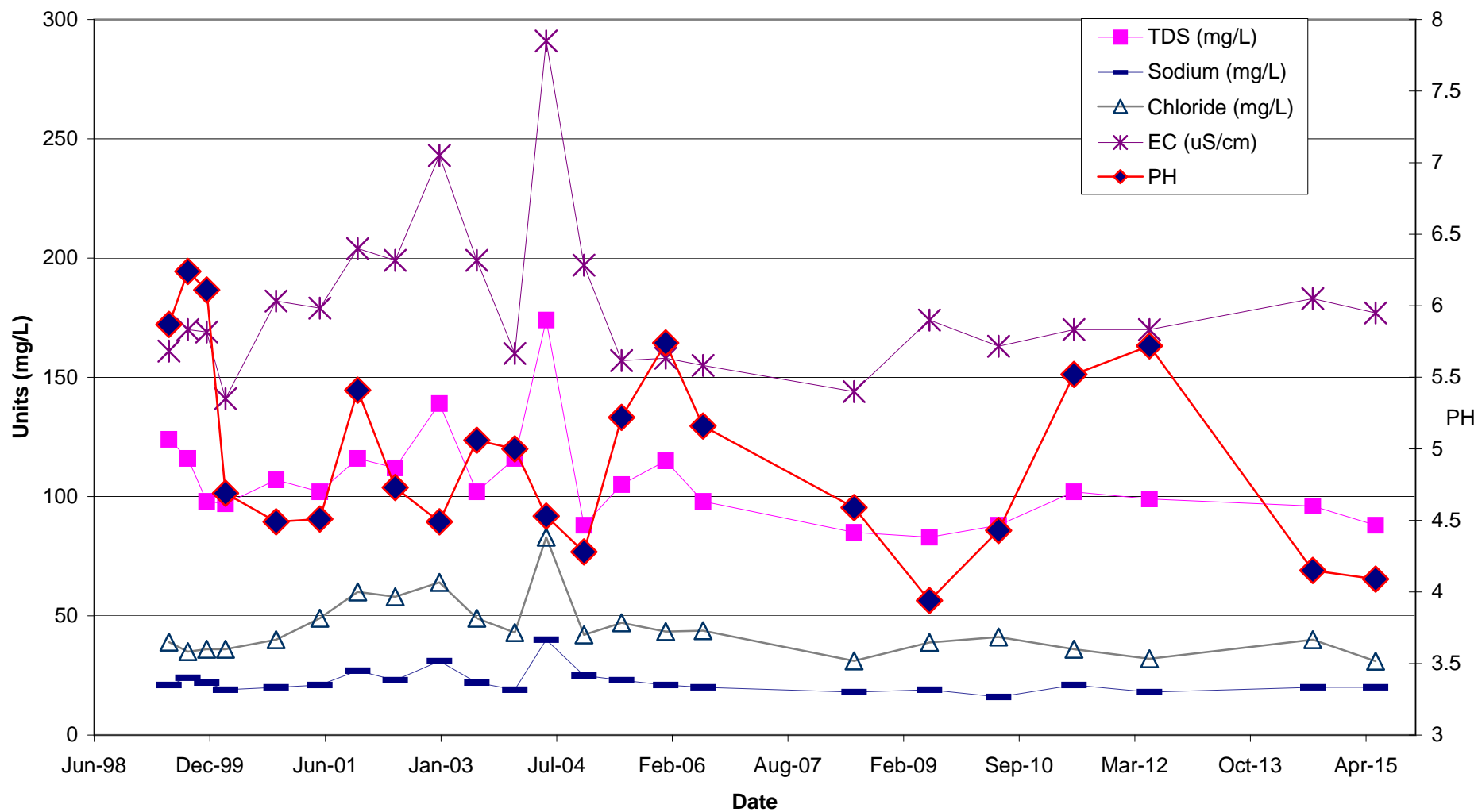
Graph -3: Groundwater Analytical Trends Bore PFL2HltchMW1



Graph -4: Groundwater Analytical Trends Bore PFP214MW1



Graph -5: Groundwater Analytical Trends Bore PF PB1



TABLES

Tables 3.3 to 3.4: Maroota Hitchcock Road- Water Analyses (1999 to 2015)

Table 3-3 Bore PFL2HitchMW1 Chemical Analyses Summary

[illegible]

Table 3-4 **Bore PFP214MW1 Chemical Analyses Summary**

[illegible]

Table 3-7: Portion 167 Dam Annual Pumpage Records

YEAR	TOTAL, ML
1997	24.56
1998	24.24
1999 to May	16.84
1 June 1999 - 30 June 2000	66.3
1 July 2000 - 5 September 2000	31.4
5 September 2000 - 25 June 2001	Not used
25 June 2001 - 30 June 2001	1
1 July 2001 - 8 February 2002	59.2
8 February 2002 - 30 June 2002	Not used
30 June 2002 - 29 August 2002	Not used
29 August 2002 - 30 June 2003	65.2
1 July 2003 - 29 June 2004	73.1
1 July 2004 - 3 May 2005	57.5
7 October 2005 - 30 June 2006	25.4
1 July 2006 - 30 June 2007	21.3
1 July 2007 - 30 June 2008	21.5
1 July 2008 - 30 June 2009	42.2
1 July 2009 - 30 June 2010	56.2
1 July 2010 - 30 June 2011	48.9
1 July 2011 - 30 June 2012	No pumpage
1 July 2012 - 30 June 2013	42.8
1 July 2013 - 30 June 2014	30.395
1 July 2014 - 30 June 2015	No pumpage

Table 3-8: Water Supply Bores Annual Pumping Records

Year	Bore	Total, ML
1 July 1999 - 30 June 2000	Bore PF1 98PB1	21.1
	PF198PB2	35.6
1 July 2000 - 30 June 2001	Bore PF198PB1	20.3
	Bore PF198PB2	29
1 July 2001 - 30 June 2002	Bore PF198PB1	25.1
	Bore PF198PB2	36
1 July 2002 - 30 June 2003	Bore PF198PB1	24.8
	Bore PF198PB2	47.8
1 July 2003 - 29 June 2004	Bore PF198PB1	22.9
	Bore PF198PB2	49.3
1 July 2004 - 29 June 2005	Bore PF1 98PB1	4.2
	Bore PF198PB2	18.7
5 July 2005 - 23 June 2006*	Bore PF198PB1	14.8
	Bore PF198PB2	8.9
24 June 2006 - 30 June 2007*	Bore PF198PB1	7.8
	Bore PF198PB2	19.9
1 July 2007 - 30 June 2008*	Bore PF198PB1	1.6
	Bore PF198PB2	22.9
1 July 2008 - 30 June 2009*	Bore PF198PB1	25.6
	Bore PF198PB2	16
1 July 2009 - 30 June 2010*	Bore PF198PB1	9.5
	Bore PF198PB2	8.1
1 July 2010 - 30 June 2011*	Bore PF198PB1	11.8
	Bore PF198PB2	NA
1 July 2011 - 30 June 2012*	Bore PF198PB1	9.8
	Bore PF198PB2	13.2
1 July 2012 - 30 June 2013	Bore PF198PB1	NA
	Bore PF198PB2	10.9
1 July 2013 - 30 June 2014	Bore PF198PB1	3.6
	Bore PF198PB2	30
1 July 2014 - 30 June 2015	Bore PF198PB1	6.1
	Bore PF198PB2	15.7

Notes:

* Due to modifications carried out at the wash plant, these bores are no longer required for continuous water supply

APPENDIX A

Limitations

Earth2Water Pty Ltd has prepared this report for the use of PF Formation in accordance with the standard terms and conditions of the consulting profession. This report is prepared in accordance with the scope of work and for the purpose outlined in the proposal. The methodology adopted and sources of information used by E2W are outlined in this report. Some adjustments were made to the data logger graphs (2013-2014) as more control data points were available for this assessment to aid water level reduction to m AHD.

This report was prepared in a short timeframe during June & July 2015 and is based on the information reviewed at the time of preparation. This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

The precision with which conditions are indicated depends largely on the frequency and method of sampling, and the uniformity of conditions as constrained by the project budget limitations. The behaviour of groundwater and some aspects of contaminants in soil and groundwater are complex. Our conclusions are based upon the analytical data presented in this report, and our experience.

Where conditions encountered at the site are subsequently found to differ significantly from those anticipated in this report, E2W should be notified of any such findings and be provided with an opportunity to review the recommendations of this report.

APPENDIX B

CERTIFICATE OF ANALYSIS

Work Order	: ES1525113	Page	: 1 of 3
Client	: EARTH2WATER PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR DINO PARISOTTO	Contact	:
Address	: 175 FERN ST GERRINGONG NSW 2534	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: earthh2o@tpg.com.au	E-mail	:
Telephone	: +61 4236 1334	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 4236 1824	Facsimile	: +61-2-8784 8500
Project	: BLANKET QUOTE - MODIFIED	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: E2W-224A	Date Samples Received	: 30-Jun-2015 18:50
C-O-C number	: ----	Date Analysis Commenced	: 30-Jun-2015
Sampler	: DINO PARISOTTO, ELLEN SWANSON	Issue Date	: 07-Jul-2015 17:28
Site	: Maroota	No. of samples received	: 5
Quote number	: ----	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	PF 167 MW-1	PF 166 MW1	PF L2 Hitch MW1	PF P2 14 MW1	PF 198 PB2 / PB1
Client sampling date / time					[30-Jun-2015]	[30-Jun-2015]	[30-Jun-2015]	[30-Jun-2015]	[30-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1525113-001	ES1525113-002	ES1525113-003	ES1525113-004	ES1525113-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.48	4.03	3.94	4.07	4.09
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		150	239	309	251	177
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	----	10	mg/L		70	100	146	118	88
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		30	1	6	<1	7
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		15	38	59	26	31
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		5	<1	<1	<1	1
Magnesium	7439-95-4	1	mg/L		3	6	3	11	2
Sodium	7440-23-5	1	mg/L		12	26	44	21	20
Potassium	7440-09-7	1	mg/L		2	1	<1	<1	1
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		1.05	1.09	1.79	0.73	1.02
^ Total Cations	----	0.01	meq/L		1.07	1.65	2.16	1.82	1.11
EP020: Oil and Grease (O&G)									
^ Oil & Grease	----	5	mg/L		<5	<5	<5	<5	<5

APPENDIX C

P.F.FORMATION
Bore PF167MW1 Groundwater Monitoring Data

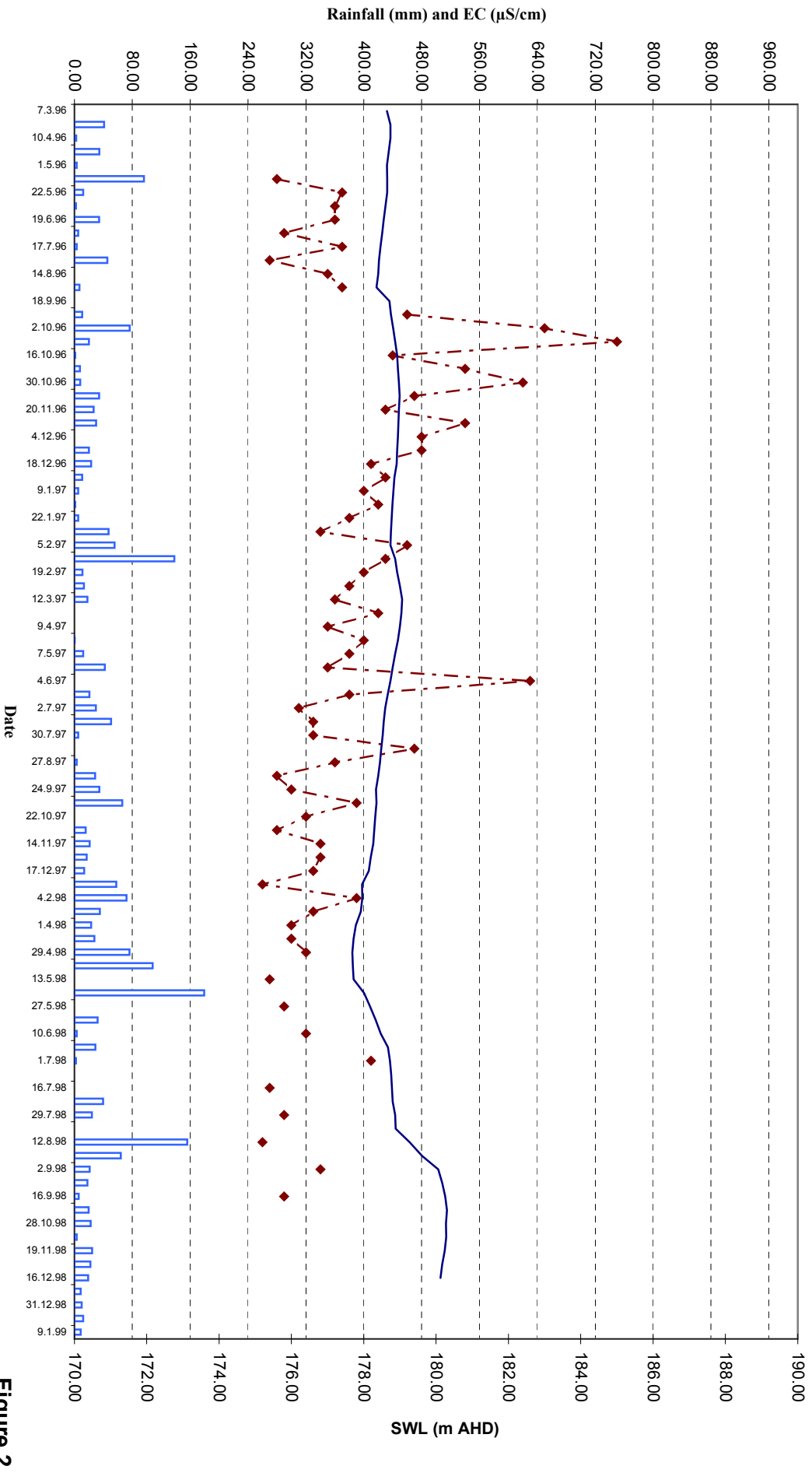


Figure 2



PF FORMATION
Bore PF167MW1 Groundwater Monitoring Data

— Rainfall, mm
— Water level m AHD

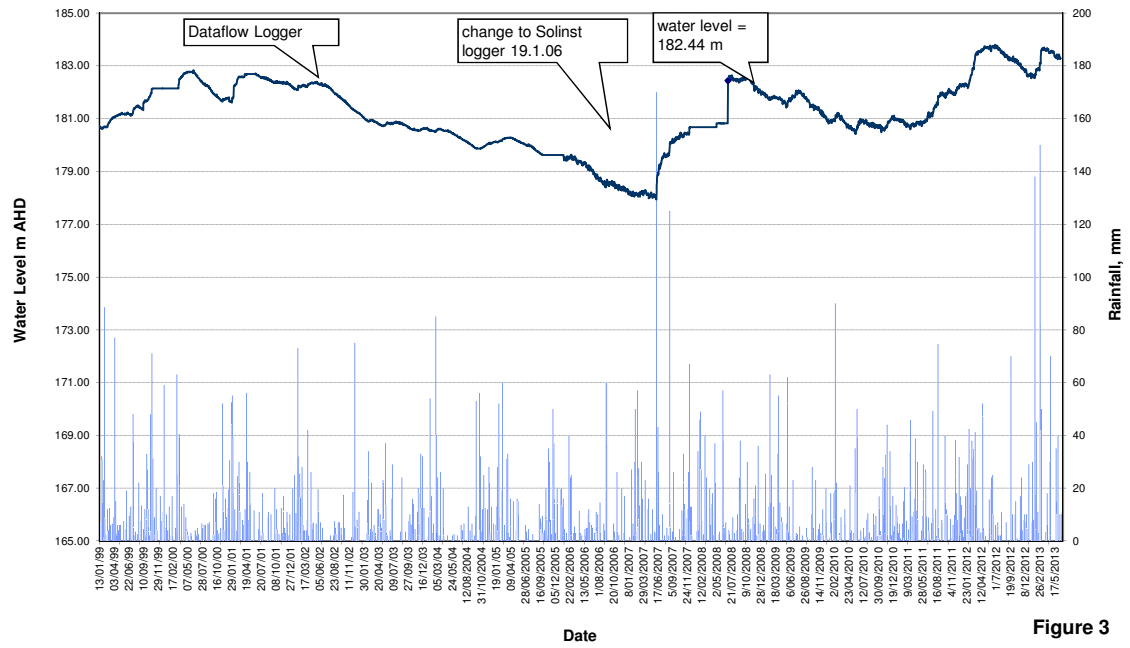


Figure 3

PF FORMATION PF166MW1 Groundwater Monitoring Data

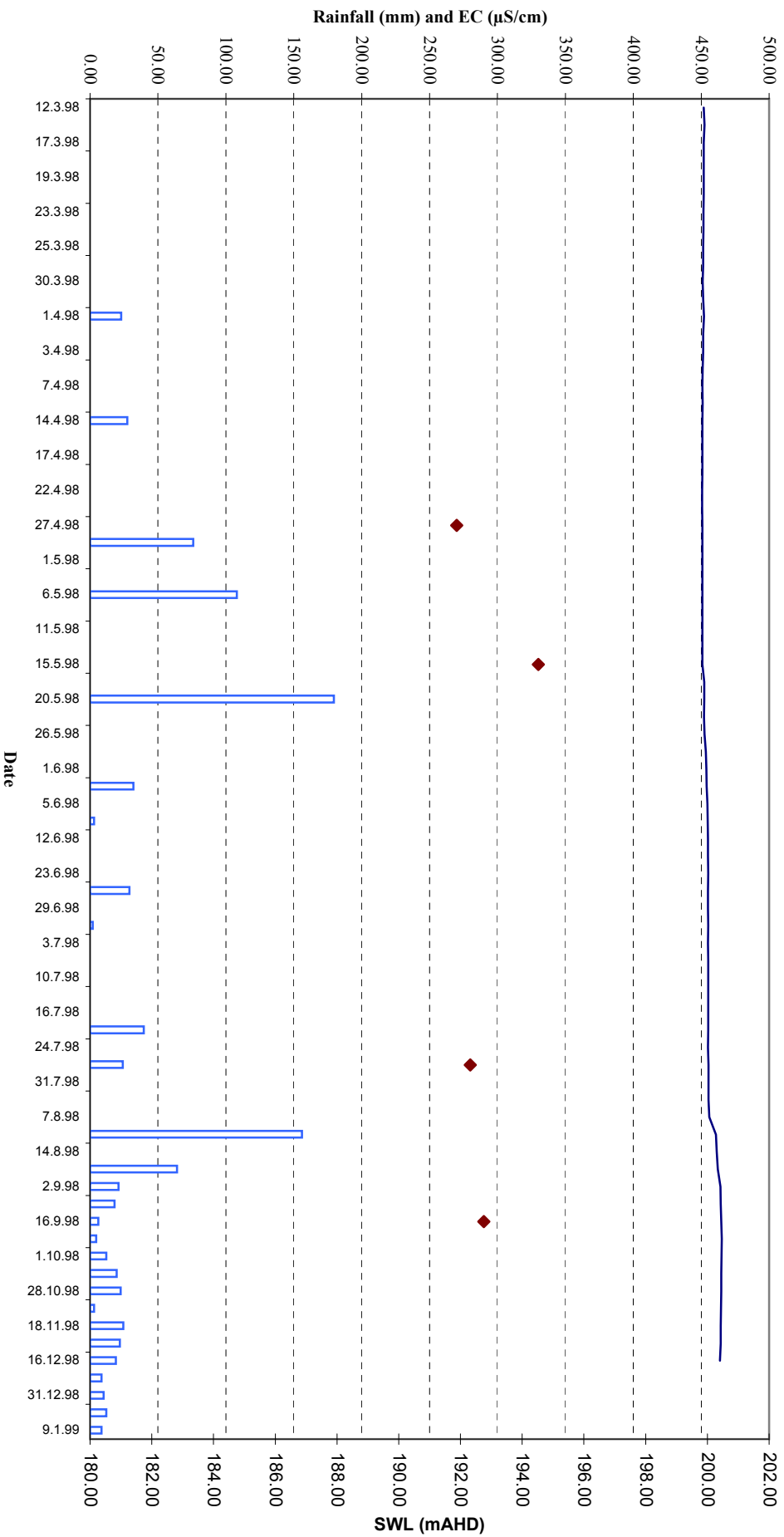


Figure 4



PF FORMATION
Bore PF166MW1 Groundwater Monitoring Data

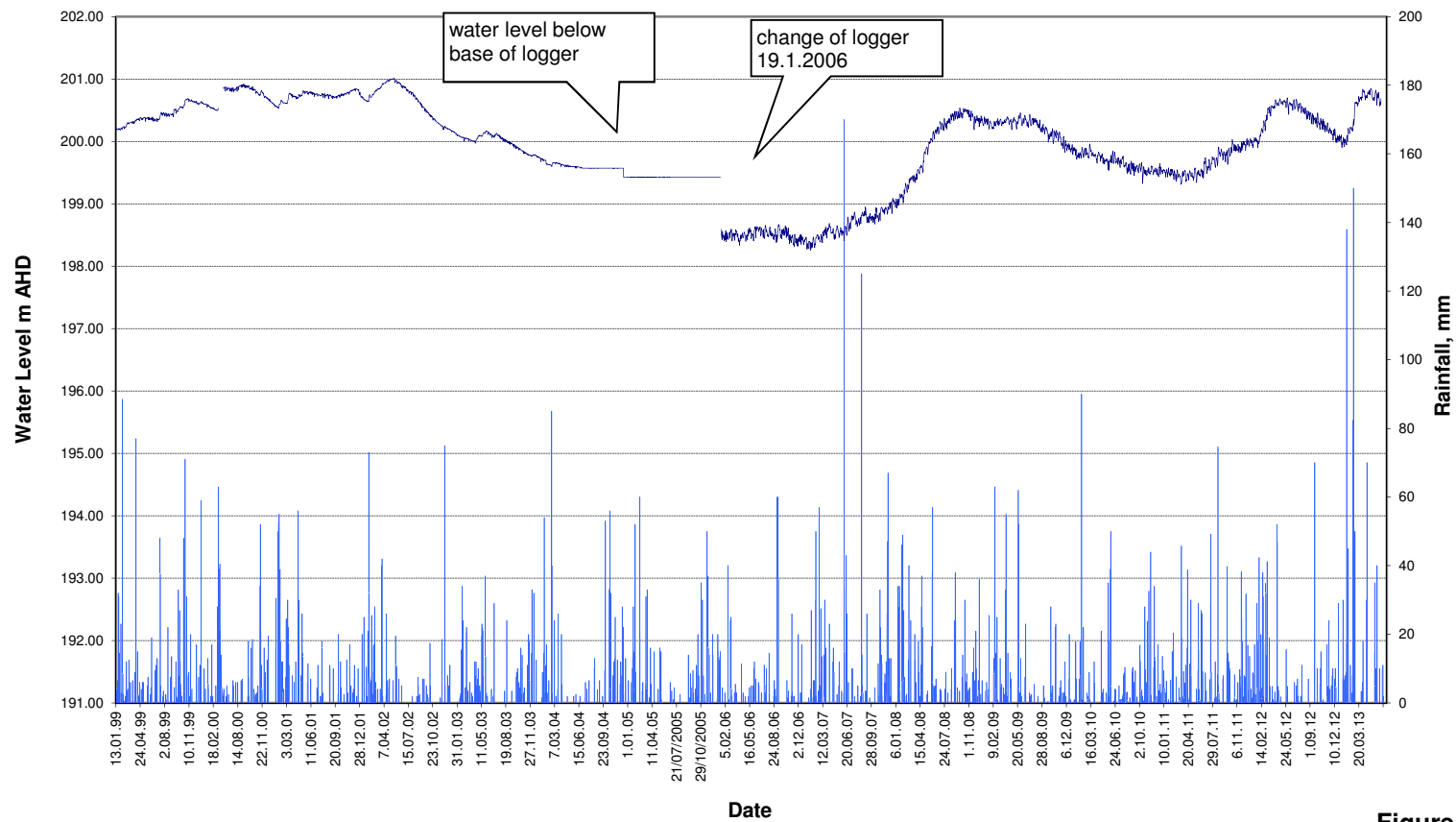
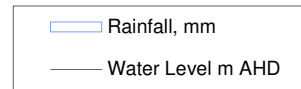


