

PF FORMATION



HITCHCOCK ROAD SAND EXTRACTION AND REHABILITATION PROJECT, MAROOTA

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

2012 - 2013



PF Formation

HITCHCOCK ROAD
Sand Extraction and Rehabilitation Project Maroota

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT 2012-2013

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Hitchcock Road sand extraction and rehabilitation project

Annual Environmental Management Report 2012-2013

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Term	Abbreviation
AEMR	Annual Environmental Management Report
AHD	Australian Height Datum. The standard reference level used to express the relative elevation of various features. A height given in metres AHD is essentially the height above sea level.
Airshed	Lower atmosphere within a defined geographic area.
Ambient	The background level at a specific location, being a composite of all sources.
Annual Average Daily Traffic	Annual average daily traffic volume representing the total traffic in both directions at a specified location calculated from mechanically obtained axle counts.
Annual Exceedance Probability (AEP)	The probability of a flood event exceeding a nominated level in a year. A one percent AEP is the probability of an event exceeding a nominated level in 100 years.
Aquifer	Geologic formation, group of formations, or part of a formation capable of transmitting and yielding economic quantities of water.
Archaeology	The scientific study of human history, particularly the relics and cultural remains of the distant past.
ARI	Average Recurrence Interval-average or expected period between exceedance of a flood.
Background Noise Level	The ambient sound pressure noise level in the absence of the sound under investigation exceeded for 90 percent of the measurement period. Normally equated to the average minimum A-weighted sound pressure level.
Batter	The side slope of walls, embankments and cuttings or the degree of such slope, usually expressed as a ratio of horizontal distance to one vertical height.
Bore	A cylindrical drill hole sunk into the ground from which water is pumped for use or monitoring.
Buffer	A physical barrier, structure or width of land which encloses, partially encloses or defines a particular environment. It serves to minimise the impacts of non-desirable external influences on the adjoining environment.
Bund Wall	A wall erected to prevent the escape of various emissions into the environment (liquids, noise or views).
Catchment	The area drained by a stream or body of water or the area of land from which water is collected.
Clay	Very fine grained sediment, often defined as having a particle size less than 2 microns (0.002mm) in diameter.
Compaction	The process of compressing individual grains in a soil or sediment in response to pressure.
Conservation	The management of resources in a way that will benefit both present and future generations.

Term	Abbreviation
Contaminant	Any physical, chemical, biological or radiological substance or matter in water or soil that is not of natural origin.
Contamination	The degradation of the natural environment as a result of human activities.
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 Sunday and public holidays.
dBA	Decibels using the A-weighted scale measured according to the frequency of the human ear.
DECC	NSW Department of Environment and Climate Change now OEH.
Decibel	A scale unit used in the comparison of powers and levels of sound energy. The number of decibels is ten times the logarithm to the base of ten of the ratio of the powers.
Department	NSW Department of Planning.
Director-General	Director-General of the Department of Planning or delegate.
DPI	NSW Department of Primary Industries
DWE	NSW Department of Water
EA	Environmental Assessment of the project entitled <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.
Ecology	The relationship between living things and their environment.
Ecologically Sustainable Development	Using, conserving and enhancing the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
Ecosystem	A functional unit of energy transfer and nutrient cycling in a given place. It includes all relationships within the biotic community and between the biotic components of the system.
Emission	Discharge of a substance to the environment.
Environment	A term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms, including humans, exists.
Environmental Assessment (EA)	impact on the physical, social and economic environment. It includes an evaluation of alternatives and an overall justification of the project. The EA is used as a vehicle to facilitate public comment and as the basis for analysing the project with respect to granting approval under relevant legislation.

Term	Abbreviation
Environment Protection Licence	
EMP	Environmental Management Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979.</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000.</i>
EPL	Environmental Protection Licence issued under the <i>Protection of the Environment Operations Act 1997.</i>
Equivalent Continuous Sound Level (LAeq)	The constant sound level which when operating over the same time interval as a fluctuating sound over an extended time, is equivalent to the same sound energy.
Erosion	The wearing away of the land surface by the action of water, wind and ice.
Evening	The period from 6.00pm to 10.00pm.
Excavate	Dig into natural material and remove using specialist machinery.
Extraction	A term referring to the removal of material from the earth synonymous with quarrying.
Extraction area	The land described as the extraction area in Appendix 1 of the Project Approval.
Evapotranspiration	Loss of water from a land mass through transpiration from plants and evaporation from the soil.
Fauna	All animals including birds, reptiles, marsupials and fish.
Flora	All plants
Frequency	Similar to the pitch of a musical note in sound pressure fluctuations of cycles per second (Hertz). Most sounds comprise a composite of frequencies of varying sound pressure levels in the range of 20 Hertz to 20,000 Hertz.
Friable	Easily crumbled.
Front-end loader	Machine used to lift and place soil, earth, rocks and other materials within an extraction site or to load products into trucks.
Gradient	Rate of change of a given variable with distance, such as temperature or elevation.
g/m²/month	grams per square metre per month
Greenhouse effect	Changes in climate that could occur due to increases in atmospheric concentrations of certain gases.
Groundwater	Subsurface water contained within the saturated zone.

Term	Abbreviation
Hawkesbury Sandstone	Prominent cliff-forming sandstone occurring across the Sydney basin.
Head (hydraulic head)	Energy contained in a water mass produced by elevation, pressure or velocity.
Heritage	Things of value which are inherited from the past.
Hydrocarbon	Any organic compound, gaseous, liquid or solid, consisting only of carbon and hydrogen.
Hydrogeology	The study of subsurface water in its geological context.
Impact	The effect of human-induced action on the environment.
Infiltration	The process of surface water soaking into the soil.
Infrastructure	Supporting installations and services supplying the needs of a project.
Introduced species	Plants and animals not native to Australia and known or thought to have been brought here by humans.
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 the approval.
Landform	A specific feature of the landscape or the general shape of the land.
µg/m³	micrograms per cubic metre
µs/cm	microsiemens per centimetre
micron	Unit of measure-one millionth of a metre.
mg/L	milligrams per litre
Mitigation measures	Measures put in place to reduce an impact.
Modelling	Use of mathematical equations to simulate and predict real events and processes.
Monitoring	Regular measurement of components of the environment to understand their condition and establish if necessary standards are being met.
Minister	NSW 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 Sunday and public holidays/
Observation well	A well constructed or utilised for the purpose of observing groundwater parameters such as water levels, pressure changes and water quality.
OEH	Office of Environment and Heritage (formerly DECC)

Term	Abbreviation
Palaeochannel	An ancient river bed, often filled with more recent sediments.
Perched water	Unconfined groundwater separated from an underlying body of groundwater by an unsaturated zone.
pH	A measure of acidity or alkalinity of a solution, numerically equal to 7 for neutral solution, increasing with increasing alkalinity and decreasing with increasing acidity. Originally stood for the words potential of hydrogen.
Piezometer	A pipe in which the elevation of the water level or potentiometric surface can be determined.
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 Planning on 18 November 2008.
Process plant	Equipment used to clean and separate sand into various sizes.
Project	The development as described in the EA.
Proponent	PF Formation or its successors in title.
Recharge	Addition of water to the zone of saturation; also the amount of water added.
Recovery	The difference between the observed water level during the recovery period after cessation of pumping and the water level measured immediately before pumping stopped.
Receptor	An environmental modelling term used to describe a map reference point where the impact is predicted. A sensitive receptor is a home, work place, school or other place where people spend some time. An elevated receptor is a point above ground level.
Rehabilitation	Preparation of a final landform following extraction and its stabilisation with vegetation.
Remnant vegetation	Native vegetation remaining after widespread clearing has taken place.
Resource	Potentially usable material in a defined area that can be economically extracted.
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 of Planning dated 27 August 2008.
RL	Reduced level, usually in metres to an arbitrary datum.
RTA	NSW Roads and Traffic Authority

Term	Abbreviation
Run-off	The proportion of precipitation discharged through surface water systems.
Sand	Sediment comprising particles ranging between 0.063mm and 2mm.
Sandstone	A fine grained rock of sedimentary origin composed primarily of sand-sized particles (0.06 to 2 mm).
Sedimentation basin	An area where runoff is ponded to allow sediment to be deposited. The longer the period that the runoff is held, the smaller the size of the sediment deposited. Such basins have to be regularly cleaned.
SHTW	Sydney Hinterland Transition Woodland
Silt	Sediment comprising most particles between 0.004mm and 0.063mm.
Species	Taxonomic grouping of organisms that are able to interbreed with each other but not with other species.
Stakeholder	An individual or group with an interest in the proposal.
Statement of Commitments	The proponent's commitments in Appendix 3 of the Project Approval.
Stockpile	Mound used to store material.
Stormwater	Rainwater which runs off catchments following rain events. The untreated water is carried into creeks, rivers and lakes.
Strategy A, Strategy B	The alternative rehabilitation proposals described in the Preferred Project Report.
Terrestrial	Relating to the land as distinct from air or water.
Tertiary	Geologic time at the beginning of the Cainozoic era, 65 to 2 million years ago, after the Cretaceous and before the Quaternary.
Topography	The physical relief and contours of the area.
Topsoil	The surface layer of a soil profile containing most of the organic material and viable life forms and seeds.
Total Dissolved Solids (TDS)	The dissolved mineral content of groundwater, commonly expressed in milligrams/Litre.
Total Suspended Solids	A measure of suspended solids concentrations in a water body and expressed in terms of mass per unit of volume.
Triassic	The earliest of the three periods that constitute the Mesozoic Era. Approximately between 230 and 180 million years before present.
TSC Act	NSW Threatened Species Conservation Act.
Turbidity	A measure of light penetration through a water column containing particles of matter in suspension.

Term	Abbreviation
Underflow	The volume of groundwater that flows through a cross sectional area of an aquifer. It depends on permeability and the prevailing gradient.
Unsaturated zone	That part of an aquifer between the land surface and water table.
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 of the Project Approval.
VENM	Virgin Excavated Natural Material as defined in the <i>Protection of the Environment Operations Act 1997</i> .
Wash plant	Equipment designed to wash unwanted sized materials from the product.
Water quality	Degree or lack of contamination.
Water table	The surface of saturation in an unconfined aquifer at which the pressure of the water is equal to that of the atmosphere.
Well	A hole sunk into the ground and completed for the abstraction or injection of water or for water observation purposes. Generally synonymous with bore.
1 in 100 Year Flood Level	The flood which occurs on average once every 100 years. Also known as the 100 year Average Recurrence Interval of a flood.

Chapter One **INTRODUCTION**

Following the lodgement of a Development Application ('DA') and associated Environmental Assessment ('EA') under Part 3A of the Environmental Planning and Assessment Act, the present development was approved by the Minister for Planning on 3 February 2009. The conditions attached to the approval required, among other things, the preparation of five management plans/monitoring programs:

- Environmental Strategy – results in Chapter 3
- Noise Management Plan – results in Chapter 4
- Air Quality Monitoring Program – results in Chapter 5
- Water Management Plan – results in Chapter 6
- Landscape Management Plan – results in Chapter 7

The first revision of these Plans occurred in 2011 and the Department of Planning (DoP) approved the revised Plans on 15 November 2011.

Each of these documents sets out the various monitoring programs required to comply with the requirements of the approval conditions. The monitoring results are summarised in an annual report known as the Annual Environmental Management Report (AEMR). This is submitted 12 months from the date of approval and every year thereafter to the Director-General, relevant agencies and the Community Consultative Committee (CCC).

This AEMR will:

- identify the standards and performance measures that apply to the project
- describe the works that will be carried out in the next 12 months
- include a summary of the complaints received during the past year and compare this to complaints received in previous years
- include a summary of the monitoring results for the project during the past year to 30 June
- include an analysis of these results against the relevant
 - impact assessment criteria/limits
 - monitoring results from previous years
 - 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; and
- describe what actions were, or are being, taken to ensure compliance.

The Approval requires the project to have an Independent Environmental Audit within 12 months of the date of approval and every three years thereafter. The audit will:

- be conducted by a suitably qualified, experienced and independent person(s) whose appointment has been approved by the Director-General;
- include consultation with the relevant agencies;
- assess the environmental performance of the project and its effects on the surrounding environment;
- assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and
- review the adequacy of any strategy/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.

First Independent Environmental Audit

On the 13 July 2010 the Department of Planning approved Environmental Planning to conduct the first Environmental Audit of the Project. In April 2011 the Independent Environmental Audit Report of the Hitchcock Road Sand Project was received. A copy of the Report is appended in **Attachment 9A** and the Audit Conclusions were:

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-conformances. 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-conformances 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, nevertheless acceptable and manageable with some improvements and corrective actions needed. This assumes that the 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.

Independent Audit Recommendations

Audit recommendations were outlined in Section 8 of the Audit Report and the PF Formation response to each of the matters raised was reported to the Department of Planning in the letter dated 14 June 2011 as per **Attachment 9B**. All matters referred to in PF Formation 'Comments on Independent Environment Report' dated 14 June 2011 have now been completed.

Points 3, 6, 7, 8, 9, 12, 13, 20 of the Audit Recommendations refer to changes/updates to be made to the Environmental Strategies, Management Plan and Water Table Contours Map and Depth of Mining Contours Map. These Plans have been updated and forwarded to the DoP on 14 September 2011 and were approved by DoP on 15 November 2011.

The next independent audit will be conducted in 2014.

Chapter Two

STATUS OF THE PROJECT

The site survey plan attached as **Attachment 2A** shows the current status of the development. The location of the various lots that make up the site is shown on Figure 2 at **Attachment 2B**.

The total amount of processed material derived from the Hitchcock Road site over the 12 months to June 2013 was within the limit of 400,000 tonnes of processed material allowed under Condition 7 of Schedule 2 for the Hitchcock Road Project Approval.

Works Carried Out in Last 12 Months and Planning for Next 12 months

- Limited extraction has continued in Lot 214 DP752039 in 2013. The majority of the sand from this site has now been extracted but further extraction will occur in the next year in the western side of the property near Hitchcock Road. Construction of tailing ponds has occurred in 2013 (Pond 12) and they will be operational in 2014. (**Attachment 2C – Photo 1**)
- Extraction on the north-western side of the site on Lot 1 DP570966 and will continue as the main extraction area for the next year (**Attachment 2C – Photo 2**)
- Removal of significant overburden heading north through Lot 2 DP1063296 to Lot 2 DP570966 to prepare for long-term extraction of this area. Intermittent extraction will occur in this area. (**Attachment 2C – Photo 3**)
- Capping of Tailings Pond 5 is about one-half complete and will continue. Water must still flow through this pond to get to the Clean Water Dam (**Attachment 2C – Photo 9**) whilst Ponds 9 and 10 are being used. (**Attachment 2C – Photo 4**)
- Former tailings Pond 7 and 8 are used as overburden stockpile area. (**Attachment 2C – Photo 5**)
- Construction of a new tailings pond in the centre of Lot 1 DP1091018 will continue. This pond will be Tailings Pond 11 immediately north of Tailings Ponds 7. (**Attachment 2C – Photo 6**)
- Tailings Ponds 9 and 10 will continue as the main ponds in use in the system. (**Attachment 2C – Photo 7&8**). A new Pond 12 (Lot 214 DP 752039) will come into use in the 2014 period.
- Continued monitoring and supplemental planting of revegetation in the completed areas of Lot 2 DP233818 (**Attachment 2C – Photo 10, 11, 12 &13**). More than 4 hectares of SHTW has been planted on the site at that stage. No further SHTW will be planted until the remaining SHTW has to be removed for extraction.
- Planting of vegetation has occurred along the northern end of Old Northern Road. Continued monitoring and supplemental planting of revegetation in this area will continue in 2014. (**Attachment 2C – Photos 14 & 15**)
- In March 2013 the NSW Department of Planning and Infrastructure gave approval to proceed with the clearing of the Sydney Hinterland Transitional Woodland (SHTW) in the middle of the site (Lot 1 DP 1091018 and Lot 2 DP233818). It is anticipated that this may occur in 2014 dependent on a final area to be rehabilitated being available (to move the SHTW to) and the need to access the resource under the SHTW.

These activities will be initiated or continued over the next 12 months and be progressively completed over three years.

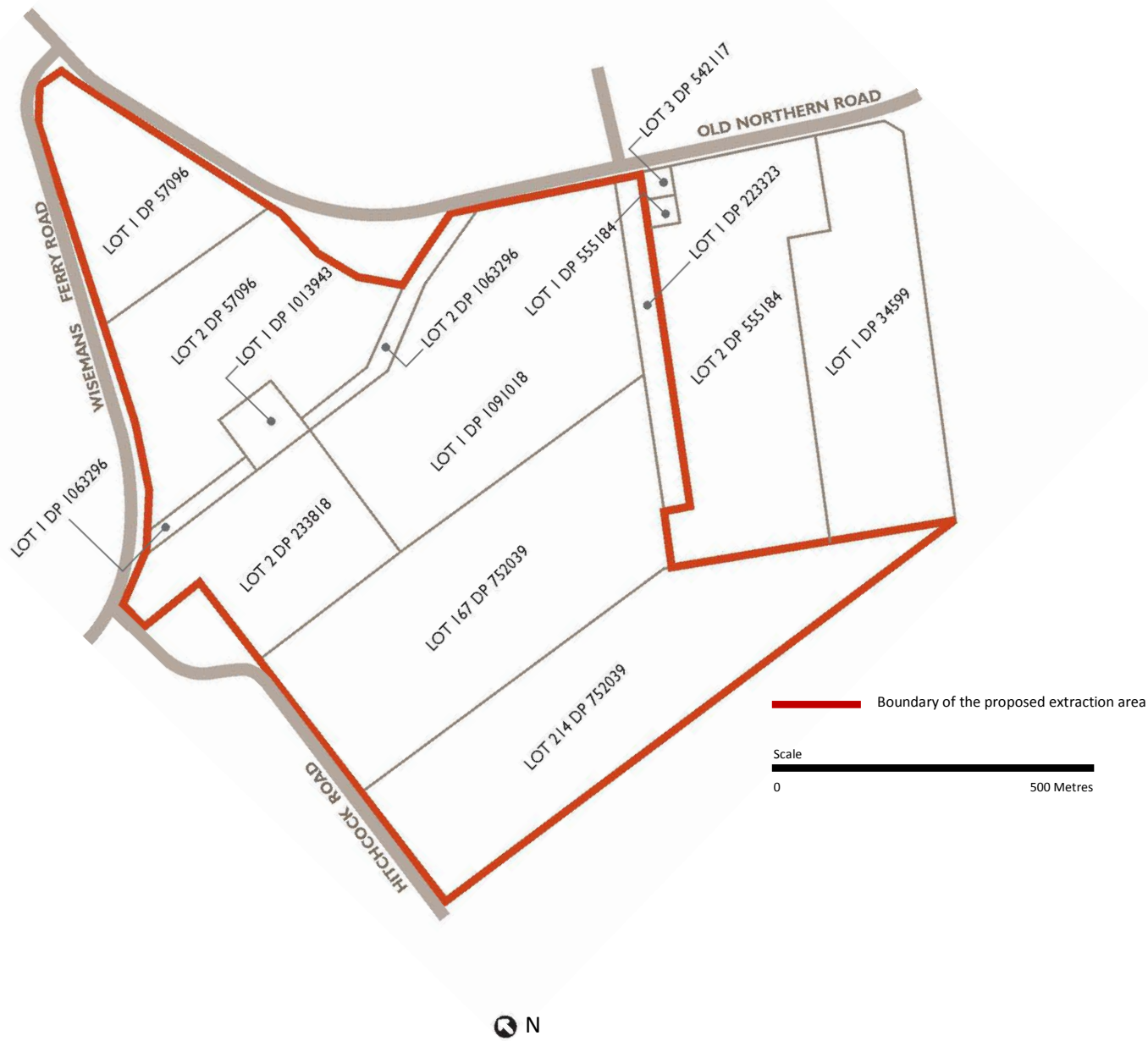
There have been no complaints during the year.

Other Matters

The weighbridge is required to be verified under the Fair Trading Rules every two years. The last verification was done on 11 May 2012 and a copy of the verification is in **Appendix 2D**.

Annual production data is forwarded to the Department of Primary Industries in aggregate for all material produced and sold at Maroota. The figures provided include material from Hornsby Shire Council and Hills Shire Council and from several Approvals/Consents. The information in these forms is commercially sensitive and in any case it does not break down the material from this Approval or others. The throughput for the year from this Approval was less than 400,000 tonnes and detail of this AEMR not available for publication.

Annual EPA Licence – we are required to lodge an annual return with the EPA. A copy is enclosed in **Appendix 2E**.



Attachment 2B
Lots Included in the Development



Photo 1: New Silt Pond



Photo 2: Main Extraction Area



Photo 3: Overburden Removal



Photo 4: Tailings Pond 4



Photo 5: Overburden Stockpile



Photo 6: New Tailings Pond 11



Photo 7: Tailings Pond 9



Photo 8: Tailings Pond 10



Photo 9: Clean Water Dam



Photo 10: Rehabilitation Area 2011 Planting



Photo 11: Rehabilitation Area 2011 Planting



Photo 12: Rehabilitation Area New to Old



Photo 13: Rehabilitation Area Older Planting



Photo 14: Planting on Old Northern Road



Photo 15: Planting Old Northern Road & Wisemans Ferry Road

Attachment 2D

Weighbridge Verification

Test report reference number: 0003394

Calibration Sticker Reference: E12-16576-1

Date of Test: 11/05/12

Verification: Y

In-Service Test:

For in-service inspection record the verification/certification mark: E2

Name of owner/user: PF FORMATION

Contact: DIANNE REA

Address of owner/user: 1774 WISEMAN FERRY RD
MAROOTA

Phone:

Report Emailed from Site? Y

DESCRIPTION OF INSTRUMENT:

Customer Scale ID: IN00542/7

Make / Model: TOLEDO 7560/5000

NSC No 6/10B/46

Capacity: 60t

Min: 0.4t

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?	Y
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?			NA
Suspended weighing instruments: does it hang freely & are all transparent covers in good repair?			NA

Repeatability Test: Pass or Fail? P	Zero Settings Pass or Fail? P	1. 41.80	2. 41.80	3. 41.80
Eccentricity Reading 1 - 12:		Difference: 0.00		

1. 12.16	2. 12.16	3. 12.18	4. 12.18	5. 12.16	6. 12.16	Mass Used:
7.	8.	9.	10.	11.	12.	12.16t

Eccentricity Test Pass or Fail? P

No. of Supports? 6

Comments:

Weighing performance using substitution load (clause 5.4.2)

Substitution Load 1:	FORKLIFT
Substitution Load 2:	LOADER
Substitution Load 3:	TRUCK

Method Used: Method A? Y Method B?

MPE change points: 500/2000e

Available weights: 18t

WEIGHBRIDGE WEIGHT TEST:

Up:	Load	Make up of load:	MPE:	1:	1/2 e:	DL:	E:	Lsub:	(rounded)	P or F?
1.	0.4t	MASS	0.5e	0.40	0.01t					P
2.	10t	MASS	1e	10.00	0.01t					P
3.	18t	MASS	1e	18.00	0.01t					P
4.	41.16t	MASS + SUB1	1.5e	41.16	0.01t	23.16t	-0.004	23.146	23.16	P
5	59.22t	MASS + SUB1,	1.5e	59.22	0.01t	41.22T	-0.010	41.210	41.22	P

Over range blanking Pass or Fail? P

Down:	Load	Make up of load:	MPE:	1:	P or F?
1.	0.4t	MASS	0.5e	0.40	P
2.	10t	MASS	1e	10.00	P
3.	18t	MASS	1e	18.00	P
4.	41.16t	MASS + SUB1,	1.5e	41.16	P
5	59.22t	MASS + SUB1,	1.5e	59.22	P

Discrimination (clause 5.5): NA

Accuracy of tare setting (clause 5.7): NA

Test Required: NA

Weight test Pass or Fail?: P

Sensitivity (clause 5.6): P

Test Required: Y

OVERALL RESULT? PASS

Technicians Name: DAVID

ID No: AUS0662

Attachment 2E

EPA Annual Return

Annual Return

ETRA PTY LTD



ANNUAL RETURN

LICENCE NO	3407
LICENCE HOLDER	ETRA PTY LTD
REPORTING PERIOD	30-Sep-2011 to 29-Sep-2012

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-2012

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 \$750 (individuals) or \$1500 (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 type="checkbox"/>	Section A:	All licence details are correct
<input type="checkbox"/>	Section B1:	You have entered the correct number in the complaints table
<input type="checkbox"/>	Section B2 – B3:	If there are tables, you have provided the required details
<input 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:	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**

Annual Return

ETRA PTY LTD



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

ETRA PTY LTD



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.	<i>Nil</i>
---	------------

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	<i>12</i>	<i>12</i>	<i>0.3</i>	<i>3.12</i>	<i>11.01</i> <i>Aug 2012</i>

**Tractor pulling competition held in close proximity to dust bottle. (19/08/12)*

Annual Return

ETRA PTY LTD



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	0.08	2.09	4.94 Sep 2012

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	1.04	2.51	5.92 Sep 2012

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 E of this Annual Return

Annual Return

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)

Annual Return

ETRA PTY LTD



E 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 and D 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-2011 to 29-Sep-2012 or ___/___/___ to ___/___/___

SIGNATURE: Joshua Graham

NAME: Joshua Graham
(printed)

POSITION: Director

DATE: 19 / 10 / 2012

SIGNATURE: Joshua Graham

NAME: Joshua GRAHAM
(printed)

POSITION: Director

DATE: 19 / 10 / 2012

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

Chapter Three

ENVIRONMENTAL MONITORING PROGRAM & RESULTS

Operational Monitoring Program

Based on all the Management Plans and Environmental Strategy the Environmental Operational Procedures have been determined and set out in the appendix to the Environmental Strategy. A Summary of the Monitoring Results is in **Attachment 3A**.

The Environmental Operational Procedures detail actions and responsibilities, performance indicators, monitoring and reporting requirements.

To document the adherence to this environmental monitoring from an operational viewpoint:

- Monthly, the Environmental Manager has a checklist that is reviewed and signed, see **Attachment 3B**
- Annually, the actions required by the Environmental Operational Procedures are reviewed and signed, see **Attachment 3C**.
- The specific monitoring of Noise Management is detailed in **Chapter 4**, Air Quality in **Chapter 5**, Water Management in **Chapter 6** and Landscape Management in **Chapter 7**

Analysis of Monitoring Results

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.

