



Department of
Environment and
Heritage Protection

28-FEB-2014

To: New Acland Coal Pty Ltd
PO Box 47
IPSWICH QLD 4305

Email: tsheppard@newhopecoal.com.au

Cc: The Mining Registrar
Department of Natural Resources and Mines
PO Box 3679
RED HILL, ROCKHAMPTON QLD 4701

Your reference: EPML00335713
Our reference: 192294

Application details

I refer to the application that was received by the administering authority on 11-FEB-2014.

Land description: ML50170; ML50216

Decision

Your application has been approved and your environmental authority (reference EPML00335713) is attached.

Additional comments or advice

You are advised that if you are not the owner of the land to which the environmental authority relates, you have 10 business days from receipt of this environmental authority to give each owner of the land, written notice that you have been issued this environmental authority.

Should you have any further enquiries, please contact Ruth Brown on telephone (07) 46994304.

Yours sincerely

	<div><p>sch4-Signature</p></div>	<div><p>28.02.2014</p></div>
	<div><p>Signature</p></div>	<div><p>Date</p></div>

Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Enclosed

Permit - environmental authority (reference EPML00335713)

RTI DL RELEASE - EHP

Department of Environment and Heritage Protection

Permit¹

Environmental Protection Act 1994

Environmental authority

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit¹ number: EPML00335713

Environmental authority takes effect on 28 February 2014

The anniversary date of this environmental authority is the same day each year being 27 May. An annual return and the payment of the annual fee which is currently \$29,248.00 will be due each year on this day.

Environmental authority holder(s)

Name	Registered address
New Acland Coal Pty Ltd	3/22 Magnolia Drive BROOKWATER QLD 4300

Environmentally relevant activity and location details

Environmentally relevant activity(ies)	Location(s)
Mining - ML black coal - 13, Site Specific	ML50170 ML50216

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

¹ Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation



Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.

	sch4-Signature	
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Signature

28.02.2014

Date

Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:

ES - Reg Serv - Western - Twba - EPA
PO Box 731
TOOWOOMBA QLD 4350
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Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Location: New Acland Coal Mine
Muldu Road, ACLAND QLD 4401
ML50170 and ML50216

Relevant activity/ies:

Schedule 2A item 13 of the *Environmental Protection Regulation 2008* – mining black coal

The environmentally relevant activity conducted at the location as described above must be conducted in accordance with the following site specific conditions of approval.

Schedule A - General

Financial Assurance

- (A1) The Environmental Authority holder must give the administering authority a Financial Assurance in the amount and form required by the administering authority prior to the commencement of activities proposed under this Environmental Authority.

NOTE: The calculation of Financial Assurance for condition (A1) must be in accordance with Guideline 17 and may include a performance discount. The amount is defined as the maximum total rehabilitation cost for complete rehabilitation of all disturbed areas, which may vary on an annual basis due to progressive rehabilitation. The amount required for the financial assurance must be the highest Total Rehabilitation Cost calculated for any year of the Plan of Operations and calculated using the formula: (Financial Assurance = Highest Total Annual Rehabilitation Cost x Percentage Required).

- (A2) The Financial Assurance is to remain in force until the administering authority is satisfied that no claim on the assurance is likely.

NOTE: Where progressive rehabilitation is completed and acceptable to the administering authority, progressive reductions to the amount of financial assurance will be applicable where rehabilitation has been completed in accordance with the acceptance criteria defined within this environmental authority.

Maintenance of measures, plant and equipment

- (A3) The Environmental Authority holder must:
- (a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this Environmental Authority; and
 - (b) maintain such measures, plant and equipment in a proper condition; and
 - (c) operate such measures, plant and equipment in a proper manner.

Monitoring

- (A4) The Environmental Authority holder must record, compile and keep for a minimum of five years all monitoring results required by this Environmental Authority and make available for inspection all or any of these records upon request by the administering authority.
- (A5) Where monitoring is a requirement of this Environmental Authority, ensure that a competent person(s) conducts all monitoring.
- (A6) All monitoring and research data, collected for the purpose of demonstrating compliance with this Environmental Authority, must be collated and maintained in a central location, such that the data are accessible on request by the administering authority.
- (A7) A monitoring program which includes monitoring locations, frequency, parameters, monitoring techniques and quality assurance protocols must be detailed in the Plan of Operations.

Storage and handling of flammable and combustible liquids

- (A8) Spillage of all chemicals and fuels must be contained within an on-site containment system and controlled in a manner that prevents environmental harm (other than trivial harm) and maintained in accordance with Section 5.9 of AS1940 - Storage and Handling of Flammable and Combustible Liquids of 2004 (or more recent editions).
- (A9) The base and walls of all bunded areas must be maintained free from gaps or cracks that may result in the loss of containment.

Definitions

- (A10) Words and phrases used throughout this Environmental Authority are defined in Schedule J Definitions Section at the end of this Environmental Authority. Where a definition for a term used in this Environmental Authority is sought and the term is not defined within this Environmental Authority, the definitions in the *Environmental Protection Act 1994*, its Regulations and Environmental Protection Policies must be used.

END OF CONDITIONS FOR SCHEDULE A

Schedule B – Air

Dust Nuisance

- (B1) Subject to Conditions (B2) and (B3) the release of dust or particulate matter or both resulting from the mining activity must not cause an environmental nuisance, at any sensitive place.
- (B2) When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

Dust Deposition Monitoring

- (B3) If the Environmental Authority holder can provide evidence through monitoring that the following limits are not being exceeded then the holder is not in breach of (B1):
- (a) Dust deposition of 120 milligrams per square metre per day, averaged over one month, when monitored in accordance with AS 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulates - Deposited matter - Gravimetric method of 1991; and
 - (b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere of 150 micrograms per cubic metre over a 24 hour averaging time, at a sensitive place downwind of the operational land, when monitored in accordance with:
 - Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet - Gravimetric method, when monitored in accordance with AS 3580.9.6 Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM (sub) 10 high volume sampler with size-selective inlet - Gravimetric method of 1990; or
 - any alternative method of sampling PM10, which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

NOTE: You must propose which monitoring method is appropriate in accordance with condition (B3) (a) or (b) or both.

- (B4) If monitoring indicates exceedence of the relevant limits in Condition (B3), then the Environmental Authority holder must:
- address the complaint including the use of appropriate dispute resolution if required; or
 - as soon as practicable or at the request of the administering authority, implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.
- (B5) Rehabilitation must be carried out in such a manner as to minimise releases of wind-blown dust and erosion.

- (B6) Dust emissions from mining activities must be suppressed by the use of water or treated in any other suitable manner to prevent a dust nuisance at a sensitive place.
- (B7) All sealed traffic areas must be cleaned as necessary to minimise the release of dust and particulate matter to the atmosphere.
- (B8) Trafficable areas must be sealed with bitumen or an equivalent hard surface, or otherwise maintained to the satisfaction of the administering authority, in a condition which minimises the release of wind-blown or traffic generated dust.
- (B9) Temporary roads used for material haulage must be watered or treated in any other suitable manner, to minimise wind-blown or traffic generated dust.

Odour nuisance

- (B10) Subject to condition (B11), the release of noxious or offensive odour(s) or any other noxious or offensive airborne contaminant(s) resulting from the mining activity must not cause an environmental nuisance at any sensitive or commercial place.
- (B11) When requested by the administering authority, odour monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- (B12) If monitoring indicates Condition (B10) is not being met then the environmental authority holder must:
 - a) address the complaint including the use of appropriate dispute resolution if required; or
 - b) immediately implement odour abatement measures so that emissions of odour from the activity do not result in further environmental nuisance.

END OF CONDITIONS FOR SCHEDULE B

Schedule C – Water

Water Management Plan

- (C1) Within the twelve months from the date the environmental authority takes effect, the holder of this environmental authority must develop and implement a Water Management Plan to be implemented through the Plan of Operations.
- (C2) The Water Management Plan must identify methods to:
 - identify the environmental values of the receiving waters including Lagoon and Spring Creek and water quality objectives and how they will be protected;
 - incorporate a risk management approach to how changing levels of flood, drought and water quality risks should be addressed;
 - manage stormwater discharge;
 - develop and implement a system for emergency spills or discharges including procedures to minimise extent and duration of release, staff training, investigation and reporting procedures;
 - manage the environmental impacts of any release of wastewater to the environment so that any impacts are minimised including restricting any discharge to waters to occasions where there is flow in receiving waters to provide considerable dilution;

- separate clean water from undisturbed areas and water from disturbed areas;
 - manage site water quality and quantity during the (3) phases of mining: development, operation and decommissioning and include a site water balance including groundwater generated through mine dewatering;
 - safeguard against the potential for soil erosion and acid drainage; and
 - provide details of operational monitoring and monitoring of hydrological processes including associated performance indicators.
- (C3) The holder of this environmental authority must submit to the administering authority a draft of the Water Management Plan within six months of the date the environmental authority takes effect for comment prior to implementation of the plan.
- (C4) A copy of the Water Management Plan and any subsequent amendment of the Water Management Plan must be kept at the place to which this environmentally relevant activity relates and be available for examination by Emergency Services Personnel or an authorised person on request.

Release to waters

- (C5) Contaminants must not be released from the mine to any waters or the bed and banks of any waters other than treated/settled stormwater from environmental dam(s) that is in accordance with the contaminant release limits in Schedule C – Table 1.

Schedule C - Table 1: End of Pipe contaminant release limits

Parameter	Units	Minimum	Maximum
pH		6.0	9.0
Electrical Conductivity	µS/cm	-	1500
Total Suspended Solids	mg/L	-	100

- (C6) Notwithstanding condition C5, the holder of the environmental authority is authorised to release contaminants to waters of Lagoon or Spring Creek as defined in the Water Management Plan in a manner that will ensure the level of electrical conductivity within the receiving waters will not exceed 1500 µS/cm at any time, 50 metres downstream from the discharge point, as a result of the discharge. Any release to waters must only occur where there is an existing minimum flow in receiving waters upstream of the discharge point to provide adequate dilution such that 1500 µS/cm is not exceeded outside the 50 metre mixing zone.
- (C7) The holder of this authority must undertake monitoring at regular intervals during any release to waters at a point 50 metres downstream of the discharge, to ensure that the level of electrical conductivity does not exceed 1500 µS/cm at that point. If monitoring indicates that 1500 µS/cm is exceeded, release of wastewaters must cease immediately.
- (C8) Monitoring of contaminant releases must be undertaken at the overflow from the environment dam(s) identified in Schedule C – Table 2 and records kept, and comply with the quality characteristics and at the frequency specified in Schedule C – Table 1.

Schedule C - Table 2: End of pipe monitoring locations and frequency

Monitoring point	Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameters
ED1 - Overflow point from Environmental Dam 1	27° 15' 45.6836762" S	151° 41' 43.7783374" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	pH, total suspended solids (mg/L), electrical conductivity(μ S/cm), sulphate (SO ₄) (mg/L), time of day, water temperature, flow rate (m/s)
ED2 - Overflow point from Environmental Dam 2	27° 17' 00.6429312" S	151° 41' 32.2135266" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	
ED3 - Overflow point from Environmental Dam 3	27° 18' 35.9158056" S	151° 42' 59.1135236" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	
ED4 Overflow point from Environmental Dam 4	27° 17' 44.4813149" S	151° 41' 25.3270867" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	

Note: This does not apply to dams containing hazardous waste.

Note: Monitoring of receiving waters for discharges from Environmental Dams will be undertaken using Rising Stage Samplers where practical.

- (C9) Ambient water monitoring must be undertaken at locations and frequencies prescribed in Schedule C – Table 3 and any mining activity release must comply with the contaminant limits defined in Schedule C – Table 1.

Schedule C - Table 3: Receiving Water Monitoring Locations and Frequency

Monitoring Point	Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameter s
Lagoon Creek at a point upstream of mine (LCU1)	27° 17' 9.7728" S	151° 44' 23.136" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity (µS/cm), sulphate (SO ₄) (mg/L), time of day, water temperature, flow rate (m/s)
Lagoon Creek at two points downstream of mine (LCD1 & LCD2)	LCD1: 27° 18' 35.64" S	151° 43' 4.3536" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity (µS/cm), sulphate (SO ₄) (mg/L), time of day, water temperature, flow rate (m/s)
	LCD2: 27° 18' 37.36" S	151° 43' 1.8768" E		
Spring Creek at a point upstream of mine (SCU1)	27° 14' 18.7728" S	151° 41' 31.2864" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity (µS/cm), sulphate (SO ₄) (mg/L), time of day, water temperature, flow rate (m/s)
Spring Creek at a point downstream of mine (SCD1)	27° 14' 47.364" S	151° 40' 36.2028" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity (µS/cm), sulphate (SO ₄) (mg/L), time of day, water temperature, flow rate (m/s)
Downstream of Environmental Dam 2 and Environmental Dam 4 (AW20)	27° 17' 46.1228" S	151° 41' 16.0147" E	At least once every 6 months and as soon as practical prior to, at least daily	pH, total suspended solids (mg/L), electrical conductivity (µS/cm), sulphate

			during and immediately after any release to waters.	(SO ₄) (mg/L), time of day, water temperature, flow rate (m/s)
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Note 1: A monitoring point may also include a monitoring point requested by the administering authority in the event of release to waters.

Note 2: LCD1 is approx 70 m downstream of road (site AW4) and LCD2 is approx 50m downstream of LCD1.

Note 3: Receiving water monitoring points are shown on Schedule K - Map 1.

Capacity of Tailings and Process Water Dams

(C10) The design storage allowance on 1st November of each year for any dam containing hazardous waste constructed or operated within the operational land must comply with Schedule C - Table 4.