Figure 5

PF FORMATION Bore PFP214MW1 Groundwater Monitoring Data

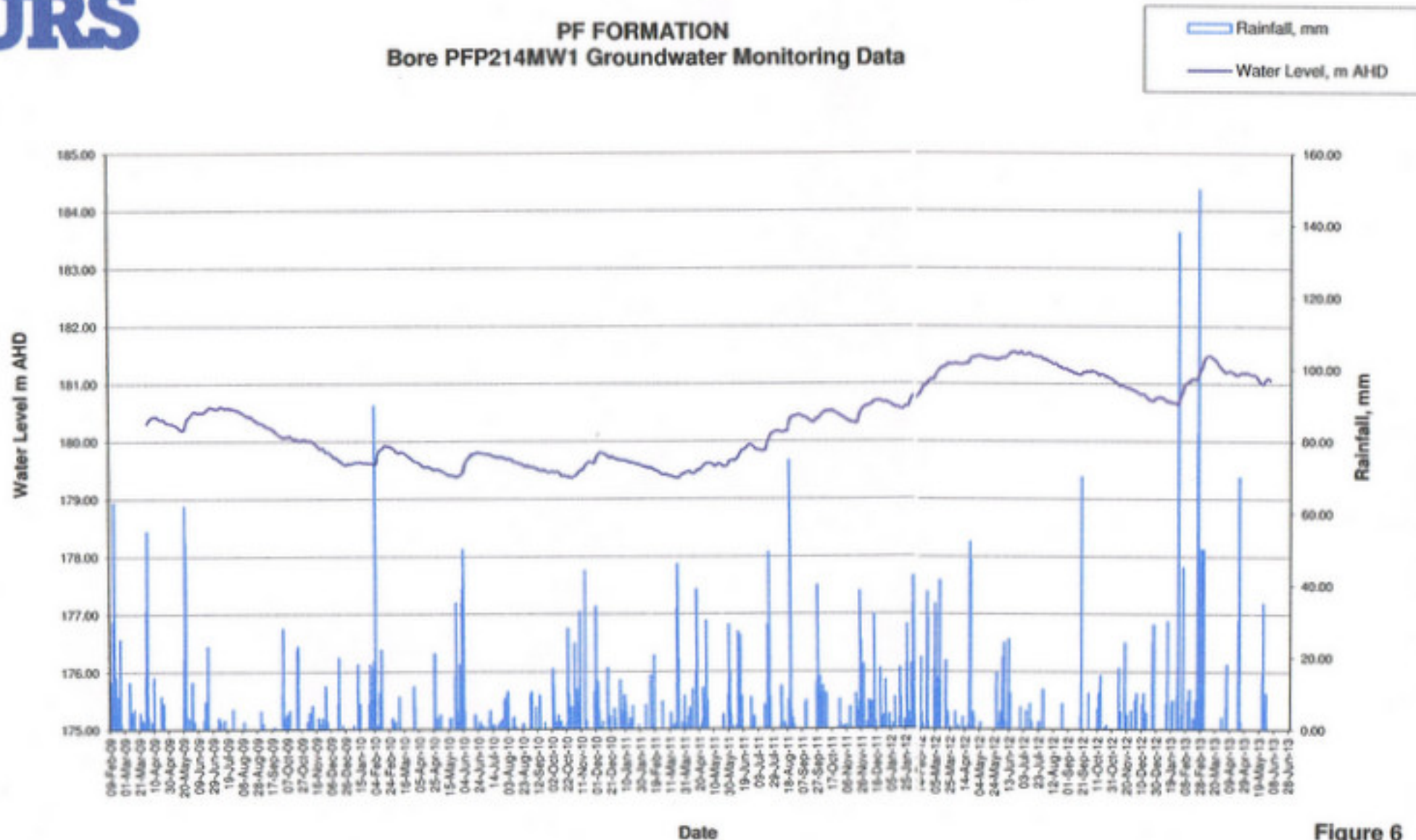


Figure 6



PF FORMATION
Bore PFL2HitchMW1 Groundwater Monitoring Data

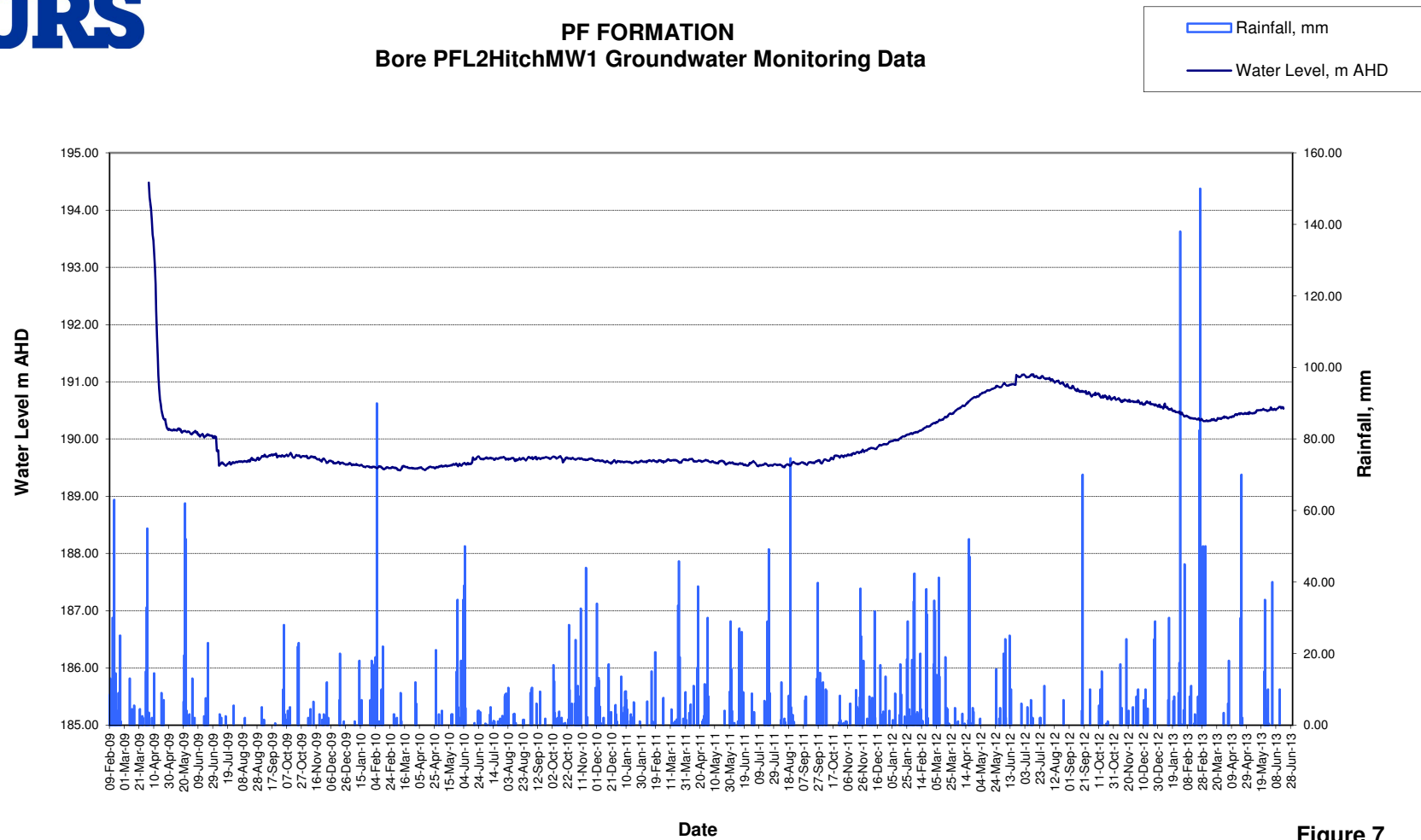


Figure 7



PF FORMATION
PF167DAM, Licence No. 10BL157308, Groundwater Monitoring Data

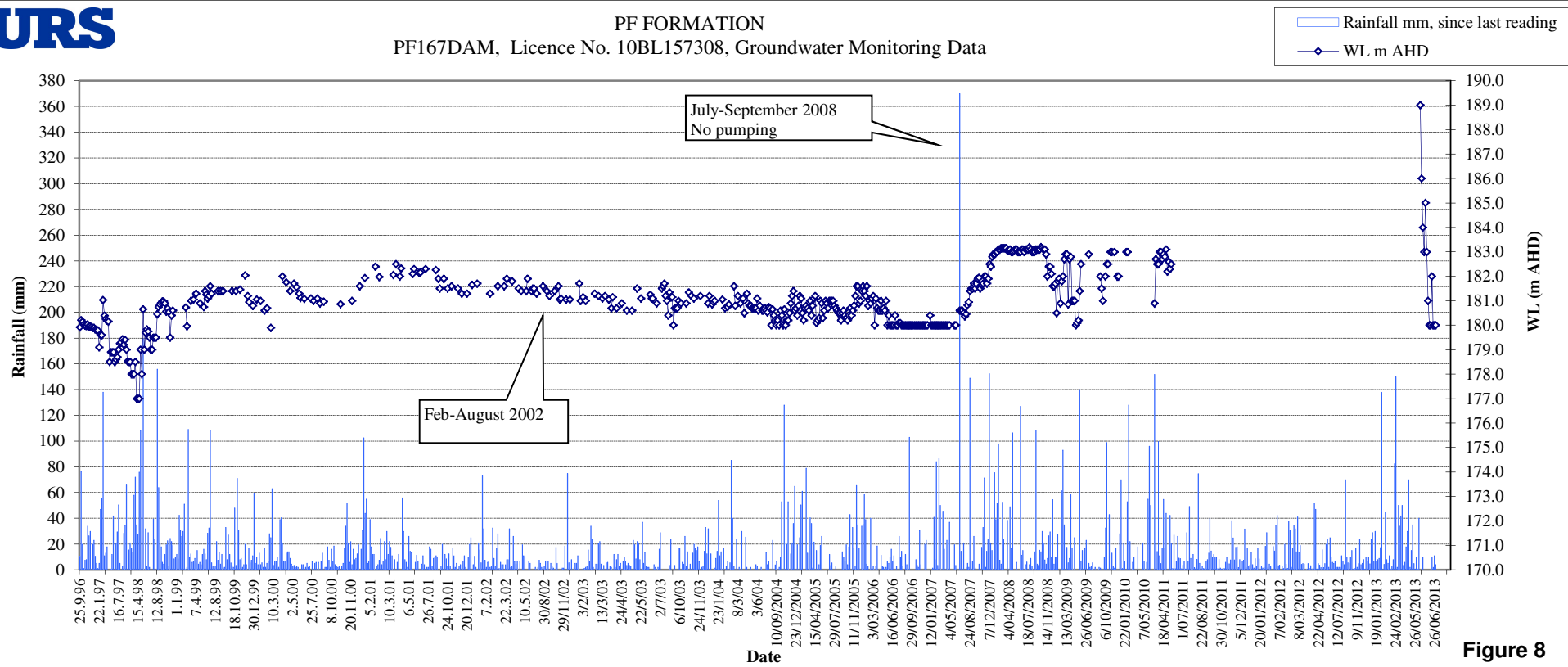


Figure 8



PF FORMATION PF167DAM Monthly Pumpage Records

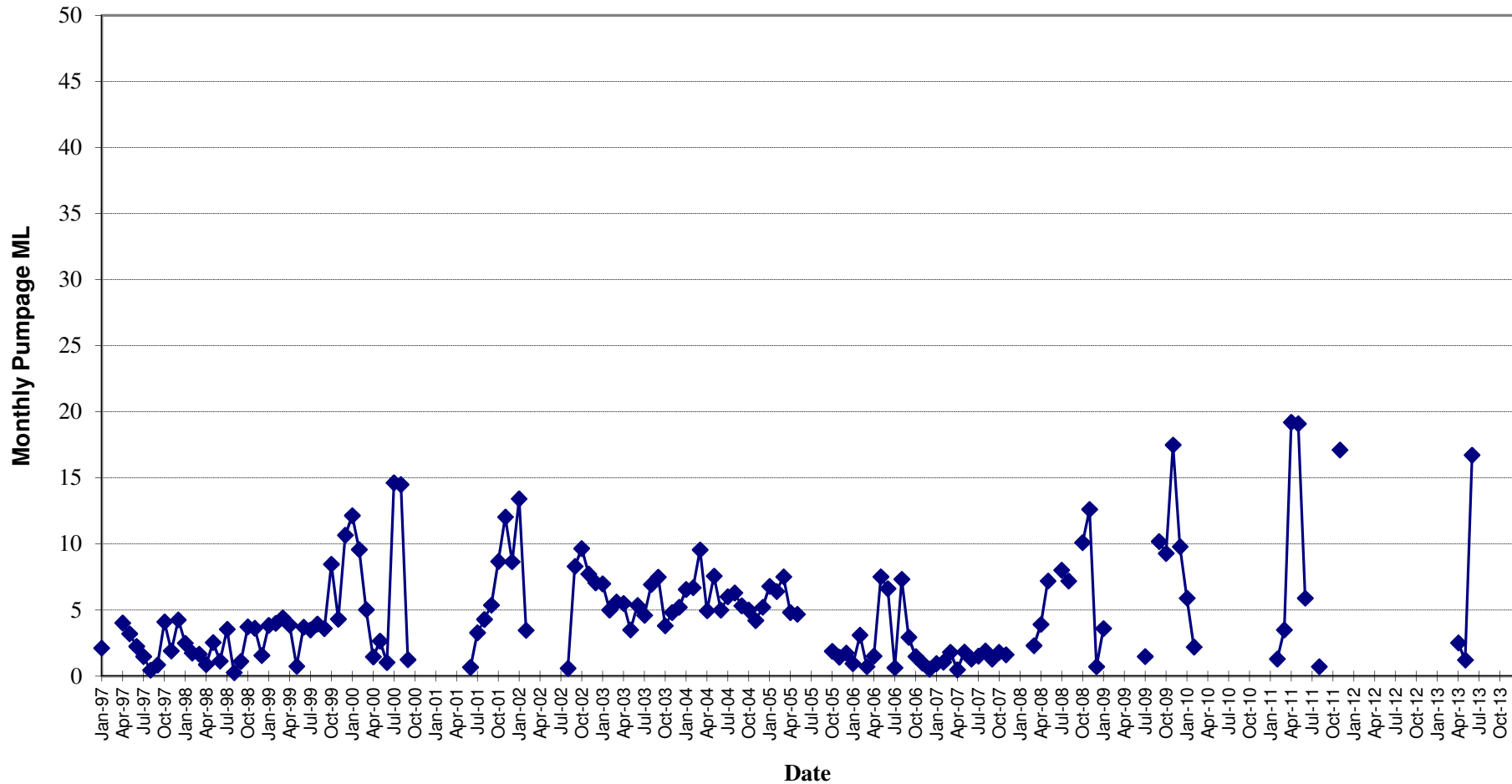


Figure 9

LAST PAGE OF REPORT



*Thank you for the opportunity to work with
PF Formation.*

feedback is welcomed.
dino@earth2water.com.au

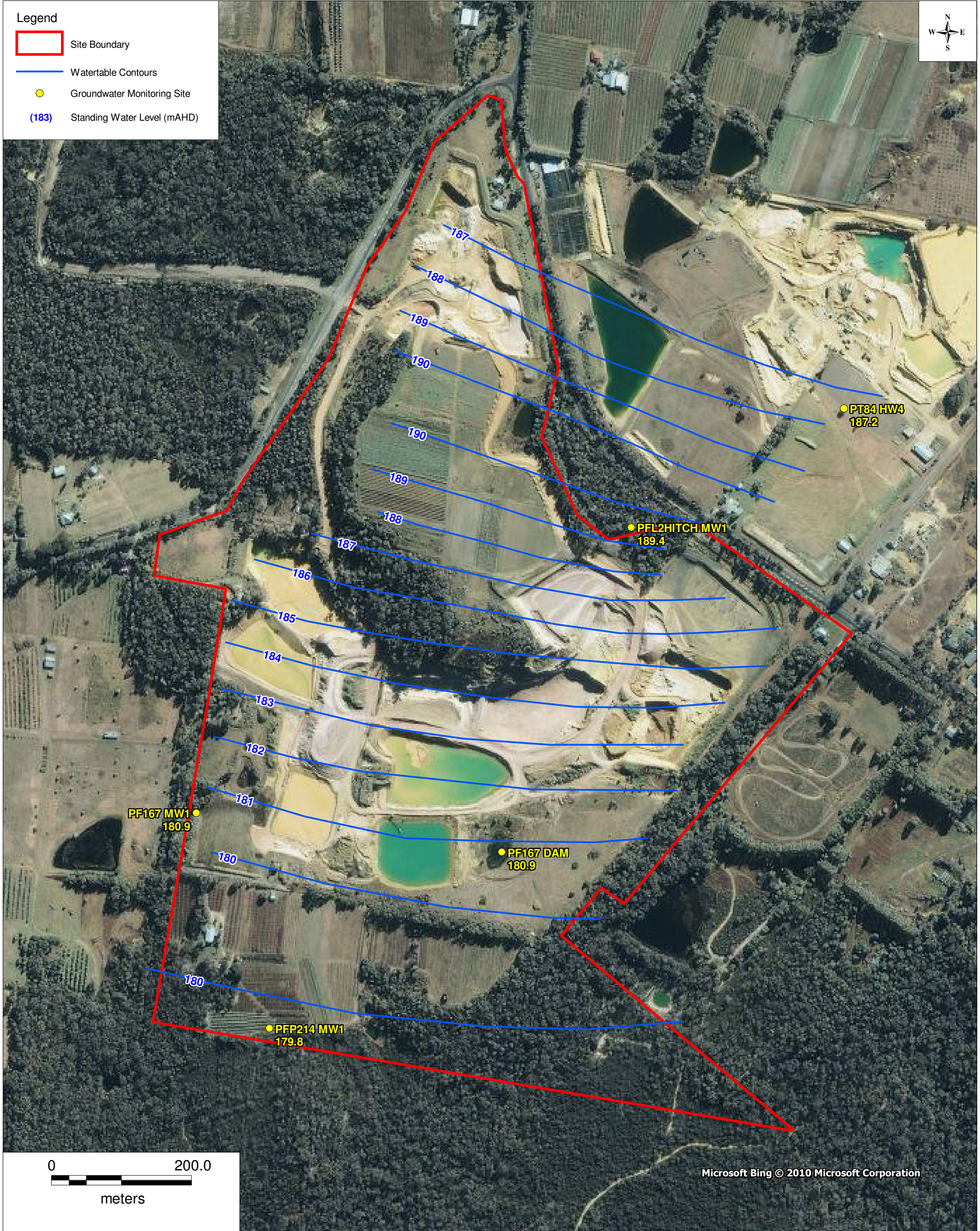


earth²water
Pty Ltd
Environmental & Groundwater Consulting

Attachment 11

Watertable Contours

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Source: Aerial imagery from Bing Maps © 2010 Microsoft Corporation and its data suppliers.
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PF FORMATION

HITCHCOCK ROAD, SAND EXTRACTION
AND REHABILITATION PROJECT

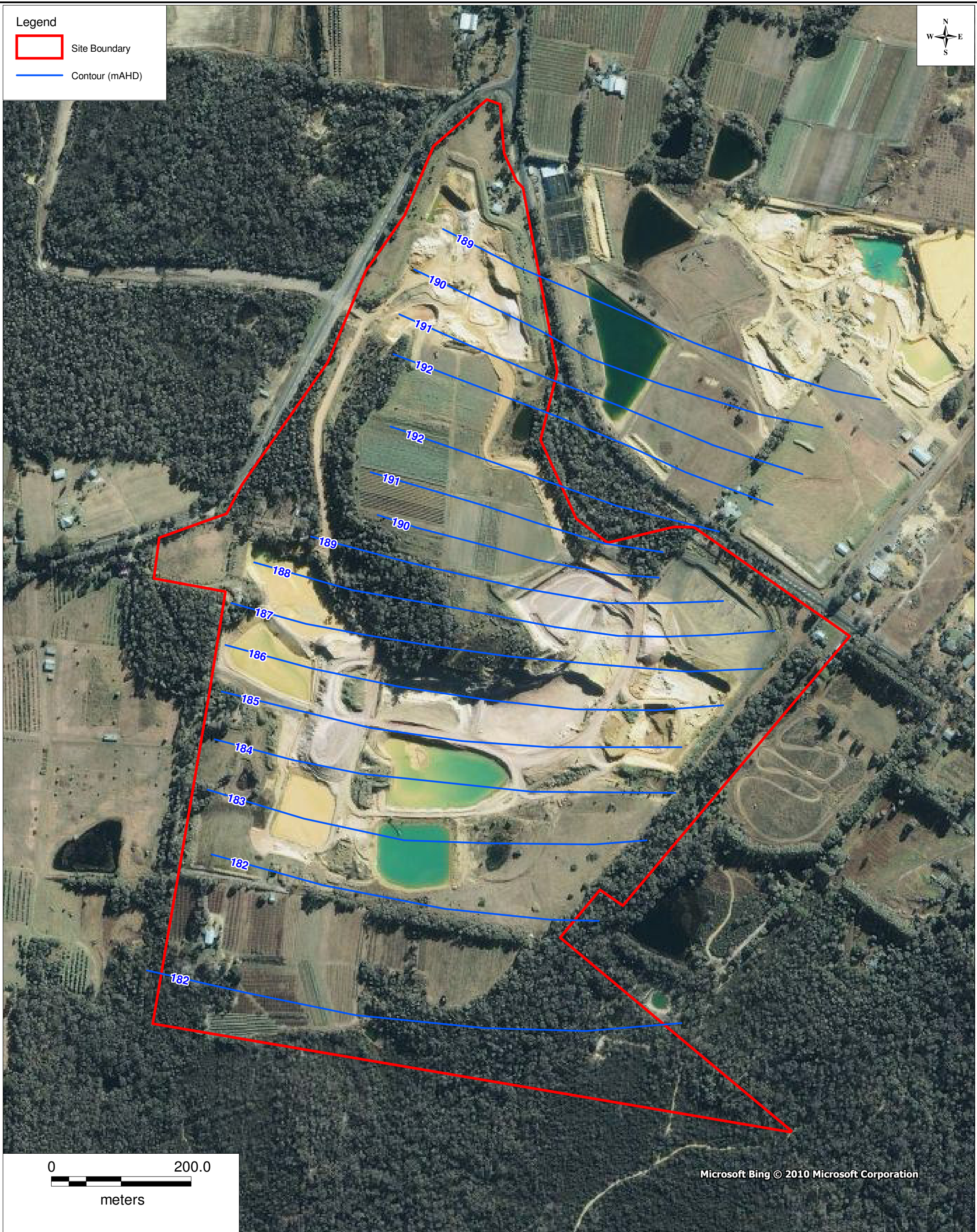
HITCHCOCK ROAD SITE
WATERTABLE CONTOURS @ 22/06/2011



Attachment 12

Maximum Extraction Depth of Mining Contours

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Source: Aerial imagery from Bing Maps © 2010 Microsoft Corporation and its data suppliers.
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PF FORMATION

HITCHCOCK ROAD, SAND EXTRACTION
AND REHABILITATION PROJECT

HITCHCOCK ROAD SITE
DEPTH OF MINING CONTOURS
@ 22/06/2011

URS

File No: 43167726.002.wor

Drawn: SB

Approved: FB

Date: 21/07/2011

Figure: 002

Rev. A

A3



Attachment 13

Lot 198 Water Testing Results

**Boral Construction Materials
Materials Technical Services**Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153

T: +61 (02) 9624 9900

F: +61 (02) 9624 9999

www.boral.com.au

Test Report

CLIENT: P.F. Formation

ADDRESS: 1774 Wisemans Ferry Road MAROOTA NSW 2756

PROJECT: Testing of Water from P.F. Formation.

FILE No.: 250/14

REQUEST No.: 59088

TEST PROCEDURE: APHA 4500 H⁺B - pH Value - Electrometric Method
APHA 2130 B - Turbidity - Nephelometric Method
APHA 5520 C - Oil & Grease - Partition-Infrared Method
APHA 2540 D - Total Suspended Solids Dried at 103-105 °C
APHA 2510 B - Conductivity - Laboratory Method

Laboratory Sample No.: 158142
Date Sampled: 10/09/2014
Date Received: 10/09/2014
Sample Description: Water -
Downstream Lot
198 - 11:15am

Field No.: 2

TEST RESULTS

pH 5.5
Turbidity (NTU) 8.2
Oil & Grease (mg/L) *1 0.6
Total Suspended Solid (mg/L) 4.0
Conductivity (μS/cm) 222
Samples submitted by the Client.

NOTE:

*1 Solvent used in the determination of Solvent Extractable Matter for Oil & Grease analysis: Polychlorotrifluoroethylene S316.

J. Graham, Q.C. File, Mat. File, File.



Approved Signatory

Nanthini Selvadurai

Date

09-10-14

Serial No.

129809

Accredited for compliance with ISO/IEC 17025

NATA Accredited Laboratory

Number: 9968



**Boral Construction Materials
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Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153

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F: +61 (02) 9624 9999

www.boral.com.au

Test Report

CLIENT: P.F. Formation

FILE No.: 250/14

ADDRESS: 1774 Wisemans Ferry Road MAROOTA NSW 2756

PROJECT: Testing of Water Samples from P.F. Formation.

REQUEST No.: 60250

TEST PROCEDURE: APHA 4500 H+ B - pH Value - Electrometric Method
APHA 2130 B - Turbidity - Nephelometric Method
APHA 5520 C - Oil & Grease - Partition-Infrared Method
APHA 2540 D - Total Suspended Solids Dried at 103-105 °C
APHA 2510 B - Conductivity - Laboratory Method

Laboratory Sample No.: 160950
Date Sampled: 2/12/2014
Date Received: 2/12/2014
Sample Description: Water -
Downstream Lot
198 - 11:30am

Field No.: 2

TEST RESULTS

pH 5.6
Turbidity (NTU) 7.2
Oil & Grease (mg/L) *1 1.2
Total Suspended Solid (mg/L) 4.0
Conductivity (µS/cm) 183
Samples submitted by the Client.

NOTE:

*1 Solvent used in the determination of Solvent Extractable Matter for Oil & Grease analysis: Polychlorotrifluoroethylene S316.

J. Graham, Q.C. File, Mat. File, File.



Approved Signatory

Nanthini Selvadurai

Nanthini Selvadurai

Date

10-12-14

Serial No.

13 1796

NATA Accredited Laboratory

Accredited for compliance with ISO/IEC 17025

Number: 9968

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Test Report

CLIENT: P.F. Formation

FILE No.: 250/15

ADDRESS: 1774 Wisemans Ferry Road MAROOTA NSW 2756

PROJECT: Testing of Water from P.F. Formation.

REQUEST No.: 61064

TEST PROCEDURE: APHA 4500 H⁺ B - pH Value - Electrometric Method
APHA 2130 B - Turbidity - Nephelometric Method
APHA 5520 C - Oil & Grease - Partition-Infrared Method
APHA 2540 D - Total Suspended Solids Dried at 103-105 °C
APHA 2510 B - Conductivity - Laboratory Method

Laboratory Sample No.: 163042
Date Sampled: 13/02/2015
Date Received: 16/02/2015
Sample Description: Water -
Downstream - Lot
198 - 1:40pm

Field No.: 2

TEST RESULTS

pH*1 7.5
Turbidity (NTU) 12
Oil & Grease (mg/L) *2 1.0
Total Suspended Solid (mg/L) 9.2
Conductivity (µS/cm) 173
Samples submitted by the Client.

NOTE:

*1 Test has not met the sample specified holding time.

*2 Solvent used in the determination of Solvent Extractable Matter for Oil & Grease analysis: Polychlorotrifluoroethylene S316.

J. Graham, Q.C. File, Mat. File, File.



Approved Signatory

Nanthini Selvadurai

Date

30-03-15

Serial No.

134906

NATA Accredited Laboratory

Accredited for compliance with ISO/IEC 17025

Number: 9968

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Materials Technical Services**Unit 4, 3-5 Gibbon Road
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F: +61 (02) 9624 9999

www.boral.com.au

Test Report

CLIENT: P.F. Formation

ADDRESS: 1774 Wisemans Ferry Road MAROOTA NSW 2756

PROJECT: Testing of Water from P.F. Formation.

FILE No.: 250/15

REQUEST No.: 62656

TEST PROCEDURE: APHA 4500 H⁺ B - pH Value - Electrometric Method
APHA 2130 B - Turbidity - Nephelometric Method
APHA 5520 C - Oil & Grease - Partition-Infrared Method
APHA 2540 D - Total Suspended Solids Dried at 103-105 °C
APHA 2510 B - Conductivity - Laboratory Method

Laboratory Sample No.: 166887
Date Sampled: 12/06/2015
Date Received: 12/06/2015
Sample Description: Water -
Downstream - Lot
198 - 10:00am

Field No.: 2

TEST RESULTS

pH 5.7
Turbidity (NTU) 38
Oil & Grease (mg/L) *1 0.8
Total Suspended Solid (mg/L) 19
Conductivity (µS/cm) 169
Samples submitted by the Client.

NOTE:

*1 Solvent used in the determination of Solvent Extractable Matter for Oil & Grease analysis: Polychlorotrifluoroethylene S316.

Joshua Graham, Q.C. File, Mat. File, File.



Approved Signatory

Nanthini Selvadurai

Date 25-06-15 Serial No. 137498

NATA Accredited Laboratory

Accredited for compliance with ISO/IEC 17025

Number: 9968

Attachment 15

Minutes of Community Consultative Committee

**Community Consultative Committee
Hitchcock Road and Lot 198 Maroota
Sand Extraction and Rehabilitation Projects**

**Minutes
11 November 2014**

Attendance

Kristine McKenzie – Hills Shire Council (HSC) - Chairperson
Robert Buckham – Hills Shire Council (HSC)
Marianne Sheumack – Resident
Shaunagh Hitchcock – Resident
John Graham – PF Formation
Peter Cummins – PF Formation
Joshua Graham – PF Formation

Apologies: Kane Winwood – NSW Department of Planning
Daniel Giffney – Hills Shire Council (HSC)

Minutes of Previous Meeting

- Accepted

Matters Arising from Minutes

- Peter Harkins to be asked whether wants to continue on the Committee. Shaunagh advised that Lisa from the school was representing Peter's place on other committees and she would discuss a position on our Committee with her.
- Steve Flint from Downer Mouchel was invited to the meeting but we did not hear back from him
- It was confirmed that the minutes of the meetings are put up on the website. PF to investigate putting a counter on the website to track the number of visitors

Report on Current Status of Operations by John Graham (PF)

- There have been no complaints in the last 6 months
- Operations have been relatively routine but getting busier.
- A couple of major new production items have been purchased. This equipment has improved emission outputs and noise levels.
- 3 recent new employees are from Maroota.
- A driver from a sand truck where the dog trailer rolled over on Wisemans Ferry Road was terminated by that transport company. Truck accidents have been in the news lifting the focus on truck safety.
- The trees planted recently on the corner of Old Northern Road and Wisemans Ferry Road have progressed well. The electricity company has cleared the trees in its electricity easement.
- The removal of the Sydney Hinterland Transitional Forest (SHTF) has progressed and PF is aiming to have prepared the remaining SHTF rehabilitation area in autumn next year.

- Kristine asked about the product stored along the Old Northern Road frontage (near the corner of Wisemans Ferry Road) as it can be viewed above the bund wall. John advised that this is a stockpile of product and is being stored temporarily while waiting to be processed.

Reporting

- PF Formation responded to the Audit Report recommendations to the Department of Planning and both the Report and Response are on the website.
- PF Formation has updated each of the monitoring strategies/plans/programs and reviewed the vegetation offset bond after considering the recommendations of the audit. These revisions were sent to the Department of Planning on 12 September 2014 for their approval. No response has been received yet.
- The 2014 Annual Environment Management Report (AEMR) has been completed and forwarded to the Department of Planning. It has also been uploaded to the website.

Environmental Matters

- The monthly dust deposit results were reviewed and discussed.
- The results were generally low for the 6 months with one unexplained high result recorded at the Roberts Road Old Northern Road deposit gauge (Jurd's). No sand quarry operations were occurring close to this site at that time.
- No significant matters arose in the 2014 AEMR.

Other Matters Discussed

- PF will be lodging a Development Application for extractive industry on Lots 1 and 2 DP 732708 Old Telegraph Road Maroota in the next week. This proposal will involve transferring a maximum of 20 trucks per day to the Hitchcock Road site for processing. The approval allows for 20 loads per day of imported material.
- Shaunagh asked, in relation to the future DA in Hornsby Shire, whether S. 94 contributions could be used to construct a footpath along Roberts Road so that pedestrians could use a path rather than walk on the side of the road given the increase in truck movements. Kristine advised that the S.94 contributions only relate to road works on Old Northern Road and Wisemans Ferry Road ie: they will not fund works on Roberts Road. Kristine advised this is a matter which would require further consideration given that the extractive site is in Hornsby Shire however Roberts Road is in The Hills Shire. The location in a rural area would also be a factor. Kristine advised she would discuss the request with the Manager-Infrastructure and Transport Planning. Kristine also advised Shaunagh that she should make this request to Hornsby Council while the DA is on exhibition.

Site Visit

- A site inspection was conducted.

Next Meeting

- 10.00 am Tuesday 5 May 2015

**Community Consultative Committee
Hitchcock Road and Lot 198 Maroota
Sand Extraction and Rehabilitation Projects**

**Minutes
5 May 2015**

Attendance

Kristine McKenzie – The Hills Shire Council (THSC) - Chairperson
Daniel Giffney – The Hills Shire Council (THSC)
Marianne Sheumack – Resident
Shaunagh Hitchcock – Resident
Lisa Aylward - Resident
John Graham – PF Formation (PF)
Peter Cummins – PF Formation (PF)
Joshua Graham – PF Formation (PF)

Apologies: None

Minutes of Previous Meeting

- Accepted

Matters Arising from Minutes

- Lisa Aylward from the school has agreed to attend our meetings in place of Peter Harkins.
- The sandstone pile of material that can be seen from Old Northern Road is gradually being used and no more material added to it.

Report on Current Status of Operations by John Graham (PF)

- There have been no complaints in the last 6 months
- Operations have been relatively routine.
- The recent extraordinary wet weather tested all our sediment control systems and PF was happy with the impact under difficult conditions
- No new planting has occurred recently. PF are aiming to continue with the Sydney Hinterland Transitional Forest (SHTF) planting next autumn. A new area to the left of the entry gate is also being prepared for planting next year. Overall the plants are going well.
- PF have 3 EPA licences. The EPA is reviewing all licences to change to a risk based system. Licence 3407 relating to the The Baulkham Hills Shire area was reviewed a couple of weeks ago. The EPA visited the site and completed a questionnaire and they indicated they were happy with the site. They will be categorizing all sites based on: a) the history of polluting; b) the industry and likelihood of polluting; and c) how good the reporting mechanisms are. All these considerations will be factored in to determine the fee category.
- A new loader with improved emissions was recently purchased.
- A change to the washplant will be made in the next couple of months to improve the sandstone washing capability

Reporting

- PF Formation has not received a response from the Department of Planning relating to the updated monitoring strategies/plans/programs and reviewed vegetation offset bond sent to the Department last year. PF will follow up with the Department.
- The Lot 198 sand extraction consent is due to finish in December this year. PF will lodge an extension for this site until 2027 which will bring it into line with the Hitchcock Road Approval period which is appropriate as both are interrelated on Lot 198 Maroota.

Environmental Matters

- The monthly dust deposit results were reviewed and discussed.
- The results were generally low for the 6 months other than the unexplained high results recorded in some months at the Roberts Road Old Northern Road deposit gauge (Jurd's). No sand quarry operations were occurring close to this site at that time.

Other Matters Discussed

- Ongoing issue of truck volume in the Maroota area making noise and dust was discussed. PF stated its commitment to inducting truck drivers on safety requirements and reminding them of their obligations.
- Lisa made a request that Council seal the parking area at the front of the school on the verge of Old Northern Road where many parents are parking. Kristine advised that Old Northern Road is an RMS road and is not a Council road. Lisa is to be provided with the contact details of Steve Flint of Downer Mouchel (who have taken over responsibility for road maintenance works currently undertaken by RMS) to follow up with them.
- PF outlined its future development plans in Maroota.

Site Visit

- A site inspection was not conducted due to the wet roads. Lisa to contact PF if she would like a site inspection before the next meeting.

Next Meeting

- 10.00 am Tuesday 10 November 2015

Attachment 16

2014 Independent Environmental Audit

INDEPENDENT ENVIRONMENTAL AUDIT OF HITCHCOCK ROAD SAND PROJECT

Prepared for PF Formation
Telephone (02) 4566 8314
admin@pfformation.com.au
www.pfformation.com.au
1774 Wisemans Ferry Road
Maroota, NSW, 2756



by Environmental Planning Pty Ltd
Telephone (02) 9648 4400
bruce@eplanning.com.au
www.eplanning.com.au
PO Box 6443
Silverwater, NSW, 1811



April 2014

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Appendix 2	Environment Protection Licence Number 3407
Appendix 3	Letters to Agencies and Response
Appendix 4	Revised Hitchcock Road Site Survey Plan
Appendix 5	Revised Hitchcock Road Site Depth of Mining Contours
Appendix 6	Revised Hitchcock Road Site Water Table Contours
Appendix 7	Hitchcock Road Site Depth of Mining Contours and April 2014 Extraction Levels
Appendix 8	<i>2013 Monitoring of Revegetation at Hitchcock Road, Maroota, 5 December 2013, Parsons Brinckerhoff, Sydney</i>

1. Background to Independent Environmental Audit

Conditions 6, 7 and 8 of Schedule 5 of the Department of Planning's Hitchcock Road Sand Project approval (06_0104) dated 3 February 2009 and provided in Appendix 1 state as follows.

Condition 6. Within 12 months of the date of this approval, and every 3 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. This audit shall:

- (a) be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General;
- (b) include consultation with the relevant agencies;
- (c) assess the environmental performance of the project, and its effects on the surrounding environment;
- (d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and
- (e) review the adequacy of any strategy/plan/program required under this approval, and, if necessary, recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

Note: The person(s) conducting the audit should have expertise in flora and fauna assessment, hydrogeology and quarry rehabilitation.

Condition 7. Within 6 weeks of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General, with a response to any of the recommendations in the audit report.

Condition 8. Within 3 months of submitting a copy of the audit report to the Director-General, the Proponent shall review and if necessary revise:

- (a) each of the environmental management and monitoring strategies/plans/programs in Schedules 3 and 5; and
- (b) the sum of the Vegetation Offset Bond (see Schedule 3). This review shall consider:
 - the effects of inflation;
 - any changes to the total area of disturbance; and
 - the performance of the vegetation offsets against the completion criteria of the Rehabilitation and Vegetation Offset Management Plan,to the satisfaction of the Director-General.

On 13 July 2010 the Department of Planning¹ approved Mr Bruce Adcock BA, Dip T&RP, CPP, CEnvP of Environmental Planning Pty Ltd to complete the independent environmental audit. On 15 November 2011 the Department of Planning & Infrastructure advised PF Formation it had reviewed the first Independent Environmental Audit dated April 2011 and the response to the audit recommendations and it was satisfied with their form, content and presentation and they had no further requirements. The second independent environmental audit acknowledges the use of AS/NZS ISO 19011:2003 *Guidelines for quality and/or environmental management systems auditing*.

2. Site Operations

Figure 1 over provides an aerial view of the Hitchcock Road Sand Project (the site) showing approximate cadastral boundaries (in red). Large portions of the site are undergoing extraction with substantial areas yet to be extracted. Total extraction area is approximately 75 hectares. Extraction areas are required to be progressively rehabilitated. A number of rural residential detached dwellings owned by PF Formation and occupied by their employees also occupy the site.

Figure 2 over provides a site survey plan of the project area as at mid-2013. Note that the contours were based on a survey in 2009 and have been modified since due to the extraction, rehabilitation and silt ponds activity areas shown on the plan.

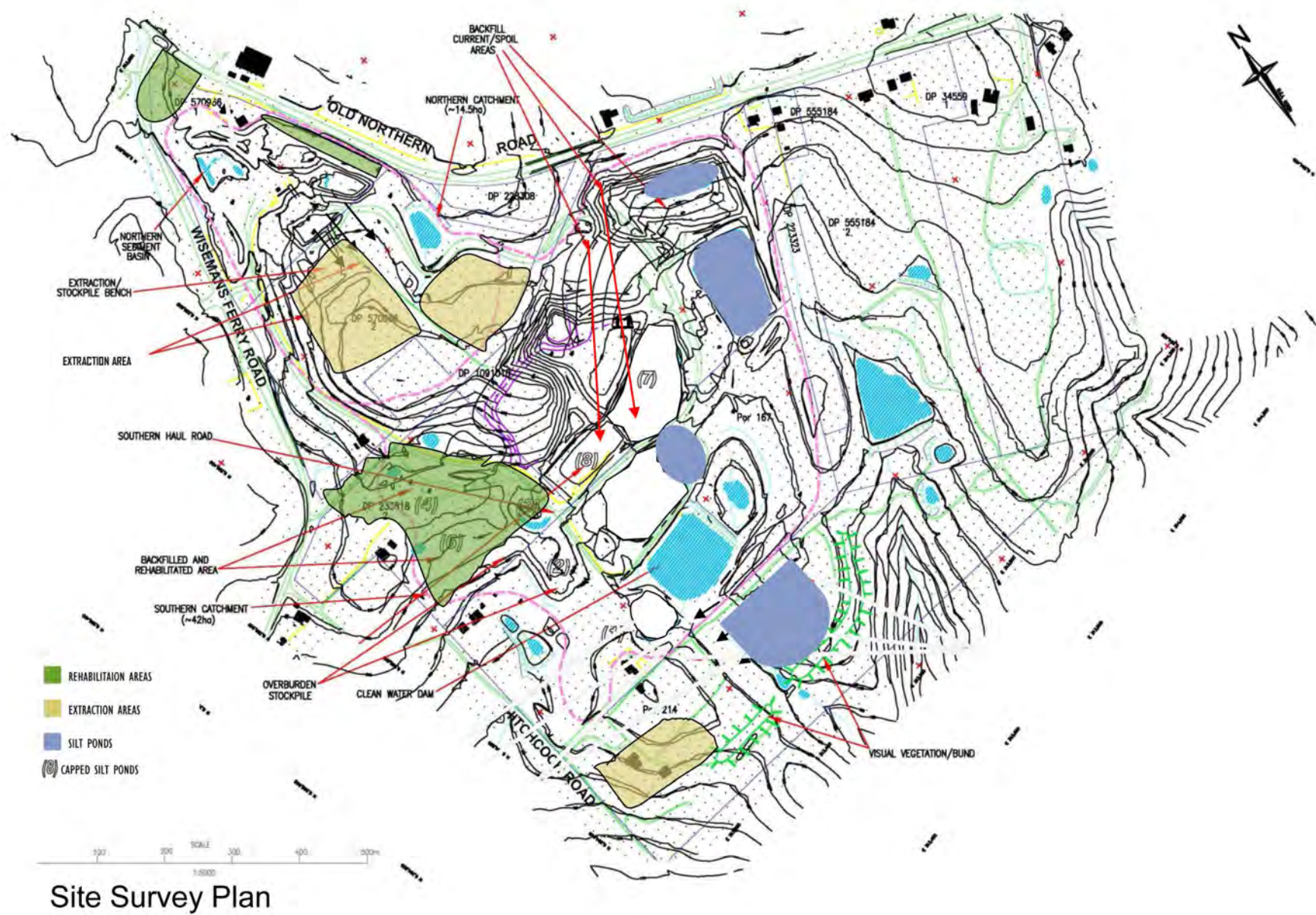
¹ Subsequently Planning and Infrastructure and now Department of Planning and Environment.

Figure 1 Aerial View of Hitchcock Road Sand Project Site



Source: SIX Maps 2014

Figure 2 Site Survey Plan of Hitchcock Road Sand Project



The Hitchcock Road Sand Project majority site owner, operator and proponent is Etra Pty Ltd as trustee for PF Formation. PF Formation has operated sand and clay extraction quarries in the Maroota area in The Hills Shire and Hornsby Shire since 1983. PF Formation refers to the sand quarries within the Hitchcock Road Sand Project site as Pit 6, Pit 7 and Pit 12 and sometimes as the Trig site in reference to the Maroota survey landmark at 241 metres Australian Height Datum near the centre of the site. This survey landmark portion (Lot 1 DP 1013943) of the site is leased until 2045 from the Crown. Permission to remove the Maroota survey landmark has been granted and removal of the nearby Sydney Hinterland Transition Woodland commenced in the first quarter of 2014.

Bulldozers strip topsoil and overburden from various pits within the project site and excavators then put raw material into dump trucks for transport to the on-site fixed processing or slurry plant located in the northern portion of the site. The coarse sand is initially screened and washed then pumped via a slurry pipeline under Wisemans Ferry Road and along a haul road to PF Formation's main processing plant (Lot 198 DP 752025) located approximately 750 metres to the north-west. The main processing plant together with offices, workshops, concrete batch plant, fuel storage, weigh bridge, loading and processed sand storage areas form PF Formation's main operational area off Patricia Fay Drive at 1774 Wisemans Ferry Road, Maroota. The processed sand is stockpiled then transported to markets by heavy vehicles for use in metropolitan Sydney's construction industry.

Figures 3, 4, 5, 6, 7, 8, 9 and 10 provide various views of the Hitchcock Road Sand Project site operations, extraction, stockpile, tailings ponds and rehabilitation areas as at February 2014 and April 2014.

Figure 3 View of Site Entrance on Wisemans Ferry Road



Figure 4 View of Main Pit at Hitchcock Road Sand Project



Figure 5 View of Extraction and Stockpile Areas From Near Hitchcock Road



Figure 6 View of Processing Plant at Hitchcock Road Sand Project



Figure 7 View of Main Tailings Ponds at Hitchcock Road Sand Project



Figure 8 View of Partial Removal of Sydney Hinterland Transition Woodland at Hitchcock Road Sand Project



Figure 9 View of Site Rehabilitation Area at Hitchcock Road Sand Project



Figure 10 View of Partial Site Rehabilitation at Hitchcock Road Sand Project



3. Audit Aim, Criteria and Tasks

The aim of the independent environmental audit is to ensure that Condition 6 of the Hitchcock Road Sand Project approval is met to the satisfaction of the renamed Department of Planning and Environment. Condition 6 also specifies the criteria for the audit. To complete the environmental audit and met the Condition 6 criteria the following tasks were undertaken.

- Overview of the Environmental Assessment and associated technical papers for the project, Preferred Project Report and Department of Planning's Hitchcock Road Sand Project approval (06_0104) dated 3 February 2009. The project approval is also available for download from PF Formation's website at www.pfformation.com.au.
- Review of the Environmental Strategy and associated Noise Management Plan, Air Quality Monitoring Program, Water Management Plan and Landscape Management Plan for the project. All of these documents were revised by PF Formation in September 2011 and approved by the Department of Planning & Infrastructure on 15 November 2011 in partial fulfilment of the project approval conditions and are the principal environmental reference documents for the site. These documents are available at www.pfformation.com.au.
- Review of Annual Environmental Management Reports (AEMR) for 2010-2011, 2011-2012 and 2012-2013 for the project. The 2012-2013 AEMR is available at www.pfformation.com.au.
- Review of Environment Protection Licence No. 3407 and associated 2010-2011, 2011-2012 and 2012-2013 annual returns for the site. Appendix 2 provides a copy of Environment Protection Licence Number 3407 covering the Hitchcock Road Sand Project.
- Site inspections, observation of activities and environmental audit of the project site in fine weather on 24 February 2014 and 16 April 2014. On-site interviews were held with PF Formation's Managing Director Mr John Graham, General Manager Mr Peter Cummins, Operations Manager Mr Joshua Graham, Quarry Manager Mr Peter Watt and the Weighbridge Officer Ms Dianna Rea. Requests were made for relevant documentation, records, information and correspondence. The locations of three dust monitoring deposition gauges were checked. Production, safety, induction, waste disposal,

environmental and monitoring records were checked. Site boundary setbacks and rehabilitation areas were checked.

- Subsequent email and telephone enquiries with the General Manager Mr Peter Cummins on some issues of concern and requests for further information and documents.
- Issue of consultation letters on 7 March 2014 to three public authorities (Office of Environment and Heritage, Department of Primary Industries – Mineral Resources and The Hills Shire Council) requesting a response within 21 days including any comments or issues on the project.
- A review of the implementation of the April 2011 audit recommendations.

This second independent environmental audit covers the three year period from the first audit in April 2011 to April 2014.

4. Audit Evidence and Environmental Monitoring

In addition to the review of formal documentation produced for the project site and referred to in Section 3, on-site inspections of the site and checking of other documentation revealed the following areas of environmental performance and concern (in no particular order or priority) in relation to effects on the surrounding environment and compliance with project approval conditions, project approval commitments, Environment Protection Licence conditions and AEMR requirements.

The Environment Protection Licence covering the site allows up to 500,000 tonnes/annum and the project approval provides for 400,000 tonnes/annum. The 2010-2011, 2011-2012 and 2012-2013 annual returns to the NSW Department of Trade & Investment, Resources & Energy Division outline the type of product (clay and fill, pea gravel, construction sand), quantity and value of material sold. A review of the monthly production and Section 94 contribution records confirmed that annual production is less than 400,000 tonnes/annum from The Hills Shire quarries including the project. The total production of each type of material has not been disclosed in this audit document because of the confidentiality and commercial sensitivity of the release of such information but it is available at PF Formation's offices. The Hills Shire Council also receives Section 94 contributions based on monthly production records which in turn are based on weigh bridge records. These Section 94 contributions were audited by Council in late 2012.