Summary of Monitoring Results

Noise Monitoring	2013	2012	2011	2010	2009
– Noise from operational activities exceed guidelines	NIL	NIL	NIL	NIL	NIL
– Complaints received	NIL	NIL	NIL	NIL	NIL
Air Quality					
Monthly dust deposit - average g/m ² /month (from all sources)					
– Location 1 - behind Maroota Primary School	3.35	1.9	3.22 ^①	2.27	4.05 ^①
– Location 2 - Hitchcock & Wisemans Ferry Roads	2.74	1.66	2.38	2.18	6.04 ^{① ②}
– Location 3 - Jurd's Residence	2.95	2.43	2.56	2.55	3.14
^① results impacted by back burning in September 2008 (10.66, 12.60 respectively)					
^② results impacted by ploughing in July 2008 (21.97)					
^③ result impacted by reading of 10.5 in October 2010					
^④ result impacted by reading of 11.01 in August 2012 Maroota Muster at School					
– Complaints received	NIL	NIL	NIL	NIL	NIL
– Plant exhaust deficiency when vehicles serviced	NIL	NIL	NIL	NIL	NIL
Access & Traffic					
– Traffic movements within limits	YES	YES	YES	YES	YES
Erosion & Sediment Control					
– Sediment leaving site	NIL	NIL	1	NIL	NIL
Water Management					
– Evidence of issue with groundwater quality	NIL	NIL	NIL	NIL	NIL
Rehabilitation					
– Area vegetated	> 4 hectares	> 4 hectares	> 4 hectares	2.4 hectares	2.4 hectares
Overall number of complaints received	NIL	NIL	1	NIL	NIL

Attachment 3B

Environmental Manager's Monthly Checklists

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

July 2012

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	Noise monitoring was carried out throughout the month. Results were consistent with previous testing showing that noise from road traffic was mainly the dominant noise source. The annual acoustic report for 2011-2012 has been prepared and will be included in the 2011 – 2012 AEMR.
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for June 2012 have been received and show low levels at all locations. Results from testing carried out throughout the reporting period will be attached to the 2011 – 2012 AEMR.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 18/07/12. A total of 9 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	URS have prepared and provided copies of the Groundwater Report for the reporting period. This report will be included in the 2011 – 2012 AEMR.
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed: 

Date: 1st August 2012

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project
EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

August 2012

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for July 2012 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 27/08/12. A total of 8 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	The remaining section along the north western setback area of the site has been poisoned off to accommodate the planting of more natives next month.
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:



Date: 31st August 2012

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project
EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

September 2012

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for August 2012 showed low levels at Site 2 and 3. The Maroota School site showed an unusually high reading which we believe is the result of the tractor pulling competition organised by the school for the annual fete on 19/08/12. Upon exchanging the bottle it was noted that the funnel had been dislodged and it appeared that someone had attempted to cover the gauge with a plastic bag.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 17/09/12. A total of 10 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	A further 700 native seedlings were planted along the north western setback area. This area is area has now been completely planted out and will be maintained as required until vegetation is established.
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	Screen planting works completed along north western peripheral areas of the site.
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:



Date: 29th September 2012

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

October 2012

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	Noise monitoring was carried out throughout the month. Results from testing were consistent with previous results showing quarry noise either inaudible or audible but not measurable.
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for September 2012 showed higher than average levels due to a number of reasons. Site 1 had vegetation cleared and hauled past the dust bottle by the farmer. (Photos of disturbance are on file). Sites 2 and 3 were subject to grass cutting in close proximity to the dust bottles.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 31/10/12. A total of 10 truck movements were recorded between the hours of 6:00 and 7:00 am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	Selga from PB has attended the site and carried out an inspection of the 2004, 2006 and 2011 rehabilitation areas. A report has been prepared and is attached to the AEMR.
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:



Date: 31st October 2012

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project
EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

November 2012

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for October 2012 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 13/11/12. A total of 9 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	Community Consultative Committee Meeting held on the 20 th November. Minutes taken from the meeting to be attached to the AEMR.
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:

Josh Graham

Date: 30th November 2012

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project
EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

December 2012

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or x	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for November 2012 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 20/12/12. A total of 9 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	Water samples were collected downstream from Lot 198. Results were consistent with previous testing and showed low levels of suspended solids and turbidity.
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
x = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:

Josh Graham

Date: 21st December 2012

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

January 2013

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or x	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	Noise monitoring was carried out throughout the month. Results from testing were consistent with previous results where quarry noise was either inaudible or audible but not measurable.
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for December 2012 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 19/01/13. A total of 7 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	Previously planted setback areas were hand weeded and certain areas were sprayed to control invasive weeds. Further planting of setback areas will continue in mid to late Spring.
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
x = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed: 

Date: 31st January 2013

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project
EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

February 2013

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for January 2013 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 15/02/13. A total of 14 truck movements were recorded between the hour of 6:00 and 7:00 am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	Water samples were collected downstream from Lot 198 after heavy rainfall. Samples were sent off to a laboratory for analysis and showed low levels of suspended solids. Full analysis of results will be included in the next AEMR.
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:

Josh Graham

Date: 28th February 2013

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project
EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

March 2013

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for February 2013 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 28/03/13. A total of 8 truck movements were recorded between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:



Date: 28th March 2013

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

April 2013

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	Noise monitoring was carried out throughout the month at 4 locations. Results from testing were consistent with previous results where quarry noise was either audible but measurable due to other noise sources or not audible at all. The monitoring results will be forwarded to an acoustic consultant to prepare a report for the AEMR.
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for March 2013 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 11/04/13. A total of 3 truck movements were recorded between the hour of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	Planting of natives was carried out throughout the month. The paddock on the corner of Old Northern and Wisemans Ferry Roads was sprayed with round up and a 200mm layer of mulch was spread over the area. Seven hundred plants were planted, which completed nearly half of the paddock. The remaining area of the paddock will be planted out in Spring.
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	The above mentioned planting will screen out the quarry from the main roads, in turn improving the visual amenity of the site.
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed: 

Date: 30th April 2013

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

May 2013

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for April 2013 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of daily truck movements was carried out on 1/05/13. A total of 10 truck movements were recorded between the hours of 6:00 and 7:00 am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	Water samples were collected from the drainage line downstream to Lot 198. Samples were sent to a laboratory for analysis and results from testing will be shown in the AEMR.
A6	A17-A20	Water	✓	Nil	
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

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✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed:



Date: 31st May 2013

PF FORMATION

HITCHCOCK ROAD MAROOTA - Sand Extraction and Rehabilitation Project EMP MANAGEMENT CONTROLS OPERATIONAL CHECKLIST - ENVIRONMENTAL MANAGER

June 2013

STRATEGY POINT	PAGE NO	DESCRIPTION	STATUS ✓ or ✗	COMPLAINTS RECEIVED	COMMENTS
A2	A3-A5	Noise	✓	Nil	Results from noise monitoring carried out throughout the reporting period have been analysed by an acoustic consultant. A report has been prepared for the 2012 – 2013 AEMR.
A3	A6-A10	Air Quality	✓	Nil	Deposited dust results for May 2013 have been received and show low levels at all locations.
A4	A11-A12	Access and Traffic	✓	Nil	An audit of early morning truck movements was carried out on 6/06/13. A total of 7 truck movements were recorded between the hours of 6:00 and 7:00am. The results from auditing showed an average of 9 truck movements between the hours of 6:00 and 7:00am.
A5	A13-A16	Erosion & Sediment Control	✓	Nil	
A6	A17-A20	Water	✓	Nil	Fabio from URS attended the site to collect groundwater samples and download the data from the data loggers. All weather and pumping records have been sent to URS and the annual groundwater management report will follow. The report will be included as an attachment in the 2012 – 2013 AEMR.
A7	A21-A25	Rehabilitation & Vegetation offset	✓	Nil	
A8	A26-A27	Social Impact	✓	Nil	
A9	A28-A29	Heritage	✓	Nil	
A10	A30-A32	Visual Amenity	✓	Nil	
A11	A33-A35	Waste Management	✓	Nil	
A12	A36-A37	Emergency Response	✓	Nil	
A13	A38-A41	Hazard, Risk and Safety	✓	Nil	

Key:

✓ = Satisfactory
✗ = Unsatisfactory

Completed by Environmental Manager (Josh Graham)

Signed: 

Date: 28th June 2013










Attachment 3C

Annual Environmental Operations Procedures Checklist

A2.3 Management controls

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 
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 
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 
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 
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 
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 
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 
2.1.8 Conduct compliance monitoring of noise levels at the defined locations and keep records of measurements.	Environmental Manager 
Performance indicator Noise from operational activities does not exceed the guideline limits. <i>Results from noise surveys showed compliance</i> Number of complaints received <i>Nil</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. <i>NOT NECESSARY ON WASH PLANTS</i>	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. <i>Results from deposition monitoring show compliance</i>
Monitoring	Dust monitoring at identified locations. <i>Deposition monitoring carried out</i> Compilation of a complaints register. <i>No Complaints</i>
Reporting	Annual reporting in the AEMR. Monitoring results will be suitably summarised for posting on the PF Formation website. <i>AEMR is on the website</i>

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
3.2.2	Regularly service all vehicles to ensure that exhaust emissions comply with the regulations. Maintain appropriate service records.	Quarry Manager
3.2.3	Identify any opportunities to minimise machinery use and ensure that all equipment used on the site is energy efficient.	Quarry Manager
Performance Indicator	Vehicle and plant emissions comply with the regulations. <i>ALL NEW EQUIPMENT</i>	
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 <i>Pralam</i>
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 <i>Pralam</i>
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. <i>subject to site audits</i>	Quarry Manager/ Environmental Manager <i>Pralam</i>
4.1.4 Ensure that all vehicle loads leaving the site are suitably covered.	Quarry Manager/ Environmental Manager <i>Pralam</i>
Performance Indicator	Minimum of complaints from the community. <i>No complaints received Pralam</i>
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	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. 

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>Palan</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>Palan</i>
5.3.7	Reuse stored stormwater for dust control and the watering of site vegetation.	Quarry Manager/ Environmental Manager <i>Palan</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
5.3.9	Control vehicle movement on the site by the identification of the haul road and current working areas.	Quarry Manager <i>✓</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. <i>Palan</i>
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Monitoring	Monitor suspended solids levels in stormwater following rainfall events. Compare results with other appropriate locations. <i>Water samples collected quarterly Palan</i>
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Reporting	Report on suspended solid levels and performance of erosion and sedimentation control measures for inclusion in the relevant AEMR. <i>Results from testing in AEMR Palan</i>
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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.	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 
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Monitoring	Regular monitoring of water levels and water quality data from the on-site bores. <i>URS reports</i> 
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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 <i>Palam</i>
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 <i>Palam</i>
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 <i>Assessment of species carried out by P13 Palam</i>
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 <i>Palam</i>
7.1.6 Separate topsoil for use in rehabilitation works.	Quarry Manager/ Environmental Manager <i>Palam</i>
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 <i>Palam</i>
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 <i>Palam</i>
Performance indicator	All areas of significant flora and fauna habitat are protected prior to the start of extraction. <i>Palam</i>

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
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.	Environmental Manager 
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.	Quarry Manager/ Environmental Manager 
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.	Quarry Manager/ Environmental Manager 

7.2.4 Undertake revegetation of the site on the following basis: Environmental Manager

- 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

Revegetation works carried out in accordance with PB report dated August 2010
Pratham

7.2.5 Establish a maintenance program aimed at promoting and protecting the growth of the rehabilitated areas.

Quarry Manager/
Environmental Manager

Pratham

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:

- 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

[Handwritten signature]

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.

[Handwritten signature]

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 open door policy . Widely publish contact phone number and provide an early response to all queries, comments and requests for information.	Quarry Manager/ Environmental Manager
8.1.2 Provide access to all relevant environmental management documentation and monitoring results on the PF Formation web site.	Environmental Manager
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
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.	Quarry Manager/ Environmental Manager
Performance indicator	Minimal complaints from the community.
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 <i>Palam</i>
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 <i>Palam</i>

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.
<i>No items of any heritage significance identified</i> <i>Palam</i>	




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.	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.








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
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/ MSMP Environmental Manager <i>Palam</i>
13.1.3 Obtain Material Safety Data Sheets for all hazardous materials stored on site.	Quarry Manager/ MSMP Environmental Manager <i>Palam</i>
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 <i>W</i>
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 <i>Palam</i>
14.1.7 Clearly label the contents of all above ground storage areas.	Quarry Manager/ Environmental Manager <i>Palam</i>
13.1.8 Secure all hazardous and dangerous goods storage areas and display appropriate signage. Segregate all incompatible material.	Quarry Manager/ Environmental Manager <i>Palam</i>
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 <i>Palam</i>
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.

Chapter Four NOISE MANAGEMENT

Introduction

The Project Approval (**Schedule 3 Condition 8**) for the Hitchcock Road development requires the preparation and implementation of a Noise Management Plan in order to demonstrate that compliance with the relevant noise impact assessment listed in the approval has been achieved. The objectives of the Annual Environmental Management Report on noise issues are therefore;

- identify the environmental noise emission criteria nominated in the relevant approval documents
- document the results of environmental noise monitoring conducted in the 12 months ended June
- assess the measured noise emissions levels against the relevant criteria; and
- nominate existing noise emission monitoring methodology and establish routine measurement procedures.

Noise emission criteria

The Noise Management Plan requires the noise criteria set out in **Table 4.1** to be applied to the impact assessment. These assessment locations as shown on **Attachment 4A** were selected because they are representative or closer to the quarry than the Noise Assessment Locations identified in Table 1 of Schedule 3 to the Notice of Project Approval.

Table 4.1 Noise impact assessment monitoring locations

Noise assessment location	Other locations covered	Day	Night ¹	
		LAeq (15 minute)	LAeq (15 minute)	LA1 (1 minute)
1. R9 – Young, Hitchcock Road	R10- Tornatola	39	35	45
2. R5 - Pignataro	R6 Camilleri	42	35	45
3. R3 – Firestation/Jurd	R1 Hammond & R2 Hitchcock	40	35	45
4. R7 – Maroota Public School	R6 Camilleri & R8 Portelli	36(LAeq(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

The following noise parameters are measured at the nominated monitoring locations.

- LAeq(15 minute) noise level measured at an appropriate free-field location close to the façade of the relevant residence or other building during day time and evening hours.
- LAeq(1 minute) noise level measured at an appropriate free-field location close to the façade of the relevant residence during night time hours.

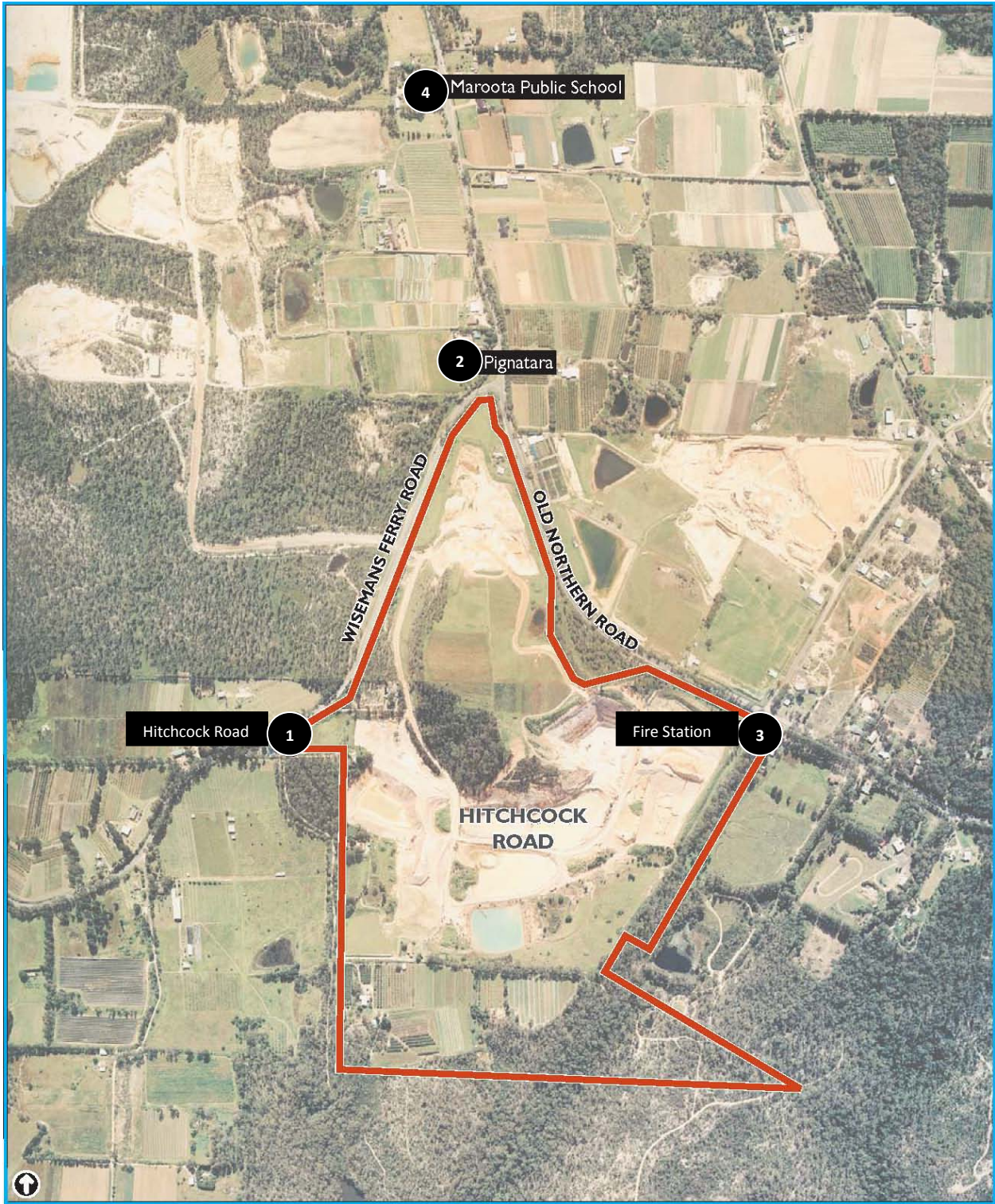
Operator-attended noise survey results

In accordance with the Noise Management Plan PF Formation conducted its quarterly operator attended daytime noise surveys at each of the four test locations. An external Noise Consultant was employed to prepare a report to assess and review the results against the noise criteria. The report prepared by Koikas Acoustics Pty Ltd is attached as **Attachment 4B**.

The locations used by Koikas Acoustics correspond to the locations in **Attachment 4A**.

Conclusion

Koikas Acoustics concluded that at most sites the quarry noise was either just audible or inaudible. The site complies with the nominated noise criteria.



Scale
0 500 Metres

NOISE IMPACT ASSESSMENT MONITORING LOCATIONS

Site boundary

4

Monitoring locations

Attachment 4B

Noise Survey Results

(Please refer to attached PDF File on disc)

Chapter Five AIR QUALITY

Introduction

The Project Approval (**Schedule 3 Condition 12**) for the Hitchcock Road development required the preparation and implementation of an Air Quality Monitoring Program. The objectives of the Annual Environmental Management Report on air quality issues are therefore:

- identify the dust deposition criteria nominated in the relevant approval documents and listed in the Air Quality Monitoring Program;
- document the results of dust deposition monitoring conducted in the 12 months ended June;
- assess the measured dust deposition levels against the relevant amenity criteria; and
- nominate existing dust deposition monitoring methodology and establish routine measurement procedures.

Dust impact assessment criteria

The proponent will ensure that dust generated by the project does not cause exceedances of the criteria listed in **Tables 5.1** and **5.2** at any residence or on more than 25 per cent of any privately owned land.

Table 5.1 Impact Assessment Criteria for Particulate Matter		
Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90µg/m ³
Particulate matter < 10µm (PM ₁₀)	Annual	30µg/m ³
	24 hour	50µg/m ³

Table 5.2 Impact Assessment Criteria for deposited dust			
Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2g/m ² /month	4g/m ² /month

Notes

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

Dust monitoring

PF Formation maintained a program of continuous monthly dust deposition monitoring. This is in compliance with the requirements of the Air Quality Monitoring Program. The locations of the monitoring stations are shown on **Attachment 5A**. In 2011 Location 2 was intended to be located on the Tornatola property but the landowner advised that the property is vacant and he did not want the monitoring station on his property. It then decided to move it across Wisemans Ferry Road on the back of the Dixon Sands property near the intersection of Wisemans Ferry Road and Hitchcock Road Maroota.

Analysis of the dust composition measurements was carried out independently by Boral Materials Testing and Environmental Services. The analysis procedure was in accordance with AS3580.10.1-1991 *Methods for Sampling and Analysis of Ambient Air Method 10.1: Determination of Particulate Deposited Matter – Gravimetric Method*.

Monitoring results

A summary of the monthly dust deposition monitoring results is provided at **Attachment 5B**. The detailed measurement and analysis results by month as prepared by Boral Materials Testing and Environmental Services are summarised in **Attachment 5C**. Location 4 in the Test Reports is not relevant to the Hitchcock Road site.

In general, dust monitoring procedures were guided by the requirements of AS2724.1-1984 *Ambient Air Particulate Matter, Part 1 – Determination of Deposited Matter Expressed as Insoluble Solids, Ash, Combustible Matter, Soluble Solids and Total Solids*.

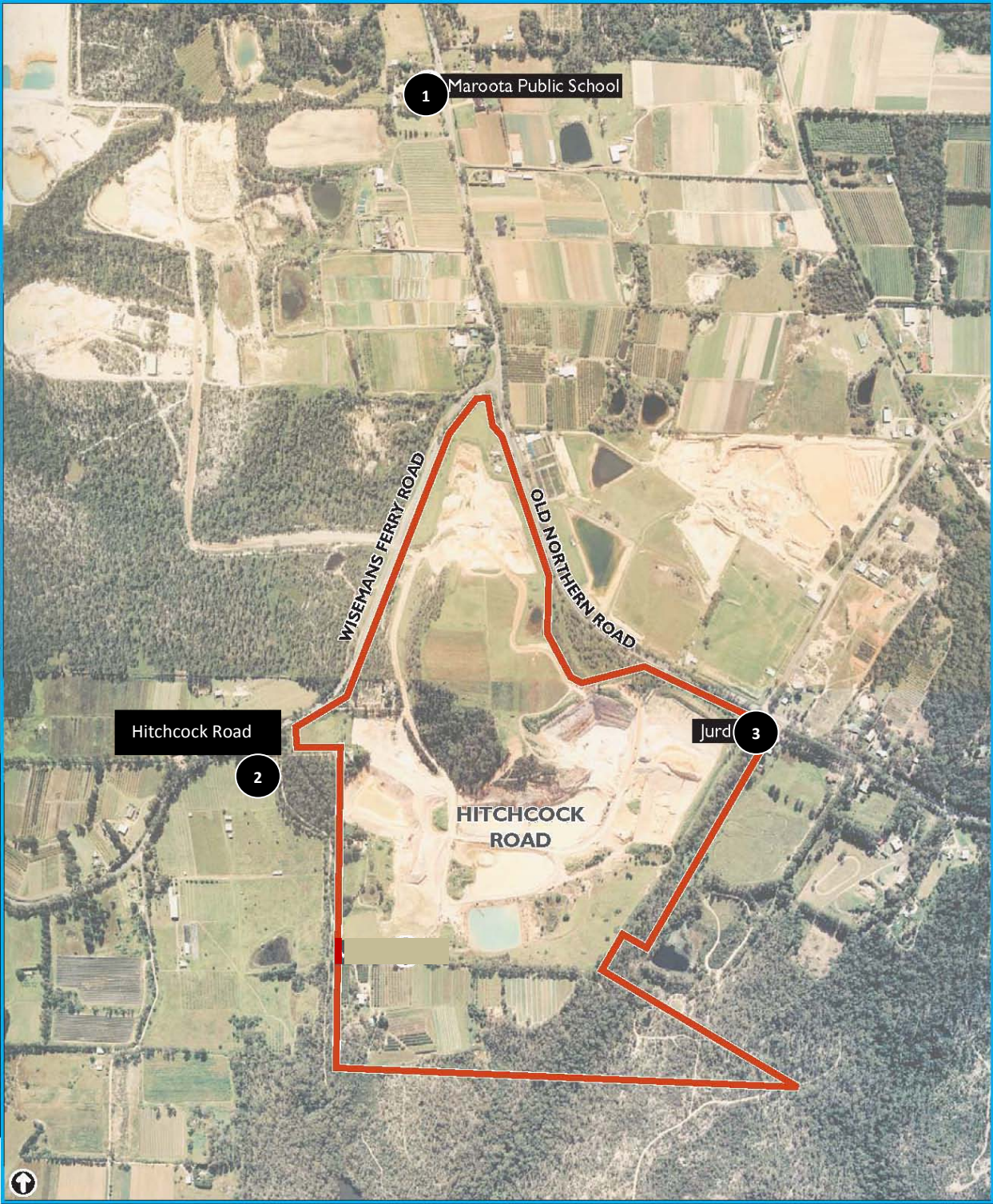
The following information can be derived from these results in relation to the dust nuisance criterion.

- The insoluble solids portion of deposited dust is expected to be mineral matter with the ash content indicating the level of solid dust particles of inorganic origin such as soil/dust that could be derived from a source such as sand extraction and processing operations.
- The monitoring results are characterised by generally low average levels over extended periods with an occasional spike when high levels are experienced. As the operations from the site are very consistent the dust generated from the site is consistent subject to weather impacts. Spikes are usually caused by factors unrelated to the quarry such as mowing or horticultural activities near the monitoring station or regional issues such as bush fires.
- The annual average ambient dust deposition rate (insoluble solids) considered a nuisance criterion is 4 g/m²/month. All sites monitored had annual averages below this level.
- The annual average ambient dust deposit rate (insoluble solids) at Location 1 – Maroota School was 3.35 g/m²/month. This is less than the dust nuisance criterion of 4 g/m²/month. This site often gets impacted by external factors such as horticultural activities adjoining the school. The results for 2013 were significantly impacted by the August 2012 result of 11.01. It is considered that the most likely cause of this result was the Maroota Public School Maroota Muster which is held next to the dust monitor recorder.

- The annual average ambient dust deposition rate (insoluble solids) at Location 2 (Hitchcock Road), which is located near the intersection of Hitchcock Road (a dirt road) and Old Northern Road was 2.74 g/m²/month. The results were very consistent and were not impacted by any spikes.
- The annual average ambient dust deposition rate (insoluble solids) at Location 3 (Jurd residence) was 2.95 g/m²/month which is below the dust nuisance criterion defined by the DECC. The September 2012 result was the highest at 5.92 but is unexplained.
- The results of the dust deposit gauges were very good for the year being below the nuisance criterion. Because of the distances from the quarry operations and the significant other factors impacting the dust deposit gauge results high recordings are not necessarily a result of quarry operations. It is reassuring when all locations have relatively low results such as this year.
- PF Formation and Dixon Sand (a neighbouring operator) have an agreement whereby if the rolling 24-hour PM₁₀ average recorded by the TEOM reaches 42.5 µg/m³, PF Formation would be notified. The wind direction would then be assessed and measures to reduce any dust impacts affecting the TEOM readings would be implemented. At no time in the last 12 months have the results derived from the TEOM reached the designated trigger. A copy of the action plan if this occurs is attached in **Attachment 5D**.
- There have been no complaints concerning dust generation over the past year.
- A summary of the weather conditions recorded on-site are in **Attachment 5E**.

Conclusions

In accordance with the requirements of the Project Approval, PF Formation has implemented a program of dust deposition monitoring. The results of the regular monthly dust deposition monitoring conducted over the past year and analysed externally by Boral Materials Testing and Environmental Services show that deposition rates from all sources are well below the maximum levels criteria.



Scale
0 500 Metres

AIR QUALITY MONITORING LOCATIONS

Site boundary

3

Monitoring locations

		Summary of Dust Deposition Monitoring Results (g/m2/month)								
		Location 1 - Maroota School			Location 2 - Hitchcock Road			Location 3 (Jurd residence)		
Month/Year		Insoluble Solids	Ash	Total Solids	Insoluble Solids	Ash	Total Solids	Insoluble Solids	Ash	Total Solids
2012	July	1.43	1.23	4.11	1.69	1.65	3.27	1.62	1.58	2.87
	August	11.01	10.53	12.64	2.40	1.83	3.37	3.98	2.62	5.65
	September	6.51	4.57	10.73	4.94	3.32	7.61	5.92	3.61	9.04
	October	1.53	1.27	3.33	1.94	1.68	4.01	1.2	1.13	3.21
	November	3.37	1.74	6.03	3.36	1.83	5.24	3.92	2.22	5.95
	December	3.19	2.1	5.99	2.77	1.81	4.99	3.54	1.99	6.22
2013	January	2.3	1.05	5.45	2.53	1.27	3.76	3.19	1.37	3.61
	February	0.85	0.67	2.1	0.97	0.48	2.6	1.09	0.69	1.8
	March	2.46	1.27	4.24	3.16	2.73	4.83	3.42	1.61	5.16
	April	2.64	1.33	3.95	3.15	1.92	4.34	2.3	1.26	3.2
	May	3.08	1.49	3.63	2.58	1.32	3.27	3.26	1.81	4.29
	June	1.8	1.22	3.23	3.39	2.68	4.78	1.99	1.47	3.33
Monthly Average		3.35			2.74			2.95		
2012		1.90			1.66			2.43		
2011		3.22			2.38			2.56		
2010		2.27			2.18			2.55		

Attachment 5C

Monthly Dust Monitoring Results



**MATERIALS TECHNICAL SERVICES
BORAL RESOURCES (NSW) PTY LTD**
ABN 51 000 756 507

Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153
Telephone 61 2 9624 9900
Facsimile 61 2 9624 9999

TEST REPORT

CLIENT : P.F. FORMATION
1774 Wisemans Ferry Road Maroota NSW 2756

FILE No. 250 / 13
REQUEST No. 53413

PROJECT: Gravimetric Dust Monitoring at Maroota for P.F. Formation for the month of June 2013

SAMPLE : Dust

TEST PROCEDURE : AS3580.10.1 - 2003 - Methods for sampling and analysis of ambient air.
Method 10.1 : Determination of particulate Deposited Matter - Gravimetric Method.

Field No.:	1	2	3	4
Lab. Sample No.:	144067	144068	144069	144070
Location:	Site 1	Site 2	Site 3	Site 4
Date sampled from:	3/6/2013	to	1/7/2013	

RESULTS:

Insoluble Solids (g/m ² month):	1.80	3.39	1.99	1.97
Ash (g/m ² month):	1.22	2.68	1.47	1.34
Combustible Matter (g/m ² month):	0.58	0.70	0.52	0.63
Soluble Matter (g/m ² month):	1.43	1.39	1.34	2.45
Total Solids (g/m ² month):	3.23	4.78	3.33	4.42
Volume of liquid in the gauge, mL:	1800	1800	1900	2000

Refer to attached graph.