Schedule C - Table 4: Storage design¹ for dams containing hazardous waste

Dam Name	Design Storage Allowance ² Critical Wet Period	Spillway Critical Design Storm ³	Mandatory ⁴ Reporting Level
Tailings Storage Facility	0.1 AEP 4 month wet season plus process inputs for the 4 month wet season	0.001 AEP	0.01 AEP
Environmental Dam 2	(Not Applicable ⁶)	0.001 AEP	0.6 metres below the spillway crest ⁶
Input Tailings Storage Facility	0.1 AEP 4 month wet season plus process inputs for the 4 month wet season	0.001 AEP	0.01 AEP

NOTE: AEP means Annual Exceedence Probability.

- Calculations are to be carried out in accordance with the "Site Water Management" guideline in the Technical Guidelines for Environmental Management of Exploration and Mining in Queensland – DME 1995.
- The design storage allowance on 1st November of each year for any dam containing hazardous waste constructed within the operational land must be equivalent to the run-off from the critical wet period plus process inputs for the period. Process inputs refers to hazardous process waste and any water, which is being disposed of in the storage facility.
- The critical storm has a duration that produces the peak discharge for the catchment
- The level below spillway crest that can accommodate runoff from a 72 hour AEP storm, or the AEP wave allowance whichever level is lower.
- The requirement for a design storage allowance for Environmental Dam 2 was removed by the administering authority following discussions with the project proponent on 22 August 2006.
- This reporting level was nominated by the administering authority following discussions with the project proponent on 22 August 2006.

(C11) The spillway for any dam containing hazardous waste, constructed within the operational land must be designed and maintained to withstand the peak flow from the spillway critical design storm in Schedule C – Table 4.

- (C12) The holder of the Environmental Authority must mark the mandatory reporting level defined in Schedule C – Table 4 on the spillway of all dams containing hazardous waste within the operational land.
- (C13) The holder of the Environmental Authority must notify the administering authority when the pondage level of the dam containing hazardous waste reaches the mandatory reporting level defined in Schedule C – Table 4.
- (C14) The holder of this Environmental Authority must implement measures to prevent access to any dams containing hazardous waste by all livestock and minimise access by native fauna.
- (C15) The base and walls of the Tailings Storage Facility and environmental dams must be constructed, installed and maintained:
- (i) so as to minimise the likelihood of a release of contaminants through the bed or banks of the dam to any waters (including groundwater); and
 - (ii) so as to ensure the stability of the dam(s) construction.
- (C16) Construction of sediment dams other than any dams in the final rehabilitation landform must not occur on out of pit spoil dumps.
- (C17) Before construction of any dam containing hazardous waste, a person suitably qualified and experienced in dam engineering must: (a) prepare design plans which design the dam to an appropriate engineering standard; and (b) certify that the design plans meet an appropriate engineering standard and are consistent with the conditions in the environmental authority.
- (C18) Before construction of a dam containing hazardous waste, the holder of the environmental authority for the dam must submit the certified design plans to the administering authority, for review and comment.
- (C19) When the construction of the dam containing hazardous waste is complete, the holder of the environmental authority must: (a) obtain certification from a person suitably qualified and experienced in dam construction that the construction of the dam is either in accordance with or generally in accordance with the certified design plans; and (b) submit the construction certification to the administering authority.
- (C20) The holder of the environmental authority must construct and operate the dam in accordance with the certified: (a) design plans; (b) operational plans; and (c) conditions contained in the environmental authority, in order to prevent or minimise environmental harm.

Groundwater Monitoring

- (C21) The location of monitoring bores must take into consideration the location of any voids, Tailings Storage Facilities, hazardous waste rock dumps, heap leach pads, location and depth of aquifers and hydro geological factors within the host rocks which may allow the movement of hazardous contaminants.
- (C22) Groundwater, affected by the mining activities must be monitored at the locations and frequencies defined in Schedule C – Tables 5 and 6.

Schedule C - Table 5: On-lease Ground Water Monitoring Locations and Frequency

Monitoring point	Latitude	Longitude	Aquifer	Surface RL (m)	Total Depth (m)	Monitoring frequency
2289P ML, near ED1	27° 15' 47.9583" S	151° 42' 02.5692" E	Coal Measures	447.04	79.0	Monthly

2291P ML, near SE boundary	27° 17' 06.8265" S	151° 44' 03.1995" E	Coal Measures	461.27	52.0	Monthly
18P nested piezometer (near CHPP)	27° 16' 29.27663" S	151° 41' 45.23075" E	Coal Measures	459.60	130.0	Monthly
25P ML, near eastern boundary	27° 16' 50.29675" S	151° 43' 41.12241" E	Basalt	493.70	50.0	Monthly
26P ML, near northeastern boundary	27° 16' 16.57705" S	151° 43' 43.89206" E	Coal Measures	497.50	50.0	Monthly
27P ML, near Cherry Road exit	27° 16' 00.37396" S	151° 43' 10.37992" E	Coal Measures	484.40	50.0	Monthly
28P ML, northern area	27° 15' 46.28750" S	151° 42' 32.99149" E	Coal Measures	457.00	50.0	Monthly
843 near southeastern boundary	27° 17' 13.28365" S	151° 41' 32.69584" E	Basalt	441.90	48.0	Monthly
848 near ED2	27° 16' 58.98916" S	151° 41' 33.12875" E	Coal Measures	443.70	66.0	Monthly
81P	27° 17' 59.74912" S	151° 42' 18.06339" E	Coal Measures	460.37	42.0	Monthly
82P	27° 18' 02.04446" S	151° 44' 12.59898" E	Coal Measures	448.62	48.0	Monthly
83P	27° 18' 28.46569" S	151° 43' 24.79850" E	Coal Measures	439.32	48.0	Monthly
84P	27° 16' 37.76433" S	151° 41' 24.52821" E	Basalt	447.95	30.0	Monthly

Schedule C - Table 6: Off-lease Ground Water Monitoring Locations and Frequency

Monitoring point	Latitude	Longitude	Aquifer	Surface RL (m)	Total Depth (m)	Monitoring frequency
BMH1 Paddock (Jondaryan-Muldu Rd)	27° 16' 37.5852" S	151° 40' 57.5616" E	Basalt	454.34	96	Monthly
CSMH1 Paddock (Oakey-Cooyar Rd)	27° 19' 19.7904" S	151° 44' 20.8788" E	Coal Measures	496.90	90	Monthly

(C23) A groundwater monitoring network must be maintained. The network must:

- a) be installed and maintained by a person possessing appropriate qualifications and experience in the fields of hydrogeology and groundwater monitoring program design to be able to competently make recommendations about these matters;
- b) be constructed in accordance with methods prescribed in the latest edition of the Agriculture and Resource Management Council of Australia and New Zealand manual titled 'Minimum Construction Requirements for Water Bores in Australia'; and
- c) include a sufficient number of 'bores of compliance' that are located at an appropriate distance from potential sources of impact from mining activities and provides the following:
 - (i) representative groundwater samples from the uppermost aquifer; and
 - (ii) background water quality in hydraulically up-gradient or background bore(s) that have not been affected by any mining activities to groundwater's; and
 - (iii) the quality of groundwater down gradient of any potential source of contamination including groundwater passing the relevant bore(s) of compliance.

(C24) Conduct monitoring and keep records of groundwater quality for the relevant bores of compliance for the aquifers. All determinations of groundwater quality must be:

- (i) conducted for the water quality characteristics and at the minimum frequency stated in Schedule C – Table 7;
- (ii) taken from sufficient monitoring points and / or well to obtain representative samples of groundwater both up-gradient and down-gradient of the potential influence;
- (iii) carried out with sufficient regularity and spatial and temporal replication to make statistically valid conclusions about the presence or absence of contamination or other impact.
- (iv) carried out with sufficient number of sampling events to determine ambient groundwater quality and level prior to any development of the site occurring.
- (v) followed by an assessment of whether or not there has been any statistically significant adverse change compared to background values at locations hydraulically down gradient of the potential sources of contamination for each quality characteristic in Schedule C – Table 7.

- (C25) On any occasion that samples are obtained in accordance with condition (C23), the holder of this Environmental Authority must measure and record standing groundwater levels in metres accurate to 0.01 metres. The elevation of the reference point, relative to Australian Height Datum, for use in any groundwater level measurement must be determined to an accuracy to 0.01 metres.
- (C26) Subject to condition C22, on-lease groundwater levels must be monitored and compared with two bores located off-lease and within the same aquifer. The difference in variation of drawdown from on-lease bores compared to the variation in drawdown from off-lease bores within any one month sampling period should be no greater than one metre. Where a difference of more than one metre is identified and that difference is not the result of pumping of licensed bores, the administering authority must be notified within 14 days of completion of monitoring.
- (C27) The method of sampling of groundwater must comply with that set out in the latest edition of the Environmental Protection Agency's Water Quality Sampling Manual.
- (C28) Groundwater level fluctuations as measured in 'bores of compliance' that are caused by seepage from Tailings Storage Facility or environmental dam must be notified within 14 days to the administering authority following completion of monitoring.
- (C29) Subject to Condition (C22), if the groundwater contaminant trigger levels defined in Schedule C - Table 7 are exceeded then the environmental authority holder must complete an investigation into the potential for environmental harm and notify the administering authority within 3 months of receiving the analysis results.
- (C30) Subject to Condition (C22), groundwater contaminant limits must not exceed the contaminant limits defined in Schedule C -Table 7.

Schedule C - Table 7: Groundwater Monitoring Limits and Frequencies

Quality Characteristic	Units	Contaminant Limits and Groundwater level	Monitoring Frequency
Al	mg/L	+/- 20% of background	Half Yearly
As	mg/L	+/- 20% of background	Half Yearly
Ca	mg/L	+/- 10% of background	Half Yearly
Se	mg/L	+/- 20% of background	Half Yearly
Cl	mg/L	+/- 10% of background	Half Yearly
Cu	mg/L	+/- 20% of background	Half Yearly
F	mg/L	+/- 20% of background	Half Yearly
Fe	mg/L	+/- 20% of background	Half Yearly
Total N	mg/L	+/- 20% of background	Half Yearly
K	mg/L	+/- 10% of background	Half Yearly
Mg	mg/L	+/- 10% of background	Half Yearly
Mn	mg/L	+/- 20% of background	Half Yearly
Na	mg/L	+/- 10% of background	Half Yearly
SO ₄	mg/L	+/- 10% of background	Half Yearly

HCO ₃	mg/L	+/- 10% of background	Half Yearly
TDS	mg/L	+/- 10% of background	Half Yearly
EC	µS/cm	+/- 0.5 for coal measures aquifers +/- 1 for basalt aquifers	Half Yearly
pH	unit		Half Yearly
Standing water level	cm		Monthly

- (C31) The baseline value for condition C30 is to be determined by sampling for a period of three years from reference bores listed in Schedule C – Table 5.
- (C32) A record of the results of groundwater monitoring must be kept and made available to the administering authority on request.
- (C33) The location of the two off-lease monitoring bores within the basalt and coal-seam aquifers referenced in Schedule C – Table 6 must be investigated and installed within 12 months of the environmental authority being issued.

Sewage Effluent Control

- (C34) All effluent released from the treatment plant must be monitored at the frequency and for the parameters specified in Schedule C – Table 8.

Schedule C - Table 8: Sewage Effluent Quality Targets for Dust Suppression and Irrigation

Quality characteristics	Release limit	Units	Limit type	Monitoring frequency
5-day Biochemical Oxygen Demand (uninhibited)	<20	mg/L	max	Quarterly
pH	6.5 – 8.5		range	Quarterly
Faecal Coliforms, based on the average of a minimum of five samples collected	<1000 c.f.u.	Colonies per 100 mL	max	Quarterly

- (C35) Sewage effluent used for dust suppression or irrigation must not exceed sewage effluent release limits defined in Schedule C – Table 8.
- (C36) Sewage effluent used for dust suppression or irrigation must not cause spray drift or over spray to any sensitive place, other than the active mining areas within ML 50176 and ML 50216.
- (C37) Subject to condition C38, sewage effluent from sewage treatment facilities must be reused or evaporated and must not be directly released from the sewage treatment plant to any water way or drainage line.
- (C38) In periods of wet weather or following wet weather, when no irrigation of effluent is reasonably practicable and when effluent storage ponds are full, the release of effluent to waters is permitted from the overflow point from Environmental Dam 2 and in accordance with the release limits in Schedule C – Table 1.

- (C39) The holder of this Environmental Authority must ensure that irrigation of effluent is carried out in such a manner that prevents and/or minimises environmental harm.
- (C40) The holder of this Environmental Authority is authorised to accept treated wastewater from the Wetalla Wastewater Reclamation Facility at a rate of no more than 5500 megalitres per year.

END OF CONDITIONS FOR SCHEDULE C

Schedule D – Noise

Noise Nuisance

- (D1) Notwithstanding any other condition of this environmental authority, noise from the activity must not cause an environmental nuisance, at any sensitive place.
- (D2) When requested by the administering authority, noise monitoring and recording must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of an authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- (D3) If the Environmental Authority holder can provide evidence through monitoring that the limits defined in Schedule D – Table 1 and 2 inclusive, are not being exceeded then the holder is not in breach of Condition D1. Noise Monitoring must include:
- (i) background noise level;
 - (ii) LA10, adj 10 mins;
 - (iii) LA1, adj 10 min;
 - (iv) LAmax, adj T;
 - (v) LAr, 1 hour;
 - (vi) the level and frequency of occurrence of impulsive or tonal noise;
 - (vii) Atmospheric conditions including temperature, wind speed and directions;
 - (viii) Effects due to extraneous factors such as traffic noise; and
 - (ix) Location, date and time of monitoring.
- (D4) If monitoring indicates exceedance of the limits in Schedule D – Table 1 and 2, then the Environmental Authority holder must:
- a) Address the complaint including the use of appropriate dispute resolution if required; and
 - b) Immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.
- (D5) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

Schedule D - Table 1: Noise Limits – Sensitive Place

Noise level dB(A) measured as	Monday to Saturday			Sundays and public holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
	Noise measured at a 'Noise sensitive place'					
LAr, 1 hour	50	45	40	50	45	40

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the Environmental Protection Agency's Noise Manuals.