Weigh bridge records detailing the type of material and mass to be transported off-site were reviewed and were satisfactory. A sample of weigh bridge records also demonstrated that laden truck movements were less than 200 vehicles per day and generally less than 10 vehicles per day entering/exiting the site between 6am and 7am. Truck movements are regularly audited by the Environmental Manager. The October 2011, February 2012 and April 2012 operational checklists in the 2011-2012 AEMR noted a total of 15, 12 and 12 truck movements respectively between 6am and 7am. The February 2013 operational checklist in the 2012-2013 AEMR noted a total of 14 truck movements between 6am and 7am. There is no physical or documentary evidence of any Virgin Excavated Natural Material being imported into the site to date.

In April 2014 PF Formation plotted existing extraction levels at three locations as shown on the revised depth of mining contours plan (see Appendix 7). The three extraction levels are all above and in compliance with the depth of mining contours plan.

A review of randomly selected timesheets for the workforce which show start and finish times for each employee generally confirmed that operating hours were between 6am and 3pm. Some employee's timesheet records had a few earlier start times at 5.30am and 5.45am in relation to opening up the weigh bridge so that the site could commence operations at 6am. Some of the weigh dockets issued to drivers at the weigh bridge confirmed that laden trucks had traversed the weigh bridge a few minutes before 6am.

A rehabilitation and offset bond (project approval schedule 3 condition 27) for \$500,000 in the form of an ANZ bank guarantee for \$500,000 in favour of the Director General of the Department of Planning and letter was forwarded to the Department of Planning on 22 November 2010. The bond was calculated based on a maximum of 127,600 square metres being disturbed in the next three years and 120,000 square metres of previously disturbed area. On 26 September 2011 PF Formation confirmed to the Department of Planning & Infrastructure that no revision of the

rehabilitation and offset bond was required. PF Formation confirmed again in March 2014 that no revision of the rehabilitation and offset bond was required.

Some star pickets painted green on top have been installed near the site boundaries (see Figure 4) to show the extent of buffer or extraction area setbacks.

A 3m high peripheral bund planted with screening vegetation needs to be located 30m from and all along the Hitchcock Road boundary.

Automatic weather station records held at the weighbridge and included in the 2010-2011, 2011-2012 and 2012-2013 AEMPs were reviewed and are satisfactory.

Minutes of the Community Consultative Committee held in November 2010, May 2011, November 2011, May 2012, November 2012, April 2013 and November 2013 were reviewed and they provide another perspective on the progress and impacts of the project.

One complaint was received and recorded in the Complaints Register during the audit period. On 24 April 2012 a telephone complaint was made about mud across Wisemans Ferry Road. A mechanical broom sweeper removed the mud as a corrective action.

No dangerous goods are stored on-site. In March 2006 WorkCover NSW advised that PF Formation no longer stores or handles notifiable quantities of dangerous goods on the premises.

Documents show regular removal of waste recyclables and waste disposal from the site is by The Hills Shire Council and an EPA licensed waste transport provider.

The Hazardous Substance Register and material safety data sheets were viewed. The Hazardous Substance Register includes 51 products/chemicals and associated material safety data sheets. Many of the products/chemicals within the register are not classified as hazardous substances² and should be removed from the register. However material safety data sheets for all materials including hazardous materials still need to be kept on site and up to date.

The visitor/contractor induction forms, site safety rules, truck driver safety rules and safety booklet were viewed and are satisfactory.

At the site entrance on Wisemans Ferry Road a single tyre was in public view on one site inspection and the 20km/hour speed limit sign was missing.

The Environment Protection Licence No. 3407 for the site lists five pollution reduction programs completed in 2008-2009.

The 2010-2011, 2011-2012 and 2012-2013 annual returns for Environment Protection Licence No. 3407 showed compliance with all conditions of the licence including dust and noise monitoring and compliance requirements. However, the 2011-2012 annual return should have recorded the 24 April 2012 complaint as required by Condition M4 of the licence. The 2010-2011 and 2011-2012 annual returns for Environment Protection Licence No. 3407 were not included in the 2010-2011 and 2011-2012 AEMRs.

The pollution incident response management plan available at www.pfformation.com.au and prepared to comply with section 153A of the *Protection of the Environment Operations Act 1997* was reviewed. The plan was last tested on 5 November 2013 but needs revision to include telephone numbers for all for all authorities and inclusion of Attachment A Hazardous Substances Register, Attachment B Emergency Procedure and Attachment C Site Plans/Map. PF Formation should consider including landslip or land stability as an additional hazard to be considered in the plan. The revised plan then needs to be made available on the PF Formation website.

² Hazardous material is defined in the Fire Brigades Act 1989 as "anything that, when produced, stored, moved, used or otherwise dealt with without adequate safeguards to prevent it from escaping, may cause injury or death or damage to property".

Production data was not included in AEMRs as per project approval conditions. Annual reports on the effectiveness of the retention basins were not available in the AEMRs and also need to be produced as per the project approval statement of commitments.

The PF Formation website needs regular updating for progress on Department of Planning and Environment approvals, revised documents and the audit.

At the Department of Planning and Infrastructure's request a copy of the latest December 2013 monitoring of revegetation report is included in Appendix 8.

5. Consultation With Agencies

On 7 March 2014 consultation letters were sent to three government agencies (Office of Environment and Heritage, Department of Primary Industries – Mineral Resources and The Hills Shire Council) requesting a response within 21 days including any comments or issues on the project. A copy of the consultation letters and the response from The Hills Shire Council are provided in Appendix 3. In summary The Hills Shire Council advised that Council staff have no concerns regarding Hitchcock Road. No responses were received from the Office of Environment and Heritage and Department of Primary Industries – Mineral Resources.

6. Audit Findings

6.1 Implementation of the April 2011 Audit Recommendations

Implementation of the April 2011 independent environmental audit recommendations and the PF Formation 14 June 2011 response (within quotation marks and italics) is provided below.

1. Improve screen planting on Lot 1 DP 570966 along Old Northern Road between Wisemans Ferry Road and 200 metres south and also near the project site access point on Wisemans Ferry Road.

The PF Formation response stated "The bund wall along Old Northern Road will be reshaped to improve the visual screening."

With regard to the comment regarding Wisemans Ferry Road this relates to the gap in the bund wall used to access the site (see photo below). As the entry point is right opposite our extraction area there is no room to build a screening bund until this area is fully extracted which could take several years. Whilst the extraction area is clearly visible at this entry point the reality is no one other than staff and visitors see this view. The gap in the bund wall is approximately 20 metres wide and road users only see this window while passing at 80 kilometres an hour i.e. for about 1.1 seconds."



As at April 2014 screen planting has been improved on Lot 1 DP 570966 along Old Northern Road between Wisemans Ferry Road and 200 metres south. Screen planting still needs to be improved near the project site access point on Wisemans Ferry Road and along Hitchcock Road.

2. Old tyres need to be removed from public view near the project site access point on Wisemans Ferry Road and either stored within the main processing plant workshop area or legally disposed of.

PF Formation agreed and the tyres are now stored on a mobile trailer out of public view.

3. The survey plan provided to the Department of Planning in May 2009 in the form of an orthophoto-map needs amendment taking into account the approved Landscape Management Plan and re-submission to the Department of Planning and Infrastructure to show the following:
 - a. A 10 metre buffer area (rather than 30 metres) along Old Northern Road near Lot 2 DP 570966 and Lot 2 DP 1063296.
 - b. Areas of vegetation to be conserved including Sydney Hinterland Transition Woodland.
 - c. An area of at least 12 hectares to be rehabilitated and revegetated.

The PF Formation response stated "The survey plan will be updated and re-submitted to the Department of Planning. The 12 hectares to be rehabilitated is conceptually shown in Appendix 5 to the Approval and will be progressively surveyed over the life of the development." The revised survey plan (see Appendix 4) was submitted to the Department of Planning & Infrastructure on 14 September 2011.

4. Any encroachment of the extraction area within Lot 2 DP 570966 and the 10 metre buffer area near the intersection of the disused access way/Crown Road and Old Northern Road needs to be rehabilitated and revegetated during the spring months of 2011.

The PF Formation response stated "There has not been an encroachment within the 10 metre set back from the Crown Road other than being used as an access track to backfill the extraction area. No extraction occurred within the setback. The area will be rehabilitated when the adjoining silt pond area is rehabilitated."

5. All buffer setback areas need to be clearly delineated on the ground with a peg out survey and use of permanent markers such as star posts and high visibility tape, coloured stakes, fences or similar.

The PF Formation response stated "The buffer setback areas in all extraction areas are all defined by existing bund walls, fences or other markers. Further identifying markers will be used."

6. A Traffic Noise Management Strategy needs to be included in the Noise Management Plan and to refer to the Maroota local traffic management policy agreed with Maroota's major quarry operators.

The PF Formation response stated "This will be included in the Noise Management Plan." Although the need for a Traffic Noise Management Strategy was removed as a condition in Environment Protection Licence No. 3407 for the site in February 2011 it is still included in the Noise Management Plan.

7. The Environmental Strategy needs to be updated including the date of publication, new names of NSW government departments, new legislation, revised Australian Standards and references.

The PF Formation response stated "this will be done". The Environmental Strategy was updated in September 2011; however the names of NSW government departments have changed again and the Environmental Strategy will need continually updating. For example, legislation and Australian Standards continually evolve and the Department of Planning is now the Department of Planning and Environment.

8. As required by the Environmental Strategy an annual internal audit needs to be completed and documented by the Environmental Manager and the Site Manager to provide the basis for the management of potential non-conformances and for annual reporting of environmental performance.

The PF Formation response stated "Monthly the Environmental Manager has a checklist that is reviewed and signed with comments made as necessary. Annually each action required by the Environmental Operations Procedures are reviewed and signed by the relevant Manager. Annually these documents and a copy of the consent are reviewed by the Management team to make sure all matters have been completed. This review and matters taken forward are reported in the Annual Environmental Management Report (Chapter 3). The wording in 3.3.2 Compliance Audit of the Environmental Strategy will be revised to reflect the actual procedures which are satisfactory." The wording in the Compliance Audit of the Environmental Strategy has been revised.

9. Annual reports on the effectiveness of the retention basins need to be produced and included in the AEMRs.

The PF Formation response stated "In the Water Management Statement of Commitments it says 'All retention basins will be regularly inspected and an annual report prepared on their effectiveness'. This commitment was incorporated into Strategy 5.1 of the Environmental Operation Procedures and is reviewed as part of the monthly checklist. These reports are signed off, dated and copies included in the AEMR (Chapter 3). Whilst there is no separate report it is reported in the AEMR in a satisfactory manner.

10. In addition to the water truck the irrigation system along parts of the internal haul roads near the revegetation (other woodland) area needs to be fixed for regular use during dry windy periods.

The PF Formation response stated "To minimize the need for water trucks to be used for dust suppression we have invested in fixed irrigation systems along some sections of the road. These systems require a high level of maintenance and regularly get blocked or break down. Therefore we have not expanded the use of the irrigation system and do not rely on it. We use our water truck to suppress dust from the roads when it is dry and windy." PF Formation has purchased another water truck of 30,000 litres capacity.

11. The concrete pipes and a large disused oil tank within the project site need to be removed off-site to reduce any risk of the items being buried within the areas of site excavation.

In their response PF Formation agreed and they have been removed.

12. The depth of mining contours plan dated 08/05/2009 and supplied to the Department of Planning needs to be updated to cover the whole extraction area of the site.

The PF Formation response stated "As required by Clause 4 of Schedule 3 of the Approval Conditions this will be reviewed and updated within 3 months of the Environmental Audit." A revised depth of mining plan was provided to the Department of Planning & Infrastructure on 14 September 2011 and is provided in Appendix 5.

13. The water table contours plan dated 08/05/2009 (see Appendix 7) and supplied to the Department of Planning needs to be updated to cover the whole extraction area of the site.

The PF Formation response stated "as above in point 12." A revised depth of water table contours plan was provided to the Department of Planning & Infrastructure on 14 September 2011 and is provided in Appendix 6.

14. Current calibration certificates for the weighbridge need to be included in the AEMRs.

The PF Formation response stated "A copy of the certificate from the Department of Fair Trading will be included in the AEMR." The certificate of verification dated 11 May 2012 in accordance with the National Measurement Act 1960 for the on-site 60 tonne weighbridge was included in the 2012-2013 AEMR.

15. Modified copies of the annual production data produced for the Department of Primary Industries using the standard form for that purpose need to be included in the AEMRs. With the consent of the Department of Planning & Infrastructure and to avoid disclosure of commercially sensitive information to the public and competitors, production data should be provided in 100,000 tonne bands in the AEMRs.

The PF Formation response stated "The AEMR is available on our website for public viewing and therefore we are reluctant to include the detail of our sales as disclosed in the annual production data provided to the Department of Primary Industries. In the second paragraph of Chapter 2 of the AEMR we confirm that our annual volume was within the limit of 400,000 tonnes. We propose that the annual production form be appended to the

AEMR but not included in the copy on the website or other copies that may potentially be publicized.” The annual production forms have not been appended to the AEMRs.

16. Annual production data needs to be separated for Hornsby Shire and The Hills Shire in annual returns so that the maximum throughput of 400,000 tonnes/annum for the project can be independently verified.

The PF Formation response stated “We are only required to complete one annual production data form for the Department of Primary Industries and there seems little point requiring more than one return. Even if a separate return was completed for Baulkham Hills Shire it still would not relate to this Approval as we have 3 different Approvals/Consents in this Council area (and 6 in the Maroota area). The throughput was readily audited in this Environmental Audit and any further paperwork serves no purpose.”

The 2010-2011 and 2011-2012 annual returns both showed combined annual production was between 400,000 tonnes/annum and 500,000 tonnes/annum from the Hornsby and Baulkham Hills quarries. In 2012-2013 combined annual production was between 300,000 tonnes/annum and 400,000 tonnes/annum from the Hornsby and Baulkham Hills quarries. The annual returns do not show the levels of production split between the Hornsby and Baulkham Hills quarries although the monthly records of Section 94 Contributions do so.

17. The Complaints Register needs to be recorded in full in response to any complaints on the project and any corrective actions undertaken.

In their response PF Formation agreed and this happened for the one complaint in the audit period although it was not recorded in the EPA annual return.

18. Within the workshop area in PF Formations main processing area an impervious bund under a shelter needs to be provided as a storage area for disused and empty fuel, lubricant and chemical drums and containers. The bund must be designed to contain at least 110% of the volume of materials stored within the area.

The PF Formation response stated “There is a storage area that should be used. Staff will be reminded of this.”

19. With the consent of the Department of Planning and Infrastructure only the three closest noise assessment locations to the project being R3 Jurd, R5 Pignataro, R10 Tornatola plus R7 Maroota Public School need be monitored in future.

The PF Formation response stated “This is as required under our EPA licence after on-site meetings with the DECC before the Approval commenced.”

20. Future AEMRs need to make reference that the Site Manager and the Quarry Manager are interchangeable and the same person. Similarly future AEMRs need to make reference that the Environmental Manager and Environmental Officer positions are either one or two persons.

In their response PF Formation agreed and this is shown in the 2010-2011, 2011-2012 and 2012-2013 AEMRs.

21. The AEMRs need to provide a plan showing all areas of in-progress rehabilitation and completed rehabilitation. The rehabilitation location plan should be based on the Vegetation Offset Plan and areas for new plantings included as Appendix 5 in the Project Approval.

The PF Formation response stated “This is shown on Attachment 2A (green area) of the AEMR but will be made clearer in future AEMRs” and this is shown in the 2010-2011, 2011-2012 and 2012-2013 AEMRs.

22. In the interests of ecologically sustainable development the volume or quantity of fuels/lubricants, electricity and water/groundwater consumed by PF Formation’s operations including the on-site and off-site processing plants should be monitored quarterly and an efficiency programme implemented to reduce annual consumption.

The PF Formation response stated “We are a small company who closely monitor all expenses particularly the major components that impact our business such as fuel, electricity and water. Other than labour these are the major expenses in running our business. We constantly look for ways to reduce the usage of these items.

Fuel is used running all our quarry equipment and the fuel efficiency is a major

consideration in every purchase decision.

Electricity is used to run all our sand washing equipment. We have always adopted a policy of utilizing electricity rather than diesel/petrol where we have a choice. We have had electricity specialists investigate our operations but as we mainly use it for running pumps and similar equipment there is little opportunity for introducing more efficient energy use.

Because of the shortage of water over the last few years we have an engineer implement measures to minimize our usage in our wash plants. The main water loss is through evaporation in our silt ponds and we are continually looking at ways of minimizing this loss.

Formal quarterly monitoring would be an inefficient waste of resources on something that is reviewed continually and in particular each month when the bills are signed. An annual summary of work done will be incorporated in the AEMP."

23. The PF Formation website needs regular updating for progress on approvals from the Department of Planning and Infrastructure and the audit.

In their response PF Formation agreed and they advise the website is updated regularly.

24. The document *Methodology* to assess success of revegetation within Hitchcock Road site, September 2008, Parsons Brinckerhoff Australia Pty Limited needs to be added to PF Formation's website as an addition to the Project Approval.

The PF Formation response stated "Agreed and done. Included in Appendix 6 to the Project Approval."

25. A full legible copy of the Project Approval including all Appendices as provided by the Department of Planning on 7 March 2011 needs to be included on PF Formation's website.

The PF Formation response stated "Agreed and done. The copy previously on the website was the one received from the Department of Planning - a new clearer copy has now been received and put on the website.

6.2 Assess the Environmental Performance of the Project and its Effects on the Surrounding Environment

A sand extraction project generally has the potential to affect the surrounding environment through adverse impacts on inter alia, flora and fauna, groundwater, water quality, noise, air quality, visual quality, waste generation and traffic generation. The sand extraction project has had impacts on the surrounding environment although the impacts are generally localised and contained within the project site. For example, removal of bushland and extraction of material has caused soil erosion, surface water quality and visual impacts within the boundaries of the quarry areas. The site operations use of heavy machinery also causes localised air and noise pollution. There are extensive areas of extraction, stockpiles, haul roads, tailing ponds and rehabilitation areas within the confines of the project area. Project approval and Environment Protection Licence conditions have been imposed to minimise any potential adverse impacts.

6.3 Assess Whether the Project Is Complying with the Relevant Standards, Performance Measures and Statutory Requirements

This section assesses the project for compliance with the relevant standards, performance measures and statutory requirements being the project approval conditions, project approval statement of commitments and Environment Protection Licence conditions.

6.3.1 Compliance With Project Approval Conditions

Tables 1, 2, 3 and 4 below summarise whether the project is complying with the project approval Schedules 2, 3, 4 and 5 conditions for administrative; environmental performance; additional procedures; environmental management, monitoring, reporting and auditing respectively.

Table 1 Compliance With Project Approval Administrative Conditions

Project Approval Schedule 2 Administrative Conditions	Compliance
Obligation to Minimise Harm to the Environment	
1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	Yes
Terms of Approval	
2. The Proponent shall carry out the project generally in accordance with the: (a) Environmental Assessment (EA); (b) preferred project report; (c) statement of commitments; and (d) conditions of this approval. <i>Notes:</i> · <i>The layout of the project is shown in the figure in Appendix 2; and</i> · <i>The statement of commitments is included in Appendix 3.</i>	Yes, generally with some non-compliances.
3. If there is any inconsistency between the above: (a) the preferred project report shall prevail over the EA; (b) the conditions of this approval shall prevail generally, to the extent of the inconsistency.	Noted
4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of: (a) any reports, plans, programs or correspondence that are submitted in accordance with the conditions of this approval; and (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.	Noted, only requirement to date is for a detailed report on rehabilitation and offset obligations already provided.
Existing Sand Mining Consent	
5. Subject to an agreement in accordance with condition 7 below, the Proponent may accept material extracted from Lot 2 DP 555184 and Lot 1 DP 34599 in accordance with the development consent issued by the Land and Environment Court on 14 July 1998 to be transported across the site and to the slurry plant on Lot 1 DP 570966 via the slurry pipeline and processed on Lot 198 DP 752025.	Noted
Limits on Approval	
6. Extraction and processing operations may take place until 30 November 2028. <i>Note: Under this approval, the Proponent is required to rehabilitate the site and provide offsets to the satisfaction of the Director-General. Consequently this approval will continue to apply in all other respects other than the right to conduct extraction and processing operations until the site has been rehabilitated and the offset provided to a satisfactory standard.</i>	Yes
7. The quantity of processed material produced at the site, together with material produced on Lot 2 DP 555184 and Lot 1 DP 34599 in accordance with the development consent issued by the Land and Environment Court on 14 July 1998, shall not exceed 400,000 tonnes a year. Prior to the commencement of any processing of extractive material (under the above consent) from activities on Lot 2 DP 555184 or Lot 1 DP 34599, the Proponent shall demonstrate, to the satisfaction of the Director-General, that it has reached an agreement with the owners of those Lots regarding the proportion of the extraction limit as it applies to each Lot.	Yes, no material accepted from Lot 2 DP 555184 and Lot 1 DP 34599 to date.

Project Approval Schedule 2 Administrative Conditions	Compliance
<p>8. The Proponent shall restrict total laden truck movements associated with the project to:</p> <p>(a) 200 per day, for the Proponent's combined operations at Maroota;</p> <p>(b) 20 per day, for trucks importing VENM to the site; and</p> <p>(c) 10 per day, for trucks entering/exiting the site between 6.00am and 7.00am.</p> <p><i>Note: For the avoidance of doubt, 200 is the maximum laden truck movement volume allowed on any one day, including the VENM and early morning truck movements.</i></p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>
<p>9. The Proponent shall not undertake any extraction within 2 metres of the established wet weather groundwater level.</p> <p><i>Note: The wet weather groundwater level shall be established in accordance with condition 3 of Schedule 3.</i></p>	<p>Yes, maximum extraction level at April 2014 was 186 metres.</p>
<p>10. The Proponent shall not disturb any Sydney Hinterland Transition Woodland (SHTW) vegetation (as shown on the plan in Appendix 5) on site without the prior written approval of the Director-General. In seeking this approval the Proponent shall demonstrate, to the satisfaction of the Director-General, that it has established at least 3.7 hectares of SHTW on the site, to a standard that meets the criteria in Appendix 6.</p> <p><i>Note: This demonstration must include an assessment by a suitably qualified and independent ecologist.</i></p>	<p>Yes, 4.2 hectares of SHTW was established by November 2012. On 15 March 2013 the Department of Planning & Infrastructure provided written approval for clearing of SHTW.</p>
Management Plans / Monitoring Programs	
<p>11. With the approval of the Director-General, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis.</p>	<p>Yes</p>
Demolition	
<p>12. The Proponent shall ensure that all demolition work is carried out in accordance with AS 2601-2001: <i>The Demolition of Structures</i>, or its latest version.</p>	<p>Yes, no demolition to date.</p>
Protection of Public Infrastructure	
<p>13. The Proponent shall:</p> <p>(a) repair, or pay all reasonable costs associated with repairing, any public infrastructure that is damaged by the project; and</p> <p>(b) relocate, or pay all reasonable costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.</p>	<p>Yes, no public infrastructure affected to date.</p>
Operation of Plant and Equipment	
<p>14. The Proponent shall ensure that all plant and equipment used at the site is:</p> <p>(a) maintained in a proper and efficient condition; and</p> <p>(b) operated in a proper and efficient condition.</p>	<p>Yes</p>
Crown Land	
<p>15. The Proponent shall not commence any development authorised by this approval on Crown land without the prior approval of the Department of Lands.</p>	<p>Yes, no development on leased</p>

Project Approval Schedule 2 Administrative Conditions	Compliance
	Crown land (Lot 1 DP 1013943) to date.
Section 94 Contributions	
16. The Proponent shall pay a monthly contribution to the Council for the upgrade and maintenance of roads in accordance with Baulkham Hills Shire Council's section 94 plan in force at the date of this approval.	Yes

Table 2 Compliance With Project Approval Environmental Performance Conditions

Project Approval Schedule 3 Environmental Performance Conditions	Compliance
GENERAL EXTRACTION AND PROCESSING PROVISIONS	
Identification of Boundaries	
<p>1. Within 3 months of the date of this approval, or as otherwise agreed by the Director-General, the Proponent shall:</p> <p>(a) engage an independent registered surveyor to survey the boundaries of the approved limit of extraction and the approved ancillary work areas;</p> <p>(b) submit a survey plan of these boundaries to the Director-General; and</p> <p>(c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.</p> <p><i>Note: The limit of extraction and ancillary areas is shown conceptually on the layout plans in Appendix 2, as amended/clarified by the conditions below.</i></p>	Yes, revised site survey plan approved and provided in Appendix 4. Most boundaries have permanent markers.
General Limits of Extraction	
<p>2. Notwithstanding the layout plans in Appendix 2, the Proponent shall not undertake extraction within:</p> <p>(a) 30 metres of Hitchcock Road; and</p> <p>(b) 10 metres of the property boundary of Lot 2 DP 555184, unless sand extraction has commenced on that lot, and extraction in this buffer has been agreed by the Director-General.</p>	Yes Yes
Maximum Extraction Depth Map	
<p>3. The Proponent shall:</p> <p>(a) establish the wet weather groundwater level for the site based on all available (and at least 12 months) site specific groundwater monitoring data;</p> <p>(b) engage a suitably qualified and experienced expert to establish the maximum extraction depths to which extraction can be undertaken on site, to comply with condition 9 of Schedule 2;</p> <p>(c) submit a Maximum Extraction Depth Map (contour map or similar) for the project to the Director- General within 3 months of the date of this approval; and</p> <p>(d) comply with the extraction depths specified in the map, to the satisfaction of the Director-General.</p>	Yes, see revised Depth of Mining Contours and revised Water Table Contours plans (Appendices 5 and 6).
<p>4. Within 3 months of the completion of the Independent Environmental Audit (see condition 6 of Schedule 5), the Proponent shall review and update the Maximum Extraction Depth Map for the project to the satisfaction of the Director-General.</p>	Yes

Project Approval Schedule 3 Environmental Performance Conditions			Compliance																																							
NOISE																																										
Operational Noise Assessment Criteria																																										
<p>5. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1 at any residence or on more than 25 per cent of any privately-owned land.</p> <table border="1"> <thead> <tr> <th rowspan="2">Noise Assessment Location</th><th>Day</th><th colspan="2">Night</th></tr> <tr> <th>L_{Aeq} (15 minute)</th><th>L_{Aeq} (15 minute)</th><th>L_{A1} (1 minute)</th></tr> </thead> <tbody> <tr> <td>R1 - Hammond</td><td>41</td><td>35</td><td>45</td></tr> <tr> <td>R2 - Hitchcock</td><td>40</td><td>35</td><td>45</td></tr> <tr> <td>R5 - Pignataro</td><td>42</td><td>35</td><td>45</td></tr> <tr> <td>R6 - Camilleri</td><td>40</td><td>35</td><td>45</td></tr> <tr> <td>R7 - Maroota Public School</td><td>36_{(L_{Aeq}(1 Hour))}</td><td>N/A</td><td>N/A</td></tr> <tr> <td>R8 - Portelli</td><td>39</td><td>35</td><td>45</td></tr> <tr> <td>R9 - Young</td><td>39</td><td>35</td><td>45</td></tr> <tr> <td>R10 - Tomatola</td><td>39</td><td>35</td><td>45</td></tr> </tbody> </table> <p><i>Table 1: Noise Impact Assessment Criteria</i></p> <p>Notes:</p> <ul style="list-style-type: none"> · To determine compliance with the L_{Aeq(15 minute)} noise limits, noise from the project 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. Where it can be demonstrated that direct measurement of noise from the project is impractical, alternative means of determining compliance may be accepted (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where applicable. · To determine compliance with the L_{A1(1 minute)} limit, noise from the project is to be measured at 1 metre from the dwelling façade. · The noise limits apply under meteorological conditions of: <ul style="list-style-type: none"> - wind speed up to 3m/s at 10m above ground level; - temperature inversion conditions of up to 3 degrees C/100m and wind speed up to 2m/s at 10m above the ground; where the wind velocity and temperature gradients are determined to be relevant to the project site in accordance with the NSW Industrial Noise Policy. · The Director-General may relax the noise limits in Table 1 for any property where the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement. · For more information on the noise assessment locations see Appendix 4. 			Noise Assessment Location	Day	Night		L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)	R1 - Hammond	41	35	45	R2 - Hitchcock	40	35	45	R5 - Pignataro	42	35	45	R6 - Camilleri	40	35	45	R7 - Maroota Public School	36 _{(L_{Aeq}(1 Hour))}	N/A	N/A	R8 - Portelli	39	35	45	R9 - Young	39	35	45	R10 - Tomatola	39	35	45	<p>Yes, compliance with noise criteria for three closest monitoring sites to project R3 Jurd, R5 Pignataro, R10 Tomatola, plus R7 Maroota Public School (see AEMR 2012-2013).</p>
Noise Assessment Location	Day	Night																																								
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R10 - Tomatola	39	35	45																																							
Cumulative Noise Criteria																																										
<p>6. The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:</p> <ul style="list-style-type: none"> · L_{Aeq(11 hour)} 50 dB(A) – Day; · L_{Aeq(4 hour)} 45 dB(A) – Evening; and · L_{Aeq(9 hour)} 40 dB(A) – Night. 			<p>Yes, see AEMR 2012-2013.</p>																																							

Project Approval Schedule 3 Environmental Performance Conditions			Compliance
Operating Hours			
7. The Proponent shall comply with the operating hours in Table 2.			Yes generally, although some employee's timesheet records had a few earlier start times at 5.30am and 5.45am to enable opening up the weighbridge so that the site could commence operations at 6am. Some transport of product before 6am.
Activity	Day	Time	
Construction work	Monday - Friday	7.00am to 6.00pm	
	Saturday	8.00am to 1.00pm	
	Sunday and Public Holidays	None	
Quarrying and Processing, (inc. overburden removal)	Monday – Saturday	7.00am to 6.00pm	
	Sunday and Public Holidays	None	
Product Transportation	Monday – Saturday	6.00am to 6.00pm	
	Sunday and Public Holidays	None	
Maintenance	Monday – Saturday	7.00am to 6.00pm	
	Sunday and Public Holidays	None	
Table 2: Operating Hours			
Notes:			
· Product transportation prior to 7.00am is restricted as per condition 8 of Schedule 2.			
· Maintenance activities may be conducted outside the hours in Table 2 provided that the activities are not audible at any residence beyond the boundary of the site.			
· This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to DECC and the affected residents as soon as possible, or within a reasonable period in the case of emergency.			
Noise Management Plan			
8. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan shall:			Yes, revised Noise Management Plan approved 15 November 2011.
(a) be submitted to the Director-General within 3 months of the date of this approval;			
(b) be prepared in consultation with DECC;			
(c) include details of how the noise performance of the project would be monitored, and include a noise monitoring protocol for evaluating compliance with the relevant noise limits in this approval; and			
(d) include an investigation and assessment (including modelling) of additional reasonable and feasible noise mitigation measures that would be implemented to ensure that noise emissions at all stages of the project comply with the noise impact assessment criteria in Table 1.			
Note: The EA predicted that receiver locations R5, R6, R9 and R10 would exceed the applicable noise criteria by between 2 and 5 decibels, during worst case operations.			
9. If the additional noise mitigation measures identified in condition 8(d) are not able to reduce noise levels to within 2 decibels of the impact assessment criteria in Table 1 then, upon receiving a written request from the applicable landowner, the Proponent shall implement additional noise mitigation consultation with the landowner.			Yes, not required as noise compliance achieved.
These additional mitigation measures must be reasonable and feasible.			
If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.			

Project Approval Schedule 3 Environmental Performance Conditions				Compliance
AIR QUALITY				
Impact Assessment Criteria				
10. The Proponent shall ensure that dust generated by the project does not cause exceedances of the criteria listed in Tables 3, 4 and 5 at any residence or on more than 25 per cent of any privately owned land.				Yes, see AEMPs.
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 3: Long Term Impact Assessment Criteria for Particulate Matter				
Pollutant		Averaging period	Criterion	
Particulate matter < 10 µm (PM ₁₀)		24 hour	50 µg/m ³	
Table 4: Short 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 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.				
Operating Conditions				
11. The Proponent shall ensure any visible air pollution generated by the project is assessed regularly, and that quarrying operations are relocated, modified, and/or stopped as required to minimise air quality impacts on privately owned land.				Yes
Air Quality Monitoring				
12. The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Director-General. This program shall: (a) be submitted to the Director-General for approval within 3 months of the date of this approval; (b) be prepared in consultation with DECC; (c) include details of how the air quality performance of the project would be monitored, providing for additional dust deposition monitoring in the vicinity of clusters of residences to the north and west of the site; and (d) include a protocol for evaluating compliance with the relevant air quality criteria in this approval.				Yes, revised Air Quality Monitoring Program approved 15 November 2011.
METEOROLOGICAL MONITORING				
13. The Proponent shall ensure the project has a suitable meteorological station on the site or in the immediate vicinity that complies with the requirements in the <i>Approved Methods for Sampling of Air Pollutants in New South Wales</i> publication.				Yes

Project Approval Schedule 3 Environmental Performance Conditions	Compliance
WATER	
Water Supply	
14. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations to match its water supply. <i>Note: The Proponent is required to obtain necessary water licences for the project under the Water Act 1912 and/or Water Management Act 2000.</i>	Yes to date.
Discharges	
15. The Proponent shall not discharge any water from the quarry or its associated operations except in accordance with an EPL.	Yes
Water Management and Monitoring	
16. The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan shall: (a) be submitted to the Director-General within 3 months of the date of this approval; (b) be prepared in consultation with DWE and DECC; and (c) include a: · Site Water Balance; · Erosion and Sediment Control Plan; · Surface Water Monitoring Program; and · Groundwater Monitoring Program.	Yes, revised Water Management Plan approved 15 November 2011.
17. The Site Water Balance shall: (a) include details of: · sources and security of water supply; · water use on site; · water management on site, including the location and capacity of water storages on site and the means of access; · off-site water transfers; and · reporting procedures; and (b) investigate and describe measures to minimise water use by the project.	Yes
18. The Erosion and Sediment Control Plan shall: (a) be consistent with the requirements of <i>Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004</i> (Landcom); (b) identify activities that could cause soil erosion and generate sediment; (c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters; (d) describe the location, function, and capacity of erosion and sediment control structures; (e) demonstrate that the design capacity of basins intended to collect storm runoff will not be compromised by storage of operational water; and (f) describe what measures would be implemented to maintain (and if necessary decommission) the structures over time.	Yes
19. The Surface Water Monitoring Program shall include: (a) detailed baseline data on surface water flows and quality in downstream watercourses that could be affected by the project; (b) surface water quality and stream health assessment criteria, including trigger levels for investigating any potentially adverse surface water impacts; and (c) a program to monitor: · surface water flows, quality, and impacts on water users; · stream health; and · channel stability.	Yes

Project Approval Schedule 3 Environmental Performance Conditions	Compliance								
<p>20. The Groundwater Monitoring Program shall include:</p> <p>(a) provision of additional monitoring bores around the periphery of the site;</p> <p>(b) detailed baseline data on groundwater levels, flows and quality in the region, and particularly any groundwater bores, springs and seeps (including spring and seep fed dams) that may be affected by operations on site;</p> <p>(c) groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;</p> <p>(d) a program to monitor:</p> <ul style="list-style-type: none"> · groundwater levels and quality in new and existing monitoring bores; · the impacts of the project on: <ul style="list-style-type: none"> - any groundwater bores, springs and seeps (including spring and seep fed farm dams) on privately-owned land; and - any groundwater dependent ecosystems; and <p>(e) a protocol for further groundwater modelling to confirm the limits to excavation depth across the site permitted in accordance with condition 9 of Schedule 2.</p>	Yes								
LANDSCAPE MANAGEMENT									
Rehabilitation									
<p>21. The Proponent shall progressively rehabilitate the site to the satisfaction of the Director-General, in a manner that is generally consistent with the concept final landform (Strategy A or Strategy B) in the preferred project report (as reproduced in Appendix 7).</p>	Yes, see Figure 2.								
Offset Strategy									
<p>22. The Proponent shall implement the Offset Strategy described in the preferred project report, and summarised in Table 6 (shown conceptually on the plan in Appendix 5), to the satisfaction of the Director-General.</p> <table border="1"> <thead> <tr> <th>Area</th><th>Minimum Size (hectares)</th></tr> </thead> <tbody> <tr> <td>On-Site Revegetation Area (SHTW)</td><td>7.9</td></tr> <tr> <td>On-Site Revegetation Area (Other Woodland)</td><td>4.1</td></tr> <tr> <td>Total</td><td>12</td></tr> </tbody> </table> <p><i>Table 6: Offset Strategy</i></p>	Area	Minimum Size (hectares)	On-Site Revegetation Area (SHTW)	7.9	On-Site Revegetation Area (Other Woodland)	4.1	Total	12	Yes, revegetation (other woodland) areas in progress. 4.2 hectares of SHTW established by November 2012.
Area	Minimum Size (hectares)								
On-Site Revegetation Area (SHTW)	7.9								
On-Site Revegetation Area (Other Woodland)	4.1								
Total	12								
<p>23. Within 3 years of the date of this approval, the Proponent shall make suitable arrangements to provide appropriate long term security for the offset areas to the satisfaction of the Director-General.</p> <p><i>Note: The Department acknowledges that the arrangements may provide for staged or delayed implementation, in accordance with the extraction in these areas.</i></p>	Yes								
Landscape Management Plan									
<p>24. The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Director-General. This plan must:</p> <p>(a) be prepared in consultation with DECC by suitably qualified expert/s whose appointment/s have been approved by the Director-General;</p> <p>(b) be submitted to the Director-General for approval within 6 months of the date of this approval; and</p> <p>(c) include a:</p> <ul style="list-style-type: none"> · Rehabilitation and Offset Management Plan; and · Quarry Closure Plan. 	Yes, revised Landscape Management Plan approved 15 November 2011.								