Joshua Graham, File.

M. Abdulnebe



ACCREDITED FOR
TECHNICAL
COMPETENCE

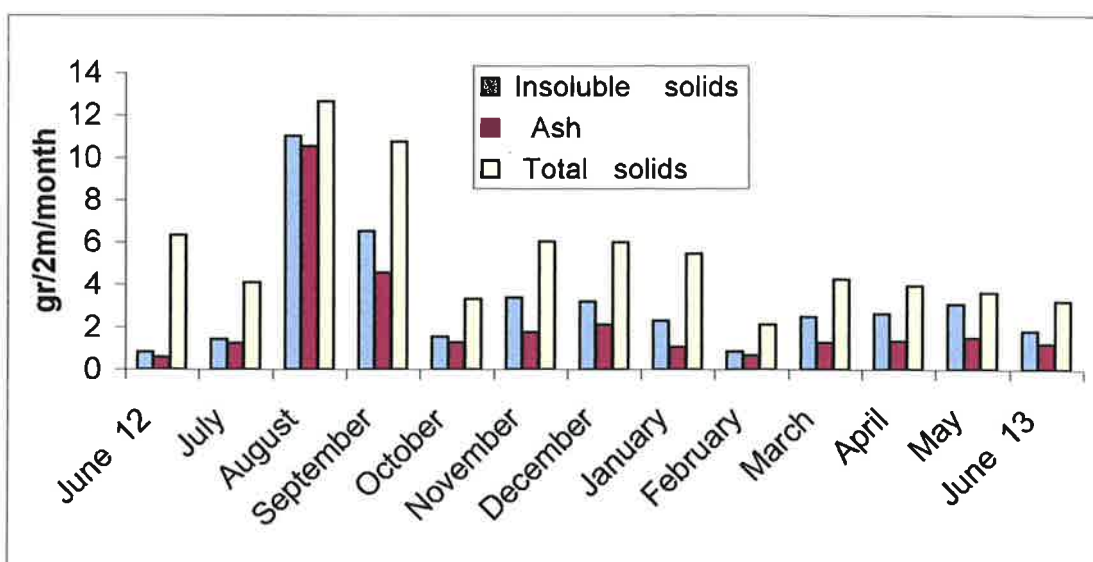
Approved Signatory _____
Date 16-07-13 Serial No. 117703

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

NATA Accredited Laboratory
Number: **9968**

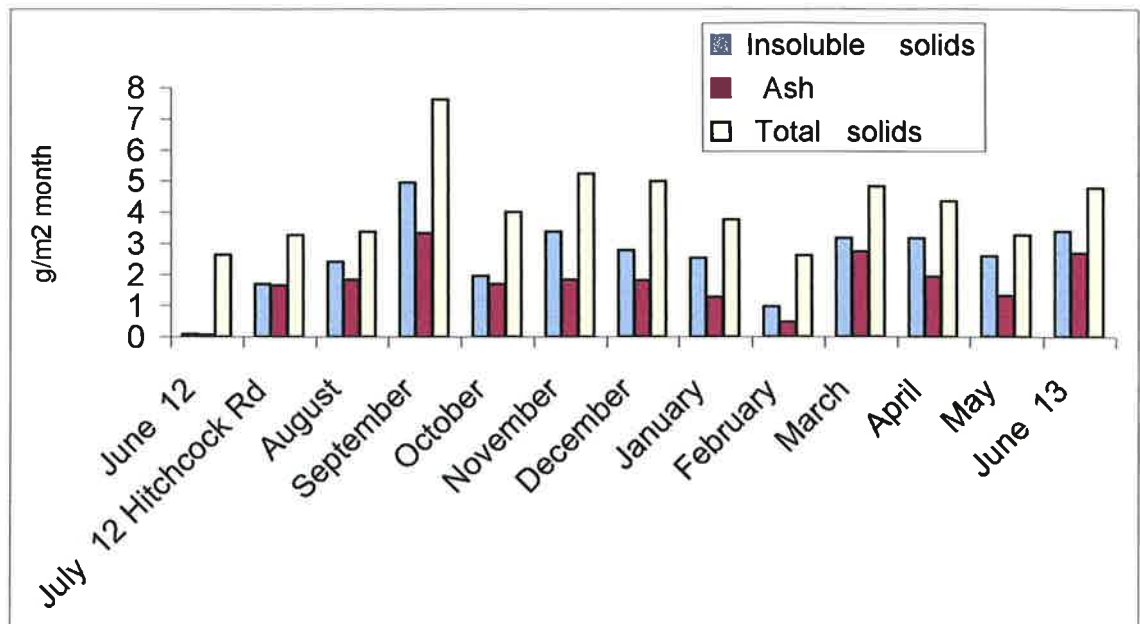
Dust Monitoring
Maroota Site 1
Maroota Public School

	Insoluble solids	Ash	Total solids
June 12	0.82	0.56	6.35
July	1.43	1.23	4.11
August	11.01	10.53	12.64
September	6.51	4.57	10.73
October	1.53	1.27	3.33
November	3.37	1.74	6.03
December	3.19	2.10	5.99
January	2.30	1.05	5.45
February	0.85	0.67	2.10
March	2.46	1.27	4.24
April	2.64	1.33	3.95
May	3.08	1.49	3.63
June 13	1.80	1.22	3.23



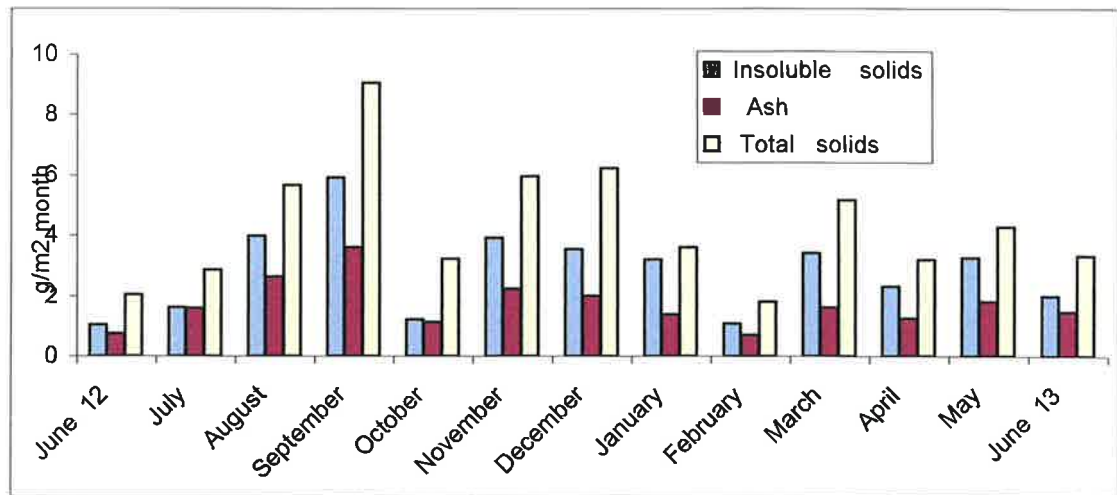
Dust Monitoring
Maroota Site 2
Hitchcock Road

	Insoluble solids	Ash	Total solids
June 12	0.08	0.06	2.62
July 12 Hitchcock Rd	1.69	1.65	3.27
August	2.40	1.83	3.37
September	4.94	3.32	7.61
October	1.94	1.68	4.01
November	3.36	1.83	5.24
December	2.77	1.81	4.99
January	2.53	1.27	3.76
February	0.97	0.48	2.60
March	3.16	2.73	4.83
April	3.15	1.92	4.34
May	2.58	1.32	3.27
June 13	3.39	2.68	4.78



Dust Monitoring
Maroota Site 3
Jurd's House

	Insoluble solids	Ash	Total solids
June 12	1.04	0.75	2.04
July	1.62	1.58	2.87
August	3.98	2.62	5.65
September	5.92	3.61	9.04
October	1.20	1.13	3.21
November	3.92	2.22	5.95
December	3.54	1.99	6.22
January	3.19	1.37	3.61
February	1.09	0.69	1.80
March	3.42	1.61	5.16
April	2.30	1.26	3.20
May	3.26	1.81	4.29
June 13	1.99	1.47	3.33



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 ug/m³ 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 5E

Weather Condition Results

PF FORMATION WEATHER CHART

JUL 12

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/07/2012	SUNDAY						
2/07/2012	5	17	0-9	WNW-WNW	1016.4	NIL	FINE
3/07/2012	3	17	0-9	SSW-ESE	1021.1	NIL	FINE
4/07/2012	1	18	0-10	S-S	1024.7	NIL	FINE
5/07/2012	9	13	0-0	ESE-ESE	1030.2	NIL	CLOUDY/RAIN
6/07/2012	8	15	0-0	S-S	1033.2	5	CLOUDY/RAIN
7/07/2012	7	12	0-9	WSW-WSW	1034.7	NIL	CLOUDY
8/07/2012	SUNDAY						
9/07/2012	6	21	0-0	NNE-NNE	1030.2	NIL	FOG/CLOUDY
10/07/2012	9	15	0-0	NNE-W	1026.4	NIL	FOG/CLOUDY
11/07/2012	11	19	0-0	WNW-WNW	1019.2	7	CLOUDY
12/07/2012	11	15	0-5	WNW-N	1017.3	2	RAIN/CLOUDY
13/07/2012	15	21	0-5	WNW-N	1012.7	2	CLOUDY
14/07/2012	9	18	0-8	WNW-N	1012.9	NIL	CLOUDY/FINE
15/07/2012	SUNDAY						
16/07/2012	5	21	0-5	WNW-SSE	1027.9	NIL	FINE
17/07/2012	6	21	0-0	NNE-WNW	1028.5	NIL	FINE
18/07/2012	8	19	0-5	NNW-S	1018.8	NIL	FINE
19/07/2012	5	17	0-8	S-ESE	1019.4	NIL	CLOUDY
20/07/2012	3	19	0-5	ESE-ESE	1026.3	NIL	FOG/FINE
21/07/2012	10	13	0-10	ESE-SSW	1029.6	NIL	FINE/CLOUDY
22/07/2012	SUNDAY						
23/07/2012	7	16	0-0	ESE-S	1028.9	2	FOG/CLOUDY
24/07/2012	10	13	0-0	S-SSW	1028.2	2	FOG/RAIN
25/07/2012	9	19	0-5	NNW-N	1025.9	NIL	
26/07/2012	11	17	0-9	NNE-NNE	1015.2	NIL	CLOUDY
27/07/2012	7	17	0-0	WNW-WNW	1012	NIL	FINE/CLOUDY
28/07/2012	4	17	0-13	WNW-SSW	1016.8	NIL	FINE
29/07/2012	SUNDAY						
30/07/2012	4	17	0-23	ESE-SE	1025	NIL	FINE/CLOUDY
31/07/2012	6	14	0-0	SSW-SSW	1026.6	NIL	CLOUDY

PF FORMATION WEATHER CHART

AUG 12

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/08/2012	2	18	0-6	SE-	1025.4	NIL	
2/08/2012	2	20	0-0	SSW-S	1022.9	NIL	FINE/CLOUDY
3/08/2012	5	18	0-0	ESE-WNW	1018.2	NIL	CLOUDY
4/08/2012	6	18	0-0	WNW-WNW	1019.5	NIL	FINE
5/08/2012	SUNDAY						
6/08/2012	12	20	0-8	SSW-S	1013.7	NIL	FINE
7/08/2012	3	18	0-0	S-NNE	1024.9	NIL	FINE
8/08/2012	3	19	0-5	NNW-	1017.3	NIL	
9/08/2012	12	20	0-14	N-W	1014	NIL	FINE
10/08/2012	4	17	0-15	SSW-S	1015.7	NIL	FINE/CLOUDY
11/08/2012	4	15	0-12	SSW-S	1021.6	NIL	FINE/CLOUDY
SUNDAY							
13/08/2012	8	20	0-0	ESE-NNW	1027.2	NIL	FINE
14/08/2012	5	17	0-0	NNE-W	1022.4	NIL	FINE
15/08/2012	7	22	0-1	NW-NW	1019.3	NIL	FINE
16/08/2012	8	19	0-0	N-N	1015.7	NIL	CLOUDY
17/08/2012	9	14	0-13	N-W	1008.7	NIL	FINE/CLOUDY
18/08/2012	9	17	May-20	WNW-WNW	1009.8	NIL	FINE/WINDY
SUNDAY							
20/08/2012	4	18	0-3	ESE-NW	1024.8	NIL	CLOUDY
21/08/2012	7	20	0-0	NNE-WNW	1020.2	NIL	CLOUDY
22/08/2012	9	20	0-15	NW-NNW	1017.6	NIL	CLOUDY/WINDY
23/08/2012	18	24	Aug-13	WNW-WNW	1009.5	NIL	CLOUDY/WINDY
24/08/2012	6	15	15-Sep	SSW-WNW	1014.8	7	FINE/WINDY
25/08/2012	9	20	0-0	SSW-WNW	1019.2	NIL	FINE
SUNDAY							
27/08/2012	6	20	0-5	ESE-NE	1024.6	NIL	CLOUDY
28/08/2012	7	21	0-0	NNE-WNW	1023.9	NIL	FINE
29/08/2012	9	20	0-13	NE-NW	1019.2	NIL	FINE
30/08/2012	10	19	0-15	N-S	1009.8	NIL	FINE
31/08/2012	8	17	0-6	SSW-SSW	1017.4	NIL	NE/WINDY/CLOUDY

PF FORMATION WEATHER CHART

SEPT 12

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/09/2012	3	13	0-18	S-S	1022.9	NIL	FINE/CLOUDY
SUNDAY							
3/09/2012	5	22	0-6	NNE-	1022.8	NIL	FINE
4/09/2012	7	26	0-0	NNE-NNE	1022.7	NIL	CLOUDY
5/09/2012	12	24	0-23	W-WNW	1018.7	NIL	FINE
6/09/2012	14	27	0-20	NW-	1009.3	NIL	FINE
7/09/2012	15	17	0-24	WNW-W	1006.1	NIL	FINE/CLOUDY
8/09/2012	10	19	0-7	WNW-W	1015.3	NIL	FINE
SUNDAY							
10/09/2012	8	26	0-0	NNE-NNW	1025.5	NIL	FINE
11/09/2012	12	23	0-0	ESE-NNE	1026.2	NIL	CLOUDY
12/09/2012	12	26	0-11	S-SE	1013.8	NIL	FINE
13/09/2012	15	16	0-13	WNW-ESE	1009.1	NIL	CLOUDY
14/09/2012	6	21	0-8	S-ESE	1019.2	NIL	FINE
15/09/2012	6	20	0-7	N-SSW	1025.4	NIL	FINE/CLOUDY
SUNDAY							
17/09/2012	12	20	0-	NNE-	1019.8	NIL	CLOUDY
18/09/2012	9	21	0-4	W-SSW	1019.7	4	FINE /CLOUDY
19/09/2012	8	21	0-0	SSE-SSW	1016.4	70	FINE
20/09/2012	10	24	0-0	W-WNW	1019.9	NIL	FINE /CLOUDY
21/09/2012	14	28	0-8	WNW-SSW	1014.3	NIL	CLOUDY
22/09/2012	9	23	0-10	S-ESE	1016.7	NIL	FINE/CLOUDY
SUNDAY							
24/09/2012	13	25	0-8	SSW-S	1013.1	NIL	FINE
25/09/2012	10	18	0-0	ESE-N	1022.7	NIL	CLOUDY
26/09/2012	11	25	0-0	SE-SSE	1022.6	NIL	FINE
27/09/2012	12	27	0-12	NNE-N	1020.5	NIL	CLOUDY
28/09/2012	22	31	6-0	WNW-WNW	1010.4	NIL	CLOUDY
29/09/2012	18	17	0-27	WNW-WNW	1005.4	10	CLOUDY
SUNDAY							

PF FORMATION WEATHER CHART

OCT 12

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/10/2012	LABOUR	DAY					
2/10/2012	13	23	0-0	N-ESE	1033.8	NIL	CLOUDY
3/10/2012	10	28	0-0	WNW-WNW	1028.4	NIL	FINE/CLOUDY
4/10/2012	14	30	0-15	SSW-WNW	1021.3	NIL	FINE
5/10/2012	20	34	0-10	WNW-SSW	1015.7	NIL	FINE/CLOUDY
6/10/2012	16	19	0-0	NNE-SSE	1018	NIL	CLOUDY
SUNDAY							
8/10/2012	12	18	0-0	ESE-N	1017.5	NIL	CLOUDY
9/10/2012	10	21	0-0	N-N	1010.9	NIL	CLOUDY
10/10/2012	9	27	0-5	ESE	1004.6	NIL	FINE
11/10/2012	13	18	0	NNW	1004.5	5.5	
12/10/2012	10	13	0-0	ESE-ESE	1006.4	5	CLOUDY/RAIN
13/10/2012	6	18	0-0	S-S	1020.3		
SUNDAY							
15/10/2012	11	27	0-0	WNW-N	1026.9	15	FINE
16/10/2012	15	32	0-8	WNW-WNW	1020.7	NIL	CLOUDY
17/10/2012	18	24	0-7	E-	1015.5		
18/10/2012	16	23	0-9	N-W	1022.5	NIL	CLOUDY
19/10/2012	14	32	0-0	NNE-WNW	1016.4	NIL	FOG/CLOUDY
20/10/2012	18	33	0-5	N-SSW	1007.3	NIL	FINE
SUNDAY							
22/10/2012	14	19	0-35	ESE-S	1014.9	NIL	FINE
23/10/2012	9	21	0-0	ESE-NNE	1029.4	1	CLOUDY
24/10/2012	12	24	0-15	NNE	1025.1	NIL	FINE
25/10/2012	13	33	0-8	N-WNW	1014.4	NIL	FINE/CLOUDY
26/10/2012	16	20	0-0	ESE-WNW	1009.6	NIL	CLOUDY
27/10/2012	11	21	0-0	WSW-WSW	1014.2	NIL	FINE
SUNDAY							
29/10/2012	9	24	0-8	NNE-NE	1026.4	NIL	CLOUDY
30/10/2012	13	24	0-11	N-NNE	1020.4	NIL	CLOUDY
31/10/2012	14	31	0-8	NNE	1011.4	NIL	FINE

PF FORMATION WEATHER CHART

NOV 12

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/11/2012	9	32	0-12	WNW-WNW	1009.3	NIL	FINE
2/11/2012	14	21	0-0	ESE-N	1013.6	NIL	FINE
3/11/2012	14	17	0-0	ESE-ESE	1020.5	NIL	CLOUDY
SUNDAY							
5/11/2012	15	33	0-0	NNE-NNW	1017.9	NIL	FINE
6/11/2012	19	31	0-0	NNE-NNE	1015.2	NIL	CLOUDY
7/11/2012	20	27	0-5	NNE-E	1013.6	NIL	CLOUDY
8/11/2012	20	23	0-0	WNW-S	1010	NIL	CLOUDY/RAIN
9/11/2012	18	26	0-0	E-WNW	1014.2	17	CLOUDY /RAIN
10/11/2012	15	18	0-0	ESE-S	1020.7	2	CLOUDY
SUNDAY							
12/11/2012	10	27	0-0	NNE-SSW	1027	NIL	CLOUDY
13/11/2012	15	25	0-0	ESE-ESE	1019.4	NIL	CLOUDY
14/11/2012	15	21	0-0	SSE-NE	1019.8	NIL	CLOUDY
15/11/2012	16	29	0-0	NNE-ESE	1015.6	NIL	CLOUDY
16/11/2012	18	15	0-11	ESE-S	1010.3	NIL	CLOUDY/RAIN
17/11/2012	14	18	0-0	ESE-SSE	1016.3	24	CLOUDY
SUNDAY							
19/11/2012	10	20	0-0	S-SE	1015.2	NIL	FINE
20/11/2012	14	18	0-0	N-N	1022.5	4	RAIN
21/11/2012	14	27	0-8	SSW-N	1020.3	NIL	FINE/CLOUDY
22/11/2012	13	18	10-0	SE-N	1016.7	NIL	
23/11/2012	15	22	0-6	ESE-NNE	1020	NIL	CLOUDY
24/11/2012	14	22	0-0	NNE-WNW	1019	NIL	FINE/CLOUDY
SUNDAY							
26/11/2012	19	28	0-19	NNE-S	1014.7	5	
27/11/2012	20	28	0-0	ESE-ESE	1012	NIL	CLOUDY
8/11/2012	18	24	0-0	NW-N	1016.6	NIL	CLOUDY
29/11/2012	19	29	0-6	N-WNW	1015.7	NIL	CLOUDY
30/11/2012	20	36	0-0	NNE-SSW	1012.8	NIL	CLOUDY

PF FORMATION WEATHER CHART

DEC 12

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/12/2012	BAD	STORM	NO	POWER			
2/12/2012	SUNDAY						
3/12/2012	18		0-	ESE-	1012.3	10	CLOUDY
4/12/2012	20	28	0-15	WNW-SSW	1004.6	NIL	CLOUDY
5/12/2012	13			WN-	1008.6	NIL	
6/12/2012	14	23	0-4	ESE-WNW	1018	NIL	FINE/CLOUDY
7/12/2012	16	22	0-0	ESE-NNE	1023.4	NIL	CLOUDY
8/12/2012	16	27	0-0	NNE-ESE	1019.9	NIL	CLOUDY
SUNDAY							
10/12/2012	15	19	0-11	N-SE	1024.4	NIL	RAIN
11/12/2012	15	20	0-11	NNE-N	1028.1	7	CLOUDY
12/12/2012	16	25	0-3	NNW-	1027.5	NIL	
13/12/2012	14	29	0-10	WNW-ESE	1023.7	10	FINE/CLOUDY
14/12/2012	17	31	0-0	N-N	1015.3	NIL	FINE/CLOUDY
15/12/2012	19	25	0-0	NNE-WNW	1008.5	NIL	CLOUDY
SUNDAY							
17/12/2012	18	22	13-0	ESE-ESE	1010.3	NIL	CLOUDY
18/12/2012	17	32	0-0	N-ESE	1011.5	NIL	CLOUDY
19/12/2012	19	24	0-2	NNE-NE	1014.2	NIL	
20/12/2012	23	28	5-Nov	N-NNE	1003.9	NIL	CLOUDY
21/12/2012	19	21	0-0	SSW.N	1016.9	NIL	CLOUDY
22/12/2012	SATURDAY	CLOSED					
SUNDAY							
24/12/2012	MONDAY	CLOSED					
25/12/2012	CHRISTMAS	DAY					
26/12/2012	BOXING	DAY					
27/12/2012	CLOSED						
28/12/2012	CLOSED						
29/12/2012	CLOSED						
SUNDAY							
31/12/2012	CLOSED						

PF FORMATION WEATHER CHART

JAN 13

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/01/2013	CLOSED						
2/01/2013	OPEN						
3/01/2013	OPEN						
4/01/2013	OPEN						
5/01/2013	CLOSED						
SUNDAY							
7/01/2013	22	29	0-0	NE-NNE	1023.4	NIL	CLOUDY /FINE
8/01/2013	24	42	0-20	NW-	999.8	NIL	HOT
9/01/2013	29	26	5-Oct	NNE-	994.2	NIL	CLOUDY
10/01/2013	18	32	0-5	SSE-	1009.7	NIL	CLOUDY
11/01/2013	18	30	0-9	NE-	1008.3	NIL	FINE
12/01/2013							
SUNDAY							
14/01/2013	16	23	0-11	ESE-ESE	1014.1	30	CLOUDY/RAIN
15/01/2013	15	27	0-0	ESE-ESE	1020.2	NIL	CLOUDY
16/01/2013	17	32	0-3	NNE-NNE	1014.7	NIL	CLOUDY
17/01/2013	20	32	0-8	ESE-NNE	1012.4	NIL	CLOUDY
18/01/2013	24	44	0-9	WNW-WNW	1002.9	NIL	FINE
19/01/2013	22	26	0-0	WSW-ESE	1010.1	NIL	CLOUDY
SUNDAY							
21/01/2013	19	26	0-8	N-NE	1015.3	8	CLOUDY
22/01/2013	19	26	0-8	NNE-W	1009.8	NIL	FOG/CLOUDY
23/01/2013	20	24	0.1	SSE-S	1016.8	NIL	CLOUDY
24/01/2013	19	29	0-5	ESE-NNE	1016.5	NIL	CLOUDY
25/01/2013	20	32	0-5	N-NNE	1012.4	NIL	FOG/CLOUDY
26/01/2013	AUSTRALIA	DAY					
SUNDAY							
28/01/2013	PUBLIC	HOLIDAY	AUSTRALIA	DAY			
29/01/2013	19	27	0-0	E-SSE	1001.7	138	RAIN
30/01/2013	19	26	0-0	NNE-E	1012.7	NIL	CLOUDY
31/01/2013	19	30	0-12	NNE-NNE	1012.9	NIL	CLOUDY

PF FORMATION WEATHER CHART

FEB 13

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/02/2013	22	20	0-0	N-SSW	1003.2	NIL	CLOUDY/RAIN
2/02/2013	13	14	0-0	SSW-SSE	1007.8	NIL	RAIN
SUNDAY							
4/02/2013	16	27	0-0	ESE-SSE	1020.4	45	CLOUDY
5/02/2013	16	25	0-0	ESE-SSE	1024.1	NIL	CLOUDY
6/02/2013	16	26	0-5	SSE-	1021.9	NIL	FINE
7/02/2013	15	30	0-0	NE-N	1018.4	NIL	FINE
8/02/2013	18	33	0-0	NE-WNW	1015.3	NIL	FINE
9/02/2013	19	32	0-0	NNE-WNW	1015.5	NIL	FINE
SUNDAY							
11/02/2013	18	21	0-5	N-S	1017.9	8	CLOUDY
12/02/2013	18	20	0-9	SSW-NNE	1019.5	5	RAIN
13/02/2013	18	22	0-10	SSE-	1023.5	11	CLOUDY
14/02/2013	15	26	0-0	NNE-N	1022.2	NIL	FOG/CLOUDY
15/02/2013	18	24	0-10	N-NNE	1020.7	NIL	CLOUDY/RAIN
16/02/2013	15	25	0-0	ESE-SSW	1021.1	NIL	CLOUDY
SUNDAY							
18/02/2013	15	25	0-5	ESE-NE	1019.7	3	CLOUDY
19/02/2013	17	29	0-0	N-ESE	1015.2	NIL	FOG/CLOUDY
20/02/2013	18	27	0-5	S-S	1015.7	NIL	
21/02/2013	19	29	0-5	S-ESE	1016.8	NIL	FOG/RAIN
22/02/2013	18	24	0-7	N-NNE	1017.2	8	RAIN
23/02/2013	18	20	9-0	WSW-E	1012.3	NIL	RAIN
SUNDAY							
25/02/2013	20	30	0-0	NNE-NE	1015.1	150	FOG/CLOUDY
26/02/2013	20	27	0-9	N-NNE	1020.7	2	CLOUDY
27/02/2013	20	30	0-6	NE-N	1017	NIL	CLOUDY
28/02/2013	21	26	0-0	WNW-N	1009.7	NIL	CLOUDY/RAIN

PF FORMATION WEATHER CHART

MAR 13

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/03/2013	16	13	0-23	S-SSW	1013.7	50	RAIN
2/03/2013	15	16	0-0	S-N		34	RAIN
SUNDAY							
4/03/2013	16	25	0-	ESE-	1022.7	50	FOG
5/03/2013	17	25	0-10	S-N	1022.4	NIL	CLOUDY
6/03/2013	17	26	0-5	NNE	1021.5	NIL	
7/03/2013	16	28	0-0	NNE-ESE	1020.8	NIL	FINE/CLOUDY
8/03/2013	16	27	0-0	NNE-ESE	1022.3	NIL	FINE
9/03/2013	19	28	0-0	NNE-WNW	1022.3	NIL	FINE/CLOUDY
SUNDAY							
11/03/2013	19	27	0-5	N-NNE	1020.5	NIL	CLOUDY
12/03/2013	18	29	0-0	E-N	1021.5	NIL	FINE/CLOUDY
13/03/2013	16	26	0-5	NNW-N	1016	NIL	FINE
14/03/2013	18	26	0-0	S-SSW	1011.9	NIL	FOG/CLOUDY
15/03/2013	19	22	14-0	ESE-ESE	1016.3	NIL	CLOUDY/RAIN
16/03/2013	19	27	0-0	ESE-WNW	1015.1	NIL	FINE
SUNDAY							
18/03/2013	13	24	0-10	SSW-N	1021.8	NIL	CLOUDY
19/03/2013	13	25	0-9	NNE-ESE	1024.8	NIL	CLOUDY
20/03/2013	13	24	0-5	NNE-	1022.5	NIL	CLOUDY
21/03/2013	14		-7		1020.5	NIL	
22/03/2013	22	29	10-Oct	W-WNW	1013.8	NIL	CLOUDY
23/03/2013	20	30	0-0	WNW-WNW	1014.7	NIL	FINE/HOT
SUNDAY							
25/03/2013	16	28	0-5	NNE-NE	1017.9	NIL	FINE
26/03/2013	17	27	0-5	NNE-	1021	NIL	CLOUDY
27/03/2013	20	32	0-0	N-WNW	1019.2	NIL	FOG/CLOUDY
28/03/2013	20	31	0-0	N-N	1016.6	NIL	CLOUDY
GOOD	FRIDAY						
EASTER	STURDAY						
EASTER	SUNDAY						