Schedule D - Table 2: Airblast Overpressure Level

Noise Parameter	Monday to Friday 9am-5pm
	Saturday 9am – 1pm*
Air blast overpressure level (dB [Lin] Peak)	115 db (linear peak for 9 out of any 10 consecutive blasts, regardless of the interval between blasts)
Air blast overpressure level (dB [Lin] Peak)	120 db (maximum)

* Blasting not permitted on public holidays and Sundays.

Note: The method of measurement and reporting of over pressure levels must comply with the latest edition of the Environmental Protection Agency's vibration and air blast overpressure monitoring guideline.

Vibration Nuisance

- (D6) Subject to Conditions (D7) and (D8) vibration from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- (D7) When requested by the administering authority, vibration monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within 14 days to the administering authority following the completion of monitoring.
- (D8) If the Environmental Authority holder can provide evidence through monitoring that the limits defined in Schedule D - Table 3 are not being exceeded then the holder is not in breach of condition D6.
- Monitoring must include:
- location of the blast(s) within the mining area (including which bench level); and
 - atmospheric conditions including temperature, relative humidity and wind speed and direction; and
 - location, date and time of recording.
- (D9) If monitoring indicates exceedance of the relevant limits in Schedule D - Table 3, then the Environmental Authority holder must:
- address the complaint including the use of appropriate dispute resolution if required; or
 - immediately implement vibration abatement measures so that vibration from the activity does not result in further environmental nuisance.

Schedule D - Table 3: Vibration Limits

Vibration Parameter	Vibration measured at sensitive place
	Monday to Friday 9am-5pm
	Saturday 9am – 1pm*
Peak particle velocity (mm/s)	5 mm/sec for nine (9) out of ten (10) consecutive blasts initiated. Any single blast not to exceed 10 mm/sec.

* Blasting not permitted on public holidays and Sundays.

Note: The method of measurement and reporting of vibration levels must comply with the latest edition of the Environmental Protection Agency's vibration and air blast overpressure monitoring guideline.

END OF CONDITIONS FOR SCHEDULE D

Schedule E – Land

Buffer Zone

- (E1) The holder of the environmental authority must not cause any disturbance within 50 metres of the high bank of Lagoon Creek (buffer zone) as shown on Map 2 - Schedule K unless in accordance with condition E2 and E3.
- (E2) The holder of the environmental authority is authorised to construct and maintain a flood protection levee and access road for inspection purposes, with the tow of the levee being no closer than 50 metres from the high bank of Lagoon Creek as shown on Map 2 - Schedule K.
- (E3) The holder of the environmental authority is authorised to access the 50 metre buffer zone as shown on Map 2 - Schedule K, for the purposes of maintaining the integrity of the flood protection levee, riparian conservation and weed management purposes.
- (E4) The flood protection levee must be designed and inspected by a suitably qualified and experienced person. The final design level of the levee crest must be above the predicted 1,000 year ARI event flood level.
- (E5) Any section of the outside face of the levee must be treated with cover material and grass seeded (unless rock armoured) within three months of completion of the earthworks for that section of the outside face of the levee.
- (E6) The condition of the levee must at a minimum be assessed:
 - a) by the environmental authority holder within 1 week of any storm of such intensity that greater than 25mm of rain falls in less than 3 hours; and
 - b) by a suitably qualified and experienced person at least once per year between the months of May and October inclusive (i.e. during the 'dry' season and before the onset of the 'wet' season).
- (E7) Remedial works identified as necessary during assessments conducted under condition E6 must be commenced within 30 days unless delayed by inclement weather.
- (E8) Any actions and incidents on site that may impact upon the integrity of the levee bank must be notified to the administering authority in accordance with condition H4.

Green Waste Storage

- (E9) The waste management hierarchy must be considered in the management of green waste.

Final Land Use and Rehabilitation Plan

(E10) Within twelve months of the date of this environmental authority the holder of this environmental authority must develop and implement a Final Land Use and Rehabilitation Plan to ensure that all areas disturbed by mining activities will be suitably rehabilitated in accordance with Schedule E – Table 1.

The Plan must include, but is not limited to the following:

- (i) disturbance type;
- (ii) disturbance area;
- (iii) pre and post mine land descriptions;
- (iv) pre and post mine land capability;
- (v) analogue site(s) identification;
- (vi) a description of rehabilitation management techniques incorporating works and monitoring programs and timetables;
- (vii) indicators for success; and
- (viii) keeping of appropriate records or rehabilitation measures implemented including taking of photographs demonstrative of rehabilitation achieved and the preparation of annual rehabilitation progress reports.

Note: The Final Land Use and Rehabilitation Plan is to be managed through the Plan of Operations.

Schedule E- Table 1: Final Land Use and Rehabilitation Approval Schedule – ML 50170 and ML50216

	Disturbance Type						
	Residual Voids	Tailings Dams	Recontoured spoil area	Waste Rock Dumps	Infrastructure & ROM Areas	Roads and Tracks	Water Supply and Sediment Dams
Tenure ID	ML50216	ML50170	ML50170 ML50216	ML50216	ML50170	ML50170 ML50216	ML50216
Projective Surface Area (ha)	55	70	740	100	5	5	40
Post mine land use	Possible water storage	Grazing	Grazing	Grazing	Grazing	Grazing	Possible water storage
Post mine land suitability classification	5	5	3-4	4	4	4	5

Note: The Final Land Use and Rehabilitation Plan will be managed through the Plan of Operations.

(E11) All areas significantly disturbed by mining activities must be rehabilitated in accordance with the Mine Closure Plan outlined in Condition E13.

(E12) Progressive rehabilitation must commence when areas become available within the operational land.

Closure and Post Closure

- (E13) The Environmental Authority holder must submit a Mine Closure Plan to the administering authority at least five years prior to the surrender of this Environmental Authority.
- (E14) When the deposition of tailings ceases, the holder of this Environmental Authority must install a final cover system to the Tailings Storage Facility, which effectively minimises:
- (i) infiltration of water into the Tailings Storage Facility; and
 - (ii) the likelihood of any erosion occurring to either the final cover system, dumped spoil material or deposited tailings;
- (E15) The final cover system must include an inert layer to reduce infiltration and an upper/final layer of earthen material that is capable of sustaining plant growth.

Sustainable Final Land Use Outcomes

- (E16) Areas that are to be progressively rehabilitated must comply with, but not be limited to, the following outcomes:
- a) All areas disturbed by mining activities must be rehabilitated to the landform design criteria defined in the Final Land Use and Rehabilitation Plan required by Condition E10 to E12; and
 - b) The final landforms must be stable with erosion rates comparable to a suitable analogue site.

Grazing Pasture Outcome

- (E17) Areas which are to be progressively rehabilitated to grazing pasture must comply with the following outcomes;
- a) generate a self sustaining vegetation with projective cover, species composition and species distribution comparable with that of analogue sites to be determined by the study detailed in Condition E10 e.g. planting local native grass and shrub species where possible. These vegetation species must be listed in the Final Land Use and Rehabilitation Plan;
 - b) all areas disturbed by mining activities must be rehabilitated to the landform design criteria defined in Schedule E – Table 2;
 - c) a measure of productivity (e.g. sustainable dry matter production, stock live weight gain) are comparable to the selected analogue sites detailed in Condition E18).
- (E18) Complete an investigation into rehabilitation of disturbed areas and submit a report to the administering authority proposing acceptance criteria to meet the outcomes in Condition E17 and landform design criteria in Schedule E – Table 2 within twelve months of the issue of the Environmental Authority.

Schedule E- Table 2: Landform design criteria for New Acland Coal Mine

Disturbance Type	Slope Range (%)	Projective Surface Area (ha)
Residual Voids (high wall)	0 - 214 % or 65°	55
Residual Voids (low wall)	0 – 100 % or 45°	
Tailings Dam Top	0 – 20 % or 11.5° *	60
Tailings Dam Wall	0 – 20 % or 11.5° *	10
Recountoured Spoil Area	0 – 20 % or 11.5° *	740

Waste Rock Dumps	0 – 20 % or 11.5° *	100
Infrastructure and ROM areas	0 – 18% or 10°	5
Roads and Tracks	0 – 10 % or 5.7°	5

Note: * = The slope depends on the vertical height and slope length. See Landform Acceptance Criteria.

Residual Void Outcome

(E19) Residual voids must comply with the following outcomes:

- a) residual voids must not cause any serious environmental harm to land, surface waters or any recognised ground water aquifer, other than the environmental harm constituted by the existence of the residual void itself, and subject to any other condition within this Environmental Authority; and
- b) residual voids must comply with Schedule E – Table 3.

(E20) Complete an investigation into residual voids and submit the findings in the Mine Closure Plan outlined by Condition E13 to the administering authority proposing acceptance criteria to meet the outcomes in (E10) and landform design criteria in Schedule E – Table 3.

Schedule E - Table 3: Residual Void Design

Void Identification	Void wall - competent rock slope (%)	Void wall - incompetent rock slope (%)	Void maximum surface area (ha)
Central Pit/South Pit Void	65° or 214%	45° or 100%	55

Dams Containing Hazardous Waste

(E21) The construction and operation of any dam containing hazardous waste within the operational land must comply with Schedule E – Table 4.

Schedule E - Table 4: Size and Purpose of Dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Maximum surface area of contents in dam (ha)	Maximum volume of dam (ML)	Maximum depth of dam (m)	Purpose of Dam
Tailings Storage Facility 1 and 2	65	2975	16	Containment of tailings from a coal washery
Environmental Dam 2	9	232	4.5	Capture of overland flow from undisturbed areas - Backup for Tailings Dam
IPT1	15	2115	40	Containment of tailings from a coal washery plant
IPT2	30	8000	35	Containment of tailings from a coal

IPT3	6	720	37	washery plant Containment of tailings from a coal washery plant
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Note 1: The name of the dam containing hazardous waste should refer to the name of the dam e.g. process residue facility and decant dam

Note 2: For dams which do not require a dam wall, input the maximum void depth e.g. where dams are formed by excavating below the land surface or backfilling a residual void

Note 3: Purpose of the dam should outline the designed function, e.g. "the permanent containment of tailings resulting from the extraction of nickel, cobalt, and other metals at the XYZ Refinery.

(E22) Any dam containing hazardous waste constructed or operated within the operational land must be located within the polygonal area defined by the points defined in Schedule E – Table 5.

Schedule E - Table 5: Location of dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Latitude (GDA94) ¹	Longitude (GDA94) ¹
1. Tailings Storage Facility	27° 17' 16.7031402" S	151° 42' 27.3833932" E
2. Environmental Dam 2	27° 17' 10.9622837" S	151° 42' 28.4233861" E
	27° 16' 51.1028709" S	151° 42' 31.8627267" E
	27° 16' 27.2791954" S	151° 42' 03.7029825" E
	27° 16' 29.1169479" S	151° 41' 39.1178177" E
	27° 17' 08.8291088" S	151° 41' 31.8175509" E
3. IPT1	27° 16' 39.5932809" S	151° 42' 49.4645845" E
	27° 16' 33.3110450" S	151° 42' 48.3367815" E
	27° 16' 40.9107864" S	151° 42' 23.1909360" E
	27° 16' 34.6002752" S	151° 42' 29.5557786" E
4. IPT2	27° 16' 45.56" S	151° 42' 22.13" E
	27° 17' 05.72" S	151° 42' 28.00" E
	27° 17' 05.34" S	151° 42' 40.75" E
	27° 17' 56.25" S	151° 42' 49.98" E
	27° 16' 45.55" S	151° 42' 43.66" E
5. IPT3	27° 17' 04.7973072" S	151° 42' 37.4263170" E
	27° 16' 56.2475766" S	151° 42' 37.0886266" E
	27° 16' 56.9219634" S	151° 42' 25.6604935" E
	27° 17' 05.2765077" S	151° 42' 29.4918417" E

Note 1: A minimum of 3 points is required to constrain the location of all activities associated with the dam containing hazardous waste. Additional infrastructure which forms part of any dam containing hazardous waste may include appurtenant works consisting of tailings discharge pipelines, seepage collection systems, runoff diversion bunds, containment systems, pressure relief wells, decant and recycle water streams.

Note 2: The location polygon defined in Schedule E – Table 5 encloses both the Tailings Storage Facility and Environmental Dam 2.

Inspection of Dams

- (E23) The holder of the environmental authority must design, construct and operate all high-hazard dams containing hazardous waste in accordance with the Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste.
- (E24) The holder of the environmental authority must design, construct and operate all low-hazard dams containing hazardous waste and non-hazardous dams in accordance with the criteria outlined in Appendix B of the Code of Environmental Compliance for Mining Lease Projects.
- (E25) High hazard dams containing hazardous waste shall be inspected by a Registered Professional Engineer (RPEQ) on or about 1st October but definitely before 1st November each year or at any time if alarming, unusual or otherwise unsatisfactory conditions are observed.
- (E26) For each inspection, the engineer shall assess the condition of the dam and its foundations, determine the hydraulic adequacy of the dam and assess the adequacy of the works with respect to dam safety.
- (E27) For each inspection, two copies of the engineer's report and any recommendations as to measures to be taken to ensure the integrity of the dam shall be furnished to the administering authority within 28 days of the inspection.

Embankment Monitoring

- (E28) During the operational life of the storage the holder of the environmental authority must regularly monitor and record the standing water levels in three monitoring wells, which will be located in a line through the highest section of the embankment.