Project Approval Schedule 3 Environmental Performance Conditions	Compliance
Rehabilitation and Offset Management Plan	
<p>25. The Rehabilitation and Offset Management Plan must include:</p> <p>(a) the rehabilitation objectives for the site, vegetation offsets and landscaping;</p> <p>(b) a description of the short, medium, and long term measures that would be implemented to:</p> <ul style="list-style-type: none"> · rehabilitate the site; · implement the Offset Strategy; and · maintain and enhance existing site vegetation outside the disturbance area; <p>(c) detailed performance and completion criteria for the site rehabilitation and implementation of the Offset Strategy;</p> <p>(d) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:</p> <ul style="list-style-type: none"> · progressively rehabilitating disturbed areas; · implementing vegetation offsets; · protecting vegetation and soil outside the disturbance areas; · rehabilitating creeks and drainage lines on the site to ensure no net loss of stream length and aquatic habitat; · undertaking pre-clearance surveys; · managing impacts on fauna; · landscaping the site to minimise visual impacts; · conserving and reusing topsoil; · collecting and propagating seed for rehabilitation works; · salvaging and reusing material from the site for habitat enhancement; · controlling weeds and feral pests; · controlling access; and · bushfire management; <p>(e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;</p> <p>(f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and</p> <p>(g) details of who would be responsible for monitoring, reviewing, and implementing the plan.</p>	Yes
Quarry Closure Plan	
<p>26. The Quarry Closure Plan must:</p> <p>(a) include provision for certification from a qualified geotechnical engineer that the final proposed landform is stable;</p> <p>(b) define the objectives and criteria for closure of the quarry;</p> <p>(c) investigate options for the future use of the site, including any final void;</p> <p>(d) describe the measures that would be implemented to minimise or manage the ongoing (post closure) environmental effects of the project; and</p> <p>(e) describe how the performance of these measures would be monitored over time.</p>	Noted

Project Approval Schedule 3 Environmental Performance Conditions	Compliance
Rehabilitation and Offset Bond	
<p>27. Within 3 months of the approval of the Landscape Management Plan, the Proponent shall lodge a rehabilitation and offset bond for the project with the Director-General. The sum of the bond shall be calculated at:</p> <p>(a) \$2.50/m² for the area of disturbance in each 3 year review period, including the offset areas; and</p> <p>(b) \$1.00/m² for the total area of land previously disturbed by the quarry, or as otherwise directed by the Director-General.</p> <p><i>Notes:</i></p> <ul style="list-style-type: none"> <i>If the rehabilitation and offsets are completed to the satisfaction of the Director-General, the Director-General will release the bond.</i> <i>If the rehabilitation and/or offsets are not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the bond, and arrange for the satisfactory completion of the relevant works.</i> 	<p>Yes, bond lodged November 2010. On 26 September 2011 PF Formation confirmed to the Department of Planning & Infrastructure that no revision of the rehabilitation and offset bond was required.</p>
ABORIGINAL HERITAGE	
<p>28. Should the Proponent discover material suspected of being Aboriginal relics or skeletal remains, work in that area shall cease and the Proponent shall advise DECC and proceed in accordance with DECC instructions.</p>	<p>Yes, no Aboriginal relics or skeletal remains found to date.</p>
TRAFFIC AND TRANSPORT	
Materials Transport	
<p>29. The Proponent shall transport all excavated material between the extraction site and processing plant site, including processing residues, via slurry pipelines.</p> <p><i>Note: When the slurry system is unusable by reason of breakdown or essential maintenance, extractive material may be transported by truck during the period of such breakdown or maintenance. The Proponent shall ensure that such periods are as brief as possible and shall advise the Council each day that truck transport is to be used.</i></p>	<p>Yes</p>
Haulage Records	
<p>30. The Proponent shall record and maintain a log of the extraction quantities and traffic movement in and out of the site, available for inspection at the request of the Director-General or the Council.</p>	<p>Yes</p>
Road Haulage	
<p>31. The Proponent shall ensure that:</p> <p>(a) all loaded vehicles entering or leaving the site are covered; and</p> <p>(b) all loaded vehicles leaving the site are cleaned of materials that may fall on the road, before they leave the site.</p>	<p>Yes</p>
VISUAL	
Visual Amenity	
<p>32. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.</p>	<p>Yes</p>

Project Approval Schedule 3 Environmental Performance Conditions	Compliance
Lighting Emissions	
33. The Proponent shall: (a) take all practicable measures to mitigate off-site lighting impacts from the project; and (b) ensure that all external lighting associated with the project complies with <i>Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting</i> , to the satisfaction of the Director-General.	Yes
Advertising	
34. The Proponent shall not erect or display any advertising structure(s) or signs on the site without the written approval of the Director-General. <i>Note: This does not include traffic management and safety or environmental signs.</i>	Yes, new replacement advertising sign on Wisemans Ferry Road installed March 2014.
WASTE MANAGEMENT	
Waste Minimisation	
35. The Proponent shall: (a) only import VENM to the site; and (b) minimise the amount of waste generated by the project to the satisfaction of the Director-General.	Yes
EMERGENCY AND HAZARDS MANAGEMENT	
Dangerous Goods	
36. The Proponent shall ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the <i>Dangerous Goods Code</i> .	Yes, no dangerous goods on site.
Safety	
37. The Proponent shall secure the project to ensure public safety to the satisfaction of the Director-General.	Yes
Bushfire Management	
38. The Proponent shall: (a) ensure that the project is suitably equipped to respond to any fires on-site; and (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire on site.	Yes, site has a 10,000 litre tanker and a 30,000 litre water truck plus fire extinguishers in vehicles and workshop.
PRODUCTION DATA	
39. The Proponent shall: (a) provide annual production data to the DPI using the standard form for that purpose; and (b) include a copy of this data in the AEMR.	Yes No

Table 3 Compliance With Project Approval Additional Procedures Conditions

Project Approval Schedule 4 Additional Procedures Conditions	Compliance
NOTIFICATION OF LANDOWNERS	
<p>1. If the results of monitoring required in Schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, then the Proponent shall notify the Director- General and the affected landowners and/or existing or future tenants accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the relevant criteria.</p>	<p>Yes, no notifications required to date.</p>
INDEPENDENT REVIEW	
<p>2. If a landowner of privately owned land considers that the operations of the quarry are exceeding the impact assessment criteria in Schedule 3, then he/she may ask the Proponent in writing for an independent review of the impacts of the project on his/her land.</p> <p>If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 3 months of the Director-General advising that an independent review is warranted:</p> <p>(a) consult with the landowner to determine his/her concerns;</p> <p>(b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to determine whether the project is complying with the relevant criteria in Schedule 3, and identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and</p> <p>(c) give the Director-General and landowner a copy of the independent review.</p>	<p>Yes, no independent reviews required to date.</p>
<p>3. If the independent review determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.</p>	<p>Noted</p>
<p>4. If the independent review determines that the quarrying operations are not complying with the relevant criteria in Schedule 3, and that the quarry is primarily responsible for this non-compliance, then the Proponent shall:</p> <p>(a) implement all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria; and</p> <p>(b) conduct further monitoring to determine whether these measures ensure compliance; or</p> <p>(c) secure a written agreement with the landowner to allow exceedances of the relevant criteria in Schedule 3, to the satisfaction of the Director-General.</p> <p>If the additional monitoring referred to above subsequently determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.</p> <p>If the Proponent is unable to finalise an agreement with the landowner, then the Proponent or landowner may refer the matter to the Director-General for resolution.</p> <p>If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 8).</p>	<p>Noted</p>
<p>5. If the landowner disputes the results of the independent review, either the Proponent or the landowner may refer the matter to the Director-General for resolution.</p> <p>If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 8).</p>	<p>Noted</p>

Table 4 Compliance With Project Approval Environmental Management, Monitoring, Reporting and Auditing Conditions

Project Approval Schedule 5 Environmental Management, Monitoring, Reporting and Auditing Conditions	Compliance
ENVIRONMENTAL MANAGEMENT STRATEGY	
<p>1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy shall be submitted to the Director-General within 3 months of the date of this approval, and;</p> <p>(a) provide the strategic context for environmental management of the project;</p> <p>(b) identify the statutory requirements that apply to the project;</p> <p>(c) describe in general how the environmental performance of the project would be monitored and managed;</p> <p>(d) describe the procedures that would be implemented to:</p> <ul style="list-style-type: none"> · keep the local community and relevant agencies informed about the construction, operation and environmental performance of the project; · receive, handle, respond to, and record complaints; · resolve any disputes that may arise during the life of the project; · respond to any non-compliance; · manage cumulative impacts; and · respond to emergencies; and <p>(e) describe the role, responsibility, authority, and accountability of the key personnel involved in the environmental management of the project.</p>	Yes, revised Environmental Strategy approved 15 November 2011.
ENVIRONMENTAL MONITORING PROGRAM	
<p>2. The Proponent shall prepare an Environmental Monitoring Program for the project to the satisfaction of the Director-General. This program shall be submitted to the Director-General concurrently with the submission of the various monitoring programs and consolidate the various monitoring requirements in Schedule 3 of this approval into a single document.</p>	Yes, Environmental Monitoring Program within revised Environmental Strategy approved 15 November 2011.
REPORTING	
Incident Reporting	
<p>3. Within 24 hours of detecting an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) harm to the environment, the Proponent shall notify the Department and other relevant agencies of the exceedance/incident.</p>	Yes, no exceedances or incidents reported to date.
<p>4. Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Proponent shall provide the Department and these agencies with a written report that:</p> <p>(a) describes the date, time, and nature of the exceedance/incident;</p> <p>(b) identifies the cause (or likely cause) of the exceedance/incident;</p> <p>(c) describes what action has been taken to date; and</p> <p>(d) describes the proposed measures to address the exceedance/incident.</p>	Yes, no exceedances or incidents reported to date.
Annual Reporting	
<p>5. Within 12 months of the date of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General, relevant agencies and</p>	Yes,

Project Approval Schedule 5 Environmental Management, Monitoring, Reporting and Auditing Conditions	Compliance
<p>CCC. This report shall:</p> <ul style="list-style-type: none"> (a) identify the standards and performance measures that apply to the project; (b) describe the works that will be carried out in the next 12 months; (c) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years; (d) include a summary of the monitoring results for the project during the past year; (e) include an analysis of these monitoring results against the relevant: <ul style="list-style-type: none"> · impact assessment criteria/limits; · monitoring results from previous years; and · predictions in the EA; (f) identify any trends in the monitoring results over the life of the project; (g) identify any non-compliance during the previous year; and (h) describe what actions were, or are being, taken to ensure compliance. 	<p>2008-2009, 2009-2010, 2010-2011, 2011-2012 and 2012-2013 AEMRs submitted to date.</p>
INDEPENDENT ENVIRONMENTAL AUDIT	
<p>6. Within 12 months of the date of this approval, and every 3 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. This audit shall:</p> <ul style="list-style-type: none"> (a) be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General; (b) include consultation with the relevant agencies; (c) assess the environmental performance of the project, and its effects on the surrounding environment; (d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and (e) review the adequacy of any strategy/plan/program required under this approval, and, if necessary, recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval. <p><i>Note: The person(s) conducting the audit should have expertise in flora and fauna assessment, hydrogeology and quarry rehabilitation.</i></p>	<p>Yes, but delayed approval of auditor in July 2010. First audit dated April 2011.</p>
<p>7. Within 6 weeks of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General, with a response to any of the recommendations in the audit report.</p>	<p>Yes, audit response forwarded to the Director-General on 14 June 2011.</p>
<p>8. Within 3 months of submitting a copy of the audit report to the Director-General, the Proponent shall review and if necessary revise:</p> <ul style="list-style-type: none"> (a) each of the environmental management and monitoring strategies/plans/programs in Schedules 3 and 5; and (b) the sum of the Vegetation Offset Bond (see Schedule 3). This review shall consider: <ul style="list-style-type: none"> · the effects of inflation; · any changes to the total area of disturbance; and · the performance of the vegetation offsets against the completion criteria of the Rehabilitation and Vegetation Offset Management Plan, to the satisfaction of the Director-General. 	<p>Yes, PF Formation advised the Director-General on 14 September 2011 of changes to the plans and no revision of vegetation offset bond is required.</p>

Project Approval Schedule 5 Environmental Management, Monitoring, Reporting and Auditing Conditions	Compliance
COMMUNITY CONSULTATIVE COMMITTEE	
<p>9. The Proponent shall establish a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in general accordance with the Department's <i>Guideline for Establishing and Operating Community Consultative Committees for Mining Projects</i>.</p> <p><i>Note: The Proponent may continue the operation of the Liaison and Review Committee established under condition 6.7 of the development consent issued by the Land and Environment Court on 14 July 1998 to fulfil this condition.</i></p>	Yes
ACCESS TO INFORMATION	
<p>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 the audits or AEMR required under this approval, the Proponent shall:</p> <p>(a) provide a copy of the relevant document/s to the relevant agencies and to members of the general public upon request; and</p> <p>(b) ensure that a copy of the relevant document/s is made publicly available on its website and at the Proponent's office.</p>	Yes
<p>11. During the project, the Proponent shall:</p> <p>(a) make a summary of monitoring results required under this approval publicly available on its website and at the site office; and</p> <p>(b) update these results on a regular basis.</p>	Yes, AEMRs also provide the results.

6.3.2 Compliance With Project Approval Statement of Commitments

Table 5 summarises whether the statement of commitments listed in the project approval are being complied with. Most of the "Yes" compliances relied on observations during the audit site inspections and the review of the environmental reference documents rather than extensive and time consuming checking of all the background paperwork. In particular the Environmental Manager's monthly checklists and annual environmental operations procedures checklists in the AEMRs provide for self-assessment and whether compliance is achieved.

Table 5 Compliance With Project Approval Statement of Commitments

Project Approval Statement of Commitments	Compliance
Noise and Vibration	
· Site activities will be managed so that any necessary high noise and vibration levels occur at times of least impact.	Yes
· All site activities will be undertaken incorporating noise attenuation measures such as restricting working hours for certain works required in the proximity of sensitive receptors.	Yes
· All equipment used on site will be certified in relation to noise performance.	Yes
· Panels and covers of silenced plant will be kept shut and plant and equipment switched off when not in use.	Yes
· All mechanical equipment will be silenced by the best practical means using current technology, prior to use. Noise suppression devices will be fitted according to manufacturer's instructions. Noise control kits will be fitted to noisy mobile equipment and shrouds provided around stationary equipment where necessary.	Yes
· All plant and equipment will be inspected regularly to ensure that it is well maintained to minimise noise emissions.	Yes

Project Approval Statement of Commitments	Compliance
· The L ₁₀ noise level at the boundary of adjacent receivers where baseline data has been obtained will not normally exceed the background level by more than 5 dB(A).	Yes
· Compliance monitoring of noise levels will be undertaken and appropriate records of measurements kept.	Yes
· The local community will be informed of the level and duration of noise to be expected during specific activities and phases of development when necessary. Communication of concerns to the Environmental Manager will be invited.	Yes
Air Quality and Greenhouse Gas Emissions	
· Ambient air quality monitoring will be conducted at identified sites.	Yes
· Dust suppression equipment will be fitted to all processing plant on the site. This will be regularly inspected and maintained in good working order at all times.	Yes
· Trafficable areas will be defined to prevent unnecessary vehicle movement into other parts of the site.	Yes
· All unsealed trafficable areas and working areas will be kept damp by spraying regularly with a water cart, water sprays or sprinklers to minimise dust emissions. Frequency of spraying to be determined based on weather conditions, soil erodibility and the observation of any visible dust.	Yes, water carts used.
· Speed controls will be applied to all unsealed areas (maximum speed of 20 km/h) and signposted accordingly.	No, maximum 20km/hour speed sign needs to be installed at site entrance.
· All semi-permanent stockpiles will be vegetated with suitable groundcover and regularly watered until the vegetation is well established.	Yes, not required to date.
· Work on any extraction activity producing dust will cease due to high winds if control cannot be achieved by watering or other means. Work will not resume until the wind velocity decreases and any dust generation can be controlled by normal means.	Yes, not required to date.
· All loaded trucks leaving the central processing plant on Lot 198 DP 752025 will have their payloads fully covered by a suitable material to prevent spillage.	Yes
· No fires will be permitted on-site without a permit.	Yes
· A mechanical road sweeping unit and water cart will be maintained for use as required to keep all roads including the intersection of the haul road and Wisemans Ferry Road free from deposited material.	Yes, but one complaint received.
· Exhausts from all vehicles and plant/equipment will be inspected to ensure that they are maintained at an acceptable level.	Yes
· All vehicles will be regularly serviced to ensure that exhaust emissions comply with the regulations. Appropriate service records will be maintained.	Yes
· Any opportunities to minimise machinery use and ensure that all equipment used on the site is energy efficient will be identified.	Yes
Access and Traffic	
· If the sand slurry plant and transport system is unusable due to breakdown or during maintenance periods, trucks will be used for the transport of extractive material on a temporary basis. This will cease once the system is operating satisfactorily.	Yes, not required to date.

Project Approval Statement of Commitments	Compliance
· The number of laden vehicle movements will not exceed a combined total of two hundred per day via the intersection of the haulage road and Wisemans Ferry Road. This is the total of laden vehicle movements allowed for PF Formation's combined extractive industry operations in Baulkham Hills Shire.	Yes
· Operations involving the transportation of material on the site will only be undertaken between 07.00 and 18.00 hours, Monday to Saturday, except a maximum of 10 laden vehicles will be allowed to enter and leave the site between 06.00 and 07.00 hours, Monday to Saturday only. Vehicles will not be allowed to arrive at the site prior to 05.45 hours on any day.	Partial, some trucks just before 6am and more than 10 trucks before 7am.
Erosion and Sediment Control	
· Soil and Water Management Plan will be reviewed and revised, if required.	Noted
· Temporary erosion and sedimentation control structures such as detention basins and catch drains will be constructed as appropriate to collect runoff from cleared land including extraction areas and access roads.	Yes
· Silt traps and erosion control fencing will be erected as appropriate along extraction area boundaries and drainage lines.	Yes
· Sediment basins with a minimum storage capacity of 400 m ³ per hectare of catchment will be constructed. Spillway capacity and stability will be designed as follows: - life of less than 5 years, adopt the 20 year time of concentration event; - life between 5 and 10 years, adopt the 50 year time of concentration event; and - life greater than 10 years, adopt the 100 year time of concentration event.	Noted
· Stormwater control measures will be assessed and routine inspections conducted to ensure that compliance with best practice guidelines and relevant legislation is achieved.	Yes
· Locations for topsoil and material stockpiles will be selected on level ground and away from drainage lines. Diversion drains and sediment filter fences will be installed up slope as appropriate.	Yes
· Training will be provided to operational personnel on the importance of erosion control measures and drivers informed of the damage that can be caused to the environment by heavy vehicles.	Yes
· Areas of exposed land will be kept to a minimum compatible with operational requirements.	Yes
· Exposed areas not in use will be stabilized with an appropriate cover crop and watered until well established.	Noted
· Erosion and sediment controls will be monitored regularly and immediately following a rainfall event. Monitoring will take place initially on a weekly basis, then monthly once operating correctly. Sediment will be cleared when the traps have collected 60% of the capacity of the basin or where sediment build-up is less than 300 mm below the spillway crest. Sediment will be removed to a location where further pollution to downslope lands and waterways will not occur.	Yes
· Maintenance of erosion and sediment controls will be undertaken when any deterioration is identified or when replacement is necessary.	Yes
· Stored stormwater will be reused for dust control and the watering of site vegetation.	Yes
· Soil stockpiles will be seeded where these are to remain unused for a period in excess of four weeks. The area will be watered until the vegetation is well established.	Noted

Project Approval Statement of Commitments	Compliance
Water Management	
<ul style="list-style-type: none"> Maximum depth of extraction will be restricted to not less than two metres above the wet weather high groundwater level (nominally 181 m AHD). 	<p>Yes, maximum depth of extraction at April 2014 was 186m AHD.</p>
<ul style="list-style-type: none"> The groundwater will not be breached or contaminated. In the event that either should occur, operations will cease in the affected area and the Department of Environment and Climate Change consulted to determine the basis on which extraction may recommence. 	<p>Yes, no breaches or contamination to date.</p>
<ul style="list-style-type: none"> Retention basins will be designed to accommodate the 100-year time of concentration event. The minimum basin capacities are: <ul style="list-style-type: none"> Northern catchment 10,000 m³ Southern catchment 38,000 m³ <p>The volume of these basins can be varied depending on the extent of the area exposed for extraction within each catchment.</p>	<p>Noted, although revised and endorsed Environmental Strategy nominates 7,800 m³ northern catchment and 19,400 m³ southern catchment.</p>
<ul style="list-style-type: none"> All retention basins will be regularly inspected and an annual report prepared on their effectiveness. 	<p>No, annual reports not prepared to date.</p>
<ul style="list-style-type: none"> A minimum of two groundwater monitoring bores will be installed. One will be located within or near the extraction area and another at some location within the site beyond the area of any direct extraction influence. The location of these bores will meet the requirements of the Department of Environment and Conservation and Baulkham Hills Shire Council. 	<p>Yes</p>
Flora and Fauna	
<ul style="list-style-type: none"> All areas which are not to be disturbed will be clearly marked. 	<p>No, all buffer areas need to be clearly marked.</p>
<ul style="list-style-type: none"> Topsoil will be separated and stored or use in rehabilitation works. 	<p>Yes</p>
<ul style="list-style-type: none"> An area of not less than 12 hectares will be identified, and indicated on the site survey. This will be identified as a revegetation area and access controlled. 	<p>Yes, shown in revised site survey.</p>
<ul style="list-style-type: none"> Seed will be collected from the existing woodland communities (Sydney Hinterland Transition Woodland), stored under controlled conditions, made available for future broadcasting and a suitable proportion propagated to provide tube stock for revegetation. 	<p>Yes</p>
<ul style="list-style-type: none"> Stored topsoil and that derived from suitable areas adjacent to the woodland communities will be spread over the defined revegetation area and seed broadcast over the site to augment the soil-borne native seed bank. Tube stock suitably protected against animal predation will also be used in appropriate locations. 	<p>Noted, topsoil is stockpiled on-site.</p>

Project Approval Statement of Commitments	Compliance
· Access to bushland will be restricted to minimise the potential for damage. These areas will be marked and signs erected to ensure that this prohibition is made clear. The boundary of the site will be fenced to prevent external access.	Yes
Rehabilitation	
· The Rehabilitation Plan will be reviewed and amended as necessary to reflect changing operational conditions. This will include a revised phasing plan and implementation programme.	Noted, not required to date.
· Setbacks to all roads and adjacent properties will be defined taking account of existing trees and other features. Programmes of mound construction and screen planting will be undertaken as required in the Rehabilitation Plan. All plant material used will reflect the species mix existing in the area.	Noted, not required to date.
· A staged seeding and planting programme will be undertaken as areas become available following completion of extraction and capping of sediment basins. This will be aimed at producing a dense plantation on the steeper slopes derived from the flora resources already established. The aim is to replicate as far as possible the mix and density of planting which is currently present.	Noted, not required to date.
· All suitable plant material will be used on the site as a seed and planting medium. Topsoil will be stored in appropriately marked low stockpiles for reuse in locations as close as possible to their source. Care will be taken to ensure that this does not become contaminated with the seeds of exotic species and weeds.	Yes
· The site will be rehabilitated in stages leaving areas exposed for as short a time as possible. This will be undertaken in conformity with the approved Rehabilitation Plan with maximum final batter grades of 4(H):1(V) on north and west facing slopes and 3(H):1(V) on those facing south and east. Final slopes will be as gentle as possible depending on the availability of fill material.	Noted, not required to date.
· All soil stockpiles and exposed areas will be seeded with an appropriate vegetation cover where no activity is to take place for more than four weeks.	Noted, not required to date.
· Revegetation of the site will be undertaken on the following basis: - as far as possible re-establish the Sydney Hinterland Transitional Woodland using seed and mulch collected from the area; - rehabilitate other areas to native species with a light sowing of cereal and allowing natural regeneration; - rehabilitate the soil to achieve a full profile; - lime, fertilise and sow areas where improved grass cover is required; and - suitably turf surfaces expected to experience high surface flows leaving the site.	Yes, generally not required to date except for SHTW rehabilitation area.
· A maintenance programme aimed at promoting and protecting the growth of the rehabilitated areas will be established.	Yes
Social Impact Management	
· Material concerning activities at the site will be prepared and published on the company's website which will allow the community and others to be informed about current news on the site.	Yes
· Regular bi-annual meetings of community representatives will be established to discuss issues in relation to sand extraction on the site.	Yes
· A Complaints Register will be established incorporating date and time, type of communication, contact details of the complainant, nature of the complaint and response taken.	Yes

Project Approval Statement of Commitments	Compliance
Heritage	
· All work will cease in the area if an archaeological or heritage item is identified during extraction operations and the National Parks and Wildlife Service, the Deerubbin Aboriginal Land Council or the Heritage Office consulted to determine any appropriate course of action prior to recommencement of the work.	Noted, no items identified to date.
· Any additional survey work required for submittal of application to destroy artefact scatters located in the later stages of the development will be undertaken. Reasonable requirements of the National Parks and Wildlife Service (DECC), the Deerubbin Aboriginal Land Council and the Heritage Office arising out of any additional studies will be implemented.	Noted, not required to date.
Visual Amenity	
· Peripheral bunds will be constructed within the established setbacks where necessary to screen extraction activities. These will be a minimum of three metres high with slopes ranging from 3(H):1(V) to 6(H):1(V) depending on the location using overburden stripped from the site.	Yes, except a complete vegetated bund needs to be established along the Hitchcock Road boundary.
· Screen planting works will be undertaken in the peripheral areas to an agreed specification using mulch to allow for native plant regeneration. This species mix will be reinforced using appropriate plantings at specified intervals.	Yes
· A tree planting programme will be undertaken within the ten metre buffer zones and in other defined parts of the site to establish a dense plantation using an appropriate mix of species reflecting that of the existing community.	Yes, generally not required to date except for a portion of The Northern Road frontage.
· The final rehabilitated landform will be established in conformity with the Rehabilitation Plan.	Noted, not required to date.
· All temporary fencing will be removed when no longer required.	Noted, not required to date.
· Vegetation in areas suitable for agricultural/horticultural uses will be re-established.	Noted, not required to date.
· All site infrastructure including the slurry plant and its associated pipelines will be removed. Those areas affected by the plant will be restored and rehabilitated.	Noted, not required to date.
· All waste materials will be removed and disposed of in an appropriate manner.	Noted, not required to date.
· The final Rehabilitation Plan will be reviewed and proposals for future use of the site prepared.	Noted, not required to date.
Waste Management	
· Waste handling areas will be clearly delineated.	Yes

Project Approval Statement of Commitments	Compliance
· Specific areas for the collection of materials for reuse and recycling will be defined and clearly labelled.	Yes
· Cleared vegetation will be used within the landscape programme.	Yes
· All topsoil will be stored in stockpiles for later use in site rehabilitation.	Yes
· Bins or skips will be provided for the collection and storage of recyclable material and waste. General construction waste will be stored in a skip located at the workshop on Lot 198 DP752025. Waste food will be removed and stored in a vermin proof bin for collection by a waste contractor. Paper waste generated from site offices, plastics and glass will be collected separately for recycling.	Yes
· Hazardous wastes (including empty drums, rags, soil contaminated with oil) will be separated from nonhazardous wastes and managed in accordance with the relevant legislation.	Yes
· Liquid wastes (chemicals, oils and greases) will be temporarily stored in an appropriately bunded area and disposed of via a licensed contractor. Wash down water will be directed to an appropriate settlement basin if quality is acceptable.	Yes
· Copies of current licences of all waste removal contractors on site will be retained.	Yes
· All documentation relating to waste removal and disposal will be retained on file at the site. This documentation will include dockets for the removal and disposal of waste at a licensed facility.	Yes
· Waste material will be progressively separated and stockpiled in designated areas for collection. Adequately secure waste disposal areas to prevent access by wildlife.	Yes
· All waste licences will be reviewed and terms and conditions for compliance monitored.	Yes
· Any materials and waste remaining on the site following completion of extraction operations will be recycled or sent for disposal. This will be either recycled or disposed of in an appropriate manner.	Noted, not required to date.
Emergency Response	
· All personnel on site during operations will be trained in appropriate procedures including site induction, materials handling and response procedures.	Yes
· Emergency response procedures will be developed and put in place. Appropriate individuals will be appointed as emergency services liaison officers.	Yes
· An emergency response table listing contact details of all relevant parties required in an environmental emergency will be prepared.	Yes, but needs revision.
· A Register of Environmentally Hazardous Materials to be stored and used on site will be established.	Yes, but needs revision.
· Appropriate safety and spill response equipment will be made available on site.	Yes
· All materials to be used and stored on site will be clearly labelled.	Yes
· Emergency response procedures will be reviewed and updated bi-annually.	Yes
· Appropriate safety and response equipment will be available at all times.	Yes
Hazard, Risk and Safety	
· A licence to keep dangerous goods will be obtained from WorkCover NSW for	Noted, not

Project Approval Statement of Commitments	Compliance
all materials stored on site which require licensing.	required.
· A Register of Hazardous Materials setting out details of quantities, storage and specific handling requirements for all relevant materials stored on site will be established.	Yes, but needs revision.
· Material Safety Data Sheets for all hazardous materials stored on site will be obtained.	Yes
· Appropriate storage and secondary containment facilities for all hazardous materials stored on site will be provided. All bunded areas will be designed to contain at least 110% of the volume of materials stored within the area.	Yes.
· A Safety Officer will be appointed for the development.	Yes
· All flammable material storage areas will be located at least ten metres from possible ignition sources.	Yes
· Contents of all above ground storage areas will be clearly labelled.	Yes
· All hazardous and dangerous goods storage areas will be secured and appropriate signage displayed. All incompatible material will be segregated.	Yes
· All personnel will be trained in the handling and safety procedures required for the hazardous materials stored and used on site.	Yes
· An Emergency Response Plan will be developed and put in place.	Yes, an EPA approved pollution incident response management plan is in place but needs revising.
· A mobile spill control kit containing appropriate absorbent materials, neutralising chemicals and other spill containment equipment will be provided.	Yes
· Personal protective equipment will be provided and personnel instructed in its use.	Yes
· Any spills beyond the bunded area will be cleaned up immediately and the contaminated material disposed of in an appropriate manner.	Yes
· The relevant authorities will be contacted in the event of a leak or spill and any instructions followed. Any contamination will be remediated to the satisfaction of the regulatory authorities.	Noted, not required to date.
· Any spills or hazardous wastes that cannot be recycled will be collected and disposal by a licensed waste contractor arranged. All records of waste removal on site will be retained.	Yes

6.3.3 Compliance With Environment Protection Licence Conditions

Table 6 summarises whether the Environment Protection Licence number 3407 conditions are being complied with. The licence covers all PF Formation operations within The Hills Shire and includes lands in addition to the Hitchcock Road Sand Project. It is noted that the requirement for Tapering Element Oscillating Microbalance air quality monitoring near Maroota Public School and referenced in the Air Quality Monitoring Program was deleted from the Environment Protection Licence conditions. In February 2011 the licence was also varied by deleting the condition that a traffic noise management strategy be developed and implemented. The next review date for the Environment Protection Licence is 5 May 2016.

Table 6 Compliance With Environment Protection Licence Conditions

Compliance With Environment Protection Licence Conditions				Compliance
Administrative conditions				
This licence authorises the carrying out of the scheduled activities listed below at the premises specified (Etra Pty Ltd, Wisemans Ferry Road, Maroota). The activities are listed according to their scheduled activity classification (extractive activities including concrete works), fee-based activity classification (land-based extractive activity) and the scale of the operation (100,000 – 500,000 tonnes).				Yes
Discharges to air and water and applications to land				
The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.				Yes
Air				
EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Description of Location	
1	Dust monitoring		Dust gauge labelled "1- School" on the Map faxed to the EPA on 5 August 2002	
2	Dust monitoring		Dust gauge labelled 2 - intersection of Hitchcock and Wisemans Ferry Road	
3	Dust monitoring		Dust gauge labelled as "Jurds Paddock - 3 Por168" on the map faxed to the EPA on 5 August 2002	
Limit conditions - Pollution of Waters				
Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.				Noted
Limit conditions - Waste				
The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.				Yes, no waste accepted to date.
This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if those activities require an environment protection licence.				Noted

Compliance With Environment Protection Licence Conditions	Compliance																				
Limit conditions - Noise Limits																					
<p>Noise generated at the premises must not exceed the noise limits presented in the table below. Note that the noise limits represent the noise contribution from the activity on the premise.</p> <p style="text-align: center;">Noise Limits (dB(A))</p> <table><tr><th>Location</th><th>Day</th><th colspan="2">Night</th></tr><tr><td></td><td>L_{Aeq}(15 minute)</td><td>L_{Aeq}(15 minute)</td><td>L_{A1}(1 minute)</td></tr><tr><td>Maroota Public School</td><td>40</td><td>NA</td><td>NA</td></tr><tr><td>Pignataro</td><td>40</td><td>37</td><td>52</td></tr><tr><td>Tornatola</td><td>39</td><td>38</td><td>52</td></tr></table> <p>For the purposes of the above condition:</p> <ul style="list-style-type: none">• Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public holidays.• Evening is defined as the period 6pm to 10pm,• Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.	Location	Day	Night			L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)	Maroota Public School	40	NA	NA	Pignataro	40	37	52	Tornatola	39	38	52	<p>Yes</p> <p>Noted</p>
Location	Day	Night																			
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)																		
Maroota Public School	40	NA	NA																		
Pignataro	40	37	52																		
Tornatola	39	38	52																		
<p>Noise from the premises is to be measured at the most affected point or within the residential boundary or at the most affected point within 30m of the dwelling (rural situations) where the dwelling is more than 30m from the boundary to determine compliance with the noise L_{Aeq,(15min)} limits in the above condition.</p> <p>Noise from the premises is to be measured at 1m from the dwelling façade to determine compliance with the L_{A1(1 minute)} noise limits in the above condition.</p> <p>Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy.</p> <p>The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.</p>	<p>Noted</p>																				
<p>The noise emission limits identified above apply for prevailing meteorological conditions (winds up to 3m/s at 10 metres above ground level), temperature inversion conditions of up to 3°C/100m and wind speed up to 2m/s at 10 metres above the ground. Noise impacts that may be enhanced by temperature inversions must be addressed by:</p> <ul style="list-style-type: none">• documenting noise complaints received to identify any higher level of impacts or patterns of temperature inversions;• where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts under temperature inversion conditions should be developed and implemented.	<p>Noted</p>																				
<p>The proponent shall prepare and implement a Noise Management Plan (NMP). The NMP must include but need not be limited to:</p> <p>a) The primary objective of minimising noise emissions from the premises</p> <p>b) A system that allows for periodic assessment of Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) to minimise noise emissions at all times and to seek to achieve noise contributions not exceeding the Project Specific Noise Levels at all receiver locations.</p> <p>c) Measures to monitor noise performance and respond to complaints.</p>	<p>Yes</p>																				

Compliance With Environment Protection Licence Conditions	Compliance
Limit conditions – Hours of Operation	
Activities covered by this licence must only be carried out between the hours of 0600 and 1800 Monday to Friday, and 0600 and 1800 Saturday, and at no time on Sundays and Public Holidays.	Yes generally, but some transport of product just before 6am.
Operating conditions	
Licensed activities must be carried out in a competent manner. This includes: (a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and (b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	Yes
All plant and equipment installed at the premises or used in connection with the licensed activity: (a) must be maintained in a proper and efficient condition; and (b) must be operated in a proper and efficient manner.	Yes
The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	Yes
All loaded trucks entering and leaving the premises must have their loads covered.	Yes
The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.	Yes
Monitoring and recording conditions	
The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.	Yes
All records required to be kept by this licence must be: (a) in a legible form, or in a form that can readily be reduced to a legible form; (b) kept for at least 4 years after the monitoring or event to which they relate took place; and (c) produced in a legible form to any authorised officer of the EPA who asks to see them.	Yes
The following records must be kept in respect of any samples required to be collected for the purposes of this licence: (a) the date(s) on which the sample was taken; (b) the time(s) at which the sample was collected; (c) the point at which the sample was taken; and (d) the name of the person who collected the sample.	Yes

Compliance With Environment Protection Licence Conditions	Compliance																								
<p>For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:</p> <p style="text-align: center;"><i>Air</i></p> <p>POINT 1</p> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Particulates - Deposited Matter</td><td>grams per square metre per month</td><td>Monthly</td><td>AM-19</td></tr></table> <p>POINT 2</p> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Particulates - Deposited Matter</td><td>grams per square metre per month</td><td>Monthly</td><td>AM-19</td></tr></table> <p>POINT 3</p> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Particulates - Deposited Matter</td><td>grams per square metre per month</td><td>Monthly</td><td>AM-19</td></tr></table>	Pollutant	Units of measure	Frequency	Sampling Method	Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19	Pollutant	Units of measure	Frequency	Sampling Method	Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19	Pollutant	Units of measure	Frequency	Sampling Method	Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19	Yes
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Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19																						
<p>Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:</p> <p>(a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or</p> <p>(b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or</p> <p>(c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.</p>	Yes																								
<p>The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.</p>	Yes																								
<p>The record must include details of the following:</p> <p>(a) the date and time of the complaint;</p> <p>(b) the method by which the complaint was made;</p> <p>(c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;</p> <p>(d) the nature of the complaint;</p> <p>(e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and</p> <p>(f) if no action was taken by the licensee, the reasons why no action was taken.</p>	Yes, however the 24 April 2012 complaint was not recorded in the 2012-2013 EPA Annual Return.																								
<p>The record of a complaint must be kept for at least 4 years after the complaint was made.</p>	Yes																								
<p>The record must be produced to any authorised officer of the EPA who asks to see them.</p>	Noted																								
<p>The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.</p>	Yes																								

Compliance With Environment Protection Licence Conditions	Compliance
The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	Yes
The conditions above do not apply until 3 months after: (a) the date of the issue of this licence or (b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.	Noted
Reporting conditions	
The licensee must complete and supply to the EPA an Annual Return in the approved form comprising: (a) a Statement of Compliance; and (b) a Monitoring and Complaints Summary.	Yes
An Annual Return must be prepared in respect of each reporting period, except as provided below.	Yes
Where this licence is transferred from the licensee to a new licensee: (a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and (b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.	Noted
Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on: (a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or (b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.	Noted
The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').	Yes
The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.	Yes
Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by: (a) the licence holder; or (b) by a person approved in writing by the EPA to sign on behalf of the licence holder.	Yes
A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.	Noted
Notifications must be made by telephoning the Environment Line service on 131 555.	Noted
The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.	Noted

Compliance With Environment Protection Licence Conditions				Compliance
Where an authorised officer of the EPA suspects on reasonable grounds that: (a) where this licence applies to premises, an event has occurred at the premises; or (b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.				Noted
The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.				Noted
The request may require a report which includes any or all of the following information: (a) the cause, time and duration of the event; (b) the type, volume and concentration of every pollutant discharged as a result of the event; (c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event; (d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort; (e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants; (f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and (g) any other relevant matters.				Noted
The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.				Noted
General conditions				
A copy of this licence must be kept at the premises to which the licence applies.				Yes
The licence must be produced to any authorised officer of the EPA who asks to see it.				Noted
The licence must be available for inspection by any employee or agent of the licensee working at the premises.				Yes
Pollution studies and reduction programs				
Completed Pollution Reduction Programs (PRP)				Noted
PRP No	PRP	Description	Completed Date	
1	Impervious bunded area to fuel storage tank	The bunded area serving the above ground fuel storage tank located outside the main workshop made impervious	1 May 2008	
2	Roofed bunded area to fuel storage tank	The bunded area serving the above ground fuel storage tank located outside the main workshop fitted with roof to exclude rainwater	1 May 2008	
3	Upgrade overflow point of sediment dam	The overflow point to the sediment dam upgraded	1 May 2008	
4	Prevent mud tracking from premises	Upgraded controls to help prevent mud tracking from the premises onto Wiseman's Ferry Road	1 May 2008	
5	PM10 dust monitoring	PM10 dust monitoring conducted from 1 March 2008 to 1 March 2009	1 March 2009	

6.4 Review the Adequacy of Any Strategy/Plan/Program Required Under This Approval, and, if Necessary, Recommend Measures or Actions to Improve the Environmental Performance of the Project, and/or Any Strategy/Plan/Program Required Under This Approval.