PF FORMATION WEATHER CHART

APR 13

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/04/2013	EASTER	MONDAY					
2/04/2013	15	29	0-0	NNE-S	1016.8	NIL	FOG / CLOUDY
3/04/2013	14		0-	NE-	1019.4	NIL	
4/04/2013	15	19	0-0	S-ESE	1028.3	6	RAIN
5/04/2013	15	24	0-10	ESE-N	1030.8	18	CLOUDY
6/04/2013	15	19	0-0	ENE-S	1029.1	NIL	CLOUDY
SUNDAY							
8/04/2013	13	22	0-0	S-SE	1025.9	NIL	FOG/CLOUDY
9/04/2013	14	21	0-0	SSW-ESE	1027.3	RAIN	FOG/CLOUDY
10/04/2013	13	23	0-	NE-	1025.9	NIL	FINE
11/04/2013	13	23	0-0	NE-NE	1023.9	NIL	FOG/FINE
12/04/2013	13	23	0-0	S-SE	1023.5	NIL	FINE/CLOUDY
13/04/2013	13	26	0-0	NE-NE	1022.9	NIL	FINE
SUNDAY							
15/04/2013	17	27	0-0	NE-S	1010.8	NIL	CLOUDY
16/04/2013	13	18	0-0	S-	1014.7	NIL	
17/04/2013	13	24	0-0	S-ESE	1017.9	NIL	CLOUDY
18/04/2013	13	24	0-0	ESE-ESE	1015.8	NIL	FOG/CLOUDY
19/04/2013	13	18	12-Nov	SSW-S	1016.6	NIL	CLOUDY /RAIN
20/04/2013	12	13	0-0	SSW-W	1015.1	NIL	RAIN
SUNDAY							
22/04/2013	13	22	0-0	N-SSW	1012.8	70	CLOUDY/RAIN
23/04/2013	10	23	0-0	N-ESE	1014.3	2	FINE/CLOUDY
24/04/2013	9	23	0-0	N-S	1019.7	NIL	CLOUDY
ANZAC	DAY						
26/04/2013	10	27	0-0	ESE-WNW	1023.8	NIL	FINE
27/04/2013	11	24	0-0	WNW-WNW	1022.9	NIL	FINE
SUNDAY							
29/04/2013	14	25	0-0	WNW-NNE	1022.2	NIL	CLOUDY
30/04/2013	17	24	0-0	N-WNW	1025.9	NIL	FOG/CLOUDY

PF FORMATION WEATHER CHART

MAY 13

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/05/2013	16	26	0-20	NW-	1020	NIL	
2/05/2013	13	19	0-5	ESE-ESE	1024.8	NIL	CLOUDY
3/05/2013	9	17	0-0	ESE-ESE	WNW	NIL	FINE
4/05/2013	15	22	0-0	WNW-WNW	1018.2	NIL	CLOUDY
SUNDAY							
6/05/2013	7	17	0-9	ESE-SSW	1027.2	NIL	CLOUDY
7/05/2013	12	19	0-0	NNE-ESE	1029.2	NIL	CLOUDY
8/05/2013	12	20	0-5	SSE-NE	1033.1	NIL	FINE
9/05/2013	10	25	0-0	NNE-W	1031.2	NIL	FINE
10/05/2013	9	19	0-0	W-SW	1031.6	NIL	FINE
11/05/2013	13	21	0-0	N-WSW	1031.2	NIL	CLOUDY
SUNDAY							
13/05/2013	12	19	0-0	N-N	1020.6	NIL	CLOUDY
14/05/2013	14	22	0-0	ESE-ESE	1014.6	NIL	CLOUDY/RAIN
15/05/2013	8	19	0-20	SSE-NWW	1015.2	NIL	FINE
16/05/2013	12	17	0-13	N-SSW	1012.4	NIL	CLOUDY
17/05/2013	8	18	0-10	W-WNW	1013.2	NIL	FINE
18/05/2013	6	20	0-0	N-WSW	1015.7	NIL	FINE
SUNDAY							
20/05/2013	5	17	0-5	W-SW	1019.7	NIL	CLOUDY
21/05/2013	9	21	0-14	W-W	1017.3	NIL	CLOUDY
22/05/2013	7	14	0-0	S-	1016.3	NIL	CLOUDY
23/05/2013	10	13	0-0	S-N	1014.5	15	CLOUDY /RAIN
24/05/2013	9	14	0-0	S-ESE	1020.1	35	CLOUDY/RAIN
25/05/2013	9	20	0-0	S-SSW	1024.4	NIL	FINE
SUNDAY							
27/05/2013	7	14	0-3	S-SW	1031.7	NIL	CLOUDY
28/05/2013	12	16	0-	ESE-ESE	1033.9	10	CLOUDY/RAIN
29/05/2013	9	19	0-8	N-NW	1032.3	NIL	FOG /CLOUDY
30/05/2013	10	22	0-0	N-NE	1030.1	NIL	FOG/CLOUDY
31/05/2013	10	19	0-0	NE-N	1028.9	NIL	FOG/CLOUDY

PF FORMATION WEATHER CHART

JUN 13

DATE	TEMP-MIN	TEMP-MAX	WIND-SPD	WIND-DIR	BAR	RAIN	CONDITION
1/06/2013	14	19	0-0	N-WNW	1022	NIL	CLOUDY
SUNDAY							
3/06/2013	8	-	0-	ESE-	1021.4	40	FINE
4/06/2013	8	22	0-0	S-ESE	1027.3	NIL	CLOUDY
5/06/2013	7	16	0-5	SSW-NE	1027.7	NIL	CLOUDY
6/06/2013	14	17	4-0	N-WNW	1025	NIL	CLOUDY
7/06/2013	16	21	0-0	NE-WNW	1021.2	NIL	CLOUDY
8/06/2013	11	19	0-0	SSE-S	1030.1	NIL	CLOUDY
SUNDAY							
10/06/2013	QUEENS	BIRTHDAY					
11/06/2013	8	21	0-0	W-WNW	1021.6	NIL	FOG /FINE
12/06/2013	8	12	0-10	NW-NNE	1017.2	NIL	RAIN
13/06/2013	10	19	0-9	W-WNW	1009.9	10	CLOUDY
14/06/2013	10	17	11-Sep	WNW-WNW	1007.4	NIL	CLOUDY
15/06/2013	11	17	15-May	S-WSW	1010.2	NIL	FINE
SUNDAY							
17/06/2013	4	15	0-5	S-SW	1011.8	NIL	FINE/CLOUDY
18/06/2013	5	20	0-0	S-ESE	1015.1	NIL	CLOUDY
19/06/2013	8	14	0-15	S-SW	1021.6	NIL	CLOUDY/FINE
20/06/2013	7	16	0-0	SW-SW	1026.2	NIL	CLOUDY
21/06/2013	6	14	0-0	ESE-SW	1022.7	NIL	CLOUDY
22/06/2013	4	14	0-0	S-S	1026	NIL	FINE/CLOUDY
SUNDAY							
24/06/2013	9	14	0-0	ESE-SW	1024.6	10	CLOUDY/RAIN
25/06/2013	8	13	0-0	SW-S	1017.5	2	CLOUDY/RAIN
26/06/2013	13	15	0-2	S-S	1020.2	11	CLOUDY/RAIN
27/06/2013	11	16	0-0	SW-ESE	1023.8	2	FOG/RAIN
28/06/2013	11	15	0-0	ESE-S	1024.8	2	FOG/RAIN
29/06/2012	WEIGH	BRIDGE	CLOSED				

Chapter Six

GROUND & SURFACE WATER MANAGEMENT

Introduction

The groundwater monitoring program included in the Water Management Plan approved by the Director-General of the Department of Planning includes:

- 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;
 - 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
- 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**.

This chapter addresses the surface and groundwater aspects of the sand extraction operations at the site.

Groundwater management

The groundwater component of the report has been prepared by URS Australia and their full report follows in **Attachment 6A**.

In July 2011 URS Australia updated the map of the wet weather groundwater level for the site based on all available site specific groundwater monitoring data they have reviewed over the years. This map is in **Attachment 6B**.

From the wet weather groundwater levels URS Australia has prepared an updated Maximum Extraction Depth Map for the project and this is **Attachment 6C**.

Surface water management

Current site conditions

The location of the current extraction areas, tailings ponds and sediment basins is shown on the figure at **Attachment 2A**. No significant changes have occurred in these areas in the last year as discussed in Chapter 2.

The following points respond, where appropriate, to the specific surface water issues listed in the Water Management Plan.

Treatment of sediment-laden water

Sediment-laden water is treated by the use of a series of tailings ponds which enable the sediment to progressively settle out of suspension with the resulting clean water returned to the processing cycle.

Stormwater runoff from disturbed areas flows to these ponds and other sediment basins across the site to maximise reuse of all water. Prior to overflow and discharge from the spillways and the site, the stormwater runoff is treated where necessary.

The clean water supply dam, located close to the southern boundary of the southern catchment, comprises the final sediment basin before any discharge of stormwater from the Hitchcock Road site. It is included in the process water cycle and, at the time of the inspection, was estimated to be using about 67 percent of its calculated capacity of 25,000 cubic metres.

The clean water supply dam is connected by pipe to the clean water dam on Lot 198 DP 752025 below the central processing plant (sand washplant). A sediment trap system has now been built in front of the dam to pump the washplant sediment back into the washplant. The system is working well and minimal operational sediment now enters the clean water dam. The capacity is 50,000 cubic metres and was estimated to be using 67% at the time of inspection. Water can be balanced between the two sites as necessary. **(Attachment 2C – Photos 9 &14)**

Past extraction in the northern extraction area has created a temporary excavation, the capacity of which significantly exceeds that required as a sediment basin for the northern catchment section of the site. A minimum capacity of 7,800 cubic metres will be maintained following final trimming of this basin. Inspection indicates a current freeboard to the spillway of about 2.5 metres with no indication of any discharge from the site during the year.

Maintaining/monitoring current surface water quality

The site does not have any permanently flowing surface waters. Existing surface water is limited to a supply sump in an area of previous extraction and a number of small farm dams. The existing tailings ponds and sediment basins will maintain the quality of the intermittent surface water flows experienced on the site.

Monitoring of surface water quality will be achieved by the visual inspection of waters within the sediment basins allowing treatment to take place if necessary prior to overflow and discharge from the site.

No discharges from the site occurred but quarterly samples were taken from an existing monitoring site on the creek below Lot 198 DP 752025. The results from these samples are in **Attachment 6D**. The PH, electrical conductivity and oil and grease results were all within the expected ranges.

Dewatering of water pits

Of the commissioned ponds, Numbers 9 and 10 are currently in the tailings stream cycle with Number 5 partially capped (as it is still used as a drain to the clean water dam). A new pond on Lot 214 DP 752039 will be commissioned in the 2014 year to June.

All other tailings ponds have been fully capped.

Decant water from the tailings ponds flows to the clean water supply dam and then to the slurry plant and the processing/wash plant on Lot 198.

The tailings ponds on Lot 198 (Wisemans Ferry Road) are currently not used for tailings disposal.

Destination points for waters collected within the extraction areas

In the southern catchment, the collected waters flow to the tailings ponds and the clean water dam (southern sediment basin) and thence to the slurry plant and the main process plant on Lot 198.

In the northern part of the Hitchcock Road site they flow to the northern sediment basin and thence (if not recovered and reused) via the overflow spillway, and two further minor sediment traps to the Wisemans Ferry Road surface drains. There are no indications that any surface water has been discharged from the Hitchcock Road site and all available water is used in the processing cycle.

On-site reuse of collected waters

All collected waters are reused in the processing cycle during the operational stage of the extraction works.

Water levels within the existing water sump

Water levels and volumes within the sump are detailed in **Attachment 6A**. The sump (dam) is located at the lowest point- in the south-eastern corner of the existing pit on Portion 167 on the eastern side of the clean water dam. The capacity of this area is essentially the full extent of the existing pit and would greatly exceed that calculated in the Rehabilitation Plan as necessary for the total capture of runoff from the 100 year time of concentration storm event (19,400 m³).

Significant site features, recharge areas and natural areas

The main extraction area changes within the site but only impacts internal water flows. Groundwater recharge areas, outside the current extraction areas remain essentially unaltered and the groundwater management plan has concluded that there has been no apparent impact on the sustainability of the groundwater. (see **Attachment 6A**)

Conclusion

Groundwater and surface water levels have been monitored and water samples tested with no abnormalities noted.

Attachment 6A

Annual Groundwater Management Plan



Report

Hitchcock Road Site, Maroota

2013 Annual Groundwater Management Plan

9 JULY 2013

Prepared for
PF Formation
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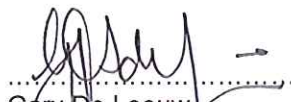


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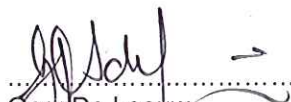
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Appendices

Appendix A	Water Quality Data Plots
Appendix B	Analytical Laboratory Certificates

Introduction

1.1 General

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 Baulkham Hills Shire Council (BHSC). 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.

URS Australia Pty Ltd (URS) has been retained by PFF to prepare the groundwater component of the above report, which is presented in the following sections.

The WMP for the year July 2012 to June 2013 also includes the monitoring data collected from 1996 to date for the Hitchcock Road site and for Portion 198.

Groundwater Monitoring Facilities

2.1 General

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;
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 the two water supply bores in Portion 198, i.e., PF198PB1 and PF198PB2 (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.

Dataloggers 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 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.

Water samples from five bores (PF167MW1, PF166 MW1, PFL2HitchMW1, PFP214MW1 and PF198PB2) were collected 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 could not be collected as the pump has been out of service for some time.

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 and Grease.

2.1.1 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 PFF. An automated weather station has been installed by

2 Groundwater Monitoring Facilities

PFF in 2010. Occasionally missing data from this station were integrated with data from the BoM Maroota station No.67014.

Figure 3 presents the combined Dataflow and Solinst dataloggers records for bore PF167MW1. Some minor data gaps exist and a slight difference between the manual data and the start of the automatic recording is evident in the graph, which are due to the time intervening between the end of the manual and start of the automatic recording methods.

2.1.2 Monitoring Bore PF166MW1

Groundwater monitoring at bore PF166MW1 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, together with EC and rainfall records collected by PFF.

The plots of bore PF167MW1 records collected after the installation of the Dataflow datalogger and those of the Solinst dataloggers are presented in Figure 5.

2.1.3 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 Levellogger Gold 3001, serial no. 51040540). Bore PFP214MW1 hydrograph is presented in Figure 6.

2.1.4 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 7.

2.1.5 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.

Plots of the water levels in the dam and of the rainfall in the same period are presented in Figure 8 and a plot of the pumpage records in Figure 9.

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.

2 Groundwater Monitoring Facilities

2.1.6 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.

As indicated earlier, the 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 graphs are presented in Appendix A and the laboratory reports in Appendix B.

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 watertables. 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 rapid response to periods of sustained rainfall. 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 2013 to June has been 755.3 mm, indicating that the rainfall for year is likely to exceed the yearly long term average.

These rainfall data are reported from the BOM weather station No. 67014 located on Old Telegraph Road.

3.1.1 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.

Since June 2011, after a period of slow decline, the water level in this bore has been rising steadily following the persistent above average rainfall. The current level is marginally above that recorded at this site in the year 2000.

3.1.2 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. The current level is below that recorded in the year 2002.

3.1.3 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.

3.1.4 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.

3 Data Assessment

3.1.5 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. Due to the above average rainfall of the last three years there have been long periods when no water was extracted from this site.

As indicated earlier, 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 year, 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. 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 8 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.

3.1.6 Groundwater Quality

As indicated in Section 2.1, 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 presented in Appendix A. The laboratory reports are presented in Appendix B.

Figures 2 and 4 show plots of the EC together 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. The EC plots 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 plots 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 and PF198PB2, the two processing plant water supply bores. The water in these bores is derived from the Hawkesbury Sandstone aquifer. Quality records are summarised in Tables 3-5 and 3-6 and have been plotted in the graphs

3 Data Assessment

presented in Appendix A. However, as mentioned earlier, a sample could not be collected from bore PF198PB2 during the recent monitoring events.

The waters in the Maroota Sand aquifer monitoring bores are similar and have a characteristic meteoric 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. Oil and Grease in the groundwater was detected in bore PF198PB1 in January 2006 (6 mg/L), in bore PF198PB2 in December 2001 (11 mg/L) and in bore PF166MW1 (6 mg/L). These appear to be isolated detections and, as no Oil and Grease has been detected in other sampling occasions, it is considered that such occurrences do not represent a cause of concern.

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 (PF198PB2) than the shallower Maroota Sand groundwater; however, its overall low salinity content and sodium-chloride meteoric composition indicate a dynamic groundwater regime with regular and rapid rainfall recharge.

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.

3.1.7 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 Data Assessment

Table 3-1 Bore PF167MW1 Chemical Analyses Summary

ANALYTE	Unit													
Date		2.6.99	8.9.99	21.12.99	9.3.00	28.11.00	21.6.01	19.12.01	26.6.02	23.1.03	9.7.03	30.1.04	29.6.04	15.12.04
pH		4.43	4.49	4.21	4.93	4.28	4.61	4.98	4.52	4.54	5.15	4.31	4.38	4.68
Electrical Conductivity, EC	µS/cm	164	190	201	179	184	170	188	215	199	204	225	221	240
Total Dissolved Solids, TDS	mg/L	118	90	105	115	207	120	108	121	101	116	157	110	143
Calcium, Ca	mg/L	3	3	5	6	3	6	6	5	3	4	4	5	5
Magnesium, Mg	mg/L	5	4	4	4	4	4	5	4	4	3	4	4	4
Sodium, Na	mg/L	16	18	16	15	18	16	18	25	20	19	22	23	26
Potassium, K	mg/L	2	2	3	3	3	5	4	5	2	2	2	3	3
Bicarbonate, HCO ₃	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Sulphate, SO ₄	mg/L	9	11	35	32	16	15	15	14	9	13	12	10	13
Chloride, Cl	mg/L	36	11	35	32	35	36	47	58	4	48	51	53	50
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
Date		22.6.05	19.1.06	6.7.06	5.7.07	3.7.08	3.7.09	16.6.10	22.6.11	20.6.12	19.6.13			
pH		5.42	4.32	4.27	4.88	5.29	4.00	4.30	5.3	4.39	4.18			
Electrical Conductivity, EC	µS/cm	215	205	199	188	161	177	190	170	174	211			
Total Dissolved Solids, TDS	mg/L	137	141	119	76	100	104	111	101	112				
Calcium, Ca	mg/L	5	4	4	2	6	5	3	4	7	<1			
Magnesium, Mg	mg/L	4	4	4	3	5	4	3	4	4	4			
Sodium, Na	mg/L	28	25	23	16	13	14	15	18	12	22			
Potassium, K	mg/L	3	3	3	2	4	4	2	4	4	2			
Bicarbonate, HCO ₃	mg/L	2	1	<1	<1	<1	<1	2	2.4	<1	<1			
Sulphate, SO ₄	mg/L	13	10	6	10	30	22.6	17.1	18	28	1			
Chloride, Cl	mg/L	56.6	57.4	53.1	36.1	26.4	34.8	39.9	29	22	42			
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5			

3 Data Assessment

Table 3-2 Bore PF166 Chemical Analyses Summary

ANALYTE	Unit													
Date		1.6.99	8.9.99	21.12.99	9.3.00	29.11.00	21.6.01	19.12.01	26.6.02	23.1.03	9.7.03	30.1.04	29.6.04	15.12.04
pH		4.18	4.19	4.13	4.14	4.31	4.19	4.63	4.48	4.82	7.86	4.39	4.27	4.06
Electrical Conductivity, EC	µS/cm	222	240	230	214	266	194	228	219	203	221	193	235	203
Total Dissolved Solids, TDS	mg/L	118	108	137	170	460	115	210	280	128	134	204	280	120
Calcium, Ca	mg/L	1	1	1	1	1	1	1	2	1	1	<1	1	1
Magnesium, Mg	mg/L	6	6	6	5	6	5	6	6	5	4	5	5	4
Sodium, Na	mg/L	26	23	23	22	29	21	22	24	19	20	18	19	19
Potassium, K	mg/L	<1	<1	1	1	1	1	2	1	<1	<1	<1	1	1
Bicarbonate, HCO ₃	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Sulphate, SO ₄	mg/L	1	7	1	1	16	2	1	2	<1	<1	2	<1	2
Chloride, Cl	mg/L	58	49	51	52	58	49	58	61	46	50	47	44	36
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	5	<5
Date		22.6.05	19.1.06	6.7.06	5.7.07	3.7.08	3.7.09	16.6.10	22.6.11	20.6.12	19.6.13			
pH					4.76		3.58	4.06	4.22	4.08	4.53			
Electrical Conductivity, EC	µS/cm	DRY	DRY	DRY	163	NA	240	247	261	229	189			
Total Dissolved Solids, TDS	mg/L				98		140	141	172	124	186			
Calcium, Ca	mg/L						<1	<1	1	1	6			
Magnesium, Mg	mg/L						4	4	6	5	4			
Sodium, Na	mg/L						26	24	24	19	15			
Potassium, K	mg/L						2	2	3	3	4			
Bicarbonate, HCO ₃	mg/L						<1	<1	<1	<1	<1			
Sulphate, SO ₄	mg/L						2.21	1.77	1	1	21			
Chloride, Cl	mg/L						49.1	56.3	53	43	32			
Oil and Grease	mg/L						<5	<5	<5	<5	<5			

3 Data Assessment

Table 3-3 Bore PFL2HitchMW1 Chemical Analyses Summary

ANALYTE	Unit	3.7.2009	16.6.2010	22.6.2011	20.6.2012	20.6.2012	19.6.2013
Date							
pH		3.96	4.1	4.1	4.03	4.03	4.18
Electrical Conductivity, EC	µS/cm	182	154	167	195	195	185
Total Dissolved Solids, TDS	mg/L	84	88	110	99	99	150
Calcium, Ca	mg/L	1	<1	<1	<1	<1	<1
Magnesium, Mg	mg/L	2	2	2	2	2	2
Sodium, Na	mg/L	19	16	22	22	22	22
Potassium, K	mg/L	2	<1	<1	<1	<1	<1
Bicarbonate, HCO ₃	mg/L	<1	<	<1	<1	<1	<1
Sulphate, SO ₄	mg/L	7.88	4.06	5	1	1	4
Chloride, Cl	mg/L	40.3	36.9	32	43	43	43
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5

3 Data Assessment

Table 3-4 Bore PFP214MW1 Chemical Analyses Summary

ANALYTE	Unit					
Date		3.7.2009	16.6.2010	22.6.2011	20.6.2012	19.6.2013
pH		4.19	4.16	4.31	4.27	5.70
Electrical Conductivity, EC	µS/cm	168	164	158	179	198
Total Dissolved Solids, TDS	mg/L	100	96	88	103	124
Calcium, Ca	mg/L	<1	<1	<1	<1	<1
Magnesium, Mg	mg/L	6	5	4	6	7
Sodium, Na	mg/L	18	15	18	17	21
Potassium, K	mg/L	1	<1	1	<1	2
Bicarbonate, HCO ₃	mg/L	<1	<1	<1	<1	2
Sulphate, SO ₄	mg/L	1.90	<0.5	<1	<1	<1
Chloride, Cl	mg/L	24.3	23.8	34	24	34
Oil and Grease	mg/L	<5	<5	<5	<5	<5

3 Data Assessment

Table 3-5 Bore 198PB1 Chemical Analyses Summary

ANALYTE	Unit	1.6.99	8.9.99	21.12.99	9.3.00	28.11.00	21.6.01	19.12.01	26.6.02	23.1.03	9.7.03	30.1.04	29.6.04	15.12.04
Date		1.6.99	8.9.99	21.12.99	9.3.00	28.11.00	21.6.01	19.12.01	26.6.02	23.1.03	9.7.03	30.1.04	29.6.04	15.12.04
pH		5.87	6.24	6.11	4.69	4.49	4.51	5.41	4.73	4.49	5.06	5	4.53	4.28
Electrical Conductivity, EC	µS/cm	161	170	169	141	182	179	204	199	243	199	160	291	197
Total Dissolved Solids, TDS	mg/L	124	116	98	97	107	102	116	112	139	102	116	174	88
Calcium, Ca	mg/L	1	<1	1	1	3	2	2	4	3	2	2	4	1
Magnesium, Mg	mg/L	4	6	5	3	3	4	4	4	4	3	2	5	2
Sodium, Na	mg/L	21	24	22	19	20	21	27	23	31	22	19	40	25
Potassium, K	mg/L	1	<1	1	1	2	5	5	3	3	2	2	3	2
Bicarbonate, HCO ₃	mg/L	13	29	22	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sulphate, SO ₄	mg/L	4	4	4	2	8	8	3	7	4	8	6	9	8
Chloride, Cl	mg/L	39	35	36	36	40	49	60	58	64	49	43	83	42
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	<5
Date		22.6.05	19.1.06	6.7.06	5.7.07	3.7.08	3.7.09	16.6.10	22.6.11	20.6.12	19.6.13			
pH		5.22	5.74	5.16	NA	4.59	3.94	4.43	5.52	5.72	NA			
Electrical Conductivity, EC	µS/cm	157	158	155		144	174	163	170	170				
Total Dissolved Solids, TDS	mg/L	105	115	98		85	83	88	102	99				
Calcium, Ca	mg/L	1	2	1		<1	1	<1	2	2				
Magnesium, Mg	mg/L	2	4	3		2	2	2	4	3				
Sodium, Na	mg/L	23	21	20		18	19	16	21	18				
Potassium, K	mg/L	2	2	2		1	2	1	2	2				
Bicarbonate, HCO ₃	mg/L	1	12	5		<1	<1	<1	3.7	9.8				
Sulphate, SO ₄	mg/L	8	6	2		10	9.31	6.89	6	6				
Chloride, Cl	mg/L	47.1	43.4	43.8		31.1	38.8	41.1	36	32				
Oil and Grease	mg/L	<5	5	<5		<5	<5	<5	<5	<5				

3 Data Assessment

Table 3-6 Bore198PB2 Chemical Analyses Summary

ANALYTE	Unit													
Date		1.6.99	8.9.99	21.12.99	9.3.00	29.11.00	21.6.01	19.12.01	26.6.02	23.1.03	9.7.03	30.1.04	29.6.04	15.12.04
pH		5.78	6.61	5.96	NA	4.80	5.24	5.99	6.33	5.96	4.84	5	5.78	5.39
Electrical Conductivity, EC	µS/cm	139	174	146	NA	152	130	141	151	146	162	160	136	156
Total Dissolved Solids, TDS	mg/L	126	102	85	NA	100	87	87	102	84	87	116	79	105
Calcium, Ca	mg/L	1	2	2	NA	<1	<1	<1	1	<1	<1	2	1	1
Magnesium, Mg	mg/L	5	5	5	NA	4	3	4	4	4	2	2	4	2
Sodium, Na	mg/L	18	19	18	NA	19	18	18	21	17	18	19	18	20
Potassium, K	mg/L	2	2	2	NA	1	1	2	2	1	<1	2	1	2
Bicarbonate, HCO ₃	mg/L	23	33	19	NA	4	3	13	8	16	<1	<1	9	2
Sulphate, SO ₄	mg/L	3	3	2	NA	1	1	3	2	<1	<1	6	1	4
Chloride, Cl	mg/L	31	28	31	NA	41	38	33	46	33	40	43	37	35
Oil and Grease	mg/L	<5	<5	<5	NA	<5	<5	11	<5	<5	<5	<5	<5	<5
Date		22.6.05	19.1.06	6.7.06	5.7.07	3.7.08	3.7.09	16.6.10	22.6.11	20.6.12	19.6.13			
pH		6.43	5.3	5.46	4.37	5.25	4.50	NA	NA	NA	5.71			
Electrical Conductivity, EC	µS/cm	133	126	122	195	135	130				146			
Total Dissolved Solids, TDS	mg/L	87	104	79	88	79	79				91			
Calcium, Ca	mg/L	<1	<1	1	<1	1	<1				<1			
Magnesium, Mg	mg/L	4	3	4	3	5	3				3			
Sodium, Na	mg/L	17	19	16	21	16	16				18			
Potassium, K	mg/L	2	1	2	1	2	2				2			
Bicarbonate, HCO ₃	mg/L	14	7	24	<1	24.4	9.2				9			
Sulphate, SO ₄	mg/L	4	1	1	4	2	2.78				2			
Chloride, Cl	mg/L	34.9	38.8	30.2	44.8	31.8	32.2				33			
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5				<5			

3 Data Assessment

3.1.8 Portion 167 dam

Records of pump operation have been kept from PF167DAM since January 1997. Figure 9 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 the last two years, no pumping has been necessary from this source. (The licensed limit for the Portion 167 dam is 50 ML/year).