Decommissioning of Dams – Documentation and Compliance

- (E29) Dams containing hazardous waste must not be abandoned, must be decommissioned to a situation where water can no longer be stored in the dams and the dams and their contained waste(s) are stable, whereafter the dams are no longer dams and they become landforms on the operational land and must comply with the rehabilitation requirements of the Environmental Authority.
- (E30) Decommissioning activities for dams must be documented in detail in the plan of operations under which the activities are to occur. Where the detailed documentation is not already contained in the Design Plan for the dam, the detailed documentation is considered to be an amendment to the design plan and must be submitted as an amendment to the design plan required by the Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste.

Infrastructure

- (E31) All infrastructure, constructed by or for the Environmental Authority holder during the mining activities including water storage structures, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post mining land owner / holder.

NOTE: This is not applicable where the landowner/holder is also the Environmental Authority holder.

Weed Control

- (E32) All areas within the mining lease will be managed to reduce the spread of declared plants including both disturbed and undisturbed areas.

END OF CONDITIONS FOR SCHEDULE E

Schedule F – Nature Conservation

- (F1) The holder of the Environmental Authority must ensure that staff induction and environmental awareness programs include reference to *Anomalopus mackayi* (Five-clawed Worm-skink, Long-legged Worm-skink) and *Tympanocryptis pinguicolla* (Grassland Earless Dragon, South-eastern Lined Earless Dragon) to ensure that any individuals that might be present in the project area are identified and reported to the mine site environmental officer for recovery and release into suitable habitat.
- (F2) The holder of this Environmental Authority must develop a Conservation Management Plan for the riparian area of Lagoon Creek and existing stands of regional ecosystems RE11.8.5 and RE11.8.3 located on Bottle Tree Hill and submit the Plan to the Administering Authority and the Department of Natural Resources, Mines and Water within twelve months of the date this environmental authority takes effect. The Plan must for the two proposed conservation areas (Lagoon Creek and Bottle Tree Hill):
- a) ensure the combined surface area to be protected and enhanced is no less than the surface area of the regional ecosystems proposed to be cleared by mining activities on Mining Leases 50170 and 50216;
 - b) develop appropriate conservation/rehabilitation objectives;
 - c) outline suitable conservation/rehabilitation techniques (including those areas where local native plant species/communities are to be re-established and/or enhanced);
 - d) develop an action plan/rehabilitation schedule for the planned conservation/rehabilitation activities;
 - e) propose specific conservation/rehabilitation acceptance criteria (including those areas where local native plant species/communities are re-established and/or enhanced);
 - f) detail a suitable monitoring program to quantify conservation/rehabilitation success (including those areas where local native plant species/communities are re-established and/or enhanced); and
 - g) propose appropriate remedial actions for conservation/rehabilitation areas not achieving the required conservation/rehabilitation objectives.

END OF CONDITIONS FOR SCHEDULE F

Schedule G – Waste Management

Storage of tyres

- (G1) Tyres stored awaiting disposal or transport for take-back and, recycling, or waste-to-energy options - should be stockpiled in volumes less than 3m in height and 200m² in area and at least 10m from any other tyre storage area.
- (G2) All reasonable and practicable fire prevention measures must be implemented, including removal of grass and other materials within a 10m radius of the scrap tyre storage area.
- (G3) Disposing of scrap tyres resulting from the mining activities in spoil emplacements is acceptable, provided tyres are placed as deep in the spoil as reasonably practicable.
- (G4) Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.

Waste Handling and Management

- (G5) Regulated waste must only be removed from the authorised place by a person that can legally transport this waste under the *Environmental Protection Act 1994*.

- (G6) From the commencement of the activity, the holder of this Environmental Authority must maintain and update its existing Waste Management Plan and ensures that it addresses at least the following matters:
- (i) the types and amounts of wastes generated by the facility
 - (ii) how the waste will be dealt with, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices mentioned in the waste management hierarchy (section 10 in the *Environmental Protection (Waste Management) Policy 2000*);
 - (iii) procedures for identifying and implementing opportunities to improve the waste management practices employed.
 - (iv) procedures for dealing with accident, spills, and other incidents that may impact on the waste management
 - (v) details of any accredited management system employed, or planned to be employed, to deal with the waste
 - (vi) how often the performance of the waste management practices will be assessed (at least annually)
 - (vii) the indicators or other criteria on which the performance of the waste management practices will be assessed.

Note: The Waste Management Plan is to be managed through the Plan of Operations

- (G7) The holder of this integrated authority must not:
- (i) allow waste to burn or be burned at or on the licensed place; or
 - (ii) remove waste from the licensed place and burn such waste elsewhere.

(This condition does not apply to the material that is required to be burnt under quarantine regulations and burning of such material is to be carried out in a way that does not cause environmental harm and this condition does not refer to activities carried out under the provisions of the Fire Services Act 1990).

Waste Rock Management

- (G8) Subject to the release limits defined in Schedule C, all reasonable and practicable measures must be implemented to prevent hazardous leachate being directly or indirectly released or likely to be released as a result of the activity to any groundwater or watercourse.

Notification of Improper Disposal of Regulated Waste

- (G9) If the holder of this Environmental Authority becomes aware that a person has removed waste from the licensed place and disposed of the waste in a manner which is not authorised by this Environmental Authority or is improper or unlawful, then the holder of Environmental Authority must, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the disposal.

Emergency Response/Contingency Plan

- (G10) Within 12 months of the date of this Environmental Authority, the holder of this Environmental Authority must develop and implement an Emergency Response/Contingency Plan to manage the environmental impacts of uncontrolled release of contaminants to the environment.
- (G11) The Emergency Response/Contingency Plan must address at the least the following matters:

- Response procedures to be implemented to reduce the likelihood of any release of contaminants to the environment.
- Response procedures to prevent any further release or if such is not practicable, minimise the extent and duration of any release to the greatest practicable extent.
- The practices and procedures to be employed to restore the environment, or if such is not practicable, mitigate any environmental impacts of the release.
- A description of the resources to be used in response to a release.
- The training of staff that will be called upon to respond to a release.
- Procedures to investigate the cause of any release, and where necessary, implement remedial actions to reduce the likelihood of recurrence of a similar event.
- The provision and availability of documented procedures to staff attending any release to enable them to effectively respond.
- Timely and accurate reporting of the circumstance and nature of release events to the administering authority

(G12) A copy of the Emergency Response/Contingency Plan and any subsequent amendment of the Emergency Response/Contingency Plan must be kept at the place to which this environmentally relevant activity relates and be available for examination by Emergency Services Personnel or an authorised person on request.

END OF CONDITIONS FOR SCHEDULE G

Schedule H - Community

Complaint recording/response

- (H1) All complaints received by the holder of this environmental authority relating to the environmentally relevant activity must be recorded in a suitable database with the following details:
- a) time and date of complaint;
 - b) type of communication (telephone, letter, personal etc.);
 - c) name, contact address and contact telephone number of complainant (Note: if the complainant does not wish to be identified then "Not identified" is to be recorded);
 - d) response and investigation undertaken as a result of the complaint;
 - e) name of person responsible for investigating complaint; and
 - f) action taken as a result of the complaint investigation and signature of responsible person.
- (H2) The complaints record required by condition number H1 must be maintained for a period of not less than three (3) years.

Notification of Emergencies and Incidents

- (H3) As soon as practicable after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority, the holder of this environmental authority must notify the administering authority of the release by telephone or facsimile.

- (H4) The notification of emergencies or incidents as required by condition number H3 must include but not be limited to the following:
- the holder of the environmental authority;
 - the location of the emergency or incident;
 - the number of the environmental authority;
 - the name and telephone number of the designated contact person;
 - the time of the release;
 - the time the holder of the environmental authority became aware of the release;
 - the suspected cause of the release;
 - the environmental harm and or environmental nuisance caused, threatened, or suspected to be caused by the release; and
 - actions taken to prevent further any release and mitigate any environmental harm and or environmental nuisance caused by the release.
- (H5) Not more than fourteen (14) days following the initial notification of an emergency or incident, the holder of the environmental authority must provide written advice of the information supplied in accordance with condition number H4 in addition to:
- proposed actions to prevent a recurrence of the emergency or incident;
 - outcomes of actions taken at the time to prevent or minimise environmental harm and or environmental nuisance; and
 - the results of any environmental monitoring performed.

Exception Reporting

- (H6) The holder of this environmental authority must notify the administering authority in writing of any monitoring result that indicates an exceedence of or non-compliance with any environmental authority limit within twenty-eight (28) days of completion of analysis.
- (H7) The written notification required by condition number H6 above must include:
- the full analysis results;
 - details of investigation or corrective actions taken; and
 - any subsequent analysis.

END OF CONDITIONS FOR SCHEDULE H

Schedule I - Light

- (I1) Subject to condition (I2), the emission of light resulting from the mining activity must not cause an environmental nuisance at any sensitive place.
- (I2) When requested by the administering authority, an assessment of the light nuisance* must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (with in neither frivolous nor vexatious based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within 14 days of the administering authority following completion of the assessment.
- (I3) If the assessment indicates condition (I1) is not being met then the environmental authority holder must:

- a) address the complaint including the use of appropriate dispute resolution if requires; or
- b) immediately implement light abatement measures so the emissions of light from the activity do not result in further environmental nuisance.

(* = Assessment to be conducted according to and with reference to the limits specified in AS 4282-1997 Control of the Obtrusive Effects of Outdoor lights).

END OF CONDITIONS FOR SCHEDULE I

Schedule J – Definitions

Words and phrases used throughout this licence are defined below except where identified in the *Environmental Protection Act 1994* or subordinate legislation. Where a word or term is not defined, the ordinary English meaning applies, and regard should be given to the Macquarie Dictionary.

"µg/L" means micrograms per litre.

"50th percentile" means that the measured values of the quality characteristic must not be greater than the release limit for any more than three out of six consecutive samples where the time interval between the taking of each consecutive sample is not less than three days.

"80th percentile" means that the measured values of the quality characteristic must not be greater than the release limit for any more than one out of five consecutive samples where the time interval between the taking of each consecutive sample is not less than three days.

"acceptance criteria" means the measures by which actions implemented are deemed to be complete. The acceptance criteria indicate the success of the decommissioning and rehabilitation outcomes or remediation of areas which have been significantly been disturbed by the mining activities. Acceptance criteria may include information regarding:

- stability of final land forms in terms of settlement, erosion, weathering, pondage and drainage;
- control of geochemical and contaminant transport processes;
- quality of runoff waters and potential impact on receiving environment;
- vegetation establishment, survival and succession;
- vegetation productivity, sustained growth and structure development;
- fauna colonisation and habitat development;
- ecosystem processes such as soil development and nutrient cycling, and the recolonisation of specific fauna groups such as collembola, mites and termites which are involved in these processes;
- microbiological studies including recolonisation by mycorrhizal fungi, microbial biomass and respiration;
- effects of various establishment treatments such as deep ripping, topsoil handling, seeding and fertiliser application on vegetation growth and development;
- resilience of vegetation to disease, insect attack, drought and fire;
- vegetation water use and effects on ground water levels and catchment yields.

"Act" means the Environmental Protection Act 1994.

"administering authority" means the Environmental Protection Agency or its successor.

"airblast overpressure" is the energy transmitted from the blast site within the atmosphere in the form of pressure waves, consisting of both audible (noise) and inaudible (concussion) energy. The maximum excess pressure in this wave is the peak airblast overpressure measured in decibels linear (dB).

"ambient (or total) noise" at a place, means the level of noise at the place from all sources (near and far), measured as the Leq for an appropriate time interval.

"annual exceedance probability" means the probability that the given event will be exceeded within a one year period.

"appropriately qualified person" means a person or body possessing appropriate experience and qualifications to perform these tasks.

"ARD" means acid rock drainage and refers to the low pH, high heavy metal pollutant typical of sulphidic mine wastes, and most commonly associated with the production of ferrous iron and sulphuric acid through the oxidation of sulphide minerals.

"authority" means Environmental Authority under the Environmental Protection Act 1994.

"background noise level" means noise, measured in the absence of the noise under investigation, as either:

- L A90,T being the A-weighted sound pressure level exceeded for 90 percent of the time period of not less than 15 minutes, using Fast response, or
- L LA_{avg},T being the arithmetic average of the minimum readings during a representative time period of not less than 15 minutes, using Fast response.

"blasting" means the use of explosive materials to fracture-

- (a) rock, coal and other minerals for later recovery; or
- (b) structural components or other items to facilitate removal from a site or for reuse.

"commercial place" means a place used as an office or for business or commercial purposes, other than a place within the boundaries of the operational land.

"construction" in relation to tailings dams includes building a new dam and modifying or lifting an existing dam.

"dam" means a containment or proposed containment whether permanent or temporary, which is designed to contain, divert or control flowable substances. However this does not include a fabricated or manufactured tank or container designed to a recognised standard.

"dB (Linear) Peak" is the maximum reading in decibels (dB) obtained using the "P" time – weighting characteristic as specified in AS 1259.1 – 1990 with all frequency – weighted networks inoperative.

"design plan" - in the context of a dam design is the documentation required under the "Code of Environmental Compliance for High Hazard Dams Containing Hazardous Waste" to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, the procedures and criteria to be used for operating the dam and the decommissioning and rehabilitation objectives in terms procedures, works and outcomes at the end of dam life. The documents can include design and investigation reports, drawings, specifications and certifications.

"design plan in the context of a dam design" is the documentation required under the Code of Environmental Compliance for High Hazard Dams Containing Hazardous Waste to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, the procedures and criteria to be used for operating the dam and the decommissioning and rehabilitation objectives in terms procedures, works and outcomes at the end of dam life. The documents can include design and investigation reports, drawings, specifications and certifications.

"design storage allowance" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"declared plant" means a plant that has been declared under the Rural Lands Protection Act 1985.

"environmental authority holder" means the holder of this environmental authority.