The Environmental Strategy and associated Noise Management Plan, Air Quality Monitoring Program, Water Management Plan and Landscape Management Plan for the project were originally approved by the Department of Planning on 8 July 2009. All of these documents were revised by PF Formation in September 2011 and approved by the Department of Planning & Infrastructure on 15 November 2011.

6.4.1 Environmental Strategy

The Environmental Strategy approved by the Department of Planning & Infrastructure on 15 November 2011 is adequate, appropriate and satisfactory to date. However, it is noted that some of the terminology in the Environmental Strategy needs updating again, such as the new names of NSW government departments, new legislation, updated emergency response management, revised Australian Standards and new references.

6.4.2 Noise Management Plan

The Noise Management Plan approved by the Department of Planning & Infrastructure on 15 November 2011 is adequate, appropriate and satisfactory to date subject to the following corrective action.

With the consent of the Department of Planning and Environment or a Section 96 modification and as in the approved Noise Management Plan only the three closest noise assessment locations to the project being R3 Jurd, R5 Pignataro, R10 Tornatola plus R7 Maroota Public School need to be monitored. These four noise assessment locations have been monitored for over 10 years by PF Formation. R5 Pignataro, R10 Tornatola and R7 Maroota Public School are premises that have noise emission limits specified in the Environment Protection Licence. Additional monitoring points described in project approval schedule 3 condition 5 are located further away from the project, are subject to noise from other sand extraction operations and do not contribute any meaningful data to noise impact assessments for the project site.

6.4.3 Air Quality Monitoring Program

The Air Quality Monitoring Program approved by the Department of Planning & Infrastructure on 15 November 2011 is adequate, appropriate and satisfactory to date.

6.4.4 Water Management Plan

The Water Management Plan approved by the Department of Planning & Infrastructure on 15 November 2011 is adequate, appropriate and satisfactory to date.

6.4.5 Landscape Management Plan

The Landscape Management Plan approved by the Department of Planning & Infrastructure on 15 November 2011 is adequate, appropriate and satisfactory to date.

6.4.6 Annual Environmental Management Reports for 2010-2011, 2011-2012 and 2012-2013

The three AEMRs include the following.

- Identify the standards and performance measures that apply to the project.
- Describe the works that will be carried out in the next 12 months.
- A summary of the complaints received during the past year and compares this to complaints received in previous years.

- A summary of the monitoring results for the project during the past year to 30 June.
- An analysis of these results against the relevant impact assessment criteria/limits, monitoring results from previous years and predictions in the EA.
- Identify any trends in the monitoring results over the life of the project.
- Identify any non-compliance during the previous year.
- Describe what actions were, or are being, taken to ensure compliance.

Signed monthly and annual checklists based on the Environmental Strategy, actions and management controls are included in the AEMRs. The Environmental Strategy nominates the Environmental Manager (Mr Joshua Graham) and Quarry Manager (Mr Peter Watts also the Site Manager) as responsible for implementing the Environmental Strategy. As at April 2014 Mr Joshua Graham is also the Operations Manager.

The 2012-2013, 2011-2012 and 2010-2011 AEMPs all noted *“All monitoring indicated that quarry operations were within any defined limits and no indicators of new potential issues were identified. From the procedures conducted there are no trends identified as yet and no areas of non-compliance.”* In addition, the 2012-2013 AEMP noted that due to approval to clear the Sydney Hinterland Transition Woodland area that the final landform for rehabilitation of the site will be based on Strategy A from the planning approval documents.

There was general compliance with the monitoring conditions.

The AEMRs are adequate, appropriate and satisfactory to date subject to the following corrective actions in future.

- Annual reports on the effectiveness of the retention basins need to be produced and included in the AEMRs.
- As required, the AEMRs do not include copies of the standard form for annual production data produced for the Department of Primary Industries.
- The monthly operational checklists in the AEMPs need more complete heading descriptors for the first three columns. For example, first column Environmental Strategy Appendix, second column Environmental Strategy Actions and page numbers (which need revising), and third column a fuller description of the environmental strategy management controls.

7. Audit Conclusions

Full cooperation was obtained from PF Formation staff during the audit with full access granted to records and copies made of records if requested. No obstacles were encountered during the audit and subsequent queries. Based on the audit findings the audit conclusions are as follows.

Based on completion of the environmental audit tasks (section 3), audit evidence and environmental monitoring results (section 4), consultation with agencies (section 5) and assessment of the compliance tables and audit findings (section 6) the environmental performance of the sand project is satisfactory with some non-compliances. The project is generally complying with the relevant standards, performance measures and statutory requirements including project approval conditions, project approval commitments and Environment Protection Licence conditions with some non-compliances that can be rectified. There is a need to improve on some environmental commitments and record keeping.

The effects of the Hitchcock Road sand project on the surrounding environment appear to be relatively minor and generally localised within the confines of the project area, nevertheless acceptable and manageable with some improvements and corrective actions needed. This assumes that all environmental management measures continue to be implemented by PF Formation.

All strategies/plans/programs required under the project approval to date are adequate with some corrective actions proposed.

There is nothing confidential in this audit report and it can be distributed as required.

8. Audit Recommendations

Based on the results of the audit, it is recommended that the following corrective actions, in no particular order or priority, be implemented by PF Formation generally within three months after assessment by the Department of Planning and Environment so that operations of the project comply with all of the project approval conditions, project approval statement of commitments and Environment Protection Licence conditions. This will help reduce any potential adverse environmental impacts of operations, improve the environmental performance of the project and reduce the risk of any third party environmental action.

1. The Environmental Strategy needs to be updated including the date of publication, new names of NSW government departments, new legislation, updated emergency response management, revised Australian Standards and references. The revised documents should then be made available on the PF Formation website.
2. All AEMPs need to include the EPA annual returns.
3. Annual reports on the effectiveness of the retention basins need to be produced and included in the AEMRs.
4. The monthly operational checklists in the AEMPs need more complete heading descriptors for the first three columns.
5. Modified copies of the annual production data produced for the Department of Primary Industries using the standard form for that purpose need to be included in the AEMRs. With the consent of the Department of Planning and Environment and to avoid disclosure of commercially sensitive information to the public and competitors, production data should be provided in 100,000 tonne bands in the AEMRs. Alternatively a Section 96 modification could be made to amend this consent condition.
6. The Complaints Register needs to be recorded in full in response to any complaints on the project and any corrective actions undertaken.
7. With the consent of the Department of Planning and Environment only the three closest noise assessment locations to the project being R3 Jurd, R5 Pignataro, R10 Tornatola plus R7 Maroota Public School need be monitored in future. Alternatively a Section 96 modification could be made to amend this consent condition.
8. The EPA approved pollution incident response management plan needs updating (on page 11) to include telephone contacts for all authorities and inclusion of Attachment A Hazardous Substances Register, Attachment B Emergency Procedure and Attachment C Site Plans/Map. PF Formation should consider including landslip or land stability as an additional hazard to be considered in the plan. The revised plan then needs to be made available on the PF Formation website.
9. Procedures must be improved so that the site operations including truck movements and use of the weigh bridge do not commence before 6am and that no more than 10 laden trucks enter and leave the site between 6am and 7am.
10. The Hazardous Substance Register needs revision to include only hazardous substances.
11. At the site entrance on Wisemans Ferry Road a 20km/hour speed limit sign needs to be installed.
12. A 3m high peripheral bund planted with screening vegetation needs to be fully established all along and 30m away from the Hitchcock Road boundary to improve visual amenity.

After consideration of the audit recommendations by PF Formation and endorsement by the Department of Planning and Environment, implementation of the audit recommendations should be verified in the next AEMR for the project.

Appendix 1
Project Approval 06_0104

Project Approval

Section 75J of the *Environmental Planning and Assessment Act 1979*

I approve the project referred to in Schedule 1, subject to the conditions set out in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for on-going environmental management of the project.

Hon Kristina Keneally MP
Minister for Planning

Sydney

2009

SCHEDULE 1

Project Application:

06_0104

Proponent:

PF Formation

Approval Authority:

Minister for Planning

Land:

See Appendix 1

Project:

Hitchcock Road Sand Project

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DEFINITIONS

AEMR	Annual Environmental Management Report
Council	The Hills Shire Council
Day	The period from 7.00am to 6.00pm on Monday to Saturday, and 8.00am to 6.00pm on Sundays and Public Holidays
DECC	Department of Environment and Climate Change
Department	Department of Planning
Director-General	Director-General of the Department of Planning, or delegate
DPI	Department of Primary Industries
DWE	Department of Water and Energy
EA	Environmental Assessment for the project titled <i>Hitchcock Road Sand Extraction and Rehabilitation Project Environmental Assessment and Appendices</i> (3 volumes), dated November 2007, prepared by DFA Consultants, including the response to submissions and preferred project report
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence issued under the <i>Protection of the Environment Operations Act 1997</i>
Evening	The period from 6.00pm to 10.00pm
Extraction Area	The land described as the extraction area in Appendix 1
Land	Land means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Minister	Minister for Planning, or delegate
Night	The period from 10.00pm to 7.00am on Monday to Saturday, and 10.00pm to 8.00am on Sundays and Public Holidays
Privately owned land	Land not owned by a public agency or the Proponent or its related companies
Preferred Project Report	The Proponent's Preferred Project Report dated September 2008, prepared by DFA Consultants, as modified in the Proponent's email to the Department of 18 November 2008
Project	The development as described in the EA
Proponent	PF Formation, or its successors in title
Response to Submissions	The Proponent's response to issues raised in submissions, dated March 2008, prepared by DFA Consultants, and subsequent submissions to the Department dated 27 August 2008
RTA	Roads and Traffic Authority
SHTW	Sydney Hinterland Transition Woodland
Site	Land to which the project application applies
Statement of Commitments	The Proponent's commitments in Appendix 3
Strategy A, Strategy B	The alternative rehabilitation proposals described in the preferred project report
Vegetation Offset	The conservation and enhancement program described in the preferred project report, to occur on the land shown on the plan in Appendix 5
VENM	Virgin Excavated Natural Material, as defined in the <i>Protection of the Environment Operations Act 1997</i>

SCHEDULE 2 ADMINISTRATIVE

Obligation to Minimise Harm to the Environment

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

Terms of Approval

2. The Proponent shall carry out the project generally in accordance with the:
 - (a) EA;
 - (b) preferred project report;
 - (c) statement of commitments; and
 - (d) conditions of this approval.

Notes:

- The layout of the project is shown in the figure in Appendix 2; and
- The statement of commitments is included in Appendix 3.

3. If there is any inconsistency between the above:
 - (a) the preferred project report shall prevail over the EA;
 - (b) the conditions of this approval shall prevail generally, to the extent of the inconsistency.
4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
 - (a) any reports, plans, programs or correspondence that are submitted in accordance with the conditions of this approval; and
 - (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.

Existing Sand Mining Consent

5. Subject to an agreement in accordance with condition 7 below, the Proponent may accept material extracted from Lot 2 DP 555184 and Lot 1 DP 34599 in accordance with the development consent issued by the Land and Environment Court on 14 July 1998 to be transported across the site and to the slurry plant on Lot 1 DP 570966 via the slurry pipeline and processed on Lot 198 DP 752025.

Limits on Approval

6. Extraction and processing operations may take place until 30 November 2028.

Note: Under this approval, the Proponent is required to rehabilitate the site and provide offsets to the satisfaction of the Director-General. Consequently this approval will continue to apply in all other respects other than the right to conduct extraction and processing operations until the site has been rehabilitated and the offset provided to a satisfactory standard.

7. The quantity of processed material produced at the site, together with material produced on Lot 2 DP 555184 and Lot 1 DP 34599 in accordance with the development consent issued by the Land and Environment Court on 14 July 1998, shall not exceed 400,000 tonnes a year.

Prior to the commencement of any processing of extractive material (under the above consent) from activities on Lot 2 DP 555184 or Lot 1 DP 34599, the Proponent shall demonstrate, to the satisfaction of the Director-General, that it has reached an agreement with the owners of those Lots regarding the proportion of the extraction limit as it applies to each Lot.

8. The Proponent shall restrict total laden truck movements associated with the project to:
 - (a) 200 per day, for the Proponent's combined operations at Maroota;
 - (b) 20 per day, for trucks importing VENM to the site; and
 - (c) 10 per day, for trucks entering/exiting the site between 6.00am and 7.00am.

Note: For the avoidance of doubt, 200 is the maximum laden truck movement volume allowed on any one day, including the VENM and early morning truck movements.

9. The Proponent shall not undertake any extraction within 2 metres of the established wet weather groundwater level.

Note: The wet weather groundwater level shall be established in accordance with condition 3 of Schedule 3.

10. The Proponent shall not disturb any SHTW vegetation (as shown on the plan in Appendix 5) on site without the prior written approval of the Director-General. In seeking this approval the Proponent shall demonstrate, to the satisfaction of the Director-General, that it has established at least 3.7 hectares of SHTW on the site, to a standard that meets the criteria in Appendix 6.

Note: This demonstration must include an assessment by a suitably qualified and independent ecologist.

Management Plans / Monitoring Programs

11. With the approval of the Director-General, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis.

Demolition

12. The Proponent shall ensure that all demolition work is carried out in accordance with AS 2601-2001: *The Demolition of Structures*, or its latest version.

Protection of Public Infrastructure

13. The Proponent shall:
 - (a) repair, or pay all reasonable costs associated with repairing, any public infrastructure that is damaged by the project; and
 - (b) relocate, or pay all reasonable costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.

Operation of Plant and Equipment

14. The Proponent shall ensure that all plant and equipment used at the site is:
 - (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient condition.

Crown Land

15. The Proponent shall not commence any development authorised by this approval on Crown land without the prior approval of the Department of Lands.

Section 94 Contributions

16. The Proponent shall pay a monthly contribution to the Council for the upgrade and maintenance of roads in accordance with Baulkham Hills Shire Council's section 94 plan in force at the date of this approval.

SCHEDULE 3 ENVIRONMENTAL PERFORMANCE

GENERAL EXTRACTION AND PROCESSING PROVISIONS

Identification of Boundaries

1. Within 3 months of the date of this approval, or as otherwise agreed by the Director-General, the Proponent shall:
 - (a) engage an independent registered surveyor to survey the boundaries of the approved limit of extraction and the approved ancillary work areas;
 - (b) submit a survey plan of these boundaries to the Director-General; and
 - (c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

Note: The limit of extraction and ancillary areas is shown conceptually on the layout plans in Appendix 2, as amended/clarified by the conditions below.

General Limits of Extraction

2. Notwithstanding the layout plans in Appendix 2, the Proponent shall not undertake extraction within:
 - (a) 30 metres of Hitchcock Road; and
 - (b) 10 metres of the property boundary of Lot 2 DP 555184, unless sand extraction has commenced on that lot, and extraction in this buffer has been agreed by the Director-General.

Maximum Extraction Depth Map

3. The Proponent shall:
 - (a) establish the wet weather groundwater level for the site based on all available (and at least 12 months) site specific groundwater monitoring data;
 - (b) engage a suitably qualified and experienced expert to establish the maximum extraction depths to which extraction can be undertaken on site, to comply with condition 9 of Schedule 2;
 - (c) submit a Maximum Extraction Depth Map (contour map or similar) for the project to the Director-General within 3 months of the date of this approval; and
 - (d) comply with the extraction depths specified in the map, to the satisfaction of the Director-General.
4. Within 3 months of the completion of the Independent Environmental Audit (see condition 6 of Schedule 5), the Proponent shall review and update the Maximum Extraction Depth Map for the project to the satisfaction of the Director-General.

NOISE

Operational Noise Assessment Criteria

5. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1 at any residence or on more than 25 per cent of any privately-owned land.

Noise Assessment Location	Day	Night	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
R1 - Hammond	41	35	45
R2 – Hitchcock	40	35	45
R5 – Pignataro	42	35	45
R6 – Camilleri	40	35	45
R7 – Maroota Public School	36(L _{Aeq} (1 Hour))	N/A	N/A
R8 – Portelli	39	35	45
R9 – Young	39	35	45
R10 - Tornatola	39	35	45

Table 1: Noise Impact Assessment Criteria

Notes:

- To determine compliance with the L_{Aeq}(15 minute) noise limits, noise from the project 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. Where it can be demonstrated that direct measurement of noise from the project is impractical, alternative means of determining compliance

may be accepted (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where applicable.

- To determine compliance with the $L_{A1(1 \text{ minute})}$ limit, noise from the project is to be measured at 1 metre from the dwelling façade.
- The noise limits apply under meteorological conditions of:
 - wind speed up to 3m/s at 10m above ground level;
 - temperature inversion conditions of up to 3 degrees C/100m and wind speed up to 2m/s at 10m above the ground;
 where the wind velocity and temperature gradients are determined to be relevant to the project site in accordance with the NSW Industrial Noise Policy.
- The Director-General may relax the noise limits in Table 1 for any property where the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.
- For more information on the noise assessment locations see Appendix 4.

Cumulative Noise Criteria

- The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:
 - $L_{Aeq(11 \text{ hour})}$ 50 dB(A) – Day;
 - $L_{Aeq(4 \text{ hour})}$ 45 dB(A) – Evening; and
 - $L_{Aeq(9 \text{ hour})}$ 40 dB(A) – Night.

Operating Hours

- The Proponent shall comply with the operating hours in Table 2.

Activity	Day	Time
Construction work	Monday - Friday	7.00am to 6.00pm
	Saturday	8.00am to 1.00pm
	Sunday and Public Holidays	None
Quarrying and Processing, (inc. overburden removal)	Monday – Saturday	7.00am to 6.00pm
	Sunday and Public Holidays	None
Product Transportation	Monday – Saturday	6.00am to 6.00pm
	Sunday and Public Holidays	None
Maintenance	Monday – Saturday	7.00am to 6.00pm
	Sunday and Public Holidays	None

Table 2: Operating Hours

Notes:

- Product transportation prior to 7.00am is restricted as per condition 8 of Schedule 2.
- Maintenance activities may be conducted outside the hours in Table 2 provided that the activities are not audible at any residence beyond the boundary of the site.
- This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to DECC and the affected residents as soon as possible, or within a reasonable period in the case of emergency.

Noise Management Plan

- The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan shall:
 - be submitted to the Director-General within 3 months of the date of this approval;
 - be prepared in consultation with DECC;
 - include details of how the noise performance of the project would be monitored, and include a noise monitoring protocol for evaluating compliance with the relevant noise limits in this approval; and
 - include an investigation and assessment (including modelling) of additional reasonable and feasible noise mitigation measures that would be implemented to ensure that noise emissions at all stages of the project comply with the noise impact assessment criteria in Table 1.

Note: The EA predicted that receiver locations R5, R6, R9 and R10 would exceed the applicable noise criteria by between 2 and 5 decibels, during worst case operations.

- If the additional noise mitigation measures identified in condition 8(d) are not able to reduce noise levels to within 2 decibels of the impact assessment criteria in Table 1 then, upon receiving a written request from the applicable landowner, the Proponent shall implement additional noise mitigation

measures such as double glazing, insulation, and/or air conditioning at any residence on the land in consultation with the landowner.

These additional mitigation measures must be reasonable and feasible.

If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

AIR QUALITY

Impact Assessment Criteria

10. The Proponent shall ensure that dust generated by the project does not cause exceedances of the criteria listed in Tables 3, 4 and 5 at any residence or on more than 25 per cent of any privately owned land.

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 $\mu\text{g}/\text{m}^3$
Particulate matter < 10 μm (PM ₁₀)	Annual	30 $\mu\text{g}/\text{m}^3$

Table 3: Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 μm (PM ₁₀)	24 hour	50 $\mu\text{g}/\text{m}^3$

Table 4: Short 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 $\text{g}/\text{m}^2/\text{month}$	4 $\text{g}/\text{m}^2/\text{month}$

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 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Operating Conditions

11. The Proponent shall ensure any visible air pollution generated by the project is assessed regularly, and that quarrying operations are relocated, modified, and/or stopped as required to minimise air quality impacts on privately owned land.

Air Quality Monitoring

12. The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Director-General. This program shall:
 - (a) be submitted to the Director-General for approval within 3 months of the date of this approval;
 - (b) be prepared in consultation with DECC;
 - (c) include details of how the air quality performance of the project would be monitored, providing for additional dust deposition monitoring in the vicinity of clusters of residences to the north and west of the site; and
 - (d) include a protocol for evaluating compliance with the relevant air quality criteria in this approval.

METEOROLOGICAL MONITORING

13. The Proponent shall ensure the project has a suitable meteorological station on the site or in the immediate vicinity that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* publication.

WATER

Water Supply

14. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations to match its water supply.

Note: The Proponent is required to obtain necessary water licences for the project under the Water Act 1912 and/or Water Management Act 2000.

Discharges

15. The Proponent shall not discharge any water from the quarry or its associated operations except in accordance with an EPL.

Water Management and Monitoring

16. The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan shall:
- be submitted to the Director-General within 3 months of the date of this approval;
 - be prepared in consultation with DWE and DECC; and
 - include a:
 - Site Water Balance;
 - Erosion and Sediment Control Plan;
 - Surface Water Monitoring Program; and
 - Groundwater Monitoring Program.
17. The Site Water Balance shall:
- include details of:
 - sources and security of water supply;
 - water use on site;
 - water management on site, including the location and capacity of water storages on site and the means of access;
 - off-site water transfers; and
 - reporting procedures; and
 - investigate and describe measures to minimise water use by the project.
18. The Erosion and Sediment Control Plan shall:
- be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
 - identify activities that could cause soil erosion and generate sediment;
 - describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;
 - describe the location, function, and capacity of erosion and sediment control structures;
 - demonstrate that the design capacity of basins intended to collect storm runoff will not be compromised by storage of operational water; and
 - describe what measures would be implemented to maintain (and if necessary decommission) the structures over time.
19. The Surface Water Monitoring Program shall include:
- detailed baseline data on surface water flows and quality in downstream watercourses that could be affected by the project;
 - surface water quality and stream health assessment criteria, including trigger levels for investigating any potentially adverse surface water impacts; and
 - a program to monitor:
 - surface water flows, quality, and impacts on water users;
 - stream health; and
 - channel stability.
20. The Groundwater Monitoring Program shall include:
- provision of additional monitoring bores around the periphery of the site;
 - detailed baseline data on groundwater levels, flows and quality in the region, and particularly any groundwater bores, springs and seeps (including spring and seep fed dams) that may be affected by operations on site;
 - groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
 - a program to monitor:
 - groundwater levels and quality in new and existing monitoring bores;
 - the impacts of the project on:
 - any groundwater bores, springs and seeps (including spring and seep fed farm dams) on privately-owned land; and

- any groundwater dependent ecosystems; and
- (e) a protocol for further groundwater modelling to confirm the limits to excavation depth across the site permitted in accordance with condition 9 of Schedule 2.

LANDSCAPE MANAGEMENT

Rehabilitation

21. The Proponent shall progressively rehabilitate the site to the satisfaction of the Director-General, in a manner that is generally consistent with the concept final landform (Strategy A or Strategy B) in the preferred project report (as reproduced in Appendix 7).

Offset Strategy

22. The Proponent shall implement the Offset Strategy described in the preferred project report, and summarised in Table 6 (shown conceptually on the plan in Appendix 5), to the satisfaction of the Director-General.

Area	Minimum Size (hectares)
On-Site Revegetation Area (SHTW)	7.9
On-Site Revegetation Area (Other Woodland)	4.1
Total	12

Table 6: Offset Strategy

23. Within 3 years of the date of this approval, the Proponent shall make suitable arrangements to provide appropriate long term security for the offset areas to the satisfaction of the Director-General.

Note: The Department acknowledges that the arrangements may provide for staged or delayed implementation, in accordance with the extraction in these areas.

Landscape Management Plan

24. The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with DECC by suitably qualified expert/s whose appointment/s have been approved by the Director-General;
 - (b) be submitted to the Director-General for approval within 6 months of the date of this approval; and
 - (c) include a:
 - Rehabilitation and Offset Management Plan; and
 - Quarry Closure Plan.

Rehabilitation and Offset Management Plan

25. The Rehabilitation and Offset Management Plan must include:
- (a) the rehabilitation objectives for the site, vegetation offsets and landscaping;
 - (b) a description of the short, medium, and long term measures that would be implemented to:
 - rehabilitate the site;
 - implement the Offset Strategy; and
 - maintain and enhance existing site vegetation outside the disturbance area;
 - (c) detailed performance and completion criteria for the site rehabilitation and implementation of the Offset Strategy;
 - (d) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:
 - progressively rehabilitating disturbed areas;
 - implementing vegetation offsets;
 - protecting vegetation and soil outside the disturbance areas;
 - rehabilitating creeks and drainage lines on the site to ensure no net loss of stream length and aquatic habitat;
 - undertaking pre-clearance surveys;
 - managing impacts on fauna;
 - landscaping the site to minimise visual impacts;
 - conserving and reusing topsoil;
 - collecting and propagating seed for rehabilitation works;
 - salvaging and reusing material from the site for habitat enhancement;
 - controlling weeds and feral pests;

- controlling access; and
 - bushfire management;
- (e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;
- (f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and
- (g) details of who would be responsible for monitoring, reviewing, and implementing the plan.

Quarry Closure Plan

26. The Quarry Closure Plan must:
- (a) include provision for certification from a qualified geotechnical engineer that the final proposed landform is stable;
 - (b) define the objectives and criteria for closure of the quarry;
 - (c) investigate options for the future use of the site, including any final void;
 - (d) describe the measures that would be implemented to minimise or manage the ongoing (post closure) environmental effects of the project; and
 - (e) describe how the performance of these measures would be monitored over time.

Rehabilitation and Offset Bond

27. Within 3 months of the approval of the Landscape Management Plan, the Proponent shall lodge a rehabilitation and offset bond for the project with the Director-General. The sum of the bond shall be calculated at:
- (a) \$2.50/m² for the area of disturbance in each 3 year review period, including the offset areas; and
 - (b) \$1.00/m² for the total area of land previously disturbed by the quarry, or as otherwise directed by the Director-General.

Notes:

- *If the rehabilitation and offsets are completed to the satisfaction of the Director-General, the Director-General will release the bond.*
- *If the rehabilitation and/or offsets are not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the bond, and arrange for the satisfactory completion of the relevant works.*

ABORIGINAL HERITAGE

28. Should the Proponent discover material suspected of being Aboriginal relics or skeletal remains, work in that area shall cease and the Proponent shall advise DECC and proceed in accordance with DECC instructions.

TRAFFIC AND TRANSPORT

Materials Transport

29. The Proponent shall transport all excavated material between the extraction site and processing plant site, including processing residues, via slurry pipelines.

Note: When the slurry system is unusable by reason of breakdown or essential maintenance, extractive material may be transported by truck during the period of such breakdown or maintenance. The Proponent shall ensure that such periods are as brief as possible and shall advise the Council each day that truck transport is to be used.

Haulage Records

30. The Proponent shall record and maintain a log of the extraction quantities and traffic movement in and out of the site, available for inspection at the request of the Director-General or the Council.

Road Haulage

31. The Proponent shall ensure that:
- (a) all loaded vehicles entering or leaving the site are covered; and
 - (b) all loaded vehicles leaving the site are cleaned of materials that may fall on the road, before they leave the site.

VISUAL

Visual Amenity

32. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.

Lighting Emissions

33. The Proponent shall:
- (a) take all practicable measures to mitigate off-site lighting impacts from the project; and
 - (b) ensure that all external lighting associated with the project complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*, to the satisfaction of the Director-General.

Advertising

34. The Proponent shall not erect or display any advertising structure(s) or signs on the site without the written approval of the Director-General.

Note: This does not include traffic management and safety or environmental signs.

WASTE MANAGEMENT

Waste Minimisation

35. The Proponent shall:
- (a) only import VENM to the site; and
 - (b) minimise the amount of waste generated by the project to the satisfaction of the Director-General.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

36. The Proponent shall ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

Safety

37. The Proponent shall secure the project to ensure public safety to the satisfaction of the Director-General.

Bushfire Management

38. The Proponent shall:
- (a) ensure that the project is suitably equipped to respond to any fires on-site; and
 - (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire on site.

PRODUCTION DATA

39. The Proponent shall:
- (a) provide annual production data to the DPI using the standard form for that purpose; and
 - (b) include a copy of this data in the AEMR.
-

SCHEDULE 4 ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. If the results of monitoring required in Schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, then the Proponent shall notify the Director-General and the affected landowners and/or existing or future tenants accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the relevant criteria.

INDEPENDENT REVIEW

2. If a landowner of privately owned land considers that the operations of the quarry are exceeding the impact assessment criteria in Schedule 3, then he/she may ask the Proponent in writing for an independent review of the impacts of the project on his/her land.

If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 3 months of the Director-General advising that an independent review is warranted:

- (a) consult with the landowner to determine his/her concerns;
 - (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to determine whether the project is complying with the relevant criteria in Schedule 3, and identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and
 - (c) give the Director-General and landowner a copy of the independent review.
3. If the independent review determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.
 4. If the independent review determines that the quarrying operations are not complying with the relevant criteria in Schedule 3, and that the quarry is primarily responsible for this non-compliance, then the Proponent shall:
 - (a) implement all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria; and
 - (b) conduct further monitoring to determine whether these measures ensure compliance; or
 - (c) secure a written agreement with the landowner to allow exceedances of the relevant criteria in Schedule 3,to the satisfaction of the Director-General.

If the additional monitoring referred to above subsequently determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.

If the Proponent is unable to finalise an agreement with the landowner, then the Proponent or landowner may refer the matter to the Director-General for resolution.

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 8).

5. If the landowner disputes the results of the independent review, either the Proponent or the landowner may refer the matter to the Director-General for resolution.

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 8).

SCHEDULE 5

ENVIRONMENTAL MANAGEMENT, MONITORING, REPORTING & AUDITING

ENVIRONMENTAL MANAGEMENT STRATEGY

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy shall be submitted to the Director-General within 3 months of the date of this approval, and;
 - (a) provide the strategic context for environmental management of the project;
 - (b) identify the statutory requirements that apply to the project;
 - (c) describe in general how the environmental performance of the project would be monitored and managed;
 - (d) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the construction, operation and environmental performance of the project;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise during the life of the project;
 - respond to any non-compliance;
 - manage cumulative impacts; and
 - respond to emergencies; and
 - (e) describe the role, responsibility, authority, and accountability of the key personnel involved in the environmental management of the project.

ENVIRONMENTAL MONITORING PROGRAM

2. The Proponent shall prepare an Environmental Monitoring Program for the project to the satisfaction of the Director-General. This program shall be submitted to the Director-General concurrently with the submission of the various monitoring programs and consolidate the various monitoring requirements in Schedule 3 of this approval into a single document.

REPORTING

Incident Reporting

3. Within 24 hours of detecting an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) harm to the environment, the Proponent shall notify the Department and other relevant agencies of the exceedance/incident.
4. Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Proponent shall provide the Department and these agencies with a written report that:
 - (a) describes the date, time, and nature of the exceedance/incident;
 - (b) identifies the cause (or likely cause) of the exceedance/incident;
 - (c) describes what action has been taken to date; and
 - (d) describes the proposed measures to address the exceedance/incident.

Annual Reporting

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

INDEPENDENT ENVIRONMENTAL AUDIT

6. Within 12 months of the date of this approval, and every 3 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. This audit shall:
 - (a) be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General;
 - (b) include consultation with the relevant agencies;

- (c) assess the environmental performance of the project, and its effects on the surrounding environment;
- (d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and
- (e) review the adequacy of any strategy/plan/program required under this approval, and, if necessary, recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

Note: The person(s) conducting the audit should have expertise in flora and fauna assessment, hydrogeology and quarry rehabilitation.

- 7. Within 6 weeks of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General, with a response to any of the recommendations in the audit report.
- 8. Within 3 months of submitting a copy of the audit report to the Director-General, the Proponent shall review and if necessary revise:
 - (a) each of the environmental management and monitoring strategies/plans/programs in Schedules 3 and 5; and
 - (b) the sum of the Vegetation Offset Bond (see Schedule 3). This review shall consider:
 - the effects of inflation;
 - any changes to the total area of disturbance; and
 - the performance of the vegetation offsets against the completion criteria of the Rehabilitation and Vegetation Offset Management Plan,
 to the satisfaction of the Director-General

COMMUNITY CONSULTATIVE COMMITTEE

- 9. The Proponent shall establish a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in general accordance with the Department's *Guideline for Establishing and Operating Community Consultative Committees for Mining Projects*.

Note: The Proponent may continue the operation of the Liaison and Review Committee established under condition 6.7 of the development consent issued by the Land and Environment Court on 14 July 1998 to fulfil this condition.

ACCESS TO INFORMATION

- 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 the audits or AEMR required under this approval, the Proponent shall:
 - (a) provide a copy of the relevant document/s to the relevant agencies and to members of the general public upon request; and
 - (b) ensure that a copy of the relevant document/s is made publicly available on its website and at the Proponent's office.
- 11. During the project, the Proponent shall:
 - (a) make a summary of monitoring results required under this approval publicly available on its website and at the site office; and
 - (b) update these results on a regular basis.