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	1.0
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

3 Data Assessment

3.1.9 Water Supply Bores, Portion 198

Pumping records for the two water supply bores in Portion 198 for the year July 2012 to June 2013 are tabulated in Table 3-8 below. The total pumpage of 10.98 ML for the year has been 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, above average rainfall and overall improved efficiency of the plant.

Table 3-8 Water Supply Bores Annual Pumpage Records

YEAR	BORE	TOTAL, ML	
1 July 1999 – 30 June 2000	Bore PF198PB1 Bore PF198PB2	21.1	35.6
1 July 2000 – 30 June 2001	Bore PF198PB1 Bore PF198PB2	20.3	29.0
1 July 2001 – 30 June 2002	Bore PF198PB1 Bore PF198PB2	25.1	36.0
1 July 2002 – 30 June 2003	Bore PF198PB1 Bore PF198PB2	24.8	47.8
1 July 2003 – 29 June 2004	Bore PF198PB1 Bore PF198PB2	22.9 49.3	
1 July 2004 – 29 June 2005	Bore PF198PB1 Bore PF198PB2	4.2 18.7	
5 July 2005 – 23 June 2006*	Bore PF198PB1 Bore PF198PB2	14.8	8.9
24 June 2006 – 30 June 2007*	Bore PF198PB1 Bore PF198PB2	7.8 19.9	
1 July 2007 – 30 June 2008*	Bore PF198PB1 Bore PF198PB2	1.6	22.9
1 July 2008 – 30 June 2009*	Bore PF198PB1 Bore PF198PB2	25.6 16.0	
1 July 2009 – 30 June 2010*	Bore PF198PB1 Bore PF198PB2**	9.5 8.1	
1 July 2010 – 30 June 2011*	Bore PF198PB1 Bore PF198PB2	11.8	NA
1 July 2011 – 30 June 2012*	Bore PF198PB1 Bore PF198PB2	9.8	13.2
1 July 2012 – 30 June 2013	Bore PF198PB1 Bore PF198PB2	NA	10.9

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

Conclusions

4.1 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 The Office of Water) in the area, indicate that:

- water levels in the Maroota Sand aquifer respond rapidly to the rainfall pattern.
- water quality in the Maroota Sand aquifer varies, albeit marginally, with rainfall recharge.
- no water levels have been measured in the dam in Portion 167 for the year to the end of June 2013 as a result of the site having remained under water for most of the recording period.
- records indicate that the water level in the dam recovers rapidly upon cessation of pumping.
- groundwater pumpage from the deep water supply bores in Portion 198 (10.9 ML) has been effected only from bore PF198PB2, as the second production bore PF198PB1 has been out of operation for the entire year.
- 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.

Limitations

5.1 Geotechnical & Hydro Geological Report

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of PF Formation.

Except as required by law, no third party may use or rely on, this Report unless otherwise agreed by URS in writing. Where such agreement is provided, URS will provide a letter of reliance to the agreed third party in the form required by URS.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Report. It is prepared in accordance with the scope of work and for the purpose outlined in the contract dated 18 June 2012.

The methodology adopted and sources of information used by URS are outlined in this the Report.

Where this Report indicates that information has been provided to URS by third parties, URS has made no independent verification of this information unless required as part of the agreed scope of work. URS assumes no liability for any inaccuracies in or omissions to that information.

This Report was prepared between 20 June 2013 and July 2013. The information in this Report is considered to be accurate at the date of issue and is in accordance with conditions at the site at the dates sampled. Opinions and recommendations presented herein apply to the site existing at the time of our investigation and cannot necessarily apply to site changes of which URS is not aware and has not had the opportunity to evaluate. This document and the information contained herein should only be regarded as validly representing the site conditions at the time of the investigation unless otherwise explicitly stated in a preceding section of this Report. URS disclaims responsibility for any changes that may have occurred after this time.

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. This Report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

This Report contains information obtained by inspection, sampling, testing or other means of investigation. This information is directly relevant only to the points in the ground where they were obtained at the time of the assessment. The borehole logs indicate the inferred ground conditions only at the specific locations tested. The precision with which conditions are indicated depends largely on the uniformity of conditions and on the frequency and method of sampling 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. Future advances in regard to the understanding of chemicals and their behaviour, and changes in regulations affecting their management, could impact on our conclusions and recommendations regarding their potential presence on this site.

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

Appendix A - Water Quality Data Plots

Whilst to the best of our knowledge information contained in this Report is accurate at the date of issue, subsurface conditions, including groundwater levels can change in a limited time.

Therefore this document and the information contained herein should only be regarded as valid at the time of the investigation unless otherwise explicitly stated in this Report.

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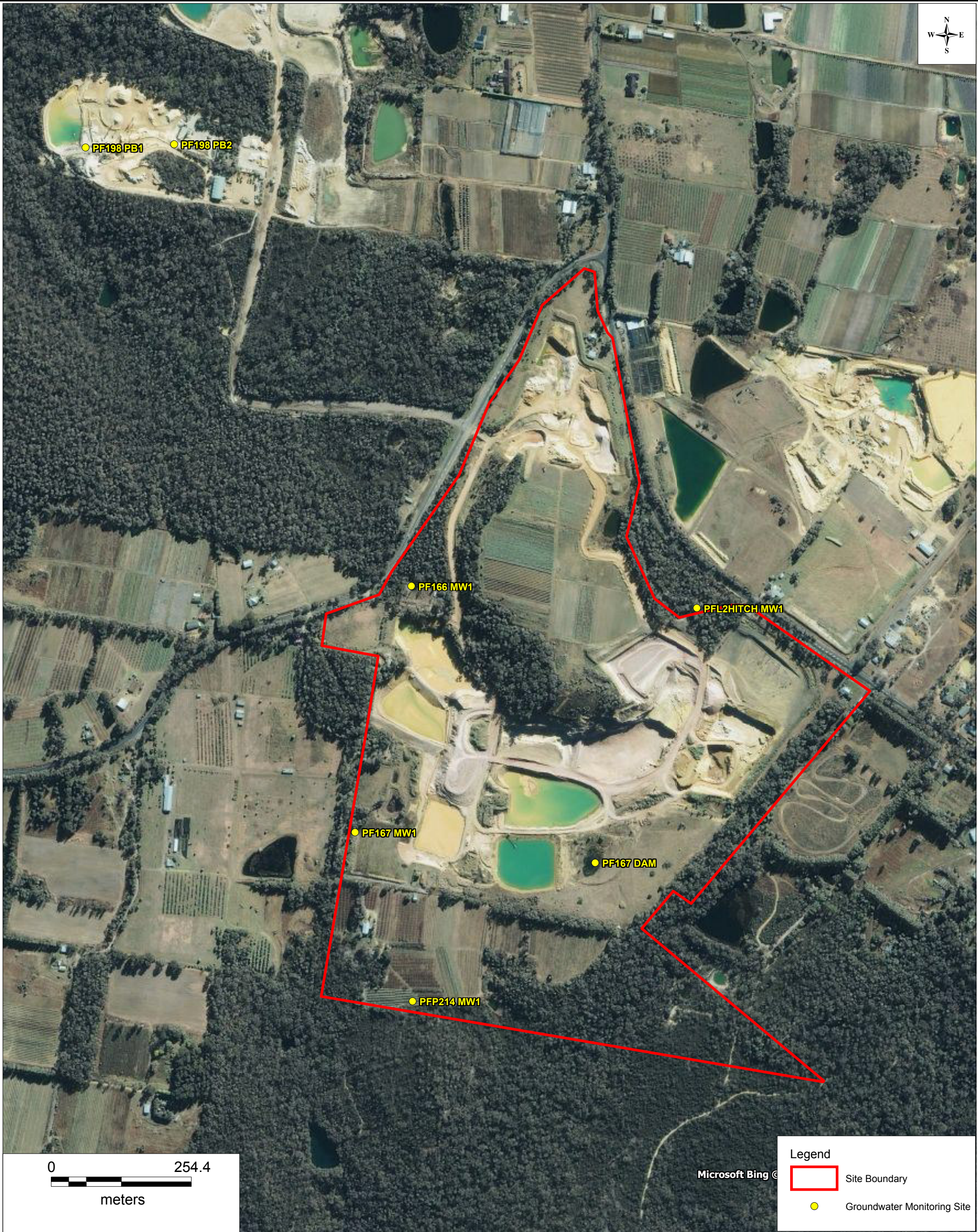
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Except as specifically stated in this section, URS does not authorise the use of this Report by any third party.

It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the relevant property.

Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

Figures



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PF FORMATION

HITCHCOCK ROAD, SAND EXTRACTION
AND REHABILITATION PROJECT

HITCHCOCK ROAD
SITE LOCALITY PLAN





P.F.FORMATION
Bore PF167MW1 Groundwater Monitoring Data

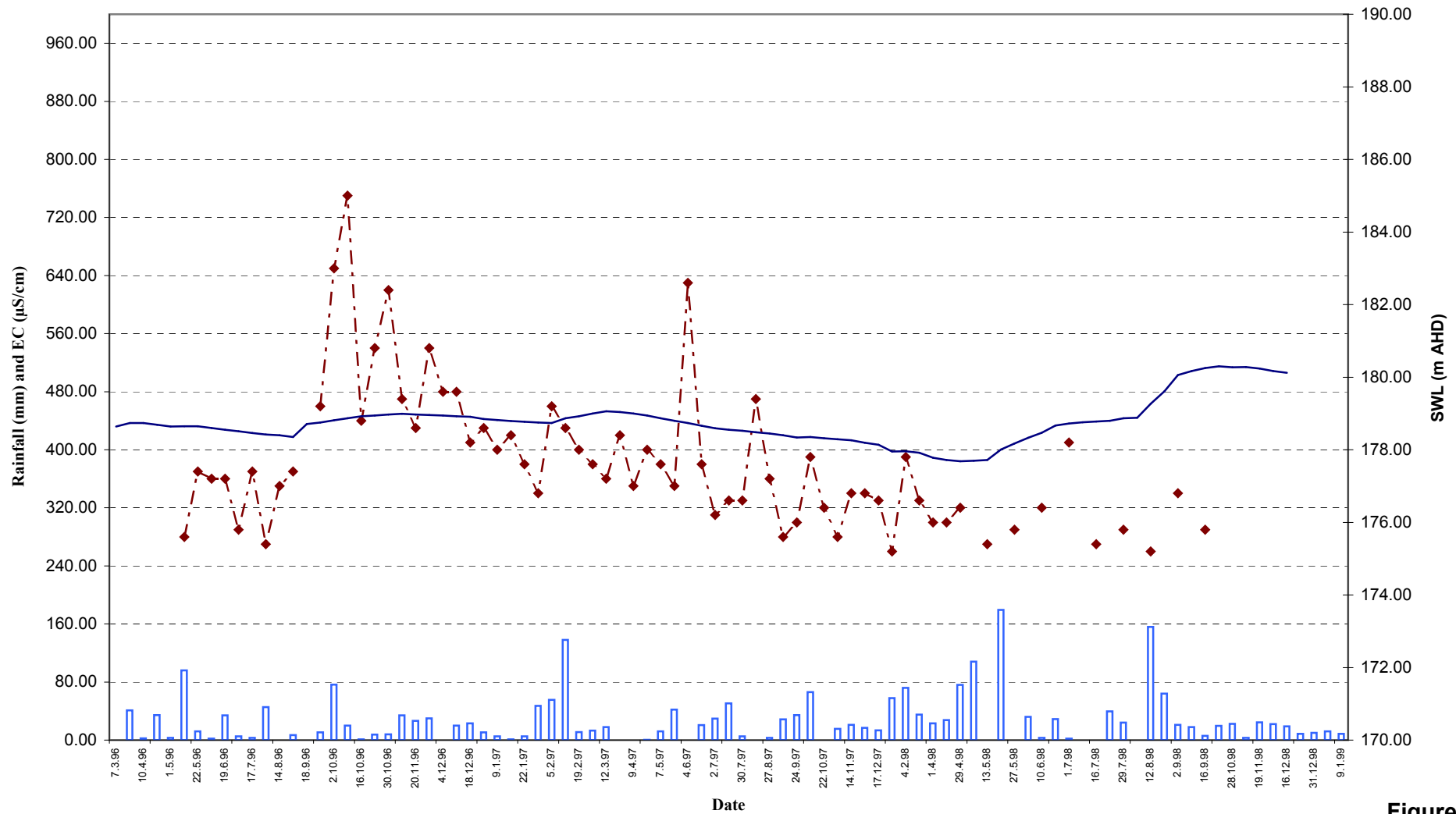
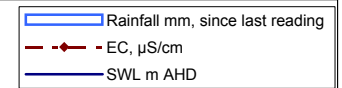


Figure 2



PF FORMATION
Bore PF167MW1 Groundwater Monitoring Data

— Rainfall, mm
— Water level m AHD

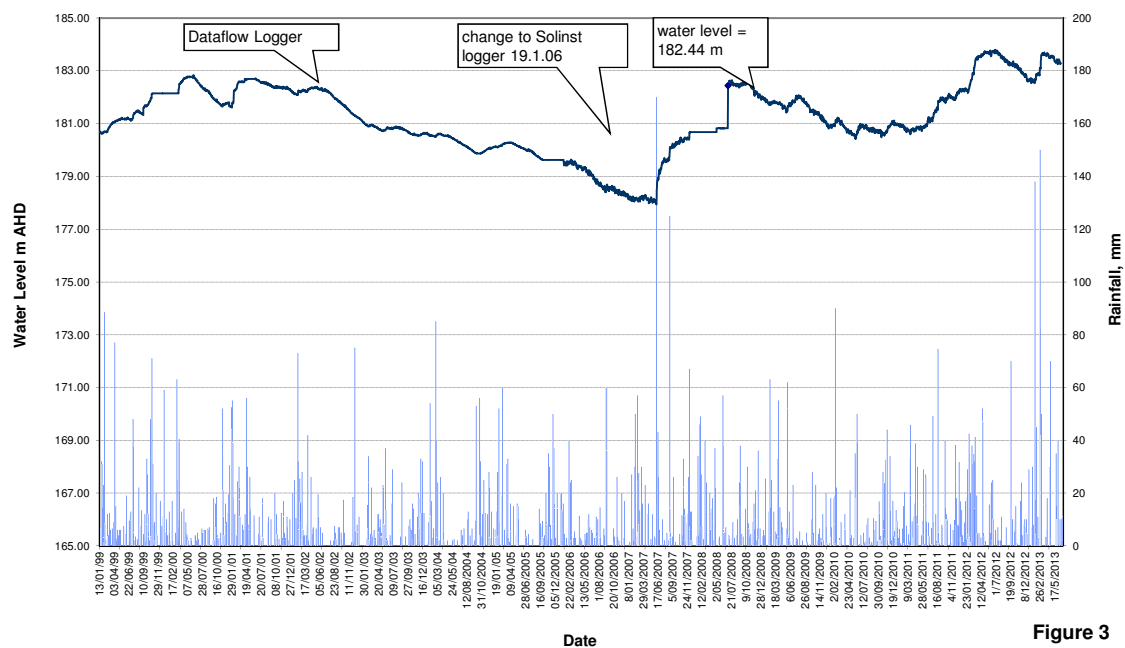


Figure 3



PF FORMATION
PF166MW1 Groundwater Monitoring Data

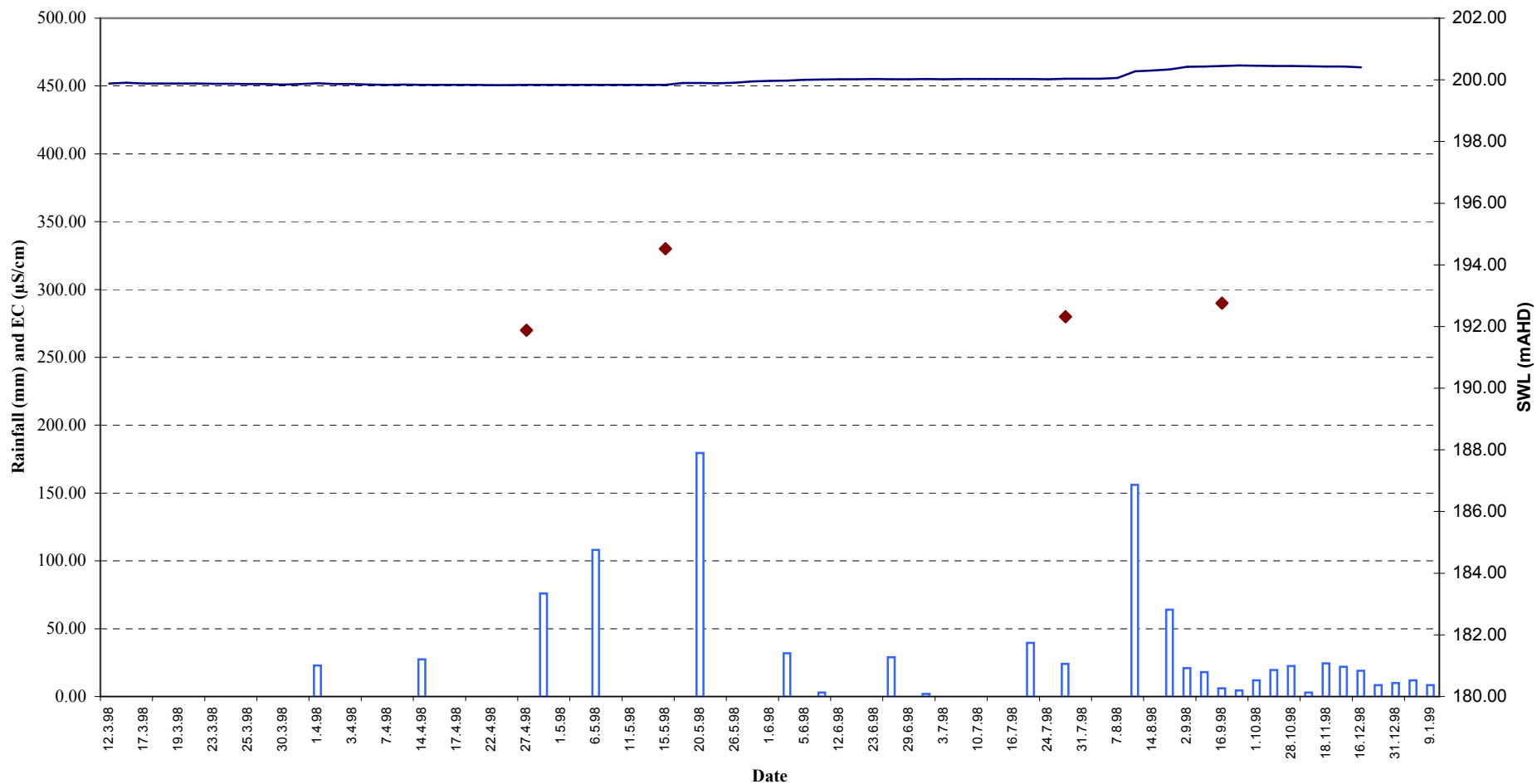
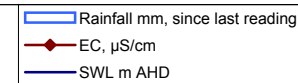


Figure 4



PF FORMATION
Bore PF166MW1 Groundwater Monitoring Data

— Rainfall, mm
— Water Level m AHD

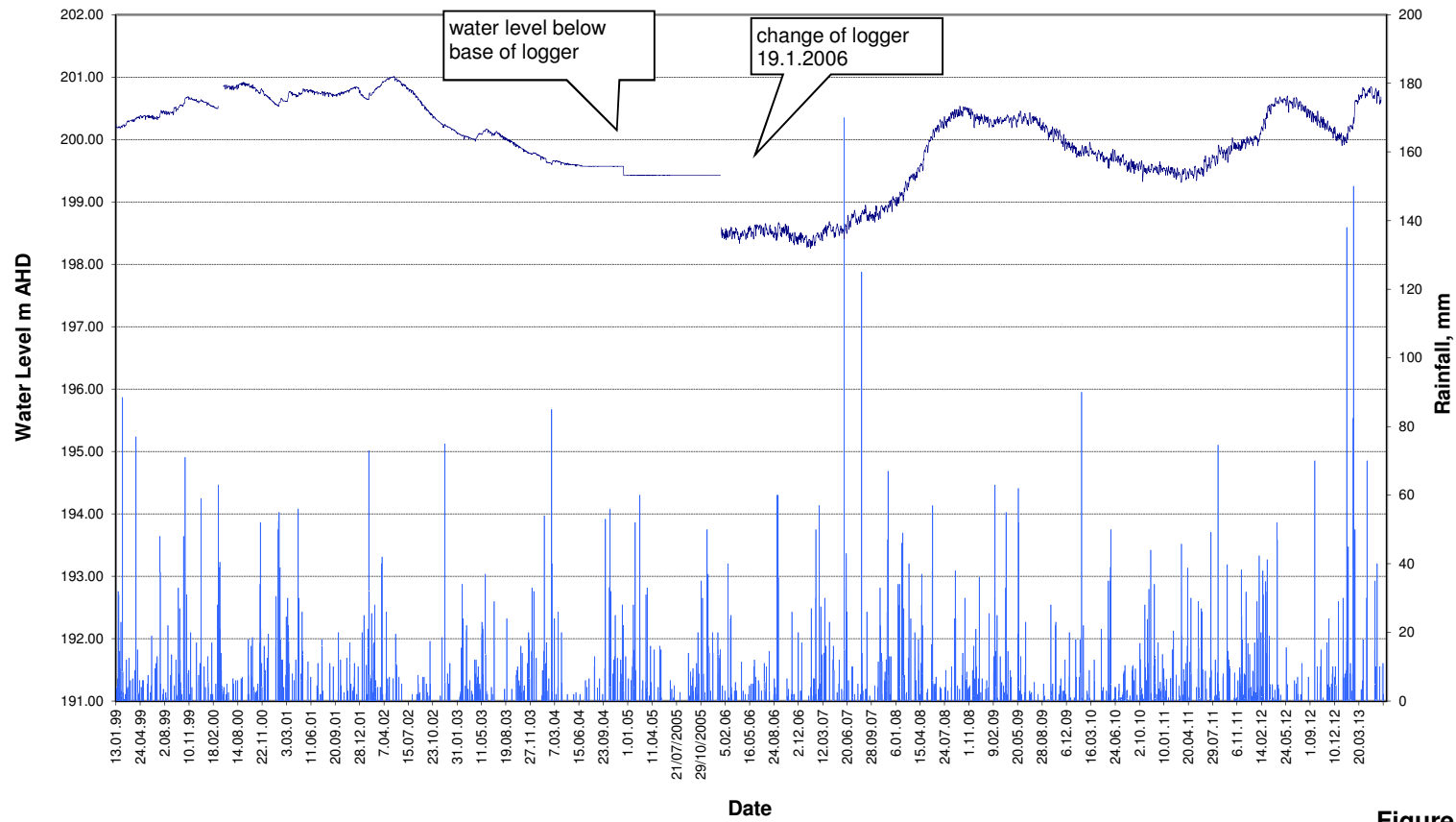
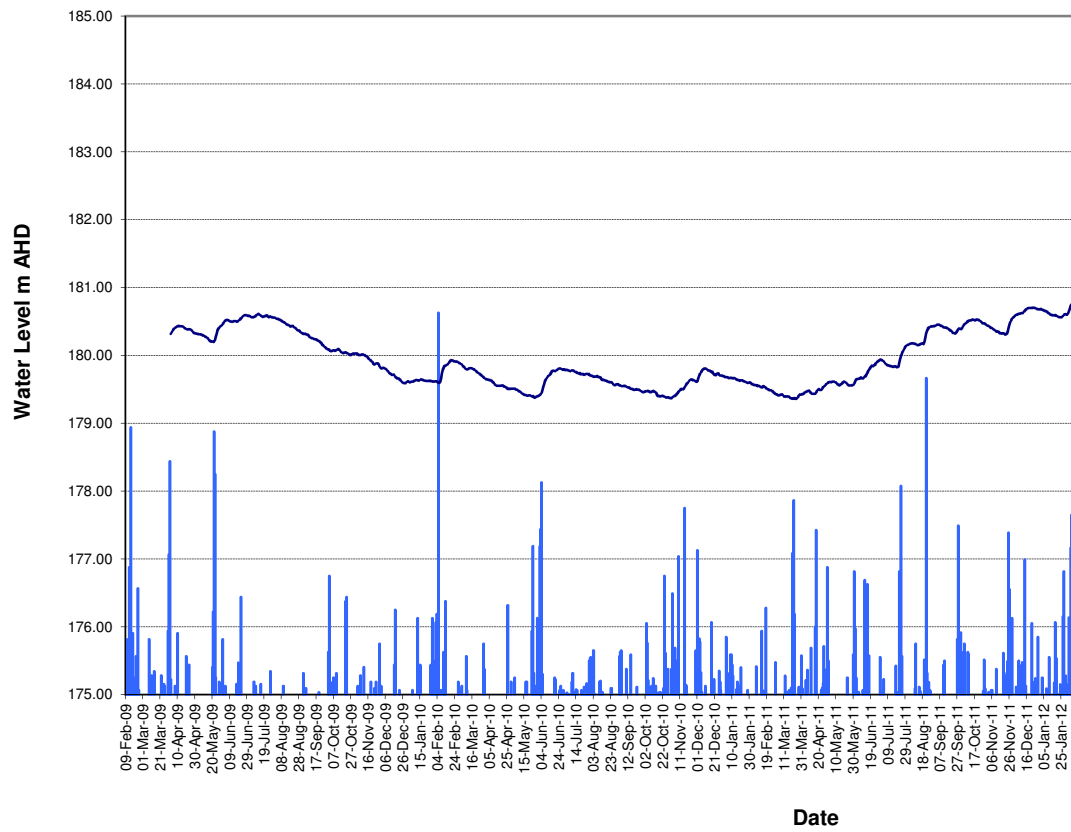