"environmental nuisance" is unreasonable interference or likely interference with an environmental value caused by:

- (a) noise, dust, odour, light; or
- (b) an unhealthy, offensive or unsightly condition because of contamination; or
- (c) another way prescribed by regulation.

"flowable substance" means matter or mixture of materials which can be forced to or otherwise flow under any conditions possible in a situation. It includes water, other liquids or a mixture that includes water or any other liquid or suspended solids.

"foreseeable future" is the period used for assessing the total risk of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptable risk of failure before that time.

"hazardous waste" means any substance, whether liquid, solid or gaseous, derived by or resulting from, the processing of minerals that tends to destroy life or impair or endanger health.

"high hazard dam" means a dam defined as high hazard in the EPA Information Sheet on Determining Dams Containing Hazardous Waste.

"infrastructure" means water storage dams, roads and tracks, buildings and other structures built for the purpose of mining activities but does not include facilities required for the long terms management of mining impacts or the protection of potential resources. Such facilities include dams containing hazardous waste, waste rock dumps, voids, or ore stockpiles and buildings or other structures whose ownership can be transferred and which have a residual beneficial use for the next owner of the operational land or the background land owner.

"L_{Amax adj,T}" means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over a time period of not less than 15 minutes, using Fast response.

"L_{Ar, 1 hour}" means the specific noise level measured as the A-weighted equivalent continuous noise level (L_{Aeq}) plus any adjustment for the character of the noise (tonal and/or impulsive) determined over a reference time period of one hour.

"land" in the "land Schedule 2" of this document means land excluding waters and the atmosphere.

"land capability" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"land suitability" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"land use" term to describe the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

"leachate" means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

"mandatory reporting level" the volume below the spillway crest, equivalent to the lower of the AEP, 72 hour storm or the AEP wave allowance (AEP is the annual exceedence probability).

"Maximum Instantaneous Charge (MIC)" is the maximum amount of explosive on any one specific delay detonator in any one blast hole.

"maximum" means that the measured value of the quality characteristic or contaminant must not be greater than the release limit stated.

"MaxLpA,T" means the maximum A-weighted sound pressure level measured over a time period of not less than 15 minutes, using Fast response.

"median" means the middle value, where half the data are smaller, and half the data are larger. If the number of samples is even, the median is the arithmetic average of the two middle values.

"mg/kg" means milligrams per kilogram.

"mg/L" means milligrams per litre.

"minimum" means that the measured value of the quality characteristic or contaminant must not be less than the release limit stated.

"ng/L" means nanograms per litre.

"noise sensitive place" means:

- a legal dwelling, caravan park, residential marina or other residential premises; or
- a motel, hotel or hostel; or
- a kindergarten, school, university or other educational institution; or
- a medical centre or hospital; or
- a protected area; or
- a public park or gardens.

and includes the curtilage of any such place.

"noxious" means harmful or injurious to health or physical well being, other than trivial harm.

"offensive" means causing unreasonable offence or displeasure; is unreasonably disagreeable to the sense; disgusting, nauseous or repulsive, other than trivial harm.

"peak particle velocity (ppv)", is a measure of ground vibration magnitude and is the maximum instantaneous particle velocity at a point during a given time interval in mms-1. (Peak particle velocity can be taken as the vector sum of the three component particle velocities in mutually perpendicular directions).

"percent slope" =

"protected area" means:

- a protected area under the Nature Conservation Act 1992; or
- a marine park under the Marine Parks Act 1992; or
- a World Heritage Area.

"progressive rehabilitation" means rehabilitation (defined below) undertaken progressively OR a staged approach to rehabilitation as mining operations are ongoing.

"range" means that the measured value of the quality characteristic or contaminant must not be greater than the higher release limit stated nor lower than the lower release limit stated.

"rehabilitation" means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this Environmental Authority and, where relevant, includes remediation of contaminated land.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"residual void" means an open pit resulting from the removal of ore and/or waste rock, which will remain following the cessation of all mining activities and completion of rehabilitation processes.

"sediment dam" means a structure for the capture and treatment of stormwater runoff contaminated only by sediments from disturbed areas and which discharge off-site once full.

"self sustaining" means an area of land which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

"sensitive place" [e.g. odour and dust] has the same meaning as and includes a noise sensitive place and a commercial place.

"significant disturbance" – includes land

- (a) if it is contaminated land; or
- (b) it has been disturbed and human intervention is needed to rehabilitate it.
 - i. to a state required under the relevant environmental authority; or
 - ii. if the environmental authority does not require the land to be rehabilitated to a particular state – to its state immediately before the disturbance.

Some examples of disturbed land include:

- areas where soil has been compacted, removed, covered, exposed or stockpiled;
- areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion; (vegetation & topsoil)
- areas where land use suitability or capability has been diminished;
- areas within a watercourse, waterway, wetland or lake where mining activities occur;
- areas submerged by tailings or hazardous contaminant storage and dam walls in all cases;
- areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after mining activities have ceased; or
- areas where land has been contaminated and a suitability statement has not been issued.

However, the following areas are not included:

- areas off lease (e.g. roads or tracks which provide access to the mining lease);
- areas previously significantly disturbed which have achieved the rehabilitation outcomes;
- by agreement with the EPA, areas previously significantly disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);

- areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc), which is to be left by agreement with the landowner. The agreement to leave permanent infrastructure must be recorded in the Landowner Agreement and lodged with the EPA;
- disturbances that pre-existed the grant of the tenure unless those areas are disturbed during the term of the tenure.

"spillway" means the passage or outlet from the dam through which surplus water flows.

"spillway crest" means the highest point (elevation) of the spillway, above which water will flow along the spillway and discharge from the dam if the flow rate is sufficient.

"stable" means land form dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (traffic ability), erosion resistance and geochemical stability with respect to seepage and contaminant generation.

'suitably qualified and experienced person' in relation to dams means a person who is a Registered Professional Engineer of Queensland under the provisions of the Professional Engineers Act 1988 or a Corporate Member of the Institution of Engineers Australia or holds equivalent professional qualifications and has the following: (a) knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and (b) at least a total of five years of suitable experience and demonstrated experience in at least four of the following areas: investigation, design, or construction of dams, operation and maintenance of dams, geomechanics with particular emphasis on stability, geology and geochemistry, hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology, hydraulics with particular reference to sediment transport and disposition, erosion control, beach processes, and hydrogeology with particular reference to groundwater, solute transport processes and monitoring thereof; and dam safety.

"the holder" means the holder of this Environmental Authority.

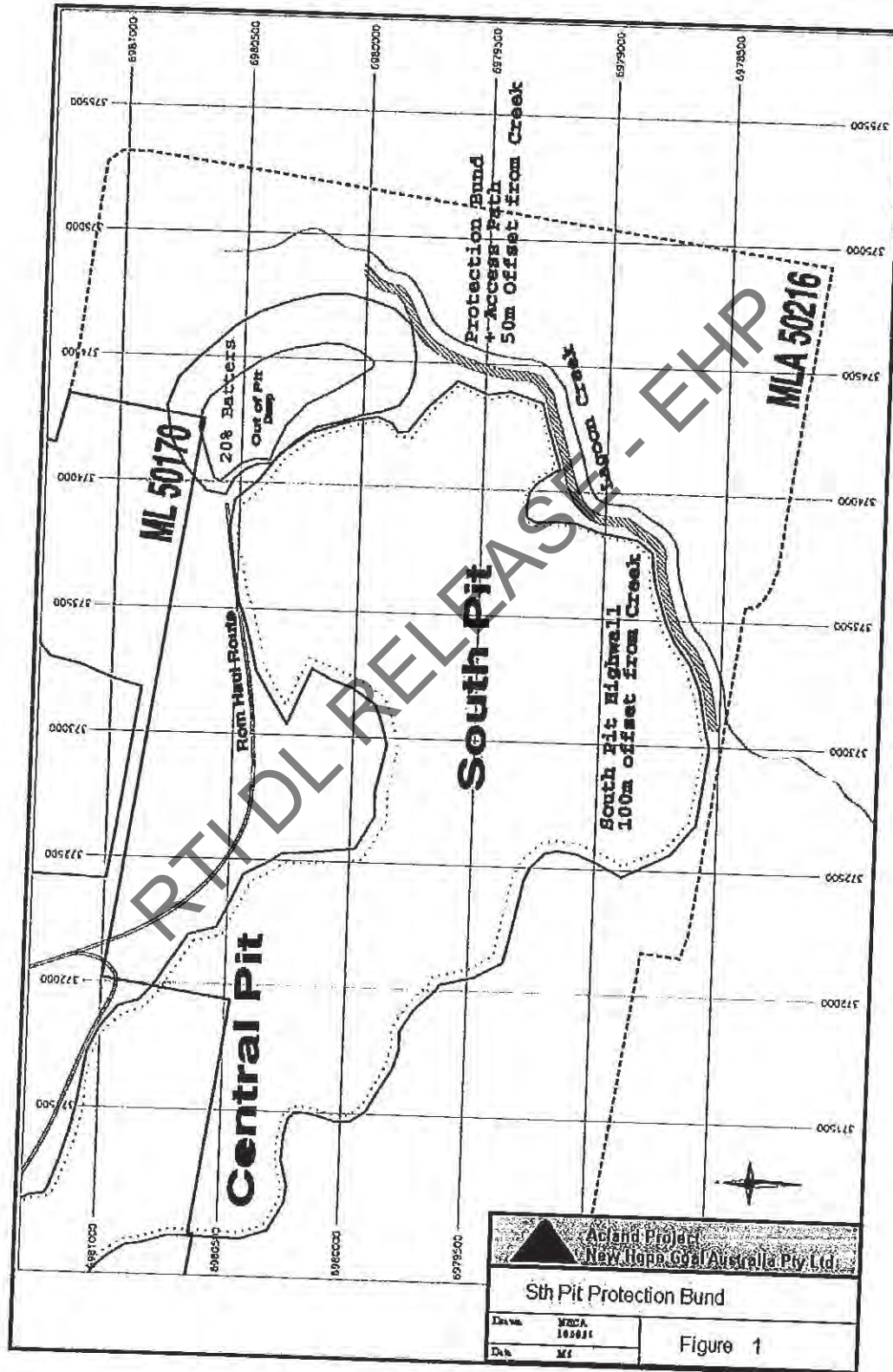
"Total Organic Carbon" ("TOC") means the sum of all compounds of carbon which contain at least one carbon to carbon bond plus methane and its derivatives. For the purpose of measurement 1 gram of TOC is deemed to have the same flame ionisation response as 1 gram of hexane.

"tolerable limits" means that a range of values could be accepted to achieve an overall environmental management objective (eg a range of settlement of a tailing capping could still meet the objective of draining the cap quickly, preventing pondage and limiting infiltration and percolation).

"waters" - includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water in natural or artificial watercourses, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater or any part-thereof.

END OF CONDITIONS FOR SCHEDULE J

Map 2: Lagoon Creek, buffer and levee



END OF CONDITIONS FOR SCHEDULE K

END OF PERMIT

RTI DL RELEASE - EHP



Notice of concurrence agency response

Sections 3.3.16 and 3.3.18 *Integrated Planning Act 1997*

This notice is issued by the administering authority pursuant to sections 3.3.16 and 3.3.18 of the Integrated Planning Act 1997, to advise you of a decision or action.

Enquiries to : Althena Davidson
Telephone : (07) 4639 4599
Your reference : 80108.224
Our reference : WT0507DA

The Chief Executive Officer
Jondaryan Shire Council
P.O. Box 105
OAKEY QLD 4401

Mr Michael Matthewson
Oakey Abattoir Pty Ltd
P.O. Box 156
Oakey Q 4401

Attention: Mr Noel Cass,

Re: Application (No. 80108.224) for development approval by Oakey Abattoir Pty Ltd for assessable development to be carried out at a place situated at Oakey Connection Road, OAKEY Q 4401

Pursuant to the following items of Schedule 2 of the *Integrated Planning Regulation 1998*, the Environmental Protection Agency is the concurrence agency for the development application:

Item 3 of Schedule 2 of the *Integrated Planning Regulation 1998*

The Environmental Protection Agency, acting as a concurrence agency under the *Integrated Planning Act 1997*, provides its response to the application detailed above as attached.

The Environmental Protection Agency, as the administering authority for the *Environmental Protection Act 1994* is required by section 540 to maintain a register of development approvals for environmentally relevant activities.

It would be appreciated if Council could provide a signed hard copy of the final development approval issued by Council (which includes the Agency's concurrence conditions), and an electronic copy of that development approval. The signed "hard copy" can be posted to the Agency's Environmental Support Officer.

Environmental Support Officer
Environmental Protection Agency
South-West District Office (Toowoomba)
PO Box 731 TOOWOOMBA QLD 4350

The electronic copy for the electronic register can be e-mailed in this instance to the Environmental Support Officer, Shari Griinke at e-mail address: shari.griinke@epa.qld.gov.au.

The EPA has not provided a notification to native title parties for this application. The State's Native Title Work Procedures indicate that responsibility for assessment of native title issues for an IDAS application rest with the



Assessment Manager. It is recommended that you undertake an assessment using your own guidelines to determine if a native title notification is required for this application.