**APPENDIX 1
SCHEDULE OF LAND**

Extraction Area	<ul style="list-style-type: none">• Lots 1 & 2 DP 570966• Lots 1 & 2 DP 1063296• Lot 1 DP 1013943• Lot 2 DP 233818• Lot 1 DP 1091018• Lot 1 DP 223323
Processing Plant	<ul style="list-style-type: none">• Lots 167 & 214 DP 752039• Lot 198 DP 752025

APPENDIX 2
GENERAL LAYOUT OF PROJECT

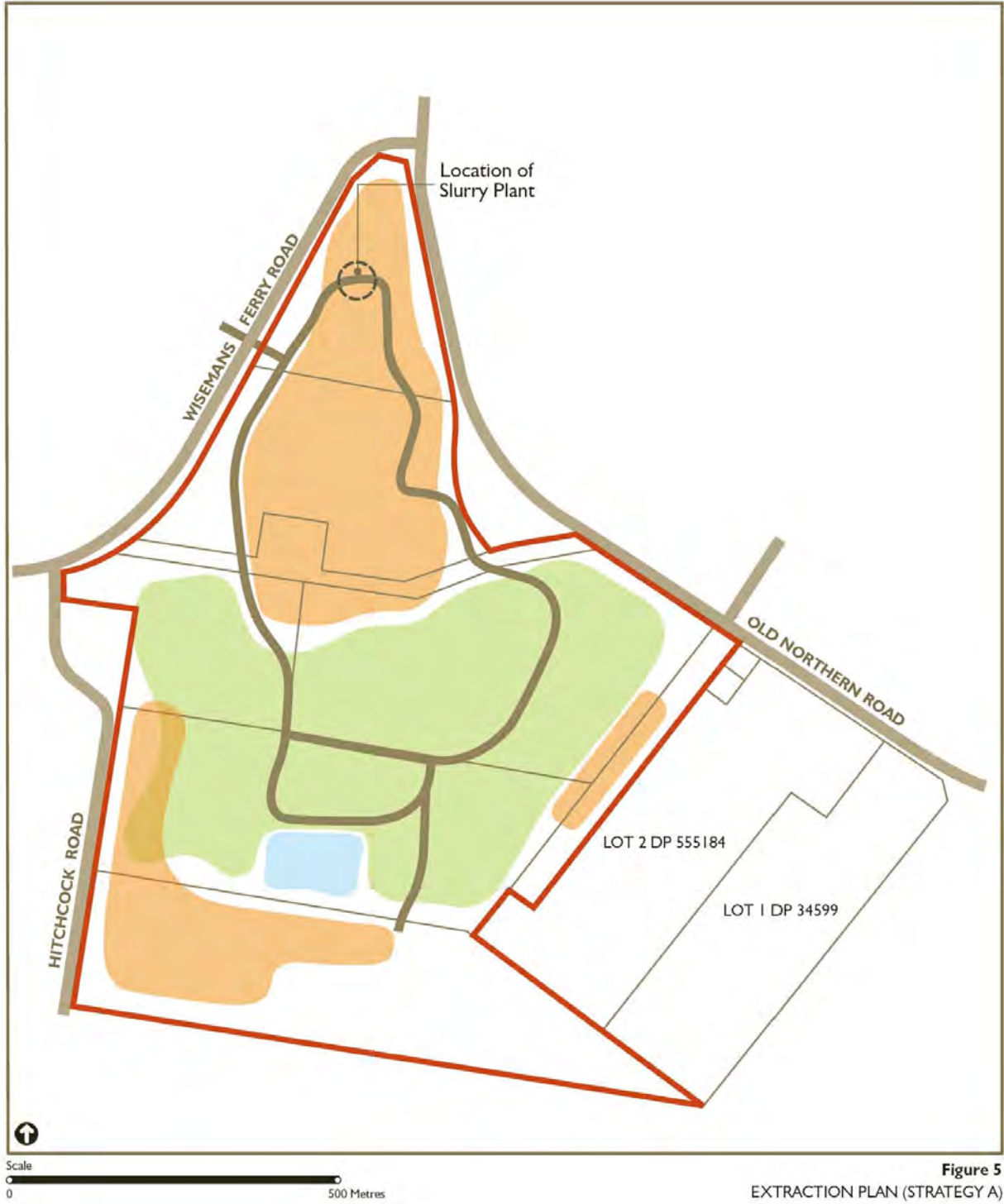


Figure 5
EXTRACTION PLAN (STRATEGY A)

- Area already extracted and partially rehabilitated
- Area for future extraction
- Clean water dam
- Existing internal haul road
- Land included in the application



Figure 4
EXISTING TOPOGRAPHY AND DEVELOPMENT SETBACKS

APPENDIX 3 STATEMENT OF COMMITMENTS

Noise and Vibration

- Site activities will be managed so that any necessary high noise and vibration levels occur at times of least impact.
- All site activities will be undertaken incorporating noise attenuation measures such as restricting working hours for certain works required in the proximity of sensitive receptors.
- All equipment used on site will be certified in relation to noise performance.
- Panels and covers of silenced plant will be kept shut and plant and equipment switched off when not in use.
- All mechanical equipment will be silenced by the best practical means using current technology, prior to use. Noise suppression devices will be fitted according to manufacturer's instructions. Noise control kits will be fitted to noisy mobile equipment and shrouds provided around stationary equipment where necessary.
- All plant and equipment will be inspected regularly to ensure that it is well maintained to minimise noise emissions.
- The L_{10} noise level at the boundary of adjacent receivers where baseline data has been obtained will not normally exceed the background level by more than 5 dB(A).
- Compliance monitoring of noise levels will be undertaken and appropriate records of measurements kept.
- The local community will be informed of the level and duration of noise to be expected during specific activities and phases of development when necessary. Communication of concerns to the Environmental Manager will be invited.

Air Quality and Greenhouse Gas Emissions

- Ambient air quality monitoring will be conducted at identified sites.
- Dust suppression equipment will be fitted to all processing plant on the site. This will be regularly inspected and maintained in good working order at all times.
- Trafficable areas will be defined to prevent unnecessary vehicle movement into other parts of the site.
- All unsealed trafficable areas and working areas will be kept damp by spraying regularly with a water cart, water sprays or sprinklers to minimise dust emissions. Frequency of spraying to be determined based on weather conditions, soil erodibility and the observation of any visible dust.
- Speed controls will be applied to all unsealed areas (maximum speed of 20 km/h) and signposted accordingly.
- All semi-permanent stockpiles will be vegetated with suitable groundcover and regularly watered until the vegetation is well established.
- Work on any extraction activity producing dust will cease due to high winds if control cannot be achieved by watering or other means. Work will not resume until the wind velocity decreases and any dust generation can be controlled by normal means.
- All loaded trucks leaving the central processing plant on Lot 198 DP 752025 will have their payloads fully covered by a suitable material to prevent spillage.
- No fires will be permitted on-site without a permit.
- A mechanical road sweeping unit and water cart will be maintained for use as required to keep all roads including the intersection of the haul road and Wisemans Ferry Road free from deposited material.
- Exhausts from all vehicles and plant/equipment will be inspected to ensure that they are maintained at an acceptable level.
- All vehicles will be regularly serviced to ensure that exhaust emissions comply with the regulations. Appropriate service records will be maintained.

- Any opportunities to minimise machinery use and ensure that all equipment used on the site is energy efficient will be identified.

Access and Traffic

- If the sand slurry plant and transport system is unusable due to breakdown or during maintenance periods, trucks will be used for the transport of extractive material on a temporary basis. This will cease once the system is operating satisfactorily.
- The number of laden vehicle movements will not exceed a combined total of two hundred per day via the intersection of the haulage road and Wisemans Ferry Road. This is the total of laden vehicle movements allowed for PF Formation's combined extractive industry operations in Baulkham Hills Shire.
- Operations involving the transportation of material on the site will only be undertaken between 07.00 and 18.00 hours, Monday to Saturday, except a maximum of 10 laden vehicles will be allowed to enter and leave the site between 06.00 and 07.00 hours, Monday to Saturday only. Vehicles will not be allowed to arrive at the site prior to 05.45 hours on any day.

Erosion and Sediment Control

- Soil and Water Management Plan will be reviewed and revised, if required.
- Temporary erosion and sedimentation control structures such as detention basins and catch drains will be constructed as appropriate to collect runoff from cleared land including extraction areas and access roads.
- Silt traps and erosion control fencing will be erected as appropriate along extraction area boundaries and drainage lines.
- Sediment basins with a minimum storage capacity of 400 m³ per hectare of catchment will be constructed. Spillway capacity and stability will be designed as follows:
 - life of less than 5 years, adopt the 20 year tc event;
 - life between 5 and 10 years, adopt the 50 year tc event; and
 - life greater than 10 years, adopt the 100 year tc event.
- Stormwater control measures will be assessed and routine inspections conducted to ensure that compliance with best practice guidelines and relevant legislation is achieved.
- Locations for topsoil and material stockpiles will be selected on level ground and away from drainage lines. Diversion drains and sediment filter fences will be installed up slope as appropriate.
- Training will be provided to operational personnel on the importance of erosion control measures and drivers informed of the damage that can be caused to the environment by heavy vehicles.
- Areas of exposed land will be kept to a minimum compatible with operational requirements.
- Exposed areas not in use will be stabilized with an appropriate cover crop and watered until well established.
- Erosion and sediment controls will be monitored regularly and immediately following a rainfall event. Monitoring will take place initially on a weekly basis, then monthly once operating correctly. Sediment will be cleared when the traps have collected 60% of the capacity of the basin or where sediment build-up is less than 300 mm below the spillway crest. Sediment will be removed to a location where further pollution to downslope lands and waterways will not occur.
- Maintenance of erosion and sediment controls will be undertaken when any deterioration is identified or when replacement is necessary.
- Stored stormwater will be reused for dust control and the watering of site vegetation.
- Soil stockpiles will be seeded where these are to remain unused for a period in excess of four weeks. The area will be watered until the vegetation is well established.

Water Management

- Maximum depth of extraction will be restricted to not less than two metres above the wet weather high groundwater level. (nominally 181 m AHD).

- The groundwater will not be breached or contaminated. In the event that either should occur, operations will cease in the affected area and the Department of Environment and Climate Change consulted to determine the basis on which extraction may recommence.
- Retention basins will be designed to accommodate the 100-year tc event. The minimum basin capacities are:
 - Northern catchment 10,000 m³
 - Southern catchment 38,000 m³

The volume of these basins can be varied depending on the extent of the area exposed for extraction within each catchment.

- All retention basins will be regularly inspected and an annual report prepared on their effectiveness.
- A minimum of two groundwater monitoring bores will be installed. One will be located within or near the extraction area and another at some location within the site beyond the area of any direct extraction influence. The location of these bores will meet the requirements of the Department of Environment and Conservation and Baulkham Hills Shire Council.

Flora and Fauna

- All areas which are not to be disturbed will be clearly marked.
- Topsoil will be separated and stored or use in rehabilitation works.
- An area of not less than 12 hectares will be identified, and indicated on the site survey. This will be identified as a revegetation area and access controlled.
- Seed will be collected from the existing woodland communities (Sydney Hinterland Transition Woodland), stored under controlled conditions, made available for future broadcasting and a suitable proportion propagated to provide tubestock for revegetation.
- Stored topsoil and that derived from suitable areas adjacent to the woodland communities will be spread over the defined revegetation area and seed broadcast over the site to augment the soil-borne native seed bank. Tube stock suitably protected against animal predation will also be used in appropriate locations.
- Access to bushland will be restricted to minimise the potential for damage. These areas will be marked and signs erected to ensure that this prohibition is made clear. The boundary of the site will be fenced to prevent external access.

Rehabilitation

- The Rehabilitation Plan will be reviewed and amended as necessary to reflect changing operational conditions. This will include a revised phasing plan and implementation programme.
- Setbacks to all roads and adjacent properties will be defined taking account of existing trees and other features. Programmes of mound construction and screen planting will be undertaken as required in the Rehabilitation Plan. All plant material used will reflect the species mix existing in the area.
- A staged seeding and planting programme will be undertaken as areas become available following completion of extraction and capping of sediment basins. This will be aimed at producing a dense plantation on the steeper slopes derived from the flora resources already established. The aim is to replicate as far as possible the mix and density of planting which is currently present.
- All suitable plant material will be used on the site as a seed and planting medium. Topsoil will be stored in appropriately marked low stockpiles for reuse in locations as close as possible to their source. Care will be taken to ensure that this does not become contaminated with the seeds of exotic species and weeds.
- The site will be rehabilitated in stages leaving areas exposed for as short a time as possible. This will be undertaken in conformity with the approved Rehabilitation Plan with maximum final batter grades of 4(H):1(V) on north and west facing slopes and 3(H):1(V) on those facing south and east. Final slopes will be as gentle as possible depending on the availability of fill material.
- All soil stockpiles and exposed areas will be seeded with an appropriate vegetation cover where no activity is to take place for more than four weeks.
- Revegetation of the site will be undertaken on the following basis:
 - as far as possible re-establish the Sydney Hinterland Transitional Woodland using seed and mulch collected from the area ;

- rehabilitate other areas to native species with a light sowing of cereal and allowing natural regeneration;
 - rehabilitate the soil to achieve a full profile;
 - lime, fertilise and sow areas where improved grass cover is required; and
 - suitably turf surfaces expected to experience high surface flows leaving the site.
- A maintenance programme aimed at promoting and protecting the growth of the rehabilitated areas will be established.

Social Impact Management

- Material concerning activities at the site will be prepared and published on the company's website which will allow the community and others to be informed about current news on the site.
- Regular bi-annual meetings of community representatives will be established to discuss issues in relation to sand extraction on the site.
- A Complaints Register will be established incorporating date and time, type of communication, contact details of the complainant, nature of the complaint and response taken.

Heritage

- All work will cease in the area if an archaeological or heritage item is identified during extraction operations and the National Parks and Wildlife Service, the Deerubbin Aboriginal Land Council or the Heritage Office consulted to determine any appropriate course of action prior to recommencement of the work.
- Any additional survey work required for submittal of application to destroy artefact scatters located in the later stages of the development will be undertaken. Reasonable requirements of the National Parks and Wildlife Service (DECC), the Deerubbin Aboriginal Land Council and the Heritage Office arising out of any additional studies will be implemented.

Visual Amenity

- Peripheral bunds will be constructed within the established setbacks where necessary to screen extraction activities. These will be a minimum of three metres high with slopes ranging from 3(H):1(V) to 6(H):1(V) depending on the location using overburden stripped from the site.
- Screen planting works will be undertaken in the peripheral areas to an agreed specification using mulch to allow for native plant regeneration. This species mix will be reinforced using appropriate plantings at specified intervals.
- A tree planting programme will be undertaken within the ten metre buffer zones and in other defined parts of the site to establish a dense plantation using an appropriate mix of species reflecting that of the existing community.
- The final rehabilitated landform will be established in conformity with the Rehabilitation Plan.
- All temporary fencing will be removed when no longer required.
- Vegetation in areas suitable for agricultural/horticultural uses will be re-established.
- All site infrastructure including the slurry plant and its associated pipelines will be removed. Those areas affected by the plant will be restored and rehabilitated.
- All waste materials will be removed and disposed of in an appropriate manner.
- The final Rehabilitation Plan will be reviewed and proposals for future use of the site prepared.

Waste Management

- Waste handling areas will be clearly delineated.
- Specific areas for the collection of materials for reuse and recycling will be defined and clearly labelled.
- Cleared vegetation will be used within the landscape programme.
- All topsoil will be stored in stockpiles for later use in site rehabilitation.

- Bins or skips will be provided for the collection and storage of recyclable material and waste. General construction waste will be stored in a skip located at the workshop on Lot 198 DP752025. Waste food will be removed and stored in a vermin proof bin for collection by a waste contractor. Paper waste generated from site offices, plastics and glass will be collected separately for recycling.
- Hazardous wastes (including empty drums, rags, soil contaminated with oil) will be separated from nonhazardous wastes and managed in accordance with the relevant legislation.
- Liquid wastes (chemicals, oils and greases) will be temporarily stored in an appropriately bunded area and disposed of via a licensed contractor. Wash down water will be directed to an appropriate settlement basin if quality is acceptable.
- Copies of current licences of all waste removal contractors on site will be retained.
- All documentation relating to waste removal and disposal will be retained on file at the site. This documentation will include dockets for the removal and disposal of waste at a licensed facility.
- Waste material will be progressively separated and stockpiled in designated areas for collection. Adequately secure waste disposal areas to prevent access by wildlife.
- All waste licences will be reviewed and terms and conditions for compliance monitored.
- Any materials and waste remaining on the site following completion of extraction operations will be recycled or sent for disposal. This will be either recycled or disposed of in an appropriate manner.

Emergency Response

- All personnel on site during operations will be trained in appropriate procedures including site induction, materials handling and response procedures.
- Emergency response procedures will be developed and put in place. Appropriate individuals will be appointed as emergency services liaison officers.
- An emergency response table listing contact details of all relevant parties required in an environmental emergency will be prepared.
- A Register of Environmentally Hazardous Materials to be stored and used on site will be established.
- Appropriate safety and spill response equipment will be made available on site.
- All materials to be used and stored on site will be clearly labelled.
- Emergency response procedures will be reviewed and updated bi-annually.
- Appropriate safety and response equipment will be available at all times.

Hazard, Risk and Safety

- A licence to keep dangerous goods will be obtained from WorkCover NSW for all materials stored on site which require licensing.
- A Register of Hazardous Materials setting out details of quantities, storage and specific handling requirements for all relevant materials stored on site will be established.
- Material Safety Data Sheets for all hazardous materials stored on site will be obtained.
- Appropriate storage and secondary containment facilities for all hazardous materials stored on site will be provided. All bunded areas will be designed to contain at least 110% of the volume of materials stored within the area.
- A Safety Officer will be appointed for the development.
- All flammable material storage areas will be located at least ten metres from possible ignition sources.
- Contents of all above ground storage areas will be clearly labelled.
- All hazardous and dangerous goods storage areas will be secured and appropriate signage displayed. All incompatible material will be segregated.

- All personnel will be trained in the handling and safety procedures required for the hazardous materials stored and used on site.
- An Emergency Response Plan will be developed and put in place.
- A mobile spill control kit containing appropriate absorbent materials, neutralising chemicals and other spill containment equipment will be provided.
- Personal protective equipment will be provided and personnel instructed in its use.
- Any spills beyond the bunded area will be cleaned up immediately and the contaminated material disposed of in an appropriate manner.
- The relevant authorities will be contacted in the event of a leak or spill and any instructions followed. Any contamination will be remediated to the satisfaction of the regulatory authorities.
- Any spills or hazardous wastes that cannot be recycled will be collected and disposal by a licensed waste contractor arranged. All records of waste removal on site will be retained.

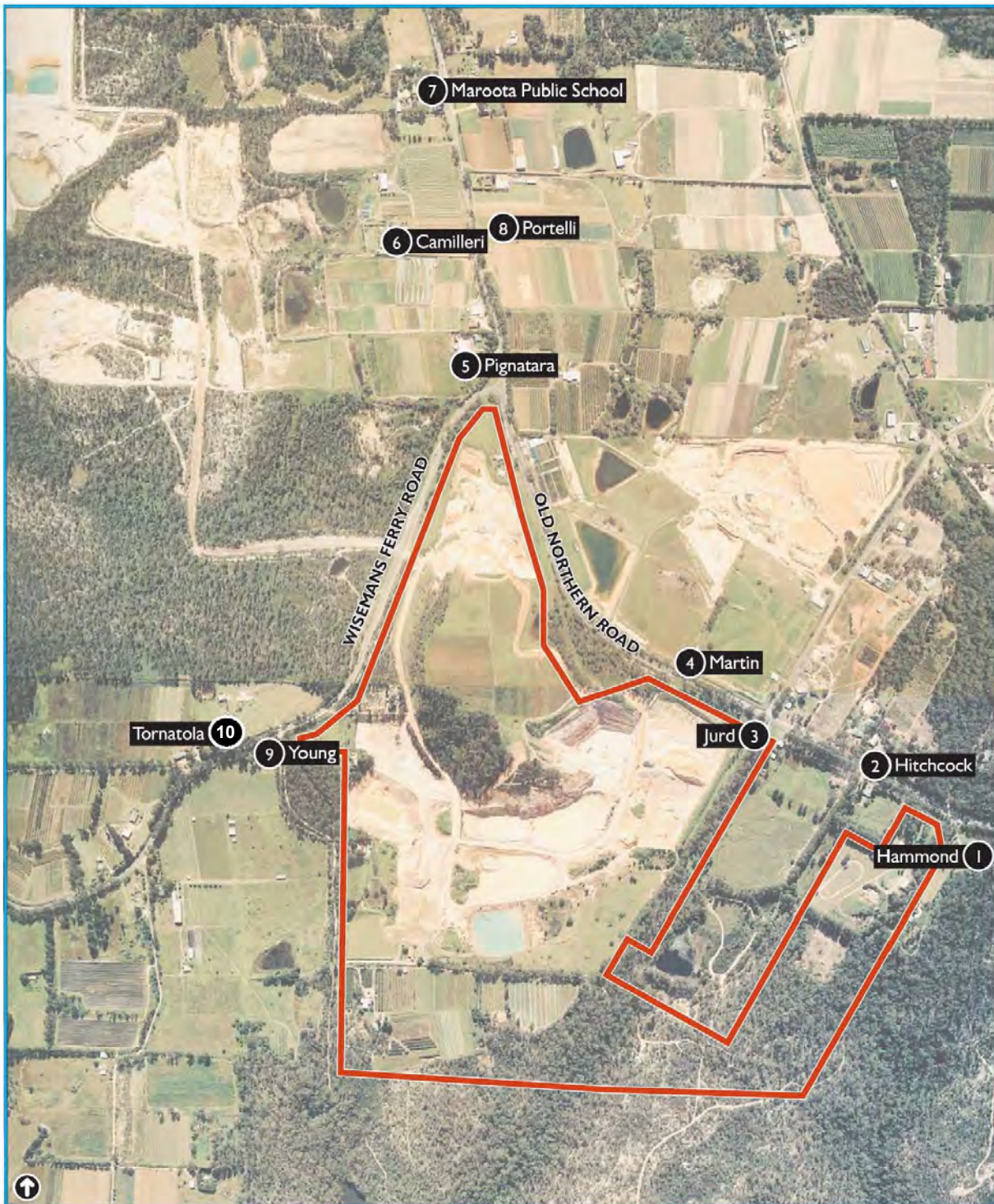


Figure 4.7

NOISE MONITORING AND ASSESSMENT LOCATIONS

Scale
0 500 Metres

Hitchcock Road site boundary

Monitoring locations

APPENDIX 4 NOISE ASSESSMENT LOCATIONS

APPENDIX 5 VEGETATION OFFSET PLAN

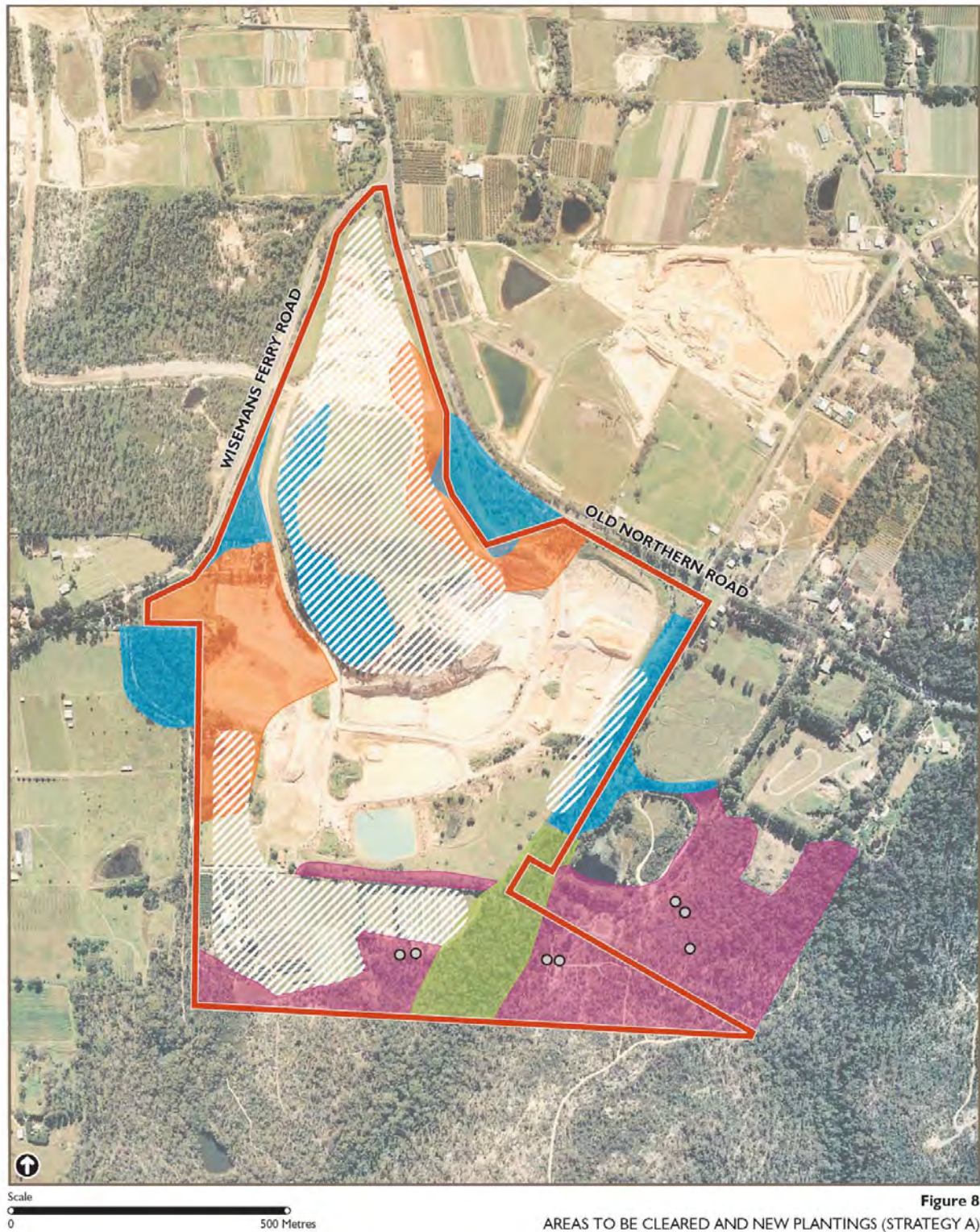


Figure 8

AREAS TO BE CLEARED AND NEW PLANTINGS (STRATEGY A)

- Hitchcock Road site
- Areas for new plantings
- Sydney Sandstone Gully Forest
- Sydney Sandstone Ridgetop Woodland
- Sydney Hinterland Transition Woodland
- Area to be cleared
- *Tetratheca glandulosa*

Note: Sydney Hinterland Transition Woodland shown at time of photograph (2005)
Parts of this area can be cleared under the current consent

APPENDIX 6 CRITERIA TO MONITOR SUCCESS OF REVEGETATION



Methodology to assess success of revegetation
within Hitchcock Road site

Table 3-1 Criteria to monitor success of revegetation

Category	Criteria	Target			Existing condition of vegetation to be removed
		5 years	10 years	15 years	
Native species	Native species diversity (average number per 400m ² quadrat)	20	35	40	46
	Average number of characteristic species for the site occurring within 400m ²	15	20	27	34.5 (+/- 1.5)
	Native species cover (% of vegetation cover in 400m ² quadrat)	>50	>85	>95	99
Weeds	Weed abundance (% of vegetation cover in 400m ² quadrat)	<50	<15	<5	<1
	Invasive or Noxious weed species (e.g. Lantana, Blackberry, exotic vines)	Controlled	Controlled	Controlled	Restricted
Vegetation structure	Vegetation structure	Canopy, shrublayer and groundcover species present. However, structure limited, generally consisting of low canopy and ground cover.	Canopy, shrublayer and groundcover species present. Structure beginning to develop.	Well structured and includes canopy, mid- storey and ground cover units	Well structured and includes canopy, mid- storey and ground cover units
Canopy ^a	Average canopy height (m)	4	8	12	12-16
	Native canopy cover (minimum % cover) [modified braun blanquet scale] ^b	5 [3]	5 [3]	5 [3]	5 [3]
Shrub layer ^a	Native shrub cover (minimum % cover) [modified braun blanquet scale] ^b	10 [3]	15 [3]	25 [4]	32.5 (+/-7.5) [4]
	Average shrub layer height (m)	0.5	1	1	1.25
Ground cover	Native ground cover (minimum % cover) [modified braun blanquet scale] ^b	5 [3]	10 [3]	10 [3]	15 (+/-5) [3]

PB

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Category	Criteria	Target			Existing condition of vegetation to be removed
		5 years	10 years	15 years	
Ecosystem function	Habitat values	Vegetation structure beginning to develop.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Provides minimal habitat for fauna, however, many woodland birds present. Well structured habitat, includes moderate levels of leaf litter and fallen timber.
	Natural regeneration indicating dispersal of seed into site and/or presence of soil seed bank	Yes	Yes	Yes	Yes

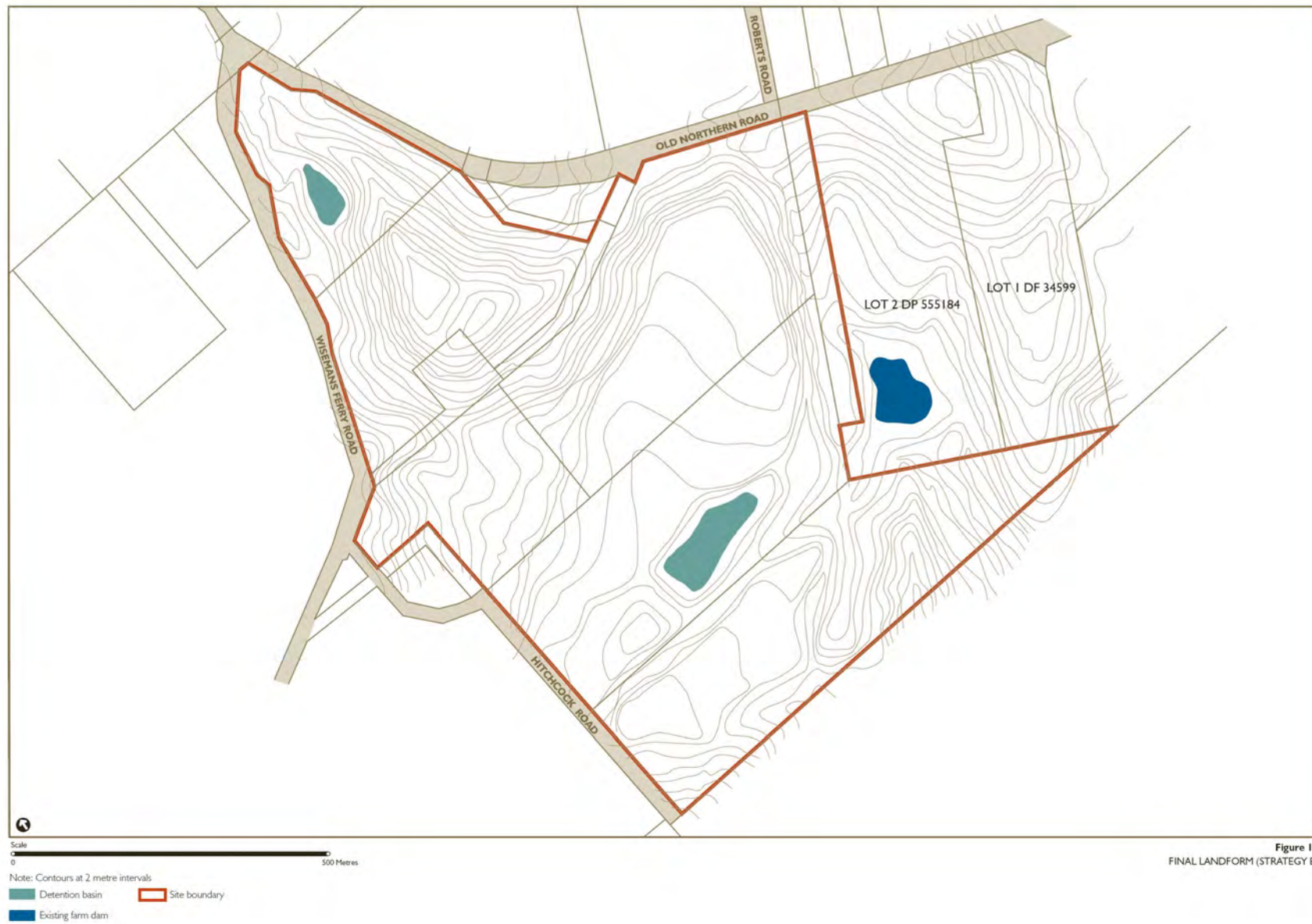
Notes: a) cover of canopy species and shrubs may be higher initially due to successional changes with dense growth potentially occurring initially particularly due to the presence of colonising species. Natural thinning is expected as colonising species senesce and canopy species mature, however, some thinning of vegetation may be required after 10 years if too dense.

b) Modified braun blanquet scale:

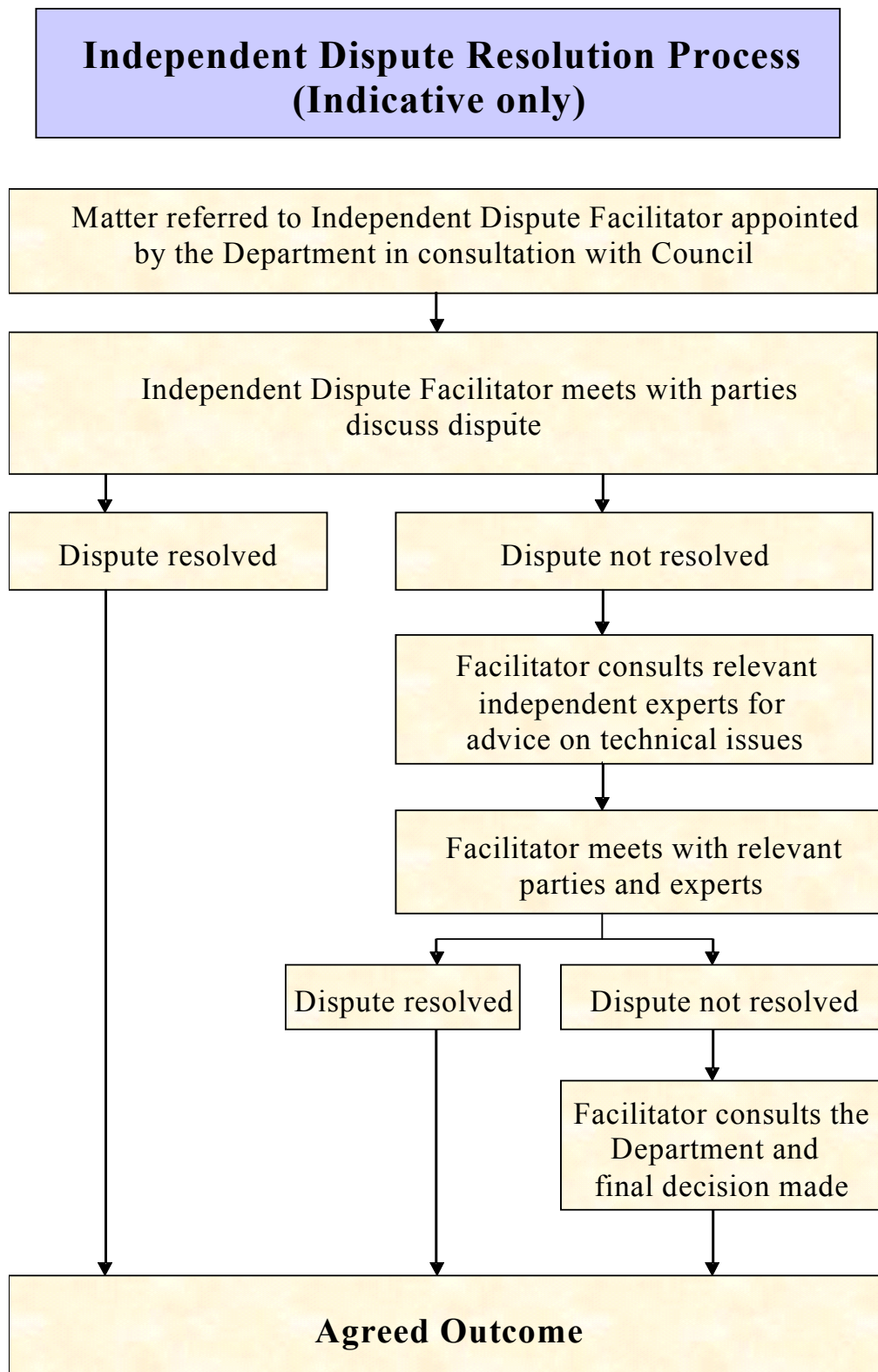
1. <5%- rare or few individuals
2. <5% common
3. 5-25%
4. 25-50%
5. 50-75%
6. 75-100%

APPENDIX 7 FINAL LANDFORM PLANS





**APPENDIX 8
INDEPENDENT DISPUTE RESOLUTION PROCESS**



Appendix 2

Environment Protection Licence No. 3407

Environment Protection Licence



Environment,
Climate Change
& Water

Licence - 3407

Licence Details

Number:	3407
Anniversary Date:	30-September

Licensee

ETRA PTY LTD
1774 WISEMANS FERRY ROAD
MAROOTA NSW 2756

Licence Type

Premises

Premises

ETRA PTY LTD
WISEMANS FERRY ROAD
MAROOTA NSW 2756

Scheduled Activity

Extractive activities

Fee Based Activity

Land-based extractive activity

Scale

> 100000 - 500000 T obtained

Region

Metropolitan
Level 3, NSW Govt Offices, 84 Crown Street
WOLLONGONG NSW 2500
Phone: 02 4224 4100
Fax: 02 4224 4110

PO Box 513 WOLLONGONG EAST
NSW 2520

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees.