Figure 5



PF FORMATION
Bore PFP214MW1 Groundwater Monitoring Data



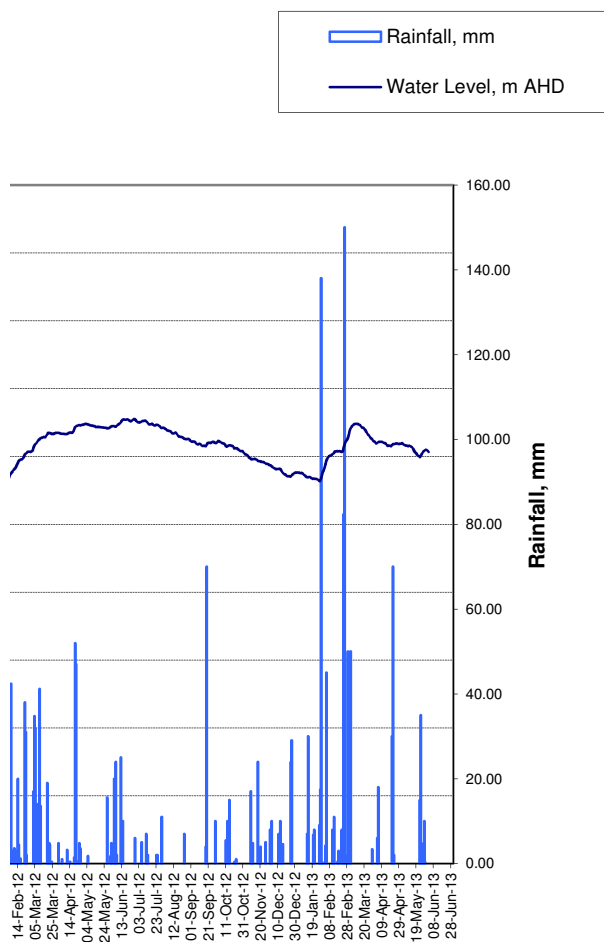


Figure 6



PF FORMATION
Bore PFL2HitchMW1 Groundwater Monitoring Data

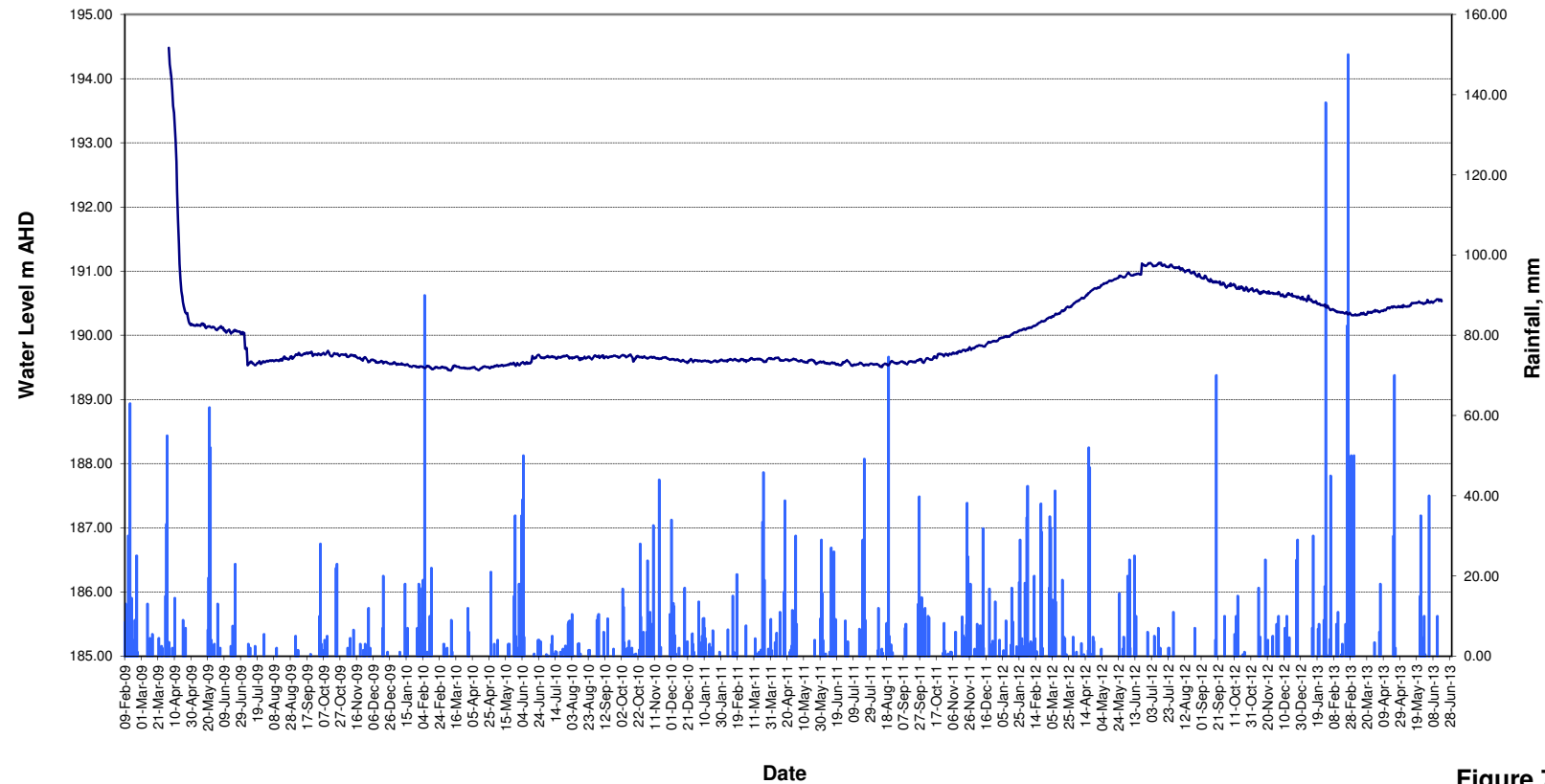
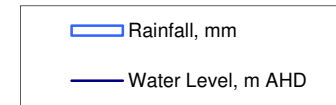


Figure 7



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

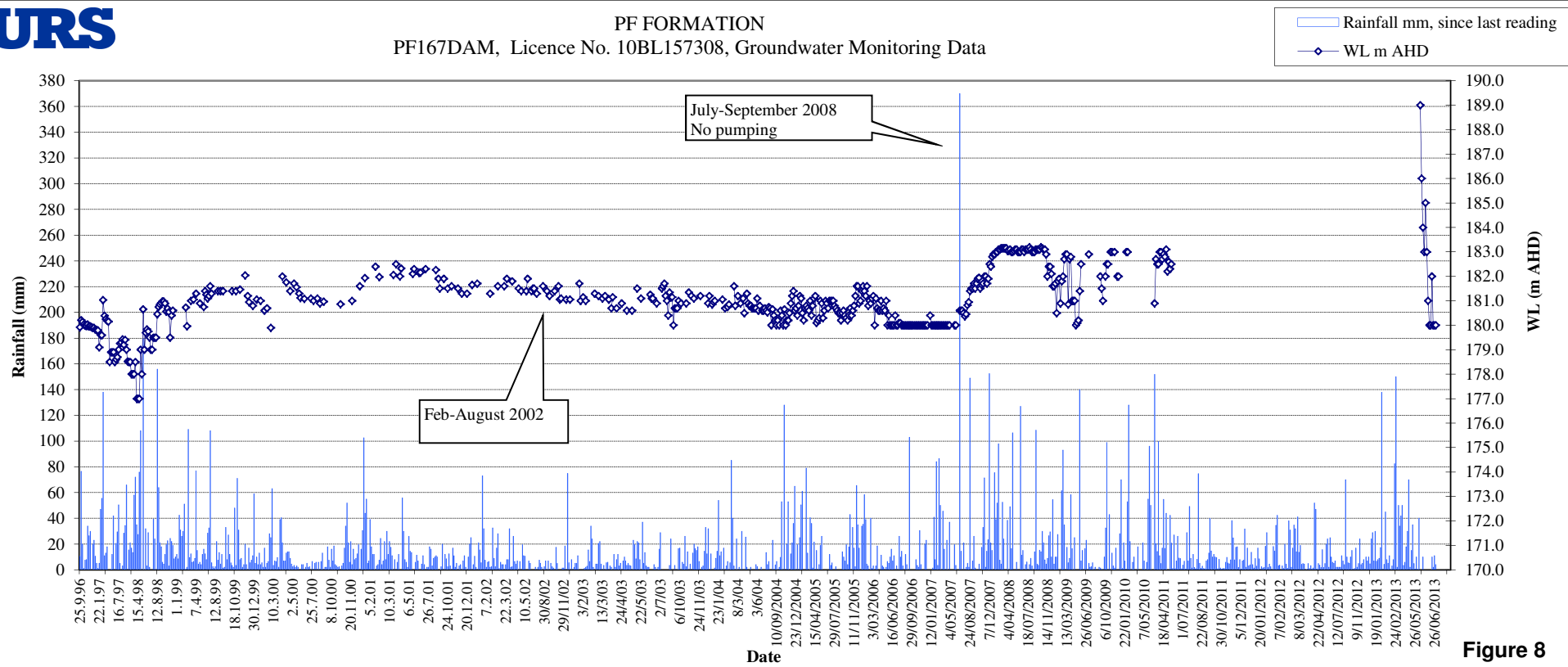


Figure 8



PF FORMATION PF167DAM Monthly Pumpage Records

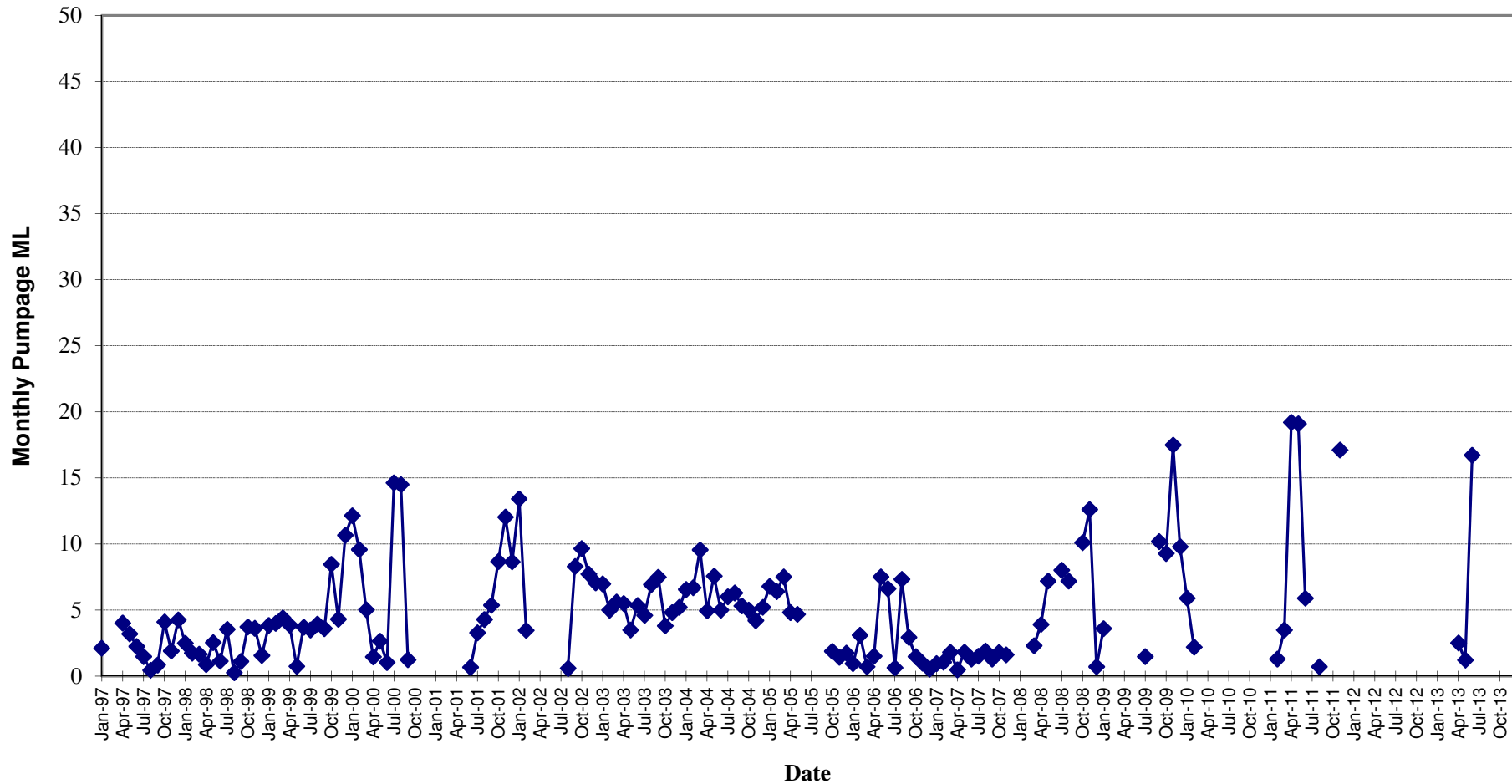


Figure 9

Appendix A Water Quality Data Plots

PF FORMATION - MAROOTA
BORE PF167MW1 GROUNDWATER ANALYTICAL SUMMARY

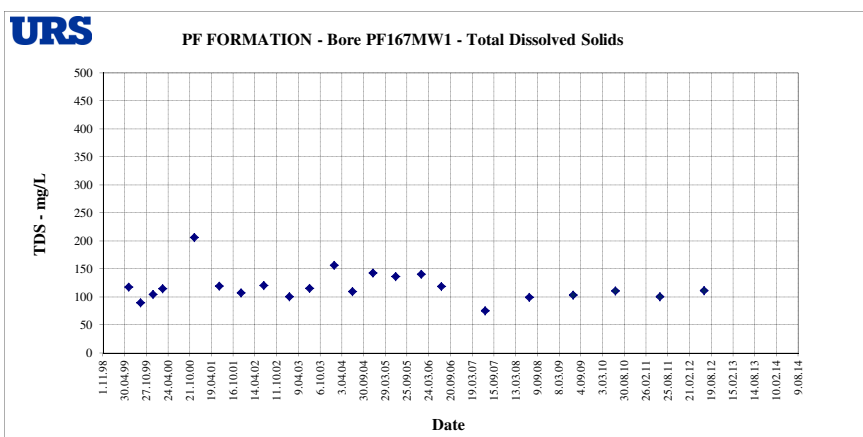
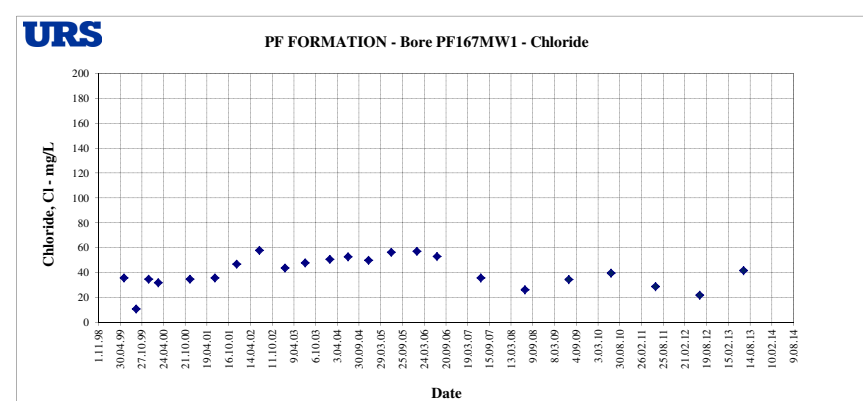
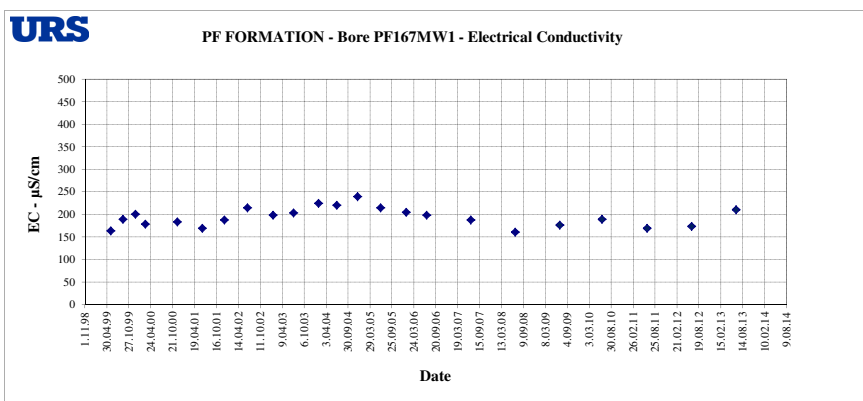
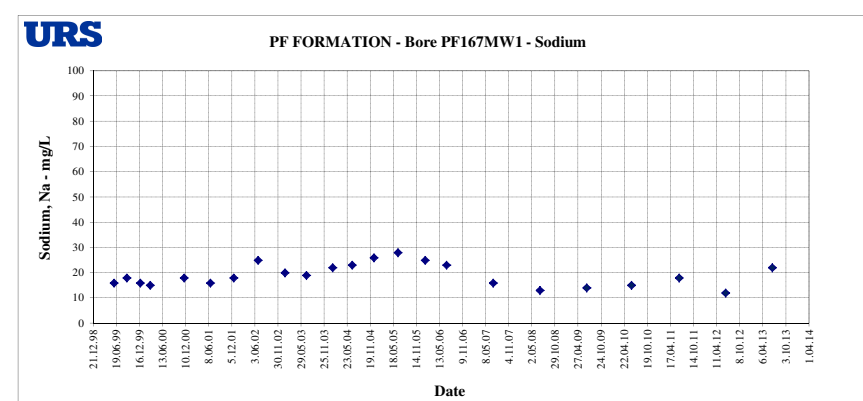
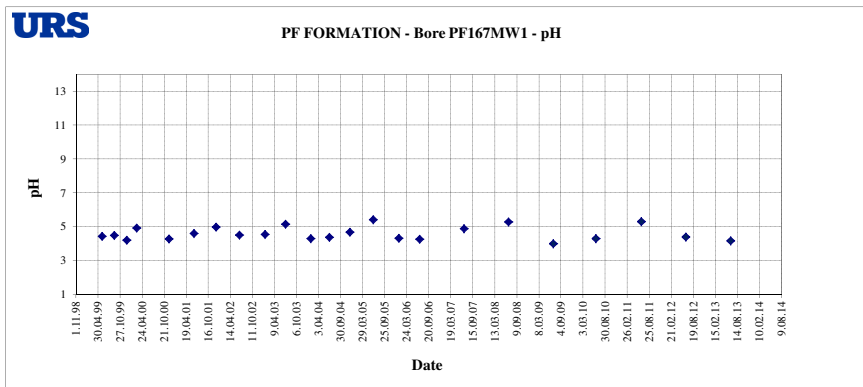
Analysis	Units	LOR	1.06.99	8.09.99	21.12.99	9.03.00	28.11.00	21.06.01	19.12.01	26.06.02	23.01.03	9.07.03	30.01.04	29.06.04	15.12.04	22.06.05	19.01.06	6.07.06	5.07.07	3.07.08
pH		0.01	4.43	4.49	4.21	4.93	4.28	4.61	4.98	4.52	4.54	5.15	4.31	4.38	4.68	5.42	4.32	4.27	4.88	5.29
Electrical Conductivity	µS/cm	1	164	190	201	179	184	170	188	215	199	204	225	221	240	215	205	199	188	161
Total Dissolved Solids	mg/L	1	118	90	105	115	207	120	108	121	101	116	157	110	143	137	141	119	76	100
Calcium	mg/L	1	3	3	5	6	3	6	6	5	3	4	4	5	5	5	4	4	2	6
Magnesium	mg/L	1	5	4	4	4	4	4	5	4	4	3	4	4	4	4	4	4	3	5
Sodium	mg/L	1	16	18	16	15	18	16	18	25	20	19	22	23	26	28	25	23	16	13
Potassium	mg/L	1	2	2	3	3	3	5	4	5	2	2	2	3	3	3	3	3	2	4
Bicarbonate	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	2	1	<1	<1	<1
Sulphate	mg/L	1	9	<1	13	17	16	15	15	14	9	13	12	10	13	13	10	6	10	30
Chloride	mg/L	1	36	11	35	32	35	36	47	58	44	48	51	53	50	56.6	57.4	53.1	36.1	26.4
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

Analysis	Units	LOR	3.07.09	16.06.10	22.06.11	20.06.12	19.06.13
pH		0.01	4	4.3	5.3	4.39	4.18
Electrical Conductivity	µS/cm	1	177	190	170	174	211
Total Dissolved Solids	mg/L	1	104	111	101	112	
Calcium	mg/L	1	5	3	4	7	<1
Magnesium	mg/L	1	4	3	4	4	4
Sodium	mg/L	1	14	15	18	12	22
Potassium	mg/L	1	4	2	4	4	2
Bicarbonate	mg/L	1	<1	2.4	2.4	<1	<1
Sulphate	mg/L	1	22.6	17.1	18	28	1
Chloride	mg/L	1	34.8	39.9	29	22	42
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5

LOR = Limit of Reporting

Average EC = 194 µS/cm
Average TDS = 119 mg/L
Average pH = 4.60

N.B. = TDS value in November 2000 is unusually high because of the presence of particulate matter in the sample.



PF FORMATION - MAROOTA
BORE PF166MW1 GROUNDWATER ANALYTICAL SUMMARY

Analysis	Units	LOR	1.06.99	8.09.99	21.12.99	9.03.00	28.11.00	21.06.01	19.12.01	26.06.02	23.01.03	9.07.03	30.01.04	29.06.04	15.12.04	22.06.05	19.01.06	6.07.06	5.07.07	3.07.08
pH		0.01	4.18	4.19	4.13	4.14	4.31	4.19	4.63	4.48	4.82	7.86	4.39	4.27	4.06	DRY	DRY	DRY		DRY
Electrical Conductivity	µS/cm	1	222	240	230	214	266	194	228	219	203	221	193	235	203				4.76	
Total Dissolved Solids	mg/L	1	118	108	137	170	460	115	210	280	128	134	204	280	120				163	
Calcium	mg/L	1	1	1	1	1	1	1	1	2	1	1	<1	1	1				98	
Magnesium	mg/L	1	6	6	6	5	6	5	6	6	5	4	5	5	4					
Sodium	mg/L	1	26	23	23	22	29	21	22	24	19	20	18	19	19					
Potassium	mg/L	1	<1	<1	1	1	1	1	2	1	<1	<1	<1	1	1					
Bicarbonate	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1					
Sulphate	mg/L	1	1	7	1	1	16	2	1	2	<1	<1	2	<1	2					
Chloride	mg/L	1	58	49	51	52	58	49	58	61	46	50	47	44	36					
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	5	<5					

Analysis	Units	LOR	3.07.99	16.06.10	22.06.11	20.06.12	19.06.13
pH		0.01	3.58	4.06	4.22	4.08	4.53
Electrical Conductivity	µS/cm	1	240	247	261	229	189
Total Dissolved Solids	mg/L	1	140	141	172	124	186
Calcium	mg/L	1	1	<1	1	1	6
Magnesium	mg/L	1	4	4	6	5	4
Sodium	mg/L	1	26	24	24	19	15
Potassium	mg/L	1	2	2	3	3	4
Bicarbonate	mg/L	1	<1	<1	<1	<1	<1
Sulphate	mg/L	1	2.21	1.77	1	1	21
Chloride	mg/L	1	49.1	56.3	53	43	32
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5

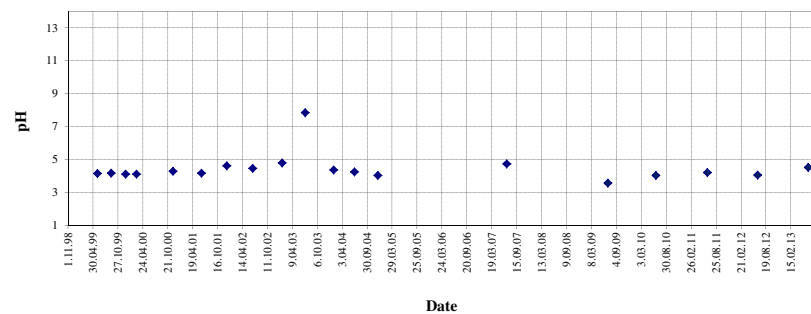
LOR = Limit of Reporting

* field measurements

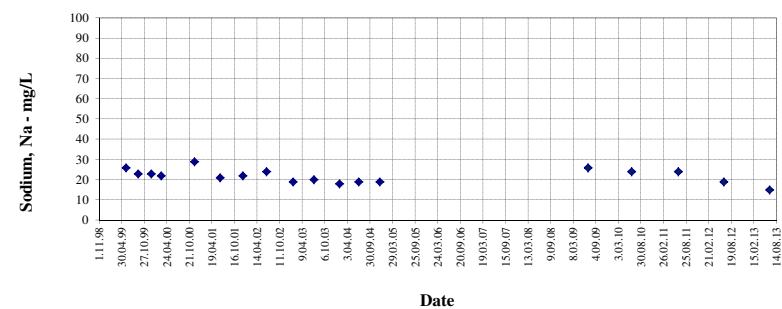
Average EC = 221 µS/cm
Average TDS = 175 mg/L
Average pH = 4.47

N.B. = TDS value in November 2000 is unusually high because of the presence of particulate matter in the sample.
NA = Not enough water for sample

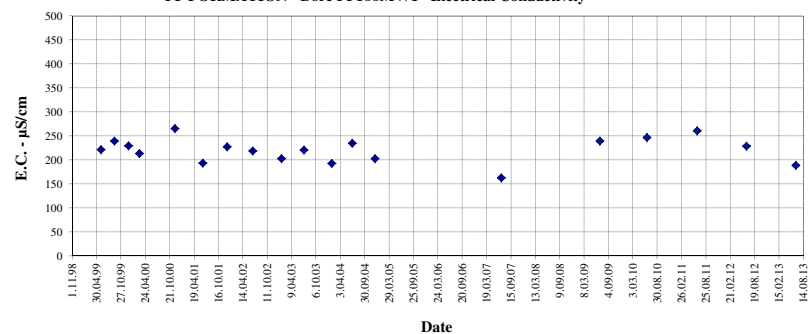
PF FORMATION - Bore PF166MW1 - pH



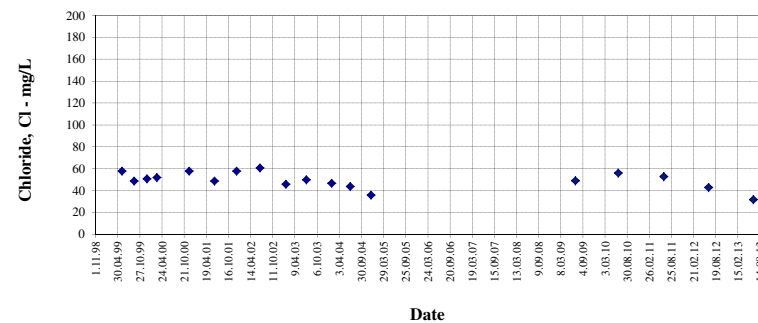
PF FORMATION - Bore PF166MW1 - Sodium



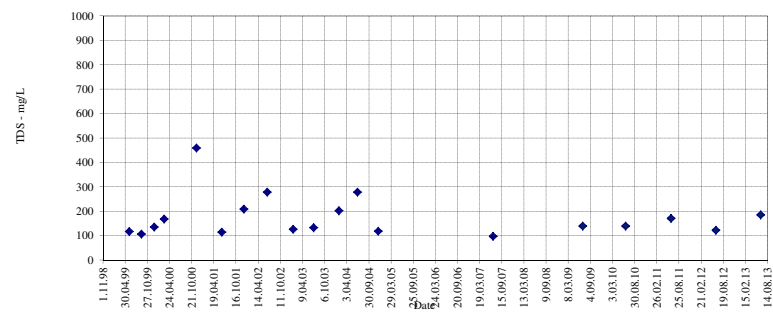
PF FORMATION - Bore PF166MW1 - Electrical Conductivity



PF FORMATION - Bore PF166MW1 - Chloride



PF FORMATION - Bore PF166MW1 - Total Dissolved Solids



PF FORMATION - MAROOTA
BORE PFP214MW1 GROUNDWATER ANALYTICAL SUMMARY

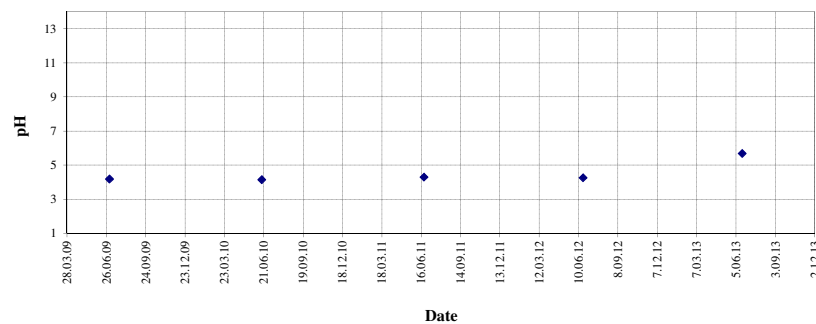
Analysis	Units	LOR	3.07.09	16.06.10	22.06.11	20.06.12	19.06.13
pH		0.01	4.19	4.16	4.31	4.27	5.7
Electrical Conductivity	µS/cm	1	168	164	158	179	198
Total Dissolved Solids	mg/L	1	100	96	88	103	124
Calcium	mg/L	1	<1	<1	<1	<1	<1
Magnesium	mg/L	1	6	5	4	6	7
Sodium	mg/L	1	18	15	18	17	21
Potassium	mg/L	1	1	<1	1	<1	2
Bicarbonate	mg/L	1	<1	<1	<1	<1	2
Sulphate	mg/L	1	1.9	<0.5	<1	<1	<1
Chloride	mg/L	1	24.3	23.8	34	24	34
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5