Should you require any further information please do not hesitate to contact Althena Davidson on either phone (07) 4639 4599 or e-mail: althena.davidson@epa.qld.gov.au

sch4-Signature

12 June 2003

Date

Sarah Fenaughty
District Manager (South West)
Southern Region
Delegate of Administering Authority
Environmental Protection Act 1994

RTI DL RELEASE - EHP



Concurrence Agency Response

Section 3.3.16 and 3.3.18 *Integrated Planning Act 1997*

Applicant:	Oakey Abattoir Pty Ltd
Assessment Manager	80108.224
Application number:	
EPA Development	WT0507DA
Application number:	
Date application received by EPA:	17 March 2002
Relevant Laws and Policies:	<i>Environmental Protection Act 1994</i> and subordinate legislation
Jurisdiction:	Item 3 of Schedule 2 of the <i>Integrated Planning Regulation 1998</i>

Development Description:

Carrying out of Environmentally Relevant Activity (ERA):

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

17 Fuel burning - Any process involving the use of fuel burning equipment (including, for example, a standby power generator) that is capable of burning (whether alone or in total) 500 kg or more of fuel an hour

32(a)(iii) Meat processing - Slaughtering animals for commercially producing meat or meat products for human consumption, or processing (other than smoking mentioned in item 35) or packaging of meat or meat products for human consumption if an integral part of the activity involves the operation of a rendering plant with a design production capacity of more than 300 t per year in works (other than a retail butcher shop) having a design production capacity of 6 000 t or more a year

53 Soil conditioner manufacturing - Commercially manufacturing soil conditioners (other than spent mushroom growing substrate by a mushroom grower) by receiving and blending, storing, processing, drying or composting organic material or organic waste, including, for example, animal manures, sewage, septic sludges and domestic waste, in works having a design production capacity of 200 t or more a year

at the following place(s):

Lot 5 AG4200, Lot 6 AG4200, Lot 7 AG4200, Lot 8 AG4200, Lot 6 AG4202, Lot 20 AG4202,
Lot 1 RP36444, Lot 4 RP36445, Lot 1 RP36446, Lot 1 RP36447, Lot 3 RP36447, Lot 4 RP36447,
Lot 13 RP36450, Lot 21 RP36505, Lot 1 RP850984, Lot 2 RP867778, Lot 3 RP867778,
Lot 1 D36648, Lot 2 O1521

located at:

Oakey Connection Road, OAKEY Q 4401

Type of development

Material change of use of premises is:

- a material change in the intensity or scale of the use of the premises, and
- the holder of an environmental authority, or development approval, for an environmentally relevant activity proposes to carry out works for the construction or alteration of premises, or for the installation or alteration of plant or equipment in premises, for carrying out the activity; and the construction, alteration or installation will result in an increase of 10% or more in the release of contaminant into the environment under the authority or approval

Response to Development Application

The Environmental Protection Agency, acting as a concurrence agency under the *Integrated Planning Act 1997*, provides its response to the application detailed above.

The concurrence agency response is that conditions must attach to any development approval

Reasons for inclusion of development conditions or refusal

In accordance with section 3.3.18(7) of the *Integrated Planning Act 1997* and section 27B of the *Acts Interpretation Act 1954*, a concurrence response must include reasons for a refusal or for the inclusion of development conditions. The Environmental Protection Agency is recognised as a concurrence agency under the *Integrated Planning Amendment Regulation (No. 1) 1998* for the protection of the environment against the release or potential release of contaminants that will or may cause environmental harm. Development conditions placed on the development approval for the environmentally relevant activity are in accordance with section 79 of the *Environmental Protection Act 1994* ('the EP Act').

The Environmental Protection Agency concurrence agency conditions for this proposed development that are contained within this response, are required in accordance with section 92 of the *EP Act* and are relevant to the object and policies pertaining to the *EP Act*.

Additional comments or advice about the application

Nil

Additional information for applicants

This concurrence response pursuant to section 79 the EP Act applies only to the environmentally relevant activity(ies) component of the development and does not remove the need to obtain any further approval for this development which may be required pursuant to this or other legislation, both State and Commonwealth. Applicants are advised to check with all relevant statutory authorities for such approvals as may be required.



It is a requirement of the *Environmental Protection Act 1994* that if the owner or occupier of this site becomes aware a Notifiable Activity (as defined under schedule 2 of the *Environmental Protection Act 1994*) is being carried out on this land or that the land has been affected by a hazardous contaminant, they must, within 30 days after becoming aware the activity is being carried out, give notice to the Environmental Protection Agency. A list of Notifiable Activities is provided within Schedule 2 of the *Environmental Protection Act 1994*.

sch4-Signature

12 June 2003

Date

Sarah Fenaughty
District Manager (South West)
Southern Region
Delegate of Administering Authority
Environmental Protection Act 1994

RTI DL RELEASE - EHP

Conditions of the development approval

As part of the concurrence agency response the following schedules of development conditions are to be attached to the development approval:

The aforementioned description of the environmentally relevant activity (ERA) for which this development approval is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this development approval. Where there is any conflict between the above description of the ERA for which this development approval is issued and the conditions as specified in this development approval as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This development approval authorises the ERA. It does not authorise environmental harm unless a concurrence agency condition within this development approval explicitly authorises that harm. Where there is no condition or the development approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

- Schedule A - Activity
- Schedule B - Air
- Schedule C - Water
- Schedule D - Noise
- Schedule E - Waste
- Schedule F - Land
- Schedule G - Community
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - Activity

Prevent and /or minimise likelihood of environmental harm

- (A1) In carrying out the environmentally relevant activities, you must take all reasonable and practicable measures to prevent and /or to minimise the likelihood of environmental harm being caused. Any environmentally relevant activity, that, if carried out incompetently, or negligently, may cause environmental harm, in a manner that could have been prevented, shall be carried out in a proper manner in accordance with the conditions of this approval.

NOTE: This approval authorises the environmentally relevant activity. It does not authorise environmental harm unless a condition contained within this approval explicitly authorises that harm. Where there is no condition or the approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of measures, plant and equipment

- (A2) The holder must:
- install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and
 - maintain such measures, plant and equipment in a proper and efficient condition; and
 - operate such measures, plant and equipment in a proper and efficient manner.

Display of Environmental Authority

- (A3) A copy of this development approval must be kept in a location readily accessible to personnel carrying out the activity.

Alterations

- (A4) No change, replacement or operation of any plant or equipment is permitted if the change, replacement or operation of the plant or equipment increases, or is likely to substantially increase, the risk of environmental harm above that expressly provided by this development approval.

An example of a substantial increase in the risk of environmental harm is an increase of 10% or more in the quantity of the contaminant to be released into the environment.

Calibration

- (A5) All instruments and measuring devices used for the measurement or monitoring of any parameter under any condition of this development approval must be calibrated, and appropriately operated and maintained.

Site based management plan

- (A6) From commencement of the activity, a Site Based Management Plan (SBMP) must be implemented. The SBMP must identify all sources of environmental harm, including but not limited to the actual and potential release of all contaminants, the potential impact of these sources and what actions will be taken to prevent the likelihood of environmental harm being caused. The SBMP must also provide for the review and 'continual improvement' in the overall environmental performance of all Environmentally Relevant Activities that are carried out.

The site based management plan must address the following matters:

- Environmental commitments - a commitment by senior management to achieve environmental goals.
- Identification of environmental issues and potential impacts.
- Control measures for routine operations to minimise likelihood of environmental harm.
- Contingency plans and emergency procedures for non-routine situations.
- Organisational structure and responsibility.
- Effective communication.
- Monitoring of the contaminant releases.
- Conducting environmental impact assessments.
- Staff training.
- Record keeping.
- Periodic review of environmental performance and continual improvement.

Records

- (A7) Record, compile and keep all monitoring results required by this document and present this information to the administering authority when requested, in a specified format.



Regulated waste

- (A8) Records must be kept for three years, and must include the following information:
- date of pickup of waste;
 - description of waste;
 - cross reference to relevant waste transport documentation;
 - quantity of waste;
 - origin of the waste;
 - destination of the waste; and
 - intended fate of the waste, for example, type of waste treatment, reprocessing or disposal.

NOTE: Records of documents maintained in compliance with a waste tracking system established under the *Environmental Protection Act 1994* or any other law for regulated waste will be deemed to satisfy this condition.

Visitors

- (A9) Visitors (including contractors) to the site must be under the reasonable supervision of a relevant staff member where it is reasonably necessary to ensure compliance by the holder of their obligations arising under this development approval.

END OF CONDITIONS FOR SCHEDULE A

Schedule B - Air

Nuisance

- (B1) The release of noxious or offensive odour(s) or any other noxious or offensive airborne contaminant(s) resulting from the activity must not cause any environmental nuisance at any odour sensitive place.
- (B2) The holder must maintain effective odour response and management procedures that include provision for:
- quantification of existing odour emissions based on field monitoring and assessment of odours during operations; and
 - modelling of emissions, for use with and in response to complaints;
 - reporting of results to the plant manager or other person responsible for plant operations;
 - recording of assessment results and responses;
 - initiation of modification of plant operation when becoming aware of: the event causing or potentially causing a nuisance; field observation of odour; or receipt of a valid complaint; and
 - continual improvement in odour management.

Note: All determinations of odour releases to the atmosphere must be made in accordance with methods prescribed in the most recent version of the Australian and New Zealand Standard AS/NZS 4323.3:2001, Stationary source emissions – Determination of odour concentration by dynamic olfactometry.

- (B3) In the event that the existing emission control system does not achieve compliance with the odour outcome required by condition B1, then the holder must either amend operational practices or implement the additional odour capture and control measures to ensure such compliance.

Biofilter Operation

- (B4) All gases from the wet and dry rendering plants and gel bone plant must be treated by an appropriately designed biofilter to minimize the likelihood of odour emissions and must be in accordance with the stages as provided in Table 5 (section 4.7) and section 5.4.1 of the Oakey Abattoir Upgrade Air Quality Working Paper (ProAnd Associates, May 2002).
- (B5) The holder of this development approval shall operate the biofilter in a manner to prevent or minimise the release of contaminants to the atmosphere.

Dust nuisance

- (B6) The release of dust and/or particulate matter resulting from the activity must not cause an environmental nuisance at any dust sensitive place.
- (B7) Exceedence of any of the following levels when measured at any dust sensitive place is an environmental nuisance for the purposes of condition B6.
- Dust deposition of 120 milligrams per square metre per day, when monitored in accordance with Australian Standard AS 3580.10 of 1991; OR
 - A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere of 150 micrograms per cubic metre over a 24 hour averaging time, at a dust sensitive place downwind of the site, when monitored in accordance with:
 - Australian Standard AS 3580.9.6 'Ambient air - Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet - Gravimetric method'; or
 - any alternative method of monitoring PM10 that may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.
- (B8) When requested by the Administering Authority, dust and particulate monitoring must be undertaken to investigate any complaint of environmental nuisance caused by dust and/or particulate matter, and the results notified within 14 days to the administering authority following completion of monitoring. Monitoring must be carried out at a place(s) relevant to the potentially affected dust sensitive place and at upwind control sites and must include:
- for a complaint alleging dust nuisance, dust deposition; and
 - for a complaint alleging adverse health effects caused by dust, the concentration per cubic metre of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere over a 24hr averaging time.

The release of contaminants to the atmosphere

- (B9) The release of contaminants to the atmosphere from a point source must only occur from those release points identified in Schedule B - Table 1 and must be directed vertically upwards without any impedance or hindrance.
- (B10) Contaminants must be released to the atmosphere from a release point at a height and a flow rate not less than the corresponding height and velocity stated for that release point in Schedule B - Table 1.

Schedule B - Table 1 (Release of contaminants)

RELEASE POINT NUMBER	SOURCE DESCRIPTION	MINIMUM RELEASE HEIGHT (metres)	MINIMUM VELOCITY (m/sec)
A1	Stack (Coal-fired Boiler)	30 m above the boiler house floor	8*
A2	Stack (Gas-fired Boiler)	6 m above the highest point of the roof of emergency	5*
A3	Stack (Gel Bone Plant)	12 m above ground level	15
A4	Stack (Digester)	12 m above ground level	15

* Efflux velocity of emission is measured when the plant is operating at its maximum capacity.

- (B11) Contaminants must not be released to the atmosphere from a release point at a mass emission rate/concentration, as measured at a monitoring point, in excess of that stated in Schedule B - Table 2 and monitored not less frequently than Schedule B - Table 3.

Schedule B – Table 2

RELEASE POINT NUMBER	CONTAMINANT	RELEASE LIMIT	RELEASE LIMIT UNITS
A1 Stack (coal-fired boiler)	Solid Particles	250*	mg/Nm ³
A2 Stack (gas-fired boiler)	Oxides of nitrogen (NOx)	350**	mg/Nm ³

* Effluent gas calculation is corrected to 12 percent by volume of carbon dioxide.

** Calculation is at 7% oxygen reference level

Monitoring of Contaminant Releases to the Atmosphere

- (B12) A continuous smoke recording apparatus is to be in operation for the coal-fired boiler flue gas in the chimney.
- (B13) The holder of this development approval must conduct and keep records of a monitoring program of contaminant releases to the atmosphere at the release points, minimum frequency, and for the determinations specified in Schedule B Table 3, as well as contingency monitoring during plant upsets, and which complies with the following:
- Monitoring provisions for the release points listed in Schedule B - Table 3 must comply with the Australian Standard AS 4323.1-1995 Stationary source emissions - Selection of sampling positions.
 - The following tests must be performed for each required determination specified in Schedule B - Table 3:
 - gas velocity and volume flow rate;
 - temperature
 - water vapour concentration (for non continuous sampling),

- Where practicable samples taken must be representative of the contaminants discharged when emissions are expected to be normal, except for specific purpose samples to be taken during periods of upset conditions', 'commissioning', 'start-up' and 'shutdown'.
- During the sampling period the following additional information must be gathered:
 - production rate, and
 - plant status.

Schedule B - Table 3

DETERMINATION REQUIRED	RELEASE POINT	FREQUENCY
Solid Particles	A1 Stack (Coal-fired boiler)	Annually
Odour emission rate (OUV/s)	Gel Bone Stack (when in operation)	Annually
Odour emission rate (OUV/s)	Rendering Plants (when in operation)	Annually
Odour emission rate flux (OUV/m ² /s)	Biofilter	Annually

Rendering Issues

- (B14) All rendering and by-product processing activities must be carried out in an enclosed building (the by-products building).
- (B15) Monitoring and keeping of records of parameters that indicate effective operation of the gas/vapour collection and treatment equipment must be undertaken. Records must be marked to show the true calendar date and time of day.