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The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

ETRA PTY LTD
1774 WISEMANS FERRY ROAD
MARROOTA NSW 2756

subject to the conditions which follow.

1 Administrative conditions

A1 What the licence authorises and regulates

A1.1 Not applicable.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

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& Water

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity
Extractive activities

Fee Based Activity	Scale
Land-based extractive activity	> 100000 - 500000 T obtained

A1.3 Not applicable.

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& Water

A2 Premises to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
ETRA PTY LTD
WISEMANS FERRY ROAD
MAROOKA
NSW
2756
PARISH OF
CORNELIA:LOT2DP703821;LOT198DP752025;LO
T 1 DP 588936;LOTS1DP595538; WR35733
PARISH OF MAROOKA LOT 1DP1013943;
LOT2DP555184;LOT167 & 214 DP752039;
LOT2DP233818; LOT1DP34599;
LOT 1 and 2DP570966; LOTS 1 & 2 DP1063296;
LOT 1DP1091018 and LOT LOT 1DP223323

A3 Other activities

A3.1 This licence applies to all other activities carried on at the premises, including:

Concrete Works

A4 Information supplied to the EPA

A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- (a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and

- (b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to air and water and applications to land

P1 Location of monitoring/discharge points and areas

- P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Description of Location
1	Dust monitoring		Dust gauge labelled "1- School" on the Map faxed to the EPA on 5 August 2002
2	Dust monitoring		Dust gauge labelled 2 - intersection of Hitchcock and Wisemans Ferry Road
3	Dust monitoring		Dust gauge labelled as "Jurds Paddock - 3 Por168" on the map faxed to the EPA on 5 August 2002

- P1.2 Not applicable.

- P1.3 Not applicable.

3 Limit conditions

L1 Pollution of waters

- L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

- L2.1 Not applicable.

- L2.2 Not applicable.

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L3 Concentration limits

L3.1 Not applicable.

L3.2 Not applicable.

L3.3 Not applicable.

L4 Volume and mass limits

L4.1 Not applicable.

L5 Waste

L5.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L5.2 This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if those activities require an environment protection licence.

L6 Noise Limits

L6.1 Noise generated at the premises must not exceed the noise limits presented in the table below. Note that the noise limits represent the noise contribution from the activity on the premise.

Noise Limits (dB(A))

Location	Day	Night	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
Maroota Public School	40	NA	NA
Pignataro	40	37	52
Tornatola	39	38	52

Note the Locations are as described in the Richard Heggie Associates Pty Ltd, 13 April 2005, *Lot 198 DP 752025 Old Northern Road, Maroota Sand Extraction Project Noise Impact Assessment*. Report 10-3138-R1.

L6.2 For the purposes of condition L6.1:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public holidays.
- Evening is defined as the period 6pm to 10pm,
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

L6.3 Noise from the premises is to be measured at the most affected point or within the residential boundary or at the most affected point within 30m of the dwelling (rural situations) where the dwelling is more than 30m from the boundary to determine compliance with the noise $L_{Aeq, (15min)}$ limits in condition L6.1

Noise from the premises is to be measured at 1m from the dwelling façade to determine compliance with the $L_{A1(1 \text{ minute})}$ noise limits in condition L6.1

Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance. 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 levels where applicable.

Definition

$L_{A10(15 \text{ minute})}$ is the sound pressure level that is exceeded for 10% of the time when measured over a 15 minute period.

Note: Noise measurement

For the purpose of noise measurements required for this condition, the L_{A10} noise level must be measured or computed at any point specified in L6.3 over a period of 15 minutes using "FAST" response on the sound level meter.

For the purpose of the noise criteria for this condition, 5dBA must be added to the measured level if the noise is substantially tonal or impulsive in character. The location or point of impact can be different for each development, for example, at the closest residential receiver or at the closest boundary of the development. Measurement locations can be:

1 metre from the facade of the residence for night time assessment;

at the residential boundary;

30 metres from the residence (rural situations) where the boundary is more than 30 metres from residence.

- L6.4 The noise emission limits identified in **L6.1** apply for prevailing meteorological conditions (winds up to 3m/s at 10 metres above ground level), temperature inversion conditions of up to 3°C/100m and wind speed up to 2m/s at 10 metres above the ground. Noise impacts that may be enhanced by temperature inversions must be addressed by:
documenting noise complaints received to identify any higher level of impacts or patterns of temperature inversions;

where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts under temperature inversion conditions should be developed and implemented.

- L6.5 The proponent shall prepare and implement a Noise Management Plan (NMP). The NMP must include but need not be limited to:
- a) The primary objective of minimising noise emissions from the premises
 - b) A system that allows for periodic assessment of Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) to minimise noise emissions at all times and to seek to achieve noise contributions not exceeding the Project Specific Noise Levels at all receiver locations.
 - c) Measures to monitor noise performance and respond to complaints.

L7 Hours of operation

- L7.1 Activities covered by this licence must only be carried out between the hours of 0600 and 1800 Monday to Friday, and 0600 and 1800 Saturday, and at no time on Sundays and Public Holidays.

4 Operating conditions

O1 Activities must be carried out in a competent manner

- O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- (a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- (b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

- O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
- (a) must be maintained in a proper and efficient condition; and
 - (b) must be operated in a proper and efficient manner.

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O3 Dust Control

- O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.
- O3.2 All loaded trucks entering and leaving the premises must have their loads covered.

O4 Potentially offensive odour

- O4.1 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

5 Monitoring and recording conditions

M1 Monitoring records

- M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.
- M1.2 All records required to be kept by this licence must be:
- (a) in a legible form, or in a form that can readily be reduced to a legible form;
 - (b) kept for at least 4 years after the monitoring or event to which they relate took place; and
 - (c) produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- (a) the date(s) on which the sample was taken;
 - (b) the time(s) at which the sample was collected;
 - (c) the point at which the sample was taken; and
 - (d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

- M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

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Air

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

- any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
- if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
- if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The Protection of the Environment Operations (Clean Air) Regulation 2002 requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Not applicable.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

Environment Protection Licence

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- M4.2 The record must include details of the following:
- (a) the date and time of the complaint;
 - (b) the method by which the complaint was made;
 - (c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - (d) the nature of the complaint;
 - (e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - (f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 Conditions M5.1 and M5.2 do not apply until 3 months after:

- (a) the date of the issue of this licence or
- (b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Requirement to monitor volume or mass

M6.1 Not applicable.

6 Reporting conditions

R1 Annual return documents

What documents must an Annual Return contain?

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

- (a) a Statement of Compliance; and

Environment Protection Licence

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(b) a Monitoring and Complaints Summary.

A copy of the form in which the Annual Return must be supplied to the EPA accompanies this licence. Before the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

Period covered by Annual Return

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:

- (a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
- (b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:

- (a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
- (b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

Deadline for Annual Return

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

Notification where actual load can not be calculated

R1.6 Not applicable.

Licensee must retain copy of Annual Return

R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

Certifying of Statement of Compliance and signing of Monitoring and Complaints Summary

R1.8 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:

- (a) the licence holder; or
- (b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

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- R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

Note: The licensee or its employees must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.
- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- (a) where this licence applies to premises, an event has occurred at the premises; or
 - (b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
- and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- (a) the cause, time and duration of the event;
 - (b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - (c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - (d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
 - (e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
 - (f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
 - (g) any other relevant matters.
- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

General conditions

G1 Copy of licence kept at the premises

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Pollution studies and reduction programs

U1 Completed Pollution Reduction Programs (PRP)

PRP No	PRP	Description	Completed Date
1	Impervious bunded area to fuel storage tank	The bunded area serving the above ground fuel storage tank located outside the main workshop made impervious	1 May 2008
2	Roofed bunded area to fuel storage tank	The bunded area serving the above ground fuel storage tank located outside the main workshop fitted with roof to exclude rainwater	1 May 2008
3	Upgrade overflow point of sediment dam	The overflow point to the sediment dam upgraded	1 May 2008
4	Prevent mud tracking from premises	Upgraded controls to help prevent mud tracking from the premises onto Wiseman's Ferry Road	1 May 2008
5	PM10 dust monitoring	PM10 dust monitoring conducted from 1 March 2008 to 1 March 2009	1 March 2009

Special conditions

Dictionary

General Dictionary

In this licence, unless the contrary is indicated, the terms below have the following meanings:

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 1998.
flow weighted	Means a sample whose composites are sized in proportion to the flow at each composites time of

Environment Protection Licence



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composite sample	collection.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

Environment Protection Licence

Licence - 3407



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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Nigel Sargent

Environment Protection Authority

(By Delegation)

Date of this edition - 08-Feb-2011

End Notes

- 1 Licence varied by notice V/M Upgrade, issued on 06-Jul-2000, which came into effect on 06-Jul-2000.
- 2 Licence varied by notice 1007929, issued on 02-Jul-2001, which came into effect on 27-Jul-2001.
- 3 Licence varied by notice 1010310, issued on 23-Aug-2002, which came into effect on 17-Sep-2002.
- 4 Licence varied by notice 1024315, issued on 16-Jan-2003, which came into effect on 10-Feb-2003.
- 5 Licence varied by notice 1076205, issued on 29-Feb-2008, which came into effect on 29-Feb-2008.
- 6 Licence varied by Change to Schedule 1, issued on 02-May-2008, which came into effect on 02-May-2008.
- 7 Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>

Environment Protection Licence

Licence - 3407



Environment,
Climate Change
& Water

End Notes

8	Licence varied by notice 1099065, issued on 18-May-2009, which came into effect on 18-May-2009.
9	Licence varied by notice 1111706, issued on 31-Mar-2010, which came into effect on 31-Mar-2010.
10	Licence varied by notice 1124599, issued on 08-Feb-2011, which came into effect on 08-Feb-2011.

Appendix 3

Letters to Agencies and Response



**ENVIRONMENTAL
PLANNING Pty Ltd**

ABN 23 064 176 174

**PO Box 6443
Silverwater NSW 1811**

**Phone (02) 9648 4400
bruce@eplanning.com.au
www.eplanning.com.au**

7 March 2014

Ms Kristine McKenzie
Principal Executive Planner
Baulkham Hills Shire Council
PO Box 75
Castle Hill NSW 1765

Dear Madam,

Independent Environmental Audit of Hitchcock Road Sand Project at Maroota

The Hitchcock Road Sand Project was approved by the Minister for Planning on 7 February 2009. Schedule 5 Condition 6 of the project approval states as follows.

Within 12 months of the date of this approval, and every 3 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. This audit shall:

- (a) be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General;
- (b) include consultation with the relevant agencies;
- (c) assess the environmental performance of the project, and its effects on the surrounding environment;
- (d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and
- (e) review the adequacy of any strategy/plan/program required under this approval, and, if necessary, recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

On 13 July 2010 the Director-General approved the undersigned to conduct the independent environmental audits. The first audit was completed in April 2011 with the second audit now in progress. With regard to condition (b) above I am writing to you representing one of the relevant agencies.

The 2012-2013 Annual Environmental Management Report and supporting documents for the project are available for download at the proponent's (PF Formation) website by following the links for the Hitchcock Road Sand Extraction Development at <http://www.pfformation.com.au/Pages/news.htm>. For your information the attached A4 color aerial photograph outlines the extent of the project as at April 2009 and the approximate cadastral boundaries. Please note that more recent aerial photographs of the project area are not available.

Could your agency please forward a response including any comments or issues on the project to the undersigned within 21 days or 28 March 2014.

Yours faithfully

Bruce Adcock
Director

Enclosure: A4 colour aerial photograph



**ENVIRONMENTAL
PLANNING Pty Ltd**

ABN 23 064 176 174

**PO Box 6443
Silverwater NSW 1811**

**Phone (02) 9648 4400
bruce@eplanning.com.au
www.eplanning.com.au**

7 March 2014

Executive Director Mineral Resources
Department of Primary Industries – Mineral Resources
PO Box 344
Hunter Region Mail Centre NSW 2310

Dear Sir/Madam,

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Enclosure: A4 colour aerial photograph



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ABN 23 064 176 174

**PO Box 6443
Silverwater NSW 1811**

**Phone (02) 9648 4400
bruce@eplanning.com.au
www.eplanning.com.au**

7 March 2014

Director
Office of Environment and Heritage
PO Box A290
Sydney South NSW 1232

Dear Sir/Madam,

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- (d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and
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Yours faithfully

Bruce Adcock
Director

Enclosure: A4 colour aerial photograph



**PF FORMATION
HITCKCOCK ROAD
SAND EXTRACTION AND REHABILITATION PROJECT SITE
MAROOTA**

ORTHOPHOTO MAP

CONTIGUOUS INTERVAL 1 METRE

100 0 200 METRES

UNIVERSAL PROJECTION MAP GRID OF AUSTRALIA
VERTICAL DATUM AUSTRALIAN HEIGHT DATUM

Geo-Spectrum (Australia) Pty Limited

COMPILED BY
GEO-SPECTRUM (AUSTRALIA) PTY LIMITED
DATE 1 APRIL 2005
BY ROSS PETER HARRIS
ON 2005 FROM 1:50,000 SCALE
AERIAL PHOTOGRAPHY FLIGHT 15th APRIL 2005
GROUND SURVEY BY
DARRIN BRADLEY & CO.

THE HILLS SHIRE COUNCIL

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Email council@thehills.nsw.gov.au
www.thehills.nsw.gov.au

ABN No. 25 034 494 656

13 March 2014

Mr Bruce Adcock
Environmental Planning Pty Ltd
PO Box 6443
SILVERWATER NSW 1811

Our Ref:

Dear Mr Adcock

**Independent Environmental Audit of Project Approval 06_0104 Issued by
Department of Planning
PF Formation, Hitchcock Road Site, Maroota**

I refer to your letter dated 7 March 2014 in respect to Condition 6 of Schedule 5 of the Project Approval granted by the Department of Infrastructure and Planning.

In response to your letter, Council staff have no concerns regarding Hitchcock Road. In this respect the site in general was inspected on 12 November 2013 at the bi-annual Liaison and Review Meeting. Please note however that as Council was not the determining authority for this consent the purpose of the site inspection was not to identify non-compliances with conditions of consent relating to Hitchcock Road and this part of the operation was not inspected.

Thank you for the opportunity to comment on this matter. Should you wish to discuss the matter further please contact me on 9843 0319.

Yours faithfully



Kristine McKenzie
PRINCIPAL EXECUTIVE PLANNER

CC: PF Formation, 1774 Wisemans Ferry Road, Maroota NSW 2756

Appendix 4

Revised Hitchcock Road Site Survey Plan



**PF FORMATION
HITCKCOCK ROAD
SAND EXTRACTION AND REHABILITATION PROJECT SITE
MAROOTA**

ORTHOPHOTOMAP
CONTOUR INTERVAL 1 METRE

SCALE 1:5,000 0 100 200 METRES

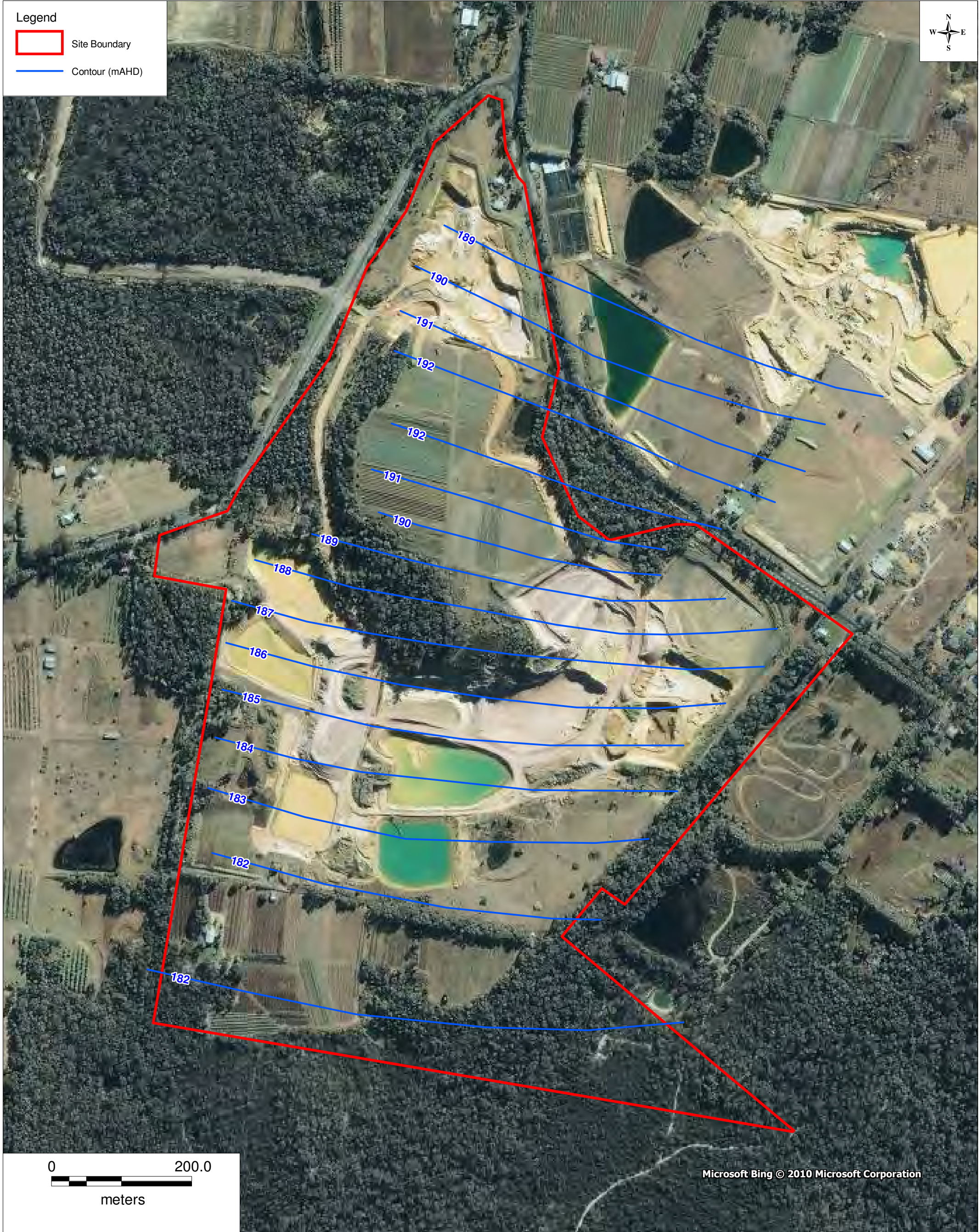
HORIZONTAL PROJECTION: MAP GRID OF AUSTRALIA
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM

Geospectrum (Australia) Pty Limited

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Appendix 5

Revised Hitchcock Road Site Depth of Mining Contours



Source: Aerial imagery from Bing Maps © 2010 Microsoft Corporation and its data suppliers.
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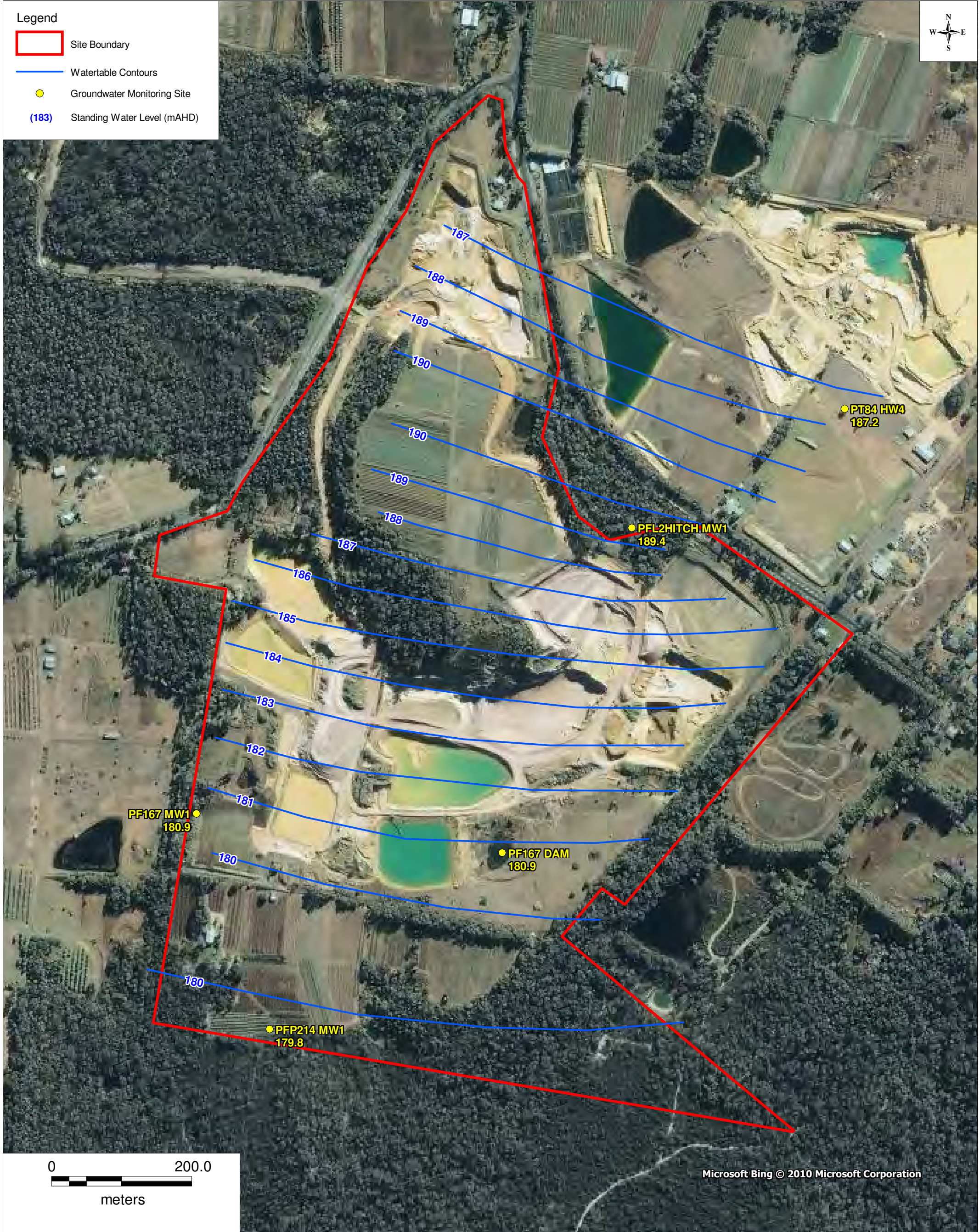
HITCHCOCK ROAD, SAND EXTRACTION
AND REHABILITATION PROJECT

HITCHCOCK ROAD SITE
DEPTH OF MINING CONTOURS
@ 22/06/2011



Appendix 6

Revised Hitchcock Road Site Water Table Contours



Source: Aerial imagery from Bing Maps © 2010 Microsoft Corporation and its data suppliers.
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Appendix 7

Hitchcock Road Site Depth of Mining Contours and April 2014 Extraction Levels



PF FORMATION

HITCHCOCK ROAD, SAND EXTRACTION
AND REHABILITATION PROJECT

References - Parsons Brinckerhoff Geological Cross Section NS3
- Geospectrum Orthophotomap

**HITCHCOCK ROAD SITE
DEPTH OF MINING CONTOURS
@ 22/06/2011**

URS

File No: 4316726.002.wor

Drawn: SB

Approved: FB

Date: 21/07/2011

Figure: 002

Rev A

A3

Appendix 8

2013 Monitoring of Revegetation at Hitchcock Road, Maroota, 5 December 2013, Parsons Brinckerhoff

PF Formation

2013 Monitoring of revegetation at Hitchcock Road, Maroota

5 December 2013



Document information

Client: PF Formation
Title: 2013 Monitoring of revegetation at Hitchcock Road,
Maroota Document No: 2200513A-ECO-REP-001 RevA
Date: 5 December 2013

Rev	Date	Details
A	05/12/2013	Original

Author, Reviewer and Approver details

Prepared by:	Selga Harrington	Date: 05/12/2013	Signature: 
Reviewed by:	Toby Lambert	Date: 05/12/2013	Signature: 
Approved by:	Paul Rossington	Date: 05/12/2013	Signature: 

Distribution

PF Formation, Parsons Brinckerhoff file

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Certified to ISO 9001, ISO 14001, AS/NZS 4801

A GRI Rating: Sustainability Report 2011

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Appendix C	Quadrat results



1. Introduction

This report presents the findings of the third monitoring session of a rehabilitation area within PF Formation's sandmining operations at Hitchcock Road, Maroota.

1.1 Background

Expansion of an existing PF Formation sand mine at Hitchcock Road required clearing of 3.7 hectares of Sydney Hinterland Transition Woodland. It was proposed to offset this clearing with revegetation and re-creation of this community within a 7.9 hectare area on the western boundary of the site where quarrying has been completed. A key condition of the clearing being permitted is that PF Formation establishes at least 3.7 hectares of revegetation, recreating the Sydney Hinterland Transition Woodland community. Revegetation was commenced by PF Formation in 2004. To date an area of 4.2 hectares has been replanted (approximately 1 hectare in 2004, 2 hectares in 2006 and 1.2 hectares in 2011) with the aim to recreate the vegetation to be cleared from Lot 1 DP 1013943.

Monitoring of the rehabilitation of previously mined areas is a requirement of project approval and environmental reporting is required to provide some certainty that this revegetation will ultimately result in the creation of a naturally regenerating patch of Sydney Hinterland Transition Woodland. This monitoring needs to be undertaken regularly by independent consultants (not those undertaking the revegetation works) and to include assessment against the success criteria developed for rehabilitation within the site, as included in the consent conditions for the project.

Parsons Brinckerhoff undertook monitoring of the site in July 2010 (Parsons Brinckerhoff 2010) with a second monitoring session in October 2012. Based on the monitoring results of 2012 (Parsons Brinckerhoff 2012) and the progress towards the ecological completion criteria, the Department of Planning and Infrastructure approved the clearing of Sydney Hinterland Transition Woodland within the site in March 2013. Continuation of the monitoring of the rehabilitation and offset obligations are required in accordance with the project approval and to provide detailed reporting for inclusion in the next Independent Environmental Audit report for the quarry in 2014.

1.2 Objectives of revegetation

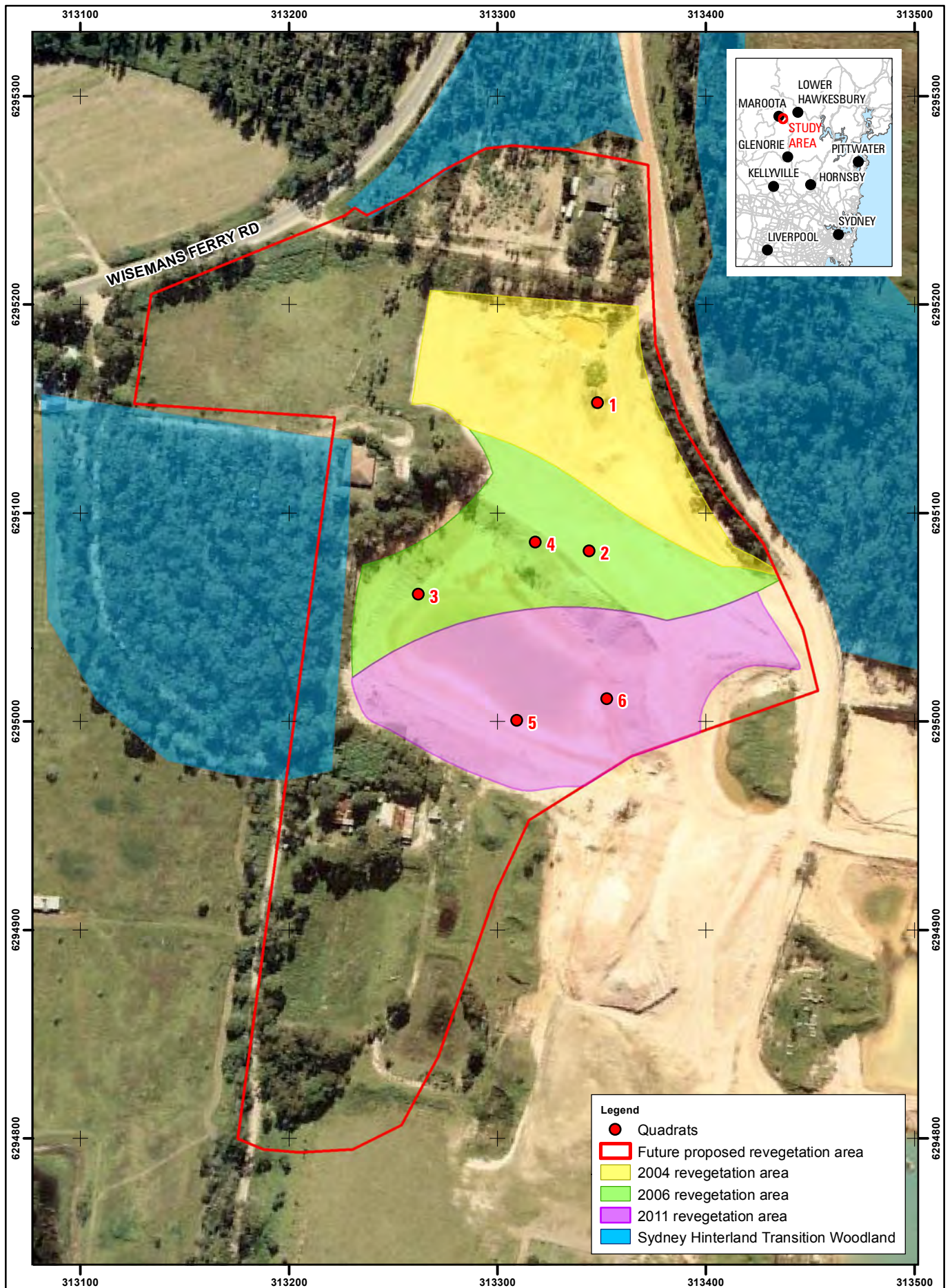
The objectives of revegetation within the Hitchcock Road site are to:

- rehabilitate and revegetate quarried areas
- revegetate with native vegetation characteristic of the community to be removed from Lot 1 DP 1013943, namely Sydney Hinterland Transition Woodland
- re-create the existing characteristics of this community, to provide an area suitable for offsetting the clearing of this community at that time.

1.3 Aims of report

The aims of this report are to:

- present the results of the monitoring survey
- analyse the results against the criteria for monitoring the success of rehabilitation and progress towards five, ten and fifteen year targets (see Section 2.3)
- provide recommendations on management actions required to assist in successful re-creation of Sydney Hinterland Transition Woodland within the site and to meet the long-term goals
- provide independent monitoring report for inclusion as part of the Independent Environmental Audit for the quarry in 2014.





2. Methodology

2.1 Nomenclature

Names of plants used in this document follow Harden (Harden 1992, 1993, 2000, 2002) with updates from PlantNet (Royal Botanic Gardens 2013) and the Australian Plant Census (Council of Heads of Australasian Herbaria 2010). Scientific names are used in this report for species of plant. Scientific and common names (where available) are provided in plant lists in Appendices A and B. Introduced species are identified within the text with an asterisk following the name, for example *Lantana camara**

2.2 Field survey

This is the third monitoring survey of the revegetation areas. The first site inspection was undertaken on 5 July 2010, the second undertaken on 25 October 2012 and this, the third undertaken on 2 December 2013. Fixed quadrats (20 x 20 m) were set up with edges running in a north-south, east west direction. Quadrats were marked with stakes at the north western and south western corners of the quadrat.

Within each quadrat, every species of plant present was recorded and its cover abundance estimated using a modified braun blanquet scale:

1. <5%- rare or few individuals
2. <5% common
3. 5–25%
4. 25–50%
5. 50–75%
6. 75–100%.

Additional information recorded at each quadrat site included:

- centre and south western corner of quadrat using GPS
- slope and aspect,
- landform
- soil type
- evidence of disturbance, condition
- evidence of canopy recruitment, natural regeneration
- fauna habitat values
- photographs from the south western corner of the quadrat (to the north, north east, east, south and west).

The location of quadrats is summarised in Table 2.1.

Table 2.1 **Quadrat survey locations**

Stratification	Quadrat identifier	Centre of site ¹		South west corner ²	
		Easting	Northing	Easting	Northing
2004 revegetation area	1	313348	6295163	313335	6295148
2006 revegetation area	2	313343	6295082	313333	6295087
	3	313262	6295061	313253	6295059
	4	313318	6295086	313306	6295077
2011 revegetation area	5	313319	6295008	313309	6295000
	6	313363	6295018	313352	6295011

(1) UTM, WGS 84

(2) Location of monitoring photo point and stake marking the south western corner of quadrat

2.3 Criteria to assess rehabilitation success

Field surveys were undertaken in 2008 of the vegetation to be cleared to provide data on the typical characteristics of the community and provide baseline information against which the revegetation program can be assessed (Parsons Brinckerhoff 2008).

The criteria for assessment and the target values for these goals are provided in Table 2.2 on the following page.

Table 2.2 Criteria to monitor success of revegetation

Category	Criteria	Target			Condition of vegetation to be removed
		5 years	10 years	15 years	
Native species	Native species diversity (average number per 400 m ² quadrat)	20	35	40	46
	Average number of characteristic species for the site occurring within 400 m ²	15	20	27	34.5 (+/- 1.5)
	Native species cover (% cover in 400 m ² quadrat)	>50	>85	>95	99
Weeds	Weed abundance (% of vegetation cover in 400 m ² quadrat)	<50	<15	<5	<1
	Invasive or Noxious weed species (e.g. Lantana, Blackberry, exotic vines)	Controlled	Controlled	Controlled	Restricted
Vegetation structure	Vegetation structure	Canopy, shrublayer and groundcover species present. However, structure limited, generally consisting of low canopy and ground cover.	Canopy, shrublayer and groundcover species present. Structure beginning to develop.	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units
Canopy ^a	Average canopy height (m)	4	8	12	12-16
	Native canopy cover (minimum % cover) [modified braun blanquet scale] ^b	5 [3]	5 [3]	5 [3]	5 [3]
Shrub layer ^a	Native shrub cover (minimum % cover) [modified braun blanquet scale] ^b	10 [3]	15 [3]	25 [4]	32.5 (+/-7.5) [4]
	Average shrub layer height (m)	0.5	1	1	1.25

Category	Criteria	Target			Condition of vegetation to be removed
		5 years	10 years	15 years	
Ground cover	Native ground cover (minimum % cover) [modified braun blanquet scale] ^b	5 [3]	10 [3]	10 [3]	15 (+/-5) [3]
Ecosystem function	Habitat values	Vegetation structure beginning to develop.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Provides minimal habitat for fauna, however, many woodland birds present. Well structured habitat, includes moderate levels of leaf litter and fallen timber.
	Natural regeneration indicating dispersal of seed into site and/or presence of soil seed bank	Yes	Yes	Yes	Yes

2.4 Results

Photos of the vegetation to be cleared within Lot 1 DP 1013943 and the rehabilitation area quadrat sites are provided in Appendix B. Species recorded, vegetation structure and other environmental characteristics of the quadrat sites are summarised in Appendix C.

2.5 Species of plant

A total of 84 species of plant was recorded within the site during this monitoring session, of which 68 (81%) are native. A full list of species recorded within each quadrat and the vegetation structure is provided in Appendix C.

No species listed as noxious under the *Noxious Weeds Act 1993* or Weed of National Significance was recorded.

2.6 Assessment against criteria

The results of the field survey were assessed against the criteria for successful revegetation, using the five, 10 and 15 year targets (Table 2.3).

Table 2.3 Assessment against criteria to monitor success of revegetation

Category	Criteria	Target			Results		
		5 years	10 years	15 years	2004 revegetation area (9 years)	2008 revegetation area (7 years)	2011 revegetation area (2 years)
Native species	Native species diversity (average number per 400 m ² quadrat)	20	35	40	33	23	16
	Average number of characteristic species for the site occurring within 400 m ²	15	20	27	28	17	11
	Native species cover (% of species in 400 m ² quadrat)	>50	>85	>95	94	78	54
Weeds	Weed abundance (% of vegetation cover in 400 m ² quadrat)	<50	<15	<5	1	19	33
	Invasive or Noxious weed species (e.g. Lantana, Blackberry, exotic vines)	Controlled	Controlled	Controlled	Controlled	Controlled	Ground cover generally dominated by invasive species, but no noxious or highly invasive species present
Vegetation structure	Vegetation structure	Canopy, shrublayer and groundcover species present. However, structure limited, generally consisting of low canopy and ground cover.	Canopy, shrublayer and groundcover species present. Structure beginning to develop.	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units	Canopy, shrublayer and groundcover species present. Structure beginning to develop.	Canopy, shrublayer and groundcover species present. However, structure limited, generally consisting of low canopy and ground cover.