LOR = Limit of Reporting

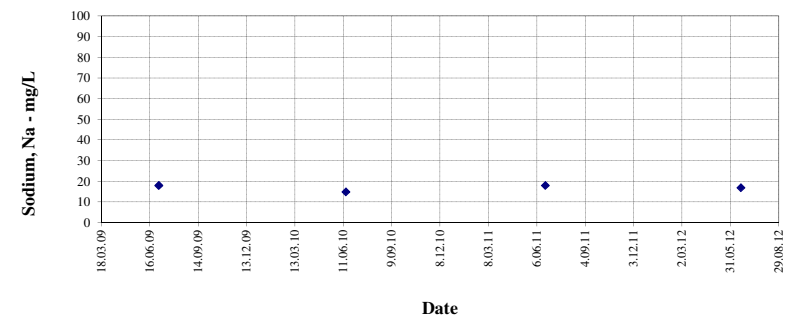
Average EC = 173 µS/cm
Average TDS = 102 mg/L
Average pH = 4.53



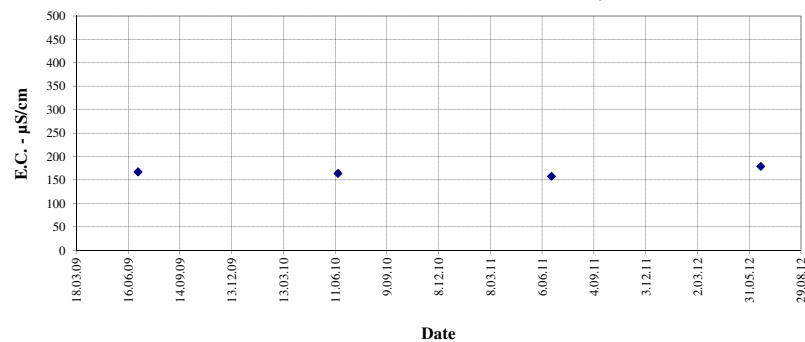
PF FORMATION - Bore PFP214MW1 - pH



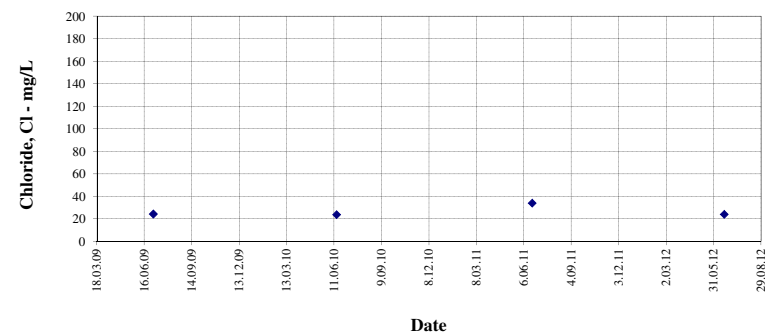
PF FORMATION - Bore PFP214MW1 - Sodium



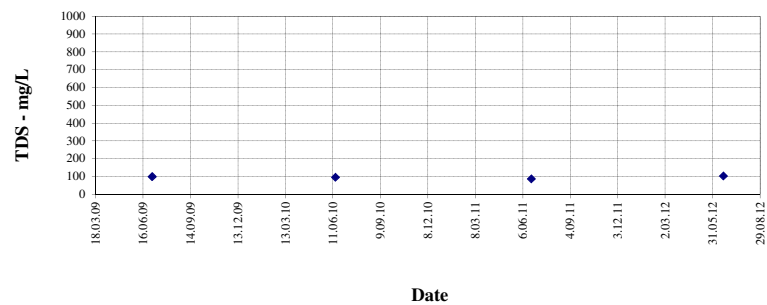
PF FORMATION - Bore PFP214MW1 - Electrical Conductivity



PF FORMATION - Bore PFP214MW1 - Chloride



PF FORMATION - Bore PFP214MW1 - Total Dissolved Solids



PF FORMATION - MAROOTA
BORE PF198PB1 GROUNDWATER ANALYTICAL SUMMARY

Analysis	Units	LOR	1.06.99	8.09.99	21.12.99	10.03.00	28.11.00	21.06.01	20.12.01	26.06.02	23.01.03	9.07.03	30.01.04	29.06.04	15.12.04	22.06.05	19.01.06	6.07.06	5.07.07	3.07.08
pH		0.01	5.87	6.24	6.11	4.69	4.49	4.51	5.41	4.73	4.49	5.06	5	4.53	4.28	5.22	5.74	5.16	NA	4.59
Electrical Conductivity	µS/cm	1	161	170	169	141	182	179	204	199	243	199	160	291	197	157	158	155		144
Total Dissolved Solids	mg/L	1	124	116	98	97	107	102	116	112	139	102	116	174	88	105	115	98		85
Calcium	mg/L	1	1	<1	1	1	3	2	2	4	3	2	2	4	1	1	2	1		<1
Magnesium	mg/L	1	4	6	5	3	3	4	4	4	4	3	2	5	2	2	4	3		2
Sodium	mg/L	1	21	24	22	19	20	21	27	23	31	22	19	40	25	23	21	20		18
Potassium	mg/L	1	1	<1	1	1	2	5	5	3	3	2	2	3	2	2	2	2		1
Bicarbonate	mg/L	1	13	29	22	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	12	5		<1
Sulphate	mg/L	1	4	4	4	2	8	8	3	7	4	8	6	9	8	8	6	2		10
Chloride	mg/L	1	39	35	36	36	40	49	60	58	64	49	43	83	42	47.1	43.4	43.8		34.1
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	<5	<5	5	<5		<5

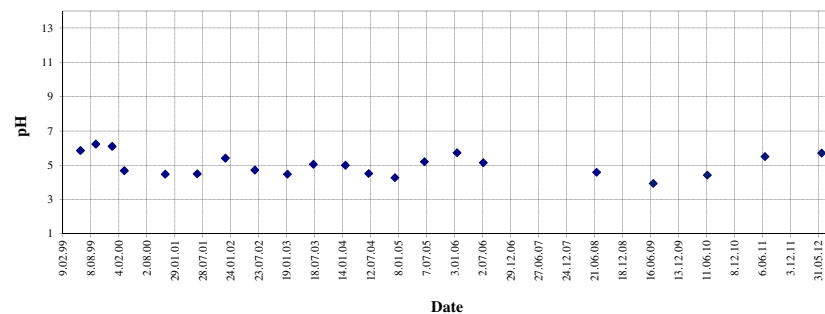
Analysis	Units	LOR	3.07.09	16.06.10	22.06.11	20.06.12	19.06.13
pH		0.01	3.94	4.43	5.52	5.72	NA
Electrical Conductivity	µS/cm	1	172	163	170	170	NA
Total Dissolved Solids	mg/L	1	83	88	102	99	NA
Calcium	mg/L	1	1	<1	2	2	NA
Magnesium	mg/L	1	2	2	4	3	NA
Sodium	mg/L	1	19	16	21	18	NA
Potassium	mg/L	1	2	1	2	2	NA
Bicarbonate	mg/L	1	<1	8.54	3.7	<1	NA
Sulphate	mg/L	1	9.31	6.1	6	6	NA
Chloride	mg/L	1	38.8	48.4	36	32	NA
Oil and Grease	mg/L	5	<5	<5	<5	<5	NA

LOR = Limit of Reporting

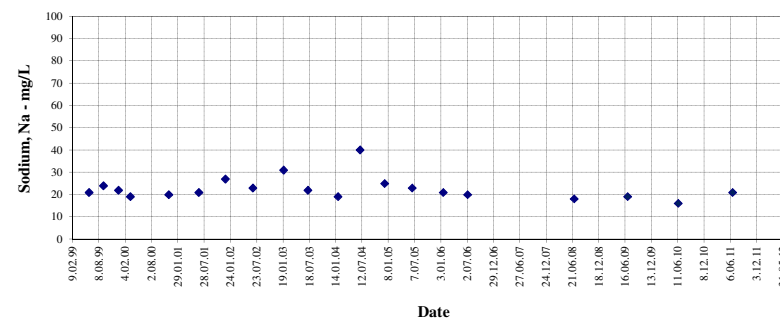
Average EC = 183 µS/cm
Average TDS = 111 mg/L
Average pH = 5.07



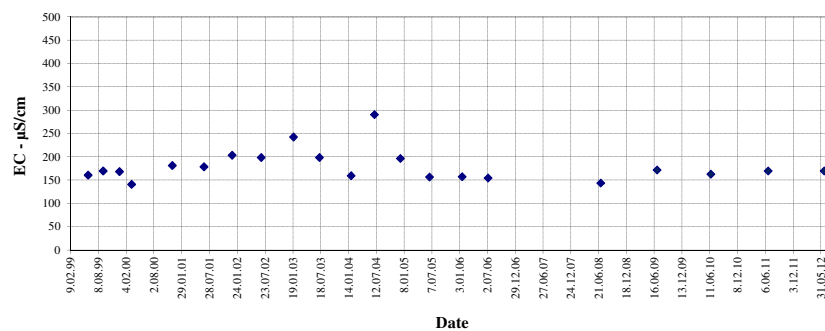
PF FORMATION Bore PF198PB1 - pH



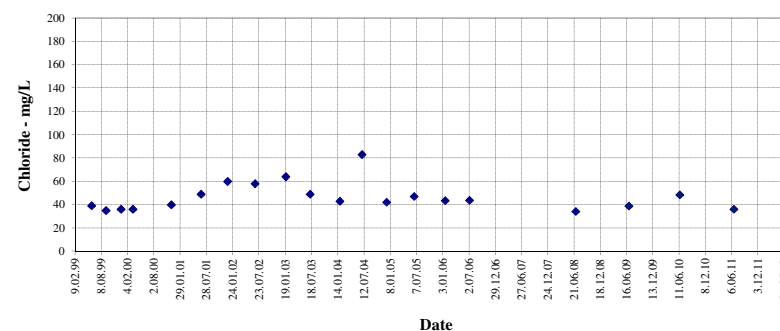
PF FORMATION Bore PF198PB1 - Sodium



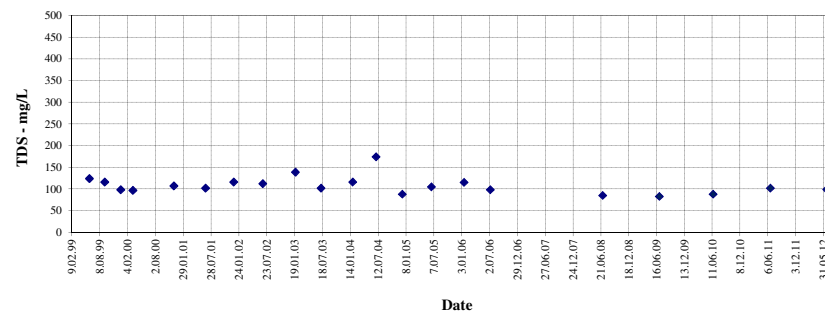
PF FORMATION Bore PF198PB1 - Electrical Conductivity



PF FORMATION Bore PF198PB1 - Chloride



PF FORMATION Bore PF198PB1 - Total Dissolved Solids



PF FORMATION - MAROOTA
BORE PF198PB2 GROUNDWATER ANALYTICAL SUMMARY

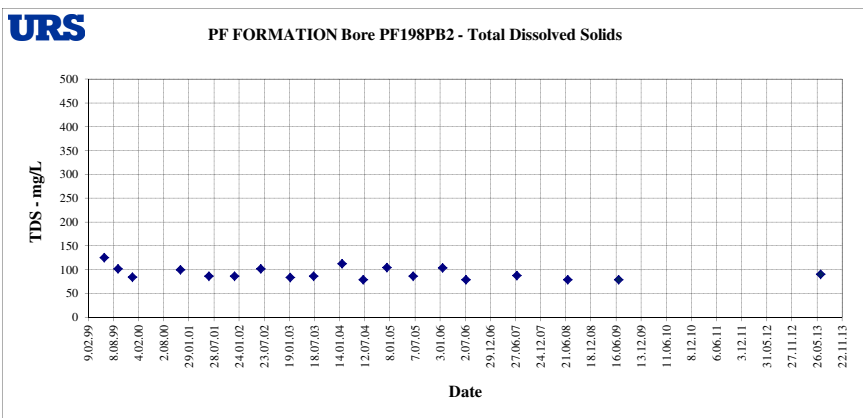
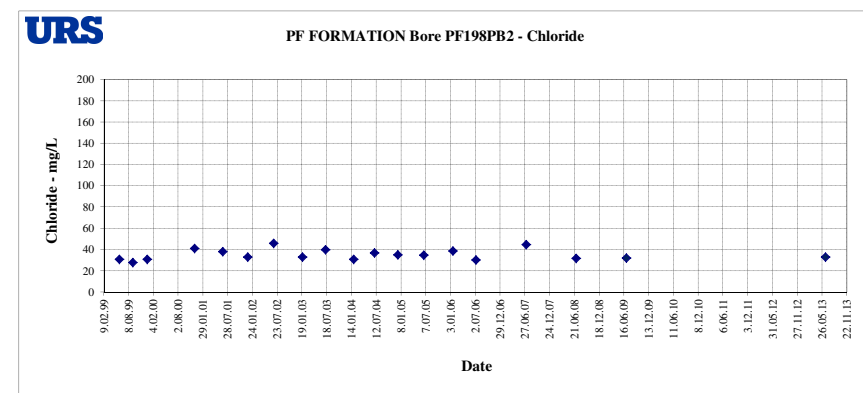
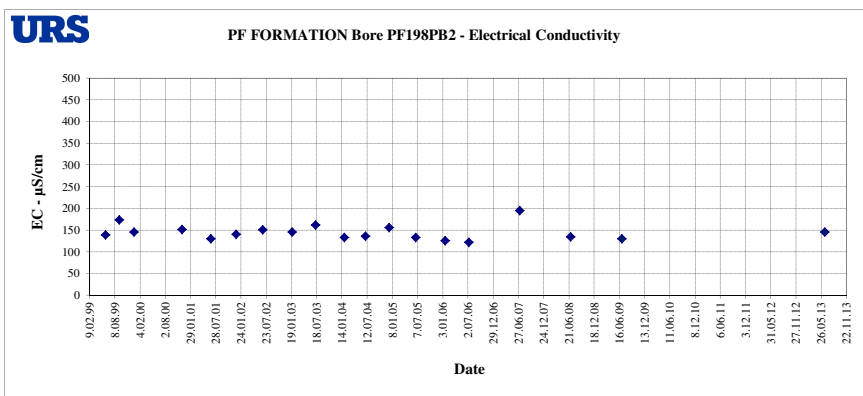
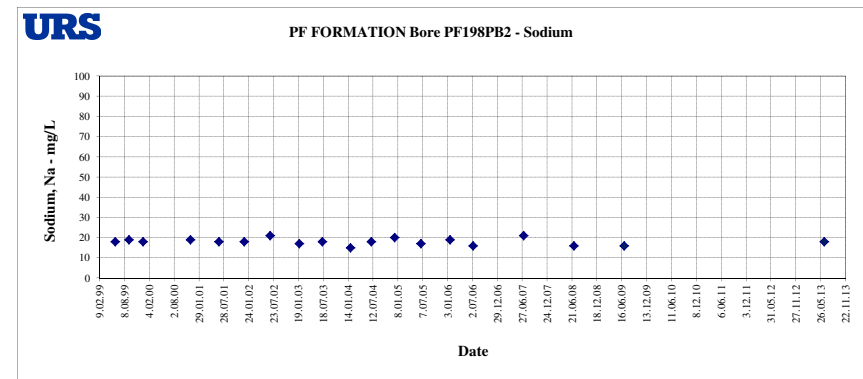
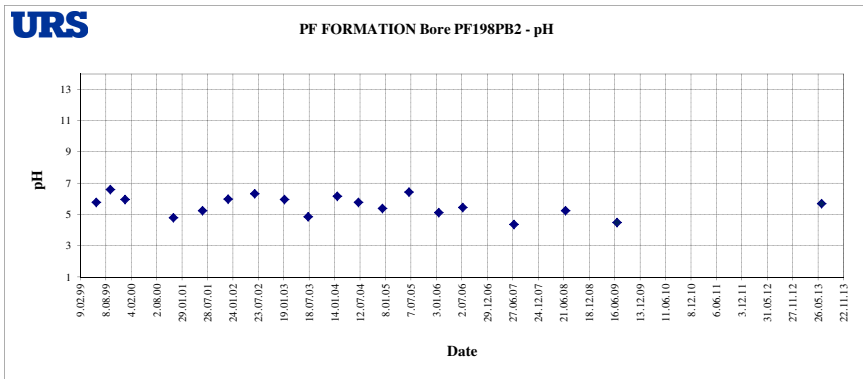
Analysis	Units	LOR	1.06.99	8.09.99	21.12.99	28.11.00	21.06.01	20.12.01	26.06.02	23.01.03	9.07.03	30.01.04	29.06.04	15.12.04	22.06.05	19.01.06	6.07.06	5.07.07	3.07.08
pH		0.01	5.78	6.61	5.96	4.8	5.24	5.99	6.33	5.96	4.87	6.18	5.78	5.39	6.43	5.13	5.46	4.37	5.25
Electrical Conductivity	µS/cm	1	139	174	146	152	130	141	151	146	162	133	136	156	133	126	122	195	135
Total Dissolved Solids	mg/L	1	126	102	85	100	87	87	102	84	87	113	79	105	87	104	79	88	79
Calcium	mg/L	1	1	2	2	<1	<1	<1	1	<1	<1	<1	1	1	<1	<1	1	0.01	1
Magnesium	mg/L	1	5	5	5	4	3	4	4	4	2	4	4	2	4	3	4	3	5
Sodium	mg/L	1	18	19	18	19	18	18	21	17	18	15	18	20	17	19	16	21	16
Potassium	mg/L	1	2	2	2	1	1	2	2	1	<1	1	1	2	2	1	2	1	2
Bicarbonate	mg/L	1	23	33	19	4	3	13	8	16	<1	16	9	2	14	7	24	<1	24.4
Sulphate	mg/L	1	3	3	2	1	1	3	2	<1	4	2	1	4	4	1	1	4	2
Chloride	mg/L	1	31	28	31	41	38	33	46	33	40	31	37	35	34.9	38.8	30.2	44.8	31.8
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5	11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

Analysis	Units	LOR	3.07.09	16.06.10	22.06.11	19.06.13	19.06.13
pH		0.01	4.5	NA	NA	NA	5.71
Electrical Conductivity	µS/cm	1	130				146
Total Dissolved Solids	mg/L	1	79				91
Calcium	mg/L	1	<1				<1
Magnesium	mg/L	1	3				3
Sodium	mg/L	1	16				18
Potassium	mg/L	1	2				2
Bicarbonate	mg/L	1	9.6				<1
Sulphate	mg/L	1	2.78				2
Chloride	mg/L	1	32.2				33
Oil and Grease	mg/L	5	<5				<5

LOR = Limit of Reporting

Note: PF198PB2 could not be sampled in March 2000

Average EC = 146 µS/cm
Average TDS = 94 mg/L
Average pH = 5.62

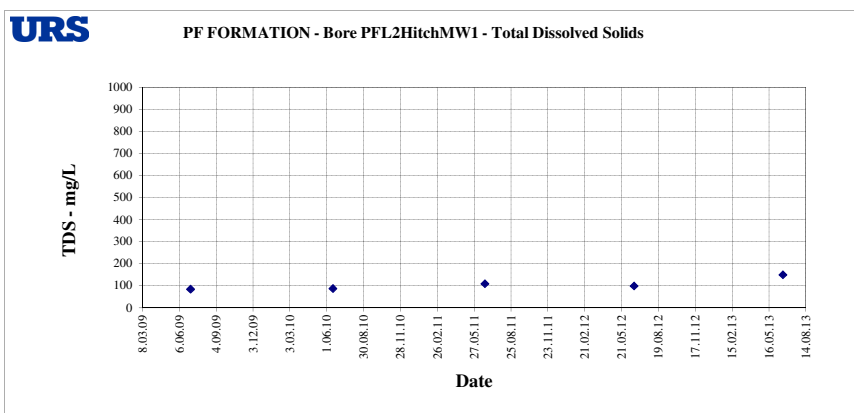
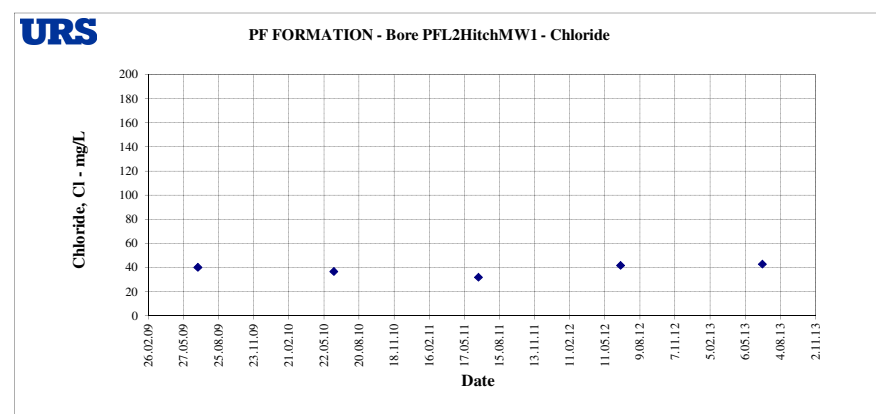
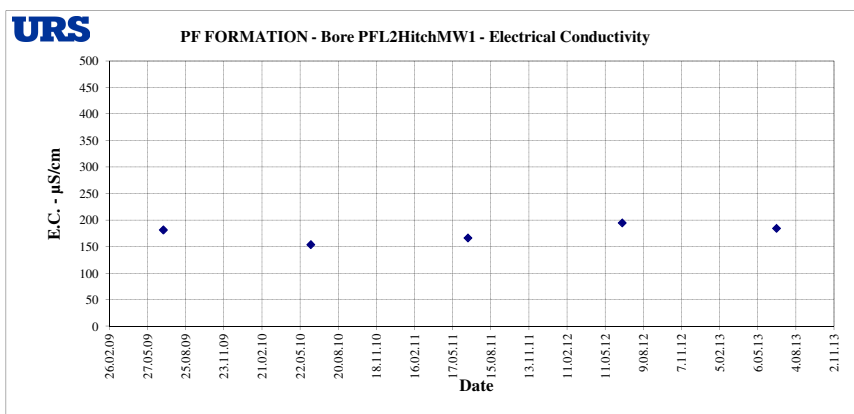
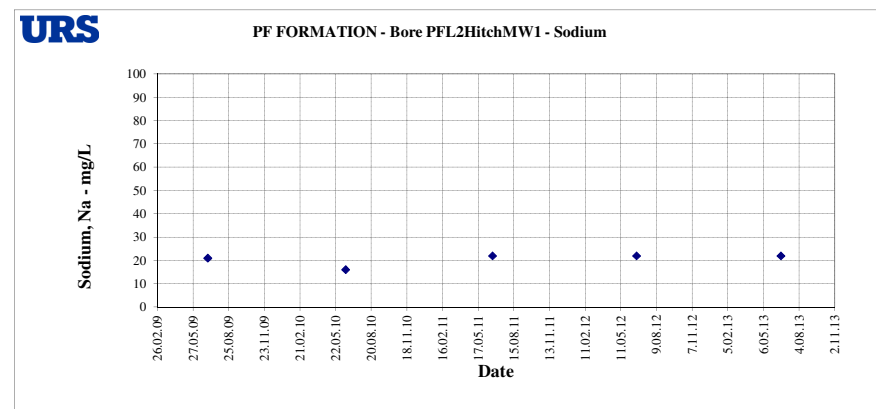
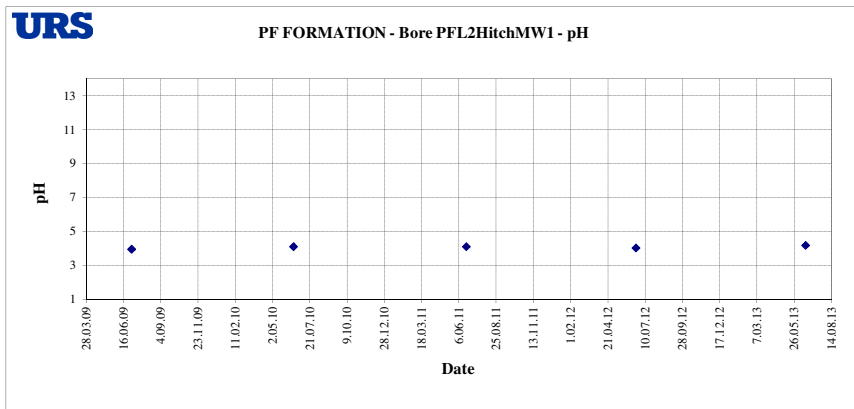


PF FORMATION - MAROOTA
BORE PFL2HitchMW1 GROUNDWATER ANALYTICAL SUMMARY

Analysis	Units	LOR	3.07.09	16.06.10	22.06.11	20.06.12	19.06.13
pH		0.01	3.96	4.1	4.1	4.03	4.18
Electrical Conductivity	µS/cm	1	182	154	167	195	185
Total Dissolved Solids	mg/L	1	84	88	110	99	150
Calcium	mg/L	1	<1	<1	<1	<1	<1
Magnesium	mg/L	1	2	2	2	2	2
Sodium	mg/L	1	21	16	22	22	22
Potassium	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate	mg/L	1	<1	<1	<1	<1	<1
Sulphate	mg/L	1	7.88	7.06	5	4	4
Chloride	mg/L	1	40.3	36.9	32	42	43
Oil and Grease	mg/L	5	<5	<5	<5	<5	<5

LOR = Limit of Reporting

Average EC = 177 µS/cm
Average TDS = 106 mg/L
Average pH = 4.07



Appendix B Analytical Laboratory Certificates

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: ES1314010	Page	: 1 of 3
Client	: URS AUSTRALIA (NSW) PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: FABIO CAROSONE	Contact	: Loren Schiavon
Address	: LEVEL 4, 407 PACIFIC HIGHWAY ARTARMON NSW, AUSTRALIA 2064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fabio_carosone@urscorp.com	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 89255500	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 89255555	Facsimile	: +61 2 8784 8500
Project	: 43167955	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 20-JUN-2013
Sampler	: FC	Issue Date	: 26-JUN-2013
Site	: ----		
Quote number	: EN/001/13	No. of samples received	: 5
		No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

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.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	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

- **EN055: % Ionic Balance not reported when Total Anions are <3meq/L. At this level, % difference is deemed not applicable.**
- **TDS by method EA-015 may bias high for variuos samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				PF167MW1	PF166MW1	PFL2 HITCH MW1	PFP214MW1	PF198PB2
				19-JUN-2013 15:00	19-JUN-2013 15:00	19-JUN-2013 15:00	19-JUN-2013 15:00	19-JUN-2013 15:00
Compound	CAS Number	LOR	Unit	ES1314010-001	ES1314010-002	ES1314010-003	ES1314010-004	ES1314010-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.18	4.53	4.18	5.70	5.71
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	211	189	185	198	146
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	841	186	150	124	91
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	2	9
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	2	9
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	21	4	<1	2
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	42	32	43	34	33
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	6	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	4	4	2	7	3
Sodium	7440-23-5	1	mg/L	22	15	22	21	18
Potassium	7440-09-7	1	mg/L	2	4	<1	2	2
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.21	1.34	1.30	1.00	1.15
Total Cations	----	0.01	meq/L	1.34	1.38	1.12	1.54	1.08
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	<5

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1314010	Page	: 1 of 6
Client	: URS AUSTRALIA (NSW) PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: FABIO CAROSONE	Contact	: Loren Schiavon
Address	: LEVEL 4, 407 PACIFIC HIGHWAY ARTARMON NSW, AUSTRALIA 2064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fabio_carosone@urscorp.com	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 89255500	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 89255555	Facsimile	: +61 2 8784 8500
Project	: 43167955	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 20-JUN-2013
C-O-C number	: ----	Issue Date	: 26-JUN-2013
Sampler	: FC	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5
Quote number	: EN/001/13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) PF167MW1, PF166MW1, PFL2 HITCH MW1, PFP214MW1, PF198PB2	19-JUN-2013	---	19-JUN-2013	----	21-JUN-2013	19-JUN-2013	✖	
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) PF167MW1, PF166MW1, PFL2 HITCH MW1, PFP214MW1, PF198PB2	19-JUN-2013	---	17-JUL-2013	----	21-JUN-2013	17-JUL-2013	✔	
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural (EA015H) PF167MW1, PF166MW1, PFL2 HITCH MW1, PFP214MW1, PF198PB2	19-JUN-2013	---	26-JUN-2013	----	25-JUN-2013	26-JUN-2013	✔	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) PF167MW1, PF166MW1, PFL2 HITCH MW1, PFP214MW1, PF198PB2	19-JUN-2013	---	03-JUL-2013	----	21-JUN-2013	03-JUL-2013	✔	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) PF167MW1, PF166MW1, PFL2 HITCH MW1, PFP214MW1, PF198PB2	19-JUN-2013	---	17-JUL-2013	----	24-JUN-2013	17-JUL-2013	✔	
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural (ED045G) PF167MW1, PF166MW1, PFL2 HITCH MW1, PFP214MW1, PF198PB2	19-JUN-2013	---	17-JUL-2013	----	24-JUN-2013	17-JUL-2013	✔	