Spray Drift – Irrigation Area

- (B16) The holder of this development approval must ensure that the irrigation of treated wastewater does not occur:
- when spray drift is, or would be reasonably expected to be, carried beyond the boundaries of the place to which this development approval relates; and
 - at a location where spray drift is, or would be reasonably be expected to be, carried beyond the boundaries of the place to which this development approval relates.

Public Health and Safety Issues

- (B17) The activities must be carried out in a manner that does not adversely affect public health and safety or otherwise cause an environmental nuisance, for example, due to smoke, breeding of flies, pests or vermin or release of aerosols, dusts or other contaminants to public areas, that may cause zoonotic diseases.

END OF CONDITIONS FOR SCHEDULE B

Schedule C - Water

Release to waters

- (C1) Contaminants must not be released from the site to any waters or the bed and banks of any waters.

Stormwater management measures

- (C2) There must be no release of stormwater runoff that has been in contact with any contaminants at the site to which this development approval relates to any waters, roadside gutter or stormwater drain.
- (C3) The measures must address at least the following issues:
- implementing and maintaining systems to prevent the release of contaminated stormwater from the site to any stormwater drain or any water;
 - prevention of incident stormwater and stormwater run-off from contacting wastes or contaminants;
 - diversion of upstream run-off away from areas containing wastes or contaminants;
 - collection, treatment and disposal of contaminated stormwater run-off, for example, from irrigation areas and any short term solid waste storage areas;
 - management of the application of contaminants to all areas where irrigation occurs; and
 - periodic monitoring of the quality of any stormwater released to ensure the measures adopted prevent the discharge of contaminated stormwater.
- (C4) The maintenance and cleaning of vehicles and any other equipment or plant must be carried out in areas that prevent the resultant contaminants being into any waters, roadside gutter or stormwater drainage system.
- (C5) Any spillage of wastes, or contaminants that may cause environmental harm, must be effectively contained and/or cleaned up as quickly as practicable. Such spillage must not be cleaned up by hosing, or otherwise releasing such waste or contaminants to any stormwater drainage system, roadside gutter or waters.

Groundwater Monitoring

- (C6) A Groundwater Monitoring System must be designed for the site by an appropriately qualified hydrogeologist.
- (C7) The holder of this development approval must conduct monitoring to ensure that the release of contaminants to land does not adversely affect groundwater.

Note: The quality characteristics to be monitored for groundwater, and the minimum frequency at which samples must be collected for analysis, are specified in Schedule C Table 1. These samples must be collected at monitoring points that are representative of potentially affected groundwater upgradient and downgradient of, and within, irrigation areas.

- (C8) Results obtained from sampling of groundwater must be kept and supplied to the Administering Authority on request, in accordance with Condition A7 of this approval.

Schedule C - Table 1 (Parameters for Groundwater Monitoring Program)

PARAMETER	MINIMUM MONITORING FREQUENCY
Standing Water Level	6 monthly
PH	6 monthly
Electrical Conductivity	6 monthly
Chloride	6 monthly
Total Dissolved Solids	6 monthly
Sodium Absorption Ratio	6 monthly
Total Nitrogen	6 monthly
Nitrate	6 monthly
Total Phosphorous	6 monthly
Total Coliforms	6 monthly
<i>E. coli</i>	6 monthly

Bunding

- (C9) Spillage of all chemicals and fuels must be contained within an on-site containment system and controlled in a manner that prevents environmental harm.
- (C10) All petroleum product storages must be designed, constructed and maintained in accordance with Australian Standard AS 1940-1993 – The storage and handling of flammable and combustible liquids.
- (C11) The base and walls of all bunded areas must be maintained free from gaps or cracks.
- (C12) All containment systems must be roofed where practicable. Where it is impractical to completely roof a containment system, any stormwater captured within the system must be free from contaminants or wastes prior to any release.
- (C13) Liquid handling operations such as tallow handling and fuel handling must be conducted in a manner that prevents any release of such liquids to stormwater drains or waters.

Pond conditions

- (C14) All ponds used for the storage or treatment of contaminants, sewage or wastes at or on the place to which this development approval relates must be constructed, installed and maintained:
- so as to minimise the likelihood of any release of effluent through the bed or banks of the pond to any waters (including ground water);
 - so that a freeboard of not less than 0.3 metres is maintained at all times on treatment ponds, except in emergencies;
 - so that a freeboard of not less than 0.3 metres is maintained at all times on the wet weather storage pond, except in emergencies; and
 - so as to ensure the stability of the ponds' construction.

Composting

- (C15) Composting or compost remixing must be carried out on hardstand pads that:
- are constructed of compacted clay or other low permeability material or using an equivalent best practice containment technology, to effectively minimise the likelihood of any release of contaminants to groundwater;
 - are graded to avoid rainwater ponding; and

- facilitate run-off of leachates and contaminated stormwater to a dedicated and appropriate leachate and stormwater collection pond(s) via an appropriate first-flush system.

Sediment and Erosion Control

- (C16) Diversion drains, appropriate first flush systems and grades or equivalent must be installed to ensure surface waters from production areas and any associated disturbed area, including composting areas, operational or trafficable areas, are diverted to the appropriate stormwater run-off and leachate pond or ponds.
- (C17) Drainage through and from all trafficable areas and production activities must be designed to minimise surface flow velocities.

END OF CONDITIONS FOR SCHEDULE C

Schedule D - Noise and vibration

Noise nuisance

- (D1) Noise from activities must not cause an environmental nuisance at any noise affected premises.
- (D2) When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) or environmental nuisance at any noise affected place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

Schedule D - Table 1 (Noise limits)

Noise level dB(A) measured as	Monday to Saturday			Sundays and public holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
	Noise measured at a 'Noise sensitive place'					
L _{A10} , adj, 15 mins	45	45	40	45	45	40
	Noise measured at a 'Noise sensitive place'					
L _{A1} , adj, 15 mins	50	50	45	50	50	45

Noise monitoring

(D3) If the development approval holder can provide evidence through monitoring of noise from the environmentally relevant activities, that the limits defined in Schedule D – Table 1 are not being exceeded (and that monitoring does not conflict with any monitoring conducted by the administering authority) then the holder is not in breach of condition (D1). Monitoring must include:

- L_{A10}, adj 15 mins;
- L_{A1}, adj 15 mins;
- the frequency of occurrence of impulsive or tonal noise;
- atmospheric conditions including wind speed and direction;
- effects due to extraneous factors such as traffic noise; and
- location, date and time of recording.

Note: where the results of noise monitoring are provided under a notification given to the administering authority under either sections 320 or 350 of the *Environmental Protection Act 1994*, then notification of noise monitoring results under (D3) is not also required.

(D4) If monitoring of noise from environmentally relevant activities indicates that noise exceeds the limits in Schedule D – Table 1, then the development approval holder must:

- address the complaint including the use of appropriate dispute resolution if required; or
- within 7 days advise the administering authority of any noise abatement measures to be taken; and
- within 14 days implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.

(D5) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

(D6) For the purposes of compliance with condition (D1), if the administering authority conducts monitoring and that monitoring indicates exceedence of the limits in Schedule D – Table 1 from the carrying out of the environmentally relevant activities then condition (D3) shall not apply.

END OF CONDITIONS FOR SCHEDULE D

Schedule E - Waste

General

(E1) Waste must not be released to the environment, stored, transferred or disposed of contrary to any condition of this development approval.

(E2) The holder of this environmental authority must not allow waste to be removed from the site and burned elsewhere, unless approval has been obtained under the *Fire and Rescue Authority Act 1990* and from the relevant local authority.

Waste handling

(E3) Regulated waste must be handled and transferred in a proper manner to prevent any leakage or spillage of waste.

- (E4) All regulated waste removed from the site must be removed by a person who holds a current approval to transport such waste under the provisions of the *Environmental Protection Act 1994*.

Note: Records must be maintained as per condition A8 of this development approval

Compost Waste

- (E5) Composting of wastes must only occur within suitable areas as described in condition C15 and be in compliance with the conditions of this development approval.
- (E6) Only the following materials are permitted at the composting facility: screened paunch material, screened yard wash-down manure, and boiler ash generated at the abattoir facility. Other materials for example green waste, solid waste from a waste treatment system, may be composted provided the Administering Authority has agreed to such material being used.
- (E7) The composting process must be undertaken with sufficient number of turning cycles and generate such heat to achieve pathogen destruction in order to comply with the levels set in Table 1 of this schedule.
- (E8) Windrows must be turned at least once per week for the first four (4) weeks of composting and thereafter turned at least once every ten (10) days until the composting of materials in the windrows is complete.
- (E9) To facilitate the destruction of pathogens, all materials being composted must be subjected to a pasteurising temperature of either:
- not less than 55°C for three (3) consecutive days; or
 - between 50°C and 55°C for twelve (12) days.
- (E10) To facilitate the subjection of all composted materials to the pasteurising temperatures and time periods prescribed in condition E11, a minimum temperature of 50°C must be maintained within the composting windrow(s) for a period of not less than six (6) weeks.
- (E11) All products derived from composting activities must not exceed the quality characteristics listed in Schedule E, Table 1, Table 2 and Table 3.

Schedule E Table 1 - Quality Characteristics

QUALITY CHARACTERISTICS	QUALITY CHARACTERISTICS LIMIT
Enteric viruses	< 1 PFU per 4 grams total solids
Helminth ova (<i>Ascaris</i> sp. and <i>Taenia</i> sp.)	<1 per 4 grams total solids
<i>E. coli</i> (MPN/gram)	<100
Faecal coliforms (MPN/gram)	<1000
<i>Salmonella</i> sp.	Not Detected/50 grams of final product

Note: PFU - Plaque-forming unit
MPN means Most Probable Number

Schedule E - Table 2



Quality Characteristics Limits

QUALITY CHARACTERISTIC	QUALITY CHARACTERISTIC LIMIT FOR OFF-SITE UNRESTRICTED USE
Arsenic (mg/kg)	20
Cadmium (mg/kg)	3
Chromium (total) (mg/kg)	100
Copper (mg/kg)	100
Lead (mg/kg)	150
Mercury (mg/kg)	1
Nickel (mg/kg)	60
Selenium (mg/kg)	5
Zinc (mg/kg)	200

Schedule E - Table 3
Quality Characteristics Limits

QUALITY CHARACTERISTIC	QUALITY CHARACTERISTIC LIMIT FOR OFF-SITE UNRESTRICTED USE
DDT/DDD/DDE (mg/kg)	0.5
Aldrin (mg/kg)	0.02
Dieldrin (mg/kg)	0.02
Chlordane (mg/kg)	0.02
Heptachlor (mg/kg)	0.02
HCB (mg/kg)	0.02
Lindane (mg/kg)	0.02
BHC (mg/kg)	0.02
PCB's (mg/kg)	0.3

Note: mg/kg values are expressed on a dry weight basis

END OF CONDITIONS FOR SCHEDULE E

Schedule F - Land

Land disposal

- (F1) The release of contaminants to land must not cause environmental harm.
- (F2) The only contaminants permitted to be released to land are treated wastewaters and matured compost to the areas shown in Figure 1 of Schedule I in compliance with the Irrigation Management Plan (IMP) for the site and conditions of this authority.
- (F3) Within 3 months of the date of this development approval the holder of this development approval must develop and implement an appropriate IMP based on site-specific soil and effluent quality data, and submit a copy of this IMP to the Administering Authority.

(F4) The IMP must describe measures to ensure the sustainable release of contaminants to the land allocated for irrigation, referred to in Condition (F2).

The IMP must include but not be limited to:

1. The identification of a sufficient area of land that is suitable for irrigation;
2. An assessment of the soils in the irrigation area including types, structure, phosphorous adsorption capacity, nutrient status, salinity and sodicity, cation exchange capacity and sodium adsorption ratio (SAR) of the irrigation area;
3. Consideration of the quality and quantity of wastewater produced by the activities;
4. The occurrence, depth and characteristics of groundwater on the site together with known uses of this groundwater resource;
5. Conducting daily time step modelling (using MEDLI or similar) to estimate at least wastewater irrigation application rates, the wastewater irrigation area required and the volume of wet weather storage required, taking into account at least:
 - local climatic conditions;
 - soils in the wastewater irrigation area;
 - the crops to be grown in the wastewater irrigation area;
 - predicted effect on soil conditions of long-term irrigation with consideration being given to nutrient balance, including loads of Nitrogen and Phosphorous, and salt balance; and
 - impacts on groundwater.
6. An irrigation program, developed considering information collected for points 1 to 4 above, and based on the sustainable long-term use of the contaminant release areas, addressing at least the following matters:
 - irrigation scheduling;
 - effluent allocation to the contaminant release area;
 - management of the predicted effect on soil conditions;
 - management of the nutrient balance, including sustainable loads of nitrogen and phosphorous;
 - management of the salt balance; and
 - proposed crop development and removal strategies.
7. A monitoring program that includes soil and sub-soil analysis (beyond the root zone), to be carried out at no less than one representative site for each release location.
8. A groundwater monitoring system as required by conditions (C6) to (C8) of this development approval.

(F5) The irrigation of effluent must be carried out in a manner such that:

- vegetation is not damaged;
- soil erosion and soil structure damage is avoided;
- there is no surface ponding of effluent;
- percolation of effluent beyond the plant root zone is minimised;
- the capacity of the land to assimilate nitrogen, phosphorus, salts, organic matter as measured by oxygen demand and water is not exceeded; and
- the quality of groundwater is not adversely affected.