Category	Criteria	Target			Results		
		5 years	10 years	15 years	2004 revegetation area (9 years)	2008 revegetation area (7 years)	2011 revegetation area (2 years)
Canopy ^a	Average canopy height (m)	4	8	12	12	6	0.2
	Native canopy cover (minimum % cover) [modified braun blanquet scale] ^b	5 [3]	5 [3]	5 [3]	25 [3]	13 [3]	0
Shrub layer ^a	Native shrub cover (minimum % cover) [modified braun blanquet scale] ^b	10 [3]	15 [3]	25 [4]	10 [3]	18 [3]	33 [4]
	Average shrub layer height (m)	0.5	1	1	1.5	2	1.4
Ground cover	Native ground cover (minimum % cover) [modified braun blanquet scale] ^b	5 [3]	10 [3]	10 [3]	55 [5]	52 [5]	17 [3]
Ecosystem function	Habitat values	Vegetation structure beginning to develop.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Species of all layers present, however, no distinct canopy layer developing yet. Leaf litter and fallen timber absent or very sparse.
	Natural regeneration indicating dispersal of seed into site and/or presence of soil seed bank	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Purple font indicates that the 5 year target has been met; black font that the 10 year target has been met, green font that the 15 year criteria has been met. Red font indicates that no target has been met.



3. Discussion and recommendations

There has been a general improvement in the habitat quality and native species diversity cover and vegetation structure since the previous monitoring survey in 2011. Erosion noted in previous years appears to be stable with increasing cover of groundcover vegetation. Key findings include:

- After 9 years the 2004 revegetation area:
 - ▶ has met the 10 and even 15 year targets in the majority of criteria. The only exception is that the:
 - native shrub cover (% cover) is at the 5 year target. This is not considered to require active management at this stage, and is likely to continue to develop towards the 10 and 15 year targets.
- After 7 years, the 2006 revegetation area:
 - ▶ has met the 5 year targets for all criteria
 - ▶ has met the 10 and 15 year targets for a number of criteria relating to vegetation structure (cover and vegetation height)
 - ▶ has some criteria that will require improvement to reach the 10 year target. However, at this stage no active management is considered necessary for these criteria as they are likely to improve naturally given time. These criteria are:
 - native species cover and diversity
 - decrease in weed cover
 - increase in canopy height.
- After 2 years, the 2011 revegetation area:
 - ▶ has had only a short time since rehabilitation
 - ▶ was dominated by early colonising species and ground cover weed species
 - ▶ has met few of the 5 year targets. The exceptions (species cover, native ground cover, shrub cover and height and weed abundance) provide some encouragement that given more time, this area will regenerate well.
 - ▶ requires regular visual assessments to check for spread of weeds that may inhibit germination and growth of native species.

Given the progress towards the targets, little additional work is considered necessary at this stage with natural regeneration considered likely to continue without active management. Recommendations for weed control and monitoring are summarised Table 3.1.

Table 3.1 Recommendations to improve revegetation success

Observation	Recommendation
Monitoring	
Monitoring has not been undertaken annually as part of the annual environmental reporting. However, based on the work undertaken and natural regeneration of the area, this has been appropriate.	<p>Given that the rehabilitation has met or exceeded the relevant targets for the 2004 and 2006 revegetation areas, monitoring next year is not considered necessary for these areas. In these areas monitoring in two years' time (i.e. at 11 and 9 years since rehabilitation respectively) would be sufficient.</p> <p>The 2011 revegetation area would benefit from regular visual inspections (twice yearly), particularly for weed abundance and cover. Where noxious, highly invasive species or dense weeds smothering native species are noted, these should be controlled. Detailed independent monitoring of this area in two year's would be sufficient.</p>
Weeds	
Weed abundance was generally low and restricted to the groundcover. Exotic grasses were dominant in patches.	<p>Consider broad spraying exotic grasses where they occur densely, particularly in the 2011 revegetation area. Broad spraying should be followed by:</p> <ul style="list-style-type: none"> ■ slashing and raking or mowing to remove excess debris and stimulate seed germination ■ inspection for regeneration of native plants ■ repeated broad spraying of germinating weeds if native regeneration is minimal ■ spot-spraying and/or hand weeding if substantial germination of native species is recorded.

The rehabilitation is progressing well and is generally meeting or exceeding the targets set. This suggests that given time the 2004 and 2006 revegetation areas are likely to continue to meet and exceed the target criteria. Given the promising results to date and the fact that the 2011 revegetation has been undertaken using similar methods as the 2004 and 2006 areas, with time, this area is likely to have similar success.



4. References

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Royal Botanic Gardens 2013, 'PlantNet - The Plant Information Network System of Botanic Gardens Trust (version 2.0)'.

Appendix A

Revegetation works to date



A1. Revegetation works to date

To date an area of 4.2 hectares has been replanted with the aim to recreate the vegetation to be removed from Lot 1 DP 1013943. The revegetation area is on the western boundary of the site (Figure 1.1) and further revegetation scheduled to the south as quarrying is completed. The revegetation area occurs adjacent to remnant vegetation, both within and adjacent to the site. This adjacent vegetation provides a potential seed source for natural seed dispersal into the revegetation area.

Greening Australia were commissioned to propagate tubestock from cuttings and seed from collected vegetation within Lot 1 DP 1013943 to enable the revegetation of quarried areas. The first collection period occurred from late 2000 to February 2002.

Rehabilitation and revegetation has commenced with further revegetation scheduled to the south as quarrying is completed. In 2004 over one hectare of the quarry that had been previously extracted and used as a silt pond was reshaped and prepared for rehabilitation by PF Formation staff. The top soil had been stored from an adjacent area with Sydney Hinterland Transition Woodland and was spread over the site. Further seed collected over the previous 4 years was broadcast over the site in June 2004 to augment the natural soil borne native seed bank.

In 2006 an additional area of approximately two hectares that had been previously mined was prepared for revegetation. The stored top soil was distributed over the site. Greening Australia then provided over 10,000 seedlings and supervised the planting in September to November 2006. An irrigation system was installed to water the plantings over that summer.

In 2011 an additional area of approximately 1.2 hectares was prepared for revegetation and stored top soil was spread over the site.

In 2011, additional work was undertaken as recommended in the 2010 report. This included weed control, erosion control and additional planting (of both seed and tube stock). Seed used for the revegetation was collected locally including from the former trig site. Species used for additional planting are listed in Table A.1.

No additional work has been undertaken on the site since the 2012 monitoring survey.

Table 4.1 Additional plantings undertaken in 2011

Scientific name	Common name	Previously recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Additional plantings	
				Seed	Tubestock
<i>Acacia decurrens</i>	Black Wattle			Y	Y
<i>Acacia falcata</i>			Y	Y	Y
<i>Acacia fimbriata</i>	Fringed Wattle			Y	
<i>Acacia linifolia</i>	Flax-leaved Wattle	Y	Y		Y
<i>Acacia longifolia</i>			Y	Y	Y
<i>Acacia myrtifolia</i>	Red-stemmed Wattle	Y	Y		Y
<i>Acacia parramattensis</i>	Parramatta Wattle	Y	Y	Y	Y
<i>Acacia suaveolens</i>	Sweet Wattle	Y	Y	Y	Y

Scientific name	Common name	Previously recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Additional plantings	
				Seed	Tubestock
<i>Acacia terminalis</i>	Sunshine Wattle	Y	Y	Y	
<i>Acacia ulicifolia</i>	Heath Wattle	Y	Y	Y	Y
<i>Allocasuarina littoralis</i>	Black Sheoak	Y	Y	Y	Y
<i>Angophora costata</i>	Sydney Red Gum	Y	Y	Y	Y
<i>Angophora floribunda</i>				Y	
<i>Angophora hispida</i>				Y	
<i>Austrodanthonia tenuior</i>			Y		Y
<i>Banksia ericifolia</i>	Heath Banksia				Y
<i>Banksia integrifolia</i>					Y
<i>Bursaria spinosa</i>	Native Blackthorn				Y
<i>Callistemon pinifolius</i>				Y	
<i>Chloris truncata</i>					Y
<i>Clematis aristata</i>		Y		Y	
<i>Daviesia acicularis</i>			Y		Y
<i>Daviesia ulicifolia</i>					Y
<i>Daviesia virgata</i>					Y
<i>Dianella caerulea</i>		Y	Y		Y
<i>Dichelachne crinita</i>					Y
<i>Dodonaea triquetra</i>			Y	Y	Y
<i>Elaeocarpus reticulatus</i>				Y	
<i>Eragrostis benthamii</i>			Y	Y	
<i>Eragrostis brownii</i>	Brown's Lovegrass		Y	Y	
<i>Eucalyptus crebra</i>			Y	Y	
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	Y	Y	Y	
<i>Eucalyptus eximia</i>				Y	
<i>Eucalyptus globoidea</i>				Y	
<i>Eucalyptus haemastoma</i>				Y	
<i>Eucalyptus moluccana</i>				Y	
<i>Eucalyptus pilularis</i>			Y	Y	
<i>Eucalyptus piperita</i>				Y	
<i>Eucalyptus punctata</i>	Grey Gum	Y	Y		Y
<i>Eucalyptus robusta</i>				Y	
<i>Eucalyptus saligna</i>					Y

Scientific name	Common name	Previously recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Additional plantings	
				Seed	Tubestock
<i>Eucalyptus sp.</i>				Y	
<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark	Y	Y	Y	
<i>Gahnia sieberiana</i>				Y	
<i>Glycine clandestina</i>		Y	Y		Y
<i>Hakea sericea</i>		Y	Y		Y
<i>Imperata cylindrica</i> var. <i>major</i>	Bladey Grass	Y	Y	Y	
<i>Isopogon anemonifolius</i>			Y	Y	
<i>Kunzea ambigua</i>	Tick Bush		Y	Y	Y
<i>Leptospermum polygalifolium</i>				Y	
<i>Leptospermum trinervium</i>			Y	Y	Y
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Y		Y	Y
<i>Macrozamia spiralis</i>		Y	Y	Y	
<i>Petrophile pulchella</i>			Y	Y	
<i>Pittosporum undulatum</i>	Sweet Pittosporum	Y		Y	
<i>Poa labillardierei</i> var. <i>labillardierei</i>		Y		Y	Y
<i>Pultenaea villosa</i>			Y	Y	Y
<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>	Turpentine	Y	Y	Y	
<i>Themeda australis</i>	Kangaroo Grass	Y	Y		Y

Following planting of the site, regular visual assessments of the site have been undertaken by PF Formation staff. Observations of the establishment of revegetation within the site, suggest that weeds initially took over the site, providing soil stability but within 12 months native plants stabilized. The native plants start growing rapidly 1 to 2 years following planting and the weeds begin to die off (pers comm. P Cummins, PF Formation).

Appendix B

Photos







B1. Vegetation within Lot 1 DP 1013943 (2008)



B2. Photomonitoring

Table B2.1 Quadrat 1 – 2004 rehabilitation area

Q1	2010	2012	2013
To north			
To east			

Q1	2010	2012	2013
To south			
To west			

Q1	2010	2012	2013
North east into centre			







Table B2.2
Quadrat 2 – 2006 rehabilitation area

Q2	2010	2012	2013
To north			

Q2	2010	2012	2013
To east			
To south			

Q2	2010	2012	2013
To west			
North east into centre			

Table B2.3
 Quadrat 3 – 2006 rehabilitation area







Q3	2010	2012	2013
To north			
To east			

Q3	2010	2012	2013
To south			
To west			

Q3	2010	2012	2013
North east into centre			

Table B2.4 Quadrat 4 – 2006 rehabilitation area

Q4	2010	2012	2013
To north			

Q4	2010	2012	2013
To east			
To south			







Q4	2010	2012	2013
To west			
North east into centre			







Table B2.5 Quadrat 5 – 2011 rehabilitation area


Q5	2012	2013
To north		
To east		
To south		

Q5		2012	2013
To west			
North east into centre			

Table B2.6 Quadrat 6 – 2011 rehabilitation area

Q6		2012	2013
To north			

Q6	2012	2013
To east		
To south		
To west		

Q6	2012	2013
North east into centre		

Appendix C

Quadrat results



C1. Quadrat results

Table C1.1 Vegetation structure

Vegetation layer	Height: range (median) m	% foliage cover	Dominant species
Quadrat 1			
T1	6-15 (12)	25	<i>Acacia parramattensis</i> , <i>Allocasuarina littoralis</i> , <i>Eucalyptus oblonga</i> , <i>Angophora costata</i>
S1	0.5-3 (1.5)	10	<i>Daviesia genistifolia</i> , <i>Bossiaea lenticularis</i> , <i>Ozothamnus diosmifolius</i> , <i>Oxylobium ilicifolium</i> , <i>Acacia parramattensis</i>
G1	0-0.5 (0.3)	55	<i>Entolasia stricta</i> , <i>Bossiaea lenticularis</i> , <i>Lomandra longifolia</i> ,
Notes:	Good regeneration. Canopy developing. Good layer of leaf litter and some dead grass; Very low cover of weeds, No weedy shrubs, weeds present only in groundcover layer; good soil health- soil lichens and moss; fauna habitat moderate- no hollows or timber, limited groundcover, leaf litter developing; lots of birds present.		
Quadrat 2			
T1	4-10 (8)	15	<i>Angophora costata</i> , <i>Syncarpia glomulifera</i> , <i>Acacia parramattensis</i> ,
S1	0.5-3 (1)	10	<i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Syncarpia glomulifera</i> , <i>Angophora costata</i>
G1	0-1 (0.3)	38	<i>Briza maxima</i> *, <i>Themeda australis</i> , <i>Hypochaeris radicata</i> *, <i>Andropogon virginicus</i> *
Notes:	Significant planting has been undertaken in the area. Lots of native seedlings, especially of <i>Hakea sericea</i> and <i>Eucalyptus</i> spp. Shrub layer is developing. Soil health developing with cryptograms present, <i>Themeda australis</i> dominant in patches; poor fauna habitat - no hollows, grass is dense, leaf litter developing, some senescent and fallen shrubs. Main weeds are <i>Andropogon virginicus</i> * and <i>Briza maxima</i> *.		
Quadrat 3			
T1	8-11 (9)	15	<i>Eucalyptus eugenioides</i> , <i>Angophora costata</i> , <i>Syncarpia glomulifera</i> , <i>Allocasuarina littoralis</i>
S1	2-5 (3)	30	<i>Leptospermum trinervium</i> , <i>Hakea sericea</i> , <i>Persoonia levis</i> , <i>Acacia fimbriata</i>
G1	0-1 (0.2)	65	<i>Entolasia stricta</i> , <i>Themeda australis</i> , <i>Andropogon virginicus</i> *, <i>Kunzea ambigua</i> , <i>Leptospermum trinervium</i>
Notes:	Canopy developing and tall shrub layer evident. Few weeds, only occasional introduced grass; good regeneration of natives including seedlings from seedbank and mature plantings; some erosion; good soil health- soil lichens and moss common; fauna habitat poor- no hollows or timber, sparse understory, limited leaf litter, lots of small lizards present.		

Vegetation layer	Height: range (median) m	% foliage cover	Dominant species
Quadrat 4			
T1	1.5-4 (2)	10	<i>Banksia ericifolia</i> , <i>Kunzea ambigua</i> , <i>Hakea dactyloides</i>
S1	0.2-1 (0.6)	15	<i>Acacia myrtifolia</i> , <i>spp.</i> , <i>Acacia ulicifolia</i>
G1	0-0.5 (0.4)	82	<i>Themeda australis</i> , <i>Hakea sericea</i> , <i>Andropogon virginicus</i> *, <i>Leptospermum trinervium</i> , <i>Briza maxima</i> *, <i>Kunzea ambigua</i>
Notes:	Erosion evident from previous surveys has stabilized, no eucalypts present; good recruitment; good native groundcover dominated by <i>Themeda australis</i> ; soil health developing with good cover of cryptograms, fauna habitat poor- no hollows or timber, limited groundcover or leaf litter		
Quadrat 5			
T1	-	-	-
S1	0.3- 2 (1.2)	30	<i>Acacia parramattensis</i> , <i>Acacia longifolia</i> , <i>Verbena bonariensis</i> *
G1	0-0.5 (0.3)	80	<i>Acacia parramattensis</i> , <i>Trifolium repens</i> *, <i>Conyza bonariensis</i> *, <i>Paspalum dilatatum</i> *
Notes:	Predominantly weedy groundcover, a diversity of <i>Acacia</i> spp. growing and some other native species germinating; leaf litter developing, shrub layer developing. Fauna habitat poor, evidence of kangaroos and rabbits.		
Quadrat 6			
T1	-	-	
S1	1-3 (1.5)	35	<i>Acacia parramattensis</i> , <i>Acacia longifolia</i> , <i>Acacia myrtifolia</i>
G1	0-0.5 (0.3)	20	<i>Acacia parramattensis</i> , <i>Sida rhombifolia</i> *, <i>Conyza bonariensis</i> *, <i>Plantago lanceolata</i> *, <i>Hypochaeris radicata</i> *
Notes:	Shrub layer developing with colonizing <i>Acacia</i> spp., regeneration of canopy species evident in groundcover including <i>Allocasuarina littoralis</i> and <i>Eucalyptus</i> spp., predominantly weedy groundcover however some regeneration of native ground cover species evident; Hard baked soil, with no leaf litter and some gully erosion evident. Fauna habitat poor, evidence of foxes and rabbits.		

Notes: T1= Tree layer; S1= Shrub layer; G1=Groundcover

Table C1.2 Quadrat results: groundcover, vegetation cover, slope and aspect

Characteristic	2010				2012						2013					
	1	2	3	4	1	2	3	4	5	6	1	2	3	4	5	6
Ground cover (% cover)																
Bare soil	5	6	13	33	5	8	15	20	50	80	0	5	10	10	10	80
Litter	57	2	5	0	41	25	5	-	-	-	40	15	15	2	5	0
Timber	1	0	0	0	-	2	-	-	-	-	2	2	0	0	0	0
Rock	5	2	1	5	2	-	-	2	3	2	1	0	0	2	3	2
Cryptogram	2	0	1	2	2	-	10	2	-	-	2	10	10	5	0	0
Vegetation	30	90	80	60	50	65	70	76	47	18	55	68	65	81	82	18
Ground cover vegetation (% cover)																
Native ground cover- grasses	20	15	70	25	28	10	53	45	1	-	44	25	43	60	15	5
Native ground cover- shrubs	2	2	5	2	3	3	5	5	5	5	3	2	10	10	5	5
Native ground cover- other	1	1	0	2	2	2	2	12	1	1	7	3	2	2	2	2
Exotic	7	72	5	30	10	50	10	20	40	12	1	38	10	9	60	6
Vegetation cover (% cover)																
Total native groundcover	23	18	75	24	33	15	60	51	7	6	55	30	55	72	22	12
Native overstorey	30	10	10	0	25	15	10	-	-	-	25	15	15	0	0	0
Native midstorey	10	10	20	8	10	8	25	10	-	-	5	10	30	15	30	35
Exotic cover (all layers)	10	72	5	30	10	50	10	20	40	12	1	38	10	9	60	6
Slope (degrees)	3	6	8	6	3	6	8	6	5	4	3	6	8	6	5	4
Aspect	S	S	SE	SE	S	S	SE	SE	SW	S	S	S	SE	SE	SW	S

Table C1.3 Species recorded

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Acacia brownii</i>	Heath Wattle			Y	Y	Y	Y			1	1		
<i>Acacia decurrens</i>	Black Wattle				Y		Y		3				
<i>Acacia falcata</i>				Y	Y	Y	Y	1					
<i>Acacia fimbriata</i>	Fringed Wattle				Y	Y	Y			1	1		
<i>Acacia hispidula</i>				Y									
<i>Acacia linifolia</i>	Flax-leaved Wattle		Y	Y	Y	Y	Y	1		3			
<i>Acacia longifolia</i>				Y		Y	Y		2		2	3	3
<i>Acacia myrtifolia</i>	Red-stemmed Wattle		Y	Y	Y	Y	Y	1			1	1	3
<i>Acacia parramattensis</i>	Parramatta Wattle		Y	Y	Y	Y	Y	3	1		2		4
<i>Acacia parvipinnula</i>				Y			Y					3	
<i>Acacia saligna</i>	Golden Wreath Wattle	*			Y								
<i>Acacia suaveolens</i>	Sweet Wattle		Y	Y	Y	Y	Y		1				
<i>Acacia terminalis</i>	Sunshine Wattle		Y	Y	Y	Y	Y	1		2	1		
<i>Acacia trinervata</i>				Y			Y				2		
<i>Acacia ulicifolia</i>	Heath Wattle		Y	Y	Y	Y	Y		1	1		1	1
<i>Acetosella vulgaris</i>		*					Y					1	
<i>Acianthus fornicatus</i>	Pixie Caps		Y	Y			Y				2		
<i>Actinotus helianthi</i>				Y									
<i>Ageratina adenophora</i>	Crofton Weed	*	Y		Y								

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Agrostis avenacea</i>						Y	Y					2	2
<i>Allocasuarina littoralis</i>	Black Sheoak		Y	Y	Y	Y	Y	4	1	2	1	1	2
<i>Anagallis arvensis</i>	Scarlet Pimpernel	*				Y	Y		1				
<i>Andropogon virginicus</i>	Whisky Grass	*			Y	Y	Y		3	2	2		
<i>Angophora bakeri</i>	Narrow-leaved Apple		Y	Y	Y	Y	Y						
<i>Angophora costata</i>	Sydney Red Gum		Y	Y	Y	Y	Y	3	3	2			1
<i>Anisopogon avenaceus</i>				Y									
<i>Araujia sericifera</i>	Moth Vine	*	Y										
<i>Aristida benthamii</i>				Y									
<i>Aristida vagans</i>	Threeawn Speargrass		Y	Y									
<i>Aristida warburgii</i>				Y									
<i>Astroloma humifusum</i>				Y									
<i>Astroloma pinifolium</i>				Y									
<i>Austrodanthonia fulva</i>				Y									
<i>Austrodanthonia tenuior</i>				Y			Y					2	
<i>Austrostipa pubescens</i>			Y	Y									
<i>Banksia ericifolia</i>	Heath Banksia				Y	Y	Y		1				
<i>Banksia integrifolia</i>					Y	Y	Y		1				
<i>Banksia oblongifolia</i>					Y	Y							

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Banksia spinulosa</i> var. <i>spinulosa</i>				Y									
<i>Bidens pilosa</i>		*				Y	Y					1	
<i>Billardiera scandens</i>	Appleberry		Y	Y		Y	Y	1					
<i>Boronia polygalifolia</i>			Y										
<i>Bossiaea lenticularis</i>			Y	Y	Y	Y	Y	2					
<i>Bossiaea obcordata</i>			Y	Y	Y								
<i>Bossiaea rhombifolia</i> subsp. <i>rhombifolia</i>				Y									
<i>Breynia oblongifolia</i>	Coffee Bush		Y										
<i>Briza maxima</i>	Quaking Grass	*				Y	Y		3			1	1
<i>Brunoniella pumilio</i>	Dwarf Blue Trumpet		Y	Y	Y	Y	Y	1					
<i>Bursaria spinosa</i>	Native Blackthorn				Y	Y	Y		2				
<i>Caesia parviflora</i>				Y									
<i>Callistemon linearis</i>				Y									
<i>Callistemon rigidus</i>				Y									
<i>Cassytha glabella</i>				Y									
<i>Cassytha pubescens</i>				Y									
<i>Caustis flexuosa</i>				Y									
<i>Centaurium erythraea</i>		*				Y	Y		2	1		2	2
<i>Ceratopetalum apetalum</i>	Coachwood		Y										

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Cheilanthes sieberi</i>				Y			Y	1					
<i>Clematis aristata</i>			Y										
<i>Comesperma ericinum</i>	Pyramid flower		Y										
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*	Y		Y	Y	Y			1		2	2
<i>Corymbia eximia</i>				Y									
<i>Corymbia gummifera</i>	Red Bloodwood		Y	Y									
<i>Cyathochaeta diandra</i>				Y									
<i>Cynodon dactylon</i>	Couch						Y					1	
<i>Cyperus ?polystachyos</i>						Y	Y					1	
<i>Daviesia acicularis</i>				Y									
<i>Daviesia corymbosa</i>				Y									
<i>Daviesia genistifolia</i>	Broom Bitter Pea			Y	Y	Y	Y	1	1	1			
<i>Daviesia squarrosa</i>				Y									
<i>Dianella caerulea</i>			Y	Y		Y	Y		1				
<i>Dianella prunina</i>			Y	Y	Y	Y	Y		1		1		
<i>Dianella revoluta</i> var. <i>revoluta</i>				Y									
<i>Dichelachne crinite</i>	Long-haired Plume Grass						Y			2			
<i>Dillwynia acicularis</i>				Y									
<i>Dillwynia parvifolia</i>				Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Dillwynia retorta</i>				Y	Y	Y	Y			1			1
<i>Dodonaea pinnata</i>				Y									
<i>Dodonaea triquetra</i>				Y									
<i>Drosera auriculata</i>				Y									
<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>				Y									
<i>Einadia hastata</i>	Berry Saltbush		Y										
<i>Entolasia stricta</i>	Wiry Panic		Y	Y	Y	Y	Y	3		3			
<i>Entolasia whiteana</i>				Y									
<i>Epacris pulchella</i>	NSW Coral Heath			Y	Y								
<i>Epacris purpurascens</i> var. <i>purpurascens</i>				Y									
<i>Eragrostis benthamii</i>				Y									
<i>Eragrostis brownii</i>	Brown's Lovegrass			Y	Y	Y	Y	1		1			
<i>Eriostemon australasius</i>				Y									
<i>Eucalyptus ?saligna</i>					Y	Y							
<i>Eucalyptus beyeriana</i>				Y									
<i>Eucalyptus crebra</i>				Y									
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark		Y	Y	Y	Y	Y		1	3		1	
<i>Eucalyptus notabilis</i>				Y	Y								
<i>Eucalyptus oblonga</i>	Stringybark			Y	Y	Y	Y	4					

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Eucalyptus pilularis</i>				Y									
<i>Eucalyptus punctata</i>	Grey Gum		Y	Y	Y	Y	Y	2					
<i>Eucalyptus resinifera</i> subsp. <i>resinifera</i>				Y									
<i>Eucalyptus scias</i> subsp. <i>scias</i>				Y									
<i>Eucalyptus sclerophylla</i>			Y	Y									
<i>Eucalyptus</i> sp.						Y	Y				1		1
<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark		Y	Y									
<i>Eucalyptus squamosa</i>				Y									
<i>Exocarpos cupressiformis</i>	Native Cherry				Y	Y	Y	1					
<i>Exocarpos strictus</i>	Dwarf Cherry		Y	Y		Y							
<i>Glycine clandestina</i>			Y	Y	Y	Y	Y	1	2		1		
<i>Glycine tabacina</i>			Y	Y		Y	Y	2					1
<i>Gnaphalium</i> sp.					Y	Y	Y		2			2	
<i>Gompholobium glabratum</i>	Dainty Wedge Pea		Y	Y									
<i>Gompholobium grandiflorum</i>				Y									
<i>Gompholobium inconspicuum</i>				Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Gompholobium minus</i>				Y									
<i>Gompholobium pinnatum</i>				Y									
<i>Gompholobium uncinatum</i>				Y									
<i>Gonocarpus tetragynus</i>				Y									
<i>Gonocarpus teucroides</i>					Y	Y	Y			1			
<i>Goodenia bellidifolia</i> subsp. <i>bellidifolia</i>			Y	Y			Y	2					
<i>Goodenia hederacea</i> subsp. <i>hederacea</i>				Y									
<i>Goodenia heterophylla</i>			Y	Y									
<i>Grevillea buxifolia</i> subsp. <i>buxifolia</i>	Grey Spider Flower		Y	Y									
<i>Grevillea diffusa</i>				Y									
<i>Grevillea longifolia</i>				Y									
<i>Grevillea mucronulata</i>				Y									
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>				Y									
<i>Grevillea phyllicoides</i>				Y									
<i>Grevillea sericea</i>				Y									
<i>Grevillea sphacelata</i>				Y									
<i>Haemodorum planifolium</i>				Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Hakea dactyloides</i>	Broad-leaved Hakea			Y	Y	Y	Y		2	2	1		
<i>Hakea sericea</i>			Y	Y	Y	Y	Y			2	3		
<i>Hardenbergia violacea</i>	False Sarsaparilla		Y	Y	Y	Y	Y	1	1			1	1
<i>Hibbertia aspera</i> subsp. <i>aspera</i>				Y									
<i>Hibbertia bracteata</i>				Y									
<i>Hibbertia diffusa</i>				Y									
<i>Hibbertia serpyllifolia</i>				Y									
<i>Hibbertia</i> sp.					Y	Y							
<i>Hovea linearis</i>			Y	Y									
<i>Hybanthus monopetalus</i>				Y									
<i>Hypochaeris radicata</i>	Catsear	*			Y	Y	Y		2		2	2	3
<i>Imperata cylindrica</i> var. <i>major</i>	Bladey Grass		Y	Y	Y	Y	Y	1		2			
<i>Isopogon anemonifolius</i>				Y									
<i>Jacksonia scoparia</i>				Y									
<i>Juncus</i> sp.			Y		Y	Y							
<i>Kunzea ambigua</i>	Tick Bush			Y	Y	Y	Y	2		3	2		
<i>Lagenifera gracilis</i>				Y									
<i>Lambertia formosa</i>	Mountain Devil			Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Lasiopetalum ferrugineum</i>				Y									
<i>Lasiopetalum rufum</i>				Y									
<i>Laxmannia gracilis</i>				Y									
<i>Lepidosperma latens</i>				Y									
<i>Lepidosperma laterale</i>			Y	Y	Y	Y	Y	2					
<i>Leptomeria acida</i>				Y									
<i>Leptospermum parvifolium</i>				Y									
<i>Leptospermum trinervium</i>				Y	Y	Y	Y	2		3	2		
<i>Leucopogon juniperinus</i>			Y		Y	Y	Y	1		1			
<i>Leucopogon lanceolatus</i>	Lance Beard Heath		Y										
<i>Leucopogon muticus</i>				Y									
<i>Leucopogon virgatus</i>				Y									
<i>Lindsaea microphylla</i>				Y									
<i>Lissanthe sapida</i>				Y									
<i>Lissanthe strigosa</i>				Y									
<i>Lobelia gracilis</i>				Y									
<i>Logania pusilla</i>				Y									
<i>Lomandra confertifolia</i> subsp. <i>rubiginosa</i>				Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Lomandra cylindrica</i>				Y									
<i>Lomandra filiformis</i> subsp. <i>coriacea</i>				Y									
<i>Lomandra filiformis</i> subsp. <i>filiformis</i>				Y									
<i>Lomandra glauca</i>				Y									
<i>Lomandra gracilis</i>			Y	Y									
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		Y		Y	Y	Y	2	1	1	1		
<i>Lomandra multiflora</i> subsp. <i>multiflora</i>			Y	Y									
<i>Lomandra obliqua</i>			Y	Y									
<i>Lomatia silaifolia</i>	Crinkle Bush		Y	Y									
<i>Macrozamia spiralis</i>			Y	Y									
<i>Medicago</i> sp.		*				Y							
<i>Melaleuca nodosa</i>				Y									
<i>Micrantheum ericoides</i>				Y									
<i>Microtis</i> sp.						Y							
<i>Mirbelia rubiifolia</i>				Y									
<i>Monotoca scoparia</i>				Y									
<i>Myrsiphyllum asparagoides</i>	Florist's Smilax	*	Y										
<i>Olearia microphylla</i>				Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Opercularia diphylla</i>				Y									
<i>Opercularia varia</i>				Y									
<i>Oxalis perennans</i>					Y	Y	Y	1					
<i>Oxylobium ilicifolium</i>	Prickly Shaggy Pea		Y		Y	Y	Y	1					
<i>Ozothamnus diosmifolius</i>	White Dogwood		Y	Y	Y	Y	Y	1					
<i>Pandorea pandorana</i>	Wonga Vine		Y										
<i>Panicum simile</i>	Two-colour Panic		Y	Y	Y	Y	Y	1					
<i>Paspalum dilatatum</i>	Paspalum	*			Y	Y	Y	1	2		1	3	2
<i>Passiflora sp.</i>	Passionfruit		Y										
<i>Patersonia glabrata</i>				Y									
<i>Patersonia longifolia</i>				Y									
<i>Patersonia sericea</i>				Y									
<i>Pennisetum clandestinum</i>		*				Y	Y					2	3
<i>Persicaria decipiens</i>	Pepperweed					Y							
<i>Persoonia hirsuta</i>				Y									
<i>Persoonia lanceolata</i>				Y									
<i>Persoonia laurina</i>				Y									
<i>Persoonia levis</i>	Broad-leaved Geebung			Y	Y	Y	Y	1		2			
<i>Persoonia linearis</i>	Narrow-leaved Geebung		Y	Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Persoonia oblongata</i>				Y									
<i>Persoonia pinifolia</i>				Y									
<i>Petrophile pulchella</i>				Y									
<i>Petrophile sessilis</i>				Y									
<i>Philotheca hispidula</i>				Y									
<i>Phyllanthus hirtellus</i>				Y									
<i>Pimelea curviflora</i> var. <i>curviflora</i>				Y									
<i>Pimelea linifolia</i> subsp. <i>linifolia</i>				Y			Y			1			
<i>Pittosporum undulatum</i>	Sweet Pittosporum		Y										
<i>Plantago lanceolata</i>	Lamb's Tongues	*			Y	Y	Y		2	1		2	2
<i>Platysace ericoides</i>				Y									
<i>Platysace lanceolata</i>			Y										
<i>Platysace linearifolia</i>				Y									
<i>Poa labillardierei</i> var. <i>labillardierei</i>			Y				Y					2	1
<i>Podolobium scandens</i>				Y									
<i>Polyscias sambucifolia</i>	Elderberry Panax		Y										
<i>Pomax umbellata</i>			Y	Y									
<i>Poranthera microphylla</i>			Y										

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Pratia purpurascens</i>	Whiteroot		Y	Y									
<i>Prostanthera howelliae</i>				Y									
<i>Pteridium esculentum</i>	Bracken				Y	Y	Y			1			
<i>Pterostylis acuminata</i>				Y									
<i>Pterostylis longifolia</i>				Y									
<i>Pultenaea ferruginea</i>				Y									
<i>Pultenaea microphylla</i>			Y										
<i>Pultenaea polifolia</i>				Y									
<i>Pultenaea scabra</i>			Y	Y									
<i>Pultenaea tuberculata</i>				Y									
<i>Pultenaea villosa</i>				Y		Y	Y				2	2	2
<i>Scaevola ramosissima</i>			Y	Y									
<i>Schizaea bifida</i>				Y									
<i>Schoenus imberbis</i>				Y									
<i>Senecio madagascariensis</i>	Fireweed	*			Y	Y	Y	1	1		1	2	2
<i>Setaria gracilis</i>	Slender Pigeon Grass	*			Y	Y							
<i>Sida rhombifolia</i>	Paddy's Lucerne	*	Y		Y	Y	Y		2		1	3	2
<i>Solanum mauritianum</i>	Wild Tobacco Bush	*	Y										
<i>Solanum nigrum</i>	Black-berry Nightshade	*	Y										

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Sonchus oleraceus</i>	Common Sowthistle	*	Y										
<i>Stylidium</i> sp.					Y	Y	Y			1			
<i>Styphelia laeta</i> subsp. <i>laeta</i>				Y									
<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>	Turpentine		Y	Y	Y	Y	Y		3	2	1	1	
<i>Thelymitra pauciflora</i>				Y									
<i>Themeda australis</i>	Kangaroo Grass		Y	Y	Y	Y	Y		3	2	4		3
<i>Thysanotus tuberosus</i> subsp. <i>tuberosus</i>				Y									
<i>Trachymene incisa</i> subsp. <i>incisa</i>				Y									
<i>Tricoryne simplex</i>				Y									
<i>Trifolium arvense</i>	Haresfoot clover	*				Y	Y		2			2	2
<i>Trifolium repens</i>	White Clover	*			Y	Y	Y		2			3	2
<i>Verbena bonariensis</i>	Purpletop	*			Y	Y	Y		2			2	1
<i>Veronica plebeia</i>	Trailing Speedwell		Y										
<i>Vicia sativa</i>		*			Y	Y							
<i>Wahlenbergia stricta</i>	Tall Bluebell				Y	Y	Y		2		2	2	2
<i>Xanthorrhoea concava</i>				Y									
<i>Xanthorrhoea media</i>				Y									

Scientific name	Common name	Exotic	Recorded within Lot 1 DP 1013943	Species of Sydney Hinterland transition woodland	Recorded in rehabilitation area			Quadrat results (2013)					
					2010	2012	2013	1	2	3	4	5	6
<i>Xanthorrhoea minor</i> subsp. <i>minor</i>				Y									
<i>Xanthorrhoea resinifera</i>				Y									
<i>Xanthorrhoea</i> sp.	Grass tree		Y										
<i>Xanthosia pilosa</i>				Y									
<i>Xanthosia tridentata</i>				Y			Y	1					
<i>Xylomelum pyriforme</i>	Woody Pear		Y	Y									

Notes:

Cover abundance scores:

- (1) 5%- rare or few individuals
- (2) <5% common
- (3) 5-25%
- (4) 25-50%
- (5) 50-75%
- (6) 75-100%