Page : 3 of 6
 Work Order : ES1314010
 Client : URS AUSTRALIA (NSW) PTY LTD
 Project : 43167955



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
PF167MW1, PFL2 HITCH MW1, PF198PB2	PF166MW1, PFP214MW1,	19-JUN-2013	---	26-JUN-2013	----	24-JUN-2013	26-JUN-2013	✔
EP020: Oil and Grease (O&G)								
Amber Glass Bottle - Sulfuric Acid (EP020)								
PF167MW1, PFL2 HITCH MW1, PF198PB2	PF166MW1, PFP214MW1,	19-JUN-2013	----	----	----	25-JUN-2013	17-JUL-2013	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	4	39	10.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Oil and Grease	EP020	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	9	22.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Oil and Grease	EP020	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	5.3	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.3	5.0	✓	ALS QCS3 requirement



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	APHA 21st ed., 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Oil and Grease	EP020	WATER	APHA 21st ed., 5520 B Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1313980-019	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride Discrete analyser	ES1313980-019	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
PF167MW1, PFL2 HITCH MW1, PF198PB2	PF166MW1, PFP214MW1,	----	----	----	21-JUN-2013	19-JUN-2013	2

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

Environmental Division

QUALITY CONTROL REPORT

Work Order	: ES1314010	Page	: 1 of 5
Client	: URS AUSTRALIA (NSW) PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: FABIO CAROSONE	Contact	: Loren Schiavon
Address	: LEVEL 4, 407 PACIFIC HIGHWAY ARTARMON NSW, AUSTRALIA 2064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fabio_carosone@urscorp.com	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 89255500	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 89255555	Facsimile	: +61 2 8784 8500
Project	: 43167955	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 20-JUN-2013
C-O-C number	: ----	Issue Date	: 26-JUN-2013
Sampler	: FC	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5
Quote number	: EN/001/13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



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.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	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.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
= Indicates failed QC



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2928667)									
ES1313966-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.72	7.73	0.1	0% - 20%
ES1313966-011	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.49	7.49	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2928666)									
ES1313966-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6430	6400	0.5	0% - 20%
ES1313966-011	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	11000	11000	0.09	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2928668)									
ES1314010-005	PF198PB2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	146	149	1.5	0% - 20%
ES1314068-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	635	635	0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2933566)									
ES1314009-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	158	178	11.7	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 2928665)									
ES1313914-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	59	58	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	59	58	0.0	0% - 20%
ES1314009-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2932730)									
ES1313980-019	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	344	343	0.0	0% - 20%
ES1314010-001	PF167MW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	1	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2932729)									
ES1313980-019	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	6200	6180	0.4	0% - 20%
ES1314010-001	PF167MW1	ED045G: Chloride	16887-00-6	1	mg/L	42	42	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2932732)									
ES1313980-019	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	257	255	0.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	671	666	0.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2900	2890	0.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	58	58	0.0	0% - 20%
ES1314010-001	PF167MW1	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	22	22	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA010P: Conductivity by PC Titrator (QCLot: 2928666)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	96	110
EA010P: Conductivity by PC Titrator (QCLot: 2928668)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	96	110
EA015: Total Dissolved Solids (QCLot: 2933566)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	88.8	87	125
ED037P: Alkalinity by PC Titrator (QCLot: 2928665)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	82.9	74	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2932730)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	91.1	86	122
ED045G: Chloride Discrete analyser (QCLot: 2932729)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	91.1	77	123
ED093F: Dissolved Major Cations (QCLot: 2932732)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.6	85	111
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	92.6	87	111
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	88.1	79	109
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	88.4	86	112
EP020: Oil and Grease (O&G) (QCLot: 2934009)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	100	80	112

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2932730)							
ES1313980-019	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2932729)							
ES1313980-019	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130



Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

Sub-Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
ED045G: Chloride Discrete analyser (QCLot: 2932729)										
ES1313980-019	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2932730)										
ES1313980-019	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----

Chain of Custody/May 00



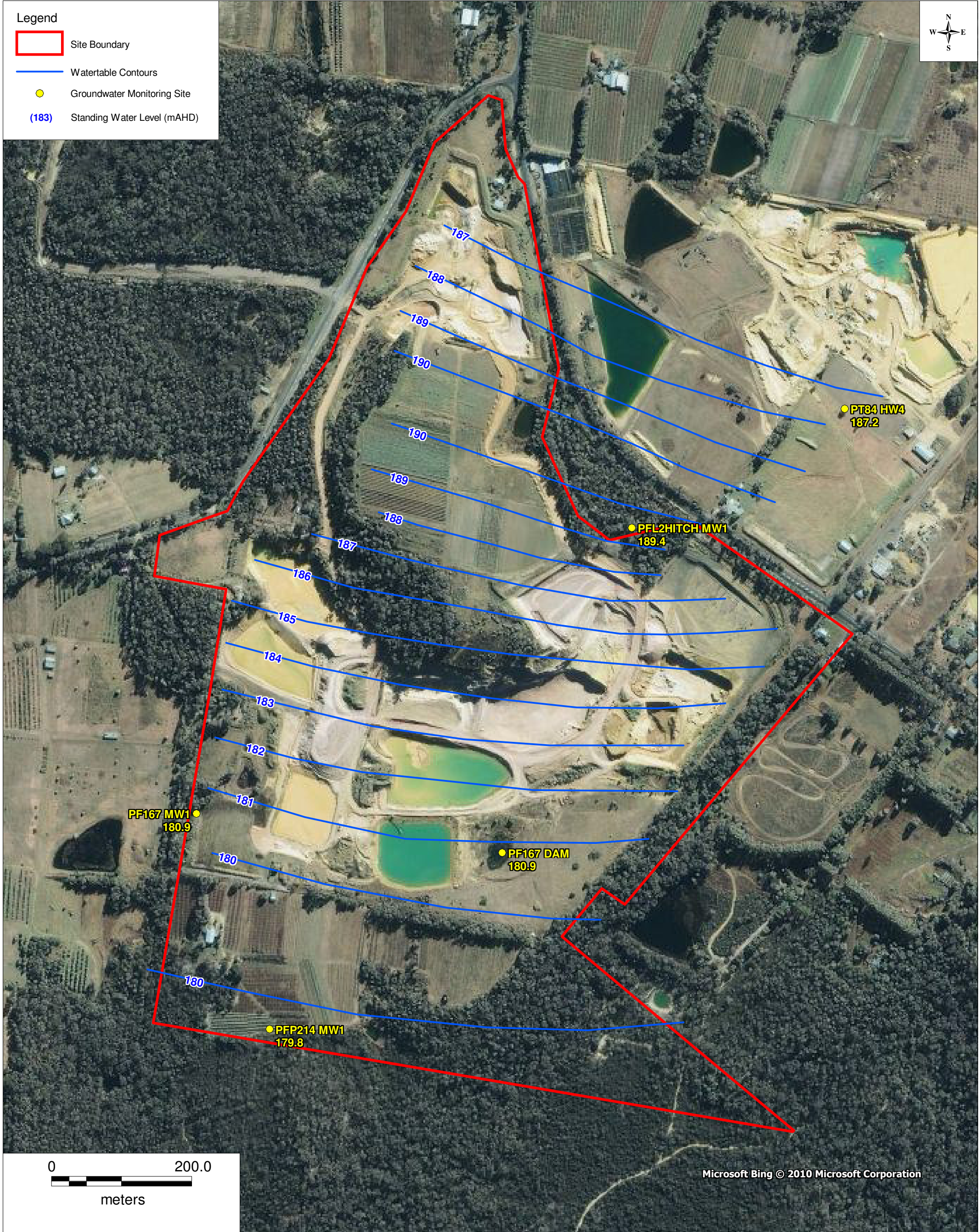
URS Australia Pty Ltd
Level 4, 407 Pacific Highway
Artarmon NSW 2064
Australia

T: 61 2 8925 5500
F: 61 2 8925 5555

www.ursglobal.com

Attachment 6B

Water Table Contours

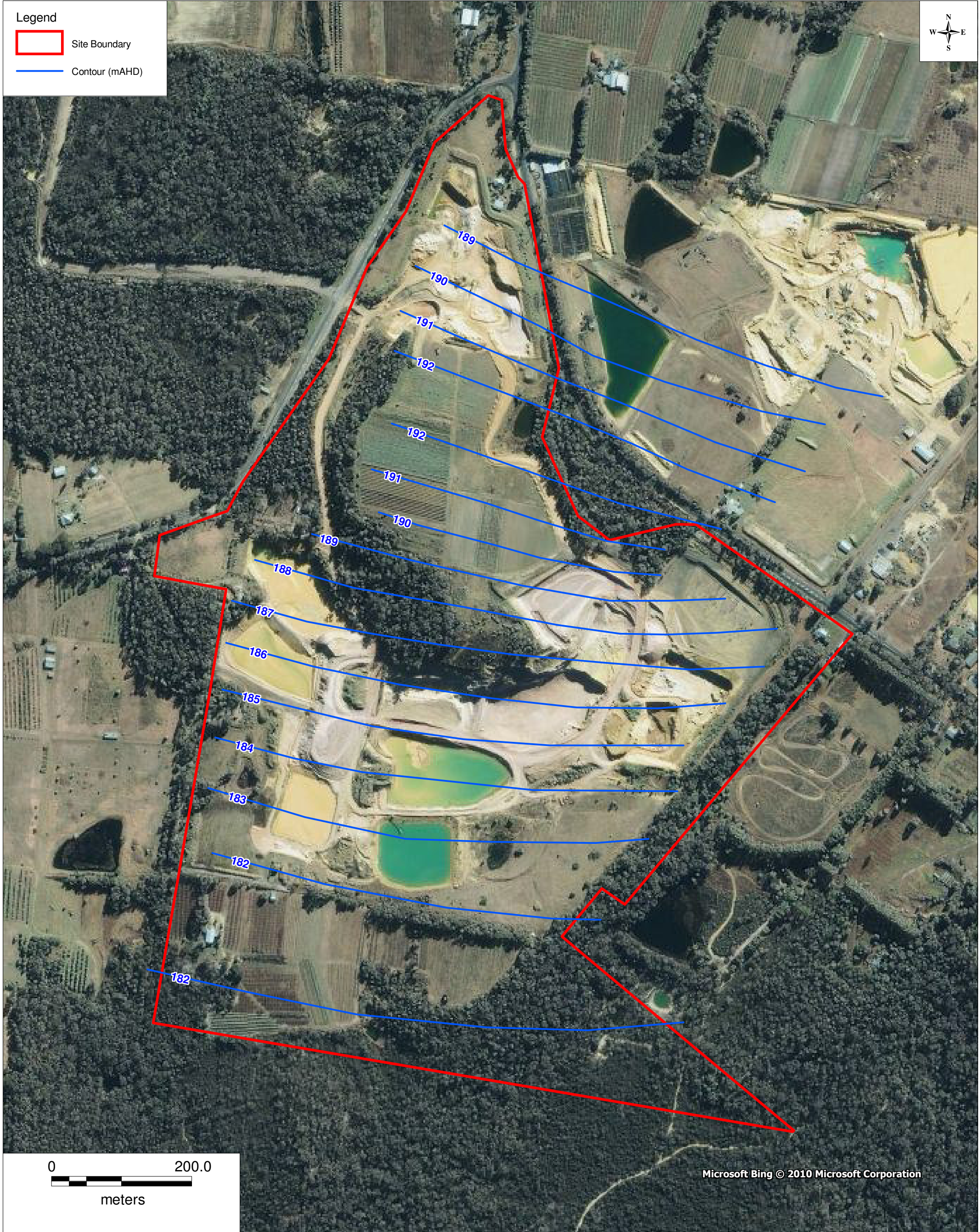


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Attachment 6C

Depth of Mining Plan



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**



Attachment 6D

Quarterly Water Testing Results

MATERIALS TECHNICAL SERVICES
BORAL RESOURCES (NSW) PTY LTD
ABN 51 000 756 507Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153
Telephone 61 2 9624 9900
Facsimile 61 2 9624 9999**Test Report**

CLIENT: P.F.FORMATION

FILE No.: 250/12

ADDRESS: 1774 WISEMANNS FERRY ROAD, MAROOTA, NSW 2756

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

REQUEST No.: 49658

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.: 133483
Date Sampled: 21.09.12
Date Received: 21.09.12
Sample Description: Water -
Downstream -
Lot 198 -
11:00am

Field No.: 1

TEST RESULTS

pH	5.3
Turbidity (NTU)	5.5
Oil & Grease (mg/L)*	<1
Total Suspended Solid (mg/L)	2.5
Conductivity (µS/cm)	193

Samples submitted by the Client.

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

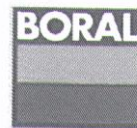
J. Graham, File.

Approved Signatory

Justin Dowse

Date 26/09/12

Serial No. 109223

MATERIALS TECHNICAL SERVICES
BORAL RESOURCES (NSW) PTY LTD
ABN 51 000 756 507Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153
Telephone 61 2 9624 9900
Facsimile 61 2 9624 9999**Test Report**

CLIENT: P.F.FORMATION

ADDRESS: 1774 WISEMANNS FERRY ROAD, MAROOTA, NSW 2756

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

FILE No.: 250/12

REQUEST No.: 50744

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.: 136520
Date Sampled: 06/12/12
Date Received: 11/12/12
Sample Description: Water -
Downstream -
Lot 198 -
1:55pm
Field No.: 1

TEST RESULTS

pH 5.5
Turbidity (NTU) 4.7
Oil & Grease (mg/L)* <1
Total Suspended Solid (mg/L) 5.6
Conductivity (µS/cm) 230

Samples submitted by the Client.

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

J. Graham, File.



Approved Signatory

Nanthini Selvadurai

Date 04-01-13

Serial No.

111875

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

NATA Accredited Laboratory
Number: 9968

Test Report

CLIENT: P.F.FORMATION

ADDRESS: 1774 WISEMANNS FERRY ROAD, MAROOTA, NSW 2756

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

FILE No.: 250/13

REQUEST No.: 51431

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.: 138533
Date Sampled: 15/02/13
Date Received: 15/02/12
Sample Description: Water -
Downstream - Lot 198
1:00pm
Field No.: 1

TEST RESULTS

pH	8.5
Turbidity (NTU)	8.5
Oil & Grease (mg/L)*	< 1.0
Total Suspended Solid (mg/L)	0.6
Conductivity (µS/cm)	385

Samples submitted by the Client.

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

J. Graham, File.

Nanthini Selvadurai

Approved Signatory Nall S
Date 22-02-13 Serial No. 113222

ACCREDITED FOR
TECHNICAL
COMPETENCE

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

NATA Accredited Laboratory
Number: 9968

MATERIALS TECHNICAL SERVICES
BORAL RESOURCES (NSW) PTY LTD
ABN 51 000 756 507Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153
Telephone 61 2 9624 9900
Facsimile 61 2 9624 9999Test Report

CLIENT: P.F.FORMATION

FILE No.: 250/13

ADDRESS: 1774 WISEMANNS FERRY ROAD, MAROOTA, NSW 2756

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

REQUEST No.: 52776

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.: 142220
Date Sampled: 24/05/13
Date Received: 24/05/12
Sample Description: Water -
Downstream - Lot 198
11:00am
Field No.: 1

TEST RESULTS

pH 5.8
Turbidity (NTU) 8.3
Oil & Grease (mg/L)* < 1.0
Total Suspended Solid (mg/L) 6.4
Conductivity (µS/cm) 176

Samples submitted by the Client.

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

J. Graham, File.

Nanthini Selvadurai

Approved Signatory

Date 12-06-13 Serial No. 116463

Chapter Seven

REHABILITATION

Introduction

A Landscape Management Plan has been prepared in compliance with the requirements of the current Project Approval and was approved by the Department of Planning. The following section therefore describes the current phase of site rehabilitation followed by responses to the issues raised in the court orders where appropriate. Reference is also made to the biodiversity offset strategy which is described in more detail in the Landscape Management Plan.

Earth bunding and rehabilitation

Bund construction and planting work has been completed in most areas, mainly sections of the northern and southern boundaries of the triangular shaped, northern portion of the site bounded by Old Northern Road and Wisemans Ferry Road.

Sections along Old Northern Road have been completed but were referred to in the Independent Environmental Audit as an area where improvement is required. The screen planting should be improved and PF Formation has commenced a planting program along Old Northern Road. Further planting in this section will occur over the next year.

Visual assessment

Because extraction has occurred and will continue to occur in the high areas of the site it has become more visible from surrounding areas. Boundary planting has occurred but the visual restriction impact is limited as these areas are substantially lower than the extraction area. The area along Old Northern Road will continue to be the main area of focus for rehabilitation.

Conclusion

The works as proposed ensure that satisfactory screening and rehabilitation of the boundary areas of the Hitchcock Road site is achieved. The proposed method of earth bunding and planting will, in time, ameliorate the visual impacts of the site operations but there is increasing visual accessibility of the quarry from a distance because of the extraction of the higher levels in the middle of the site. In conjunction with further rehabilitation work, the site can be returned to a natural state on the completion of sand extraction.

Rehabilitation Issues

Rate of rehabilitation

Rehabilitation of the site is taking place generally in phase with the overall staging program. The removal of material from the first phases has been completed and extraction has continued as shown on the Site Plan at **Attachment 2A**.

Rehabilitation of the project is dependent on three main factors:

- Material for backfilling does not become available until topsoil and overburden are removed from later phases as similar material from the first phase area is used to form peripheral mounds and the earthworks required for the tailings dams.
- Substantial parts of the operational area are occupied by a series of basins required for surface water treatment. These require capping prior to any major rehabilitation-taking place in the area. This cannot be undertaken until new basins are developed as part of the next phase development which in turn serve the whole project. In addition, capping cannot take place until the ponds are sufficiently dry to accommodate heavy vehicles with safety. This can take up to three years.

The timing of the rehabilitation of the initial phases is therefore dependent on a substantial start being made on the next phase. Activity to date has focussed on the provision of the peripheral mounds which are required for acoustic and visual reasons. These have been constructed, so far, in those areas particularly sensitive to these impacts. This work has now been completed. A number of the early tailings dams have been capped and the area is in the process of rehabilitation. This is particularly the case in the western part of the site immediately to the south of the former Crown Road where several silt ponds have been capped and the ground contours reconfigured. 4 hectares of the eastern part has been seeded under the guidance of Greening Australia and Parsons Brinckerhoff.

Final Landform (Strategy A)

Two options for the final landform were incorporated in the planning documents. Strategy B was based on final landforms if PF Formation was unable to get approval from the Director General to disturb the Sydney Hinterland Transition Woodland (SHTW) in the middle of the site. On 15 March 2013 the NSW Department of Planning and Infrastructure gave approval to proceed with the clearing of the SHTW. Therefore the final landform will be based on Strategy A from the planning documents.

Maintenance of vegetated conservation zones and rehabilitated areas

Conservation zones identified in the Landscape Management Plan are regularly inspected as required in the Environmental Strategy (**Strategy 7.1**). These areas are signposted and the areas suitably protected. All existing vegetation around the periphery of the site will be protected within setbacks and buffer zones.

The peripheral bunds constructed to date have been planted. These are regularly inspected and the area maintained.

Retention and protection of vegetation within buffer zones

All existing vegetation within the defined buffer zones will be retained and protected. A setback with a minimum depth of 30 metres is being maintained along Hitchcock Road and all existing vegetation within this area will be retained.

Integration of the site rehabilitation with the surrounding terrain

Operations have been undertaken on the Hitchcock Road site under the previous consent since November 1998. These have inevitably concentrated on the site works required for the development including retention basins and the construction of the peripheral bunds. It is too early in the life of the development, with more than 10 years of life remaining, to consider the establishment of the final landform in any detail. The area in the south has been reformed with final batter slopes which give an indication of the way in which the final landform will integrate with the surrounding area.

The final landform of the Hitchcock Road site will be influenced by the depth of extraction, the location of commercially available resource and the volume of overburden, mainly clay, available for re-contouring the extracted areas. Sand has been extracted from part of the site to the depth allowed in the previous consent and part of this area has been rehabilitated.

The existing topography and setbacks is also shown on the Site Survey Plan. The final landform has been developed in response to the requirements of the proposed biodiversity offset strategy.

The final landform (Strategy A) comprises a large gently sloping basin with steeper side slopes along the boundary to Old Northern Road. Some of the levels have been amended to reflect changes in the extraction areas to minimise vegetation removal.

Vegetative cover

In 2010 Greening Australia were commissioned to prepare a plan of management for the rehabilitation area of 2.4 hectares previously planted and for the additional area of 1.6 hectares to be rehabilitated. Based on that plan of management the additional area was planted in Spring 2011 to give an area subject to SHTW rehabilitation exceeding 4 hectares.

Flora and fauna monitoring program

Regular monitoring of flora and fauna is a requirement of the Environmental Strategy. Results to date are encouraging. A report prepared by Parson Brinkerhoff was completed in November 2012 and is appended as **Attachment 7A**. The report states that 'the rehabilitation of the area is progressing well and is meeting or exceeding the targets set'. Parson Brinkerhoff are conducting a further site inspection in November 2013.

Conservation of threatened species, populations and ecological communities

It is a requirement of the Environmental Strategy that all those areas to be retained and defined as needing protection will be clearly identified. Signs have been placed at intervals around the areas needing protection.

Construction of acoustic and visual bunding

Construction of the peripheral bunds has already been noted. Improvements are required along Old Northern Road to better screen the sand slurry plant.

Compliance with current environmental laws, standards and practices

All the necessary management controls and related actions are in conformity with all relevant current laws, standards and practices as indicated in the document.

Conclusion

The site rehabilitation is necessarily more in focus in the latter stages of the development. 4.2 hectares of Sydney Hinterland Transition Woodland has been planted on site. Parsons Brinckerhoff have monitored this area in October 2012 by reviewing plant species within six fixed (20 x 20 metre) quadrants and their report is in **Attachment 7A**. In general the revegetation areas appear to be progressing well and is meeting or exceeding the targets set.

The final landform will be in accordance with Strategy A from the planning documents.

Attachment 7A

Monitoring of Revegetation

(Please refer to attached PDF File on disc)

Chapter Eight

SOCIAL IMPACT MANAGEMENT

Community representatives participate in the Community Consultative Committee which has met twice during the year. Minutes of these meetings are included as **Attachment 8A**.

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

**Minutes
20 November 2012**

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

Absent: Kane Winwood – NSW Department of Planning
Peter Harkin – Resident
Daniel Giffney – Hills Shire Council (HSC)

Minutes of Previous Meeting

- Accepted

Report on Current Status of Operations by John Graham

- The major change over the last 6 months has been the move of the main extraction area to the northern side of the operation. Significant levels of overburden must be moved and they are being used to cap tailings dams and to achieve final landforms on the southern side of the operation.
- Kane Winwood from the Department Planning did a site inspection in September 2012. No significant matters were noted but PF Formation took the opportunity to show him the status of the rehabilitation and the operational need to move the vegetation from the high point in the quarry.
- Parsons Brinkerhoff ('PB'), our Flora consultants have recently completed their rehabilitation monitoring survey of the Sydney Hinterland Transitional Forrest ('SHTF'). Six 20 x 20 metre quadrants were surveyed and analysed against the criteria for monitoring the success of rehabilitation outlined in the Approval. In summary the rehabilitation area is progressing well and is meeting or exceeding the targets set.
- 4.2 hectares have been planted with SHTF which is over the 3.8 hectares minimum required under the Approval. The Department of Planning will be requested to approve the removal of the SHTF area now that the minimum rehabilitation areas have reached the targets set.
- The slurry pipeline has been replaced over the years with rubber-lined steel to limit the wear of the pipes. The last remaining section, being under Wisemans Ferry Road, was replaced this year.
- There have been no complaints in the last 6 months.
- The deceleration lane has been re-painted by the RMS recently

- There is an audit of the Section 94 payments commencing on 21 November 2012.

Reporting

- The Annual Environment Management Report (AEMR) has recently been completed and will be on the website by Christmas. We had been waiting for the PB consultant to return from maternity leave to finish the flora report.

Environmental Matters

- The monthly dust deposit results were reviewed and discussed.
- The dust monitoring behind the school is impacted by the tractor-pull at the school fete and by farmer slashing and tree removal. It was agreed to move the dust monitoring station to a better area around the school subject to the EPA approval.

Other Matters

- The issue of poor truck driver behaviour particularly on Wisemans Ferry Road was discussed.

Site Visit

- A site inspection was conducted.

Next Meeting

- 10.00 am Tuesday 14 May 2013

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

**Minutes
30 April 2013**

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

Absent: Kane Winwood – NSW Department of Planning
Peter Harkin – Resident
Daniel Giffney – Hills Shire Council (HSC)

Minutes of Previous Meeting

- Accepted

Report on Current Status of Operations by John Graham

- There have been no complaints in the last 6 months
- Rehabilitation has continued to progress. The tailings pond on the southern side has been capped and significant overburden moved there building up the levels of the landform.
- Planting has occurred on the corner of Wisemans Ferry and Old Northern Roads
- A 6-wheel all-terrain truck was purchased recently to be used as a water truck for dust suppression. The truck will improve our ability to access all areas of the quarry.
- The Department of Planning has given approval for the removal of SHTF area. The removal will not occur in the short term and Council will be given notice before it occurs.
- Operationally the business has been quiet

Reporting

- The Annual Environment Management Report (AEMR) for 2012 is on the website and the consultant reports for 2013 will commence in a couple of months as the AEMR is for the year to June.

Environmental Matters

- The monthly dust deposit results were reviewed and discussed.
- The results were low for the 6 months

Other Matters Discussed

- The long standing commitment by the residents Marianne Sheumack and Shaunagh Hitchcock was discussed.
- The impact on business by the North West Rail project was discussed
- The Maroota School issues seem to have been resolved by the TEOM and flashing school zone lights
- The poor state of Old Northern Road and the lack of a passing lane between Maroota and Glenorie were discussed. Peter Cummins to contact the RMS representative, David Blackmore, to invite him to our next meeting
- Council noted that the RMS works program has been prepared and will be going to Council for approval in the middle of the year
- The audit of Section 94 payments has been completed and Council is happy with the results. Audits will be completed regularly by the Council's internal auditor.

Site Visit

- A site inspection was conducted.

Next Meeting

- 10.00 am Wednesday 6 November 2013

Chapter Nine

INDEPENDENT AUDIT REPORTS

Attachment 9A – Independent Environmental Audit Report

Attachment 9B – Response to Audit Recommendations

Attachment 9A

Independent Environmental Audit Report

(Please refer to attached PDF File on disc)

Attachment 9B

Response to Audit Recommendations



Etra Pty Ltd as Trustee for PF Formation Trust
ABN 61 113 814 256

Director-General

NSW Government Department of Planning

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Sydney

NSW 2001

SAND & CONCRETE

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14 June 2011

Dear Sir/Madam

Hitchcock Road Sand Project (06_0104) Comments on Independent Environmental Audit

Under Clause 7 of Schedule 5 of the Notice of Project Approval dated 3 February 2010 we are required to commission an Independent Environmental Audit within 12 months of the date of the approval. This audit has been completed and a copy is enclosed. Our response to the audit recommendations outlined on page 38 of the Report are detailed 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 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 (photo 1). 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 ie for about 1.1 seconds.

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.*

Agreed.

3. *The survey plan provided to the Department of Planning in May 2009 in the form of an orthophoto-map (see Appendix 5) 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 re vegetated.*

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.

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.*

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 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.*

This will be 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.*

This will be done.

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.*

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.

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

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.*

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.

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.*

Agreed.

12. *The depth of mining contours plan dated 08/05/2009 (see Appendix 6) and supplied to the Department of Planning needs to be updated to cover the whole extraction area of the site.*

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.

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.*

As above in point 12.

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

A copy of the certificate from the Department of Fair Trading will be included in the 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 and 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 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.

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.*

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.

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

Agreed.

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.*

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.*

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.*

Agreed.

21. *The AEMPs 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.*

This is shown on Attachment 2A (green area) of the AEMP but will be made clearer in future AEMPs.

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.*

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 washplants. 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.*

Agreed.

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

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.*

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.

Yours faithfully



Peter Cummins
General Manager

Photo 1 : Wisemans Ferry Road Maroota