Off-site Irrigation of Effluent

- (F6) If the holder of this development approval gives or transfers ownership of the treated effluent to another person(s), or disposes or intends to dispose of the treated wastewaters to land other than the land to which this development approval relates, the approval holder must:
- prior to giving such effluent or transferring ownership of such effluent and / or stormwater to that person(s), obtain from that person details of how that person intends to comply with the general environmental duty provided for by Section 319 of the *Environmental Protection Act 1994* (the Act) in respect of the use and disposal of such effluent, particularly in relation to environmental sustainability of any effluent disposal, protection of public health and protection of environmental values of waters;
 - only give or transfer ownership of such effluent in accordance with a written agreement¹ between the person carrying out the activities under this development approval and that person(s);
 - develop and implement a system to monitor compliance with the written agreement and the general environmental duty provided by Section 319 of the Act; and
 - where the holder of this development approval is to irrigate effluent off-site, an appropriate system must be developed and implemented to ensure environmental harm does not occur; and
 - upon becoming aware that the person is not or is not likely to comply with the general environmental duty provided by Section 319 of the Act, cease the giving and transferring ownership of such effluent, as the case may be.

¹The written agreement with the third party user must ensure that use of the effluent is consistent with the Irrigation Management Plan developed for the site to which this development approval relates.

Irrigation in General

- (F7) Irrigation of treated effluent / stormwater must not result in runoff beyond the boundary of designated irrigation areas.

Quantity of Contaminants Released to Land

- (F8) The daily volume of contaminants released to land must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.

Wet Weather Storage

- (F9) When conditions prevent the irrigation of treated effluent to land (such as during rain events), alternative measures must be taken to store / dispose of effluent (such as wet weather storage or tankering off site).

Quality of Contaminants Released to Land

- (F10) The contaminants released must comply with each of the release limits at the monitoring point specified in Schedule F Table 1 for each quality characteristic.

Schedule F - Table 1 (Irrigation effluent contaminant release limits)

RELEASE AND MONITORING POINT	QUALITY CHARACTERISTIC	RELEASE LIMIT	
		80 th percentile	Maximum
Irrigation pump well (wet weather pond)	5 day BOD		100 mg/L
	Suspended solids	100 mg/L	
	pH		6.5 – 8.5 pH units
	Oil and grease		10 mg/L

- (F11) Notwithstanding the quality characteristic limits specified in Table 1 of Schedule F of this development approval, the contaminants released must not have any properties nor contain any organisms or contaminants in concentrations that are capable of causing environmental harm.
- (F12) Samples of treated effluent must be collected from the irrigation pump well (wet weather pond) and analysed for the quality characteristics.
- Note: All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency's Water Quality Sampling Manual;
 - carried out on samples that are representative of the discharge; and
 - recorded in accordance with Condition (A7) of this development approval.

Contaminant Release Precautions

- (F13) The holder of this development approval must take all reasonable measures to provide for the uniform distribution of contaminants over the disposal areas described in condition (F2) of this development approval. Reasonable measures would include, but not be limited to:
- selecting and installing a waste water distribution system (irrigation system) which distributes waste water through sprinklers or nozzles which provide an even coverage of the wetted area;
 - following the irrigation equipment manufacturers, or their authorised agents, recommendations with regard to using appropriately sized irrigation supply mains to ensure adequate, but not excessive, flow and pressure to all waste water distribution systems;
 - spacing distribution sprinklers, whether fixed or mobile, to avoid excessive overlap of wetted areas; and
 - preventing the release of contaminants (eg. through spray drift) beyond the irrigation area.

Soil Monitoring of the Contaminant Release Area

- (F14) The holder of this development approval must conduct monitoring to determine the effects of the release of contaminants on potentially affected soils and sub-soils.
- (F15) The quality characteristics to be monitored for soils, and the depth and minimum frequency at which samples must be collected for analysis are to be specified in the irrigation management plan (IMP) and must be collected at monitoring points that are representative of soils within the contaminant release area.
- (F16) All determinations of the condition of soils in the release area must be made by a suitably qualified person.

END OF CONDITIONS FOR SCHEDULE F

Schedule G - Community

Complaint response

- (G1) All complaints received must be recorded including investigations undertaken, conclusions formed and action taken. This information must be made available to the administering authority on request.

END OF CONDITIONS FOR SCHEDULE G

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:
Where a definition for a term used in this approval is sought and the term is not defined within this approval the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

"administering authority" means the Environmental Protection Agency or its successor.

"you" means the holder of this Environmental Authority or owner / occupier of the land which is the subject of this Development Approval.

"site" means the place to which this environmental authority relates or the premises to which this development approval relates.

"authorised place" means the place authorised under this environmental authority/development approval for the carrying out of the specified environmentally relevant activities.

"this authority" means this environmental authority/development approval.

"authority" means level 1 licence (without development approval), or level 1 approval (without development approval), or level 2 approval (without development approval) under the *Environmental Protection Act 1994*.

"approval" means 'notice of development application decision' or 'notice of concurrence agency response' under the *Integrated Planning Act 1997*

"dust sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential place;
- a motel, hotel or hostel;
- a kindergarten, school, university or other educational institution;
- a medical centre or hospital;
- a protected area;
- a park or gardens; or
- a place used as an office or for business or commercial purposes.
and includes the curtilage of any such place.

"odour sensitive place" has the same meaning as a "dust sensitive place"

"dwelling" means any of the following structures or vehicles that is principally used as a residence-

- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land;
- a water craft in a marina.

"noxious" means harmful or injurious to health or physical well being.

"offensive" means causing offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive.

"nuisance sensitive place" includes -

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
 - a public thoroughfare, park or gardens; or
 - a place used as a workplace, an office or for business or commercial purposes.
- and includes a place within the curtilage of such a place reasonably used by persons at that place.

" $L_{A 10, \text{adj}, 10 \text{ mins}}$ " means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10 minute measurement period, using Fast response.

" $L_{A 1, \text{adj}, 10 \text{ mins}}$ " means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response

" $L_{A, \text{max adj}, T}$ " means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over any 10 minute period, using Fast response.

"noise affected premises" means a "noise sensitive place" or a "commercial place"

"noise sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area; or
 - a park or gardens.
- and includes the curtilage of such place.

"commercial place" means a place used as an office or for business or commercial purposes.

"intrusive noise" means noise that, because of its frequency, duration, level, tonal characteristics, impulsiveness or vibration -

- is clearly audible to, or can be felt by, an individual; and
- annoys the individual.

In determining whether a noise annoys an individual and is unreasonably intrusive, regard must be given to Australian Standard 1055.2 - 1997 Acoustics - Description and Measurement of Environmental Noise Part 2 - Application to Specific Situations.

"protected area" means -

- a protected area under the Nature Conservation Act 1992; or
- a marine park under the Marine Parks Act 1992; or
- a World Heritage Area.



"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

"50th percentile" means not more than three (3) of the measured values of the quality characteristic are to exceed the stated release limit for any six (6) consecutive samples for a release/monitoring point at any time during the environmental activity(ies) works.

"80th percentile" means not more than one (1) of the measured values of the quality characteristic is to exceed the stated release limit for any five (5) consecutive samples for a sampling point at any time during the environmental activity(ies) works

"land" in the "land schedule" of this document means land excluding waters and the atmosphere.

"mg/L" means milligrams per litre.

"NTU" means nephelometric turbidity units

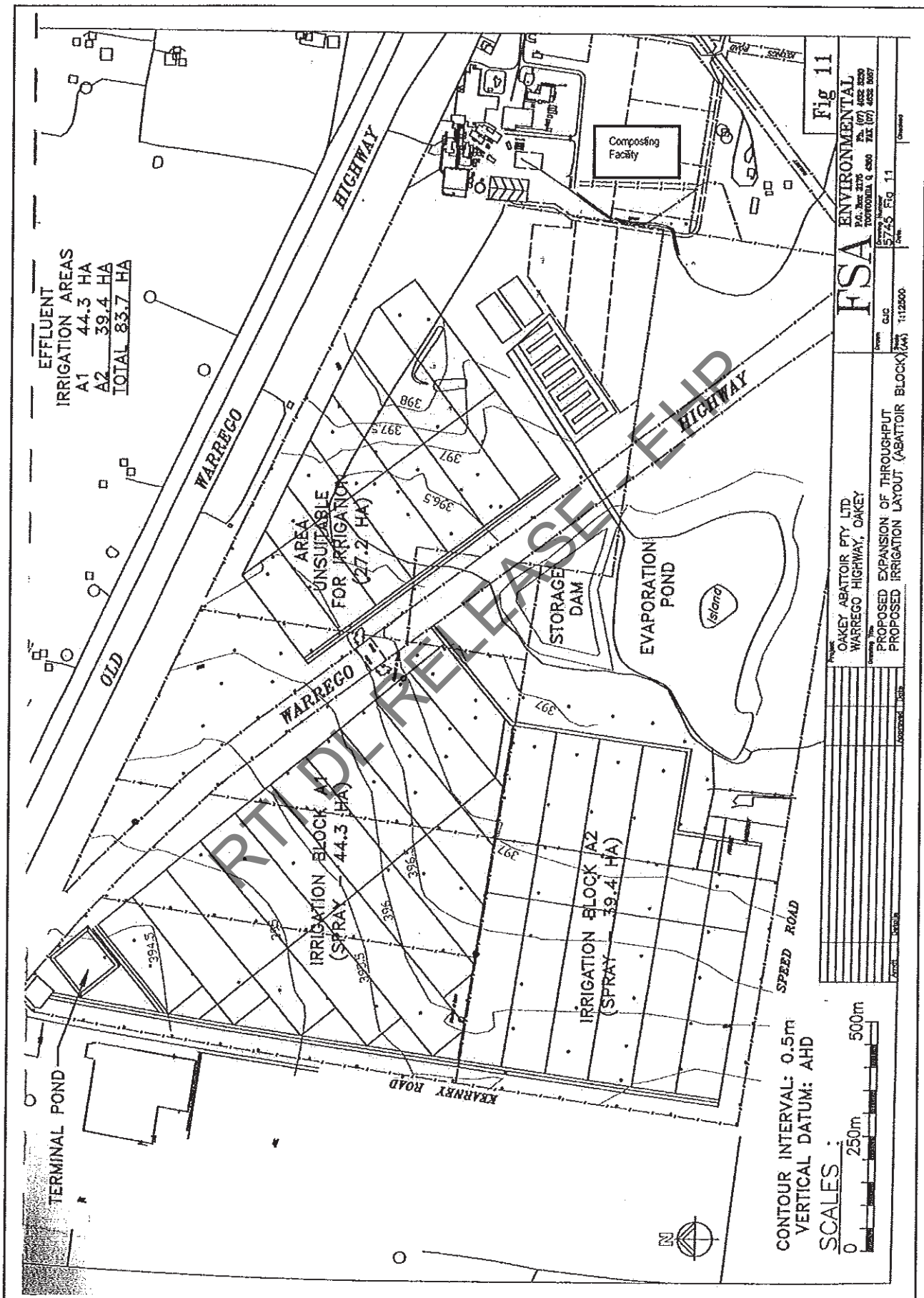
"regulated waste" means non-domestic waste mentioned in Schedule 7 of the Environmental Protection Regulation 1998 (whether or not it has been treated or immobilised), and includes:

- for an element - any chemical compound containing the element; and
- anything that has contained the waste.

"annual return" means the return required by the annual notice (under section 316 of the Environment Protection Act, 1994) for the section 86(2) licence that applies to the development approval.

END OF DEFINITIONS FOR SCHEDULE H

Schedule I - Maps / Plans





END OF CONDITIONS FOR SCHEDULE I

END OF CONCURRENCE AGENCY RESPONSE

RTI DL RELEASE - EHP



Integrated Authority No. WT0208

Section 311 Environmental Protection Act 1994

This integrated authority, issued in accordance with section 311 of the Environmental Protection Act 1994 (the EP Act), provides for the carrying out of different Environmentally Relevant Activities or Environmentally Relevant Activities at different places managed in an integrated way. This integrated authority comprises of one or more types of environmental authority(ies) in accordance with sections 86, 93, 95, 104, 113 and 311, of the EP Act, and this integrated authority details the conditions that are relevant to each stated type of environmental authority.

**Under the provisions of the
Environmental Protection Act 1994 this integrated authority is issued to:**

Oakey Power Holdings Pty Ltd
Corner Warrego Highway and Kearney Road
OAKEY QLD 4401

**in respect of carrying out the Environmentally Relevant Activities (ERAs) at the
same place and under the type of environmental authority
described in Table 1.**

This integrated authority is subject to the conditions set out in the attached schedules.

The anniversary date of this licence is 1 August.

This integrated authority takes effect from 30 November 2001.

sch4-Signature

Signed

30/11/01

Date

Dr Geoff Power
Acting District Manager - South West
Southern Region, EPA
Delegate of Administering Authority
Environmental Protection Act 1994

Note: This integrated authority document is not proof of the current status of the integrated authority. The current status of the integrated authority may be ascertained by contacting the Environmental Protection Agency.

ENVIRONMENTAL PROTECTION ACT 1994



Table 1: This integrated authority consists of the following part(s):

Part 2: Licence/s (without development approval) (Section 93)

Applicable Part & Schedule(s)	ERA No.	ERA name	Lot	Plan	Location
Part 2 Sch 2A to 2I	7(a)	Chemical Storage	2	RP117990	Cnr Warrego Highway & Kearner Rd, Oakey QLD 4401
Part 2 Sch 2A to 2I	11(b)	Crude oil or petroleum product storage	2	RP117990	Cnr Warrego Highway & Kearner Rd, Oakey QLD 4401
Part 2 Sch 2A to 2I	18(a&b)	Power Station	2	RP117990	Cnr Warrego Highway & Kearner Rd, Oakey QLD 4401

The aforementioned description of the ERA(s) for which this authority is issued is simply a restatement of the ERA(s) as prescribed in the legislation at the time of issuing the authority. Where there is any conflict between the above description of the ERA(s) for which this authority is issued and the conditions as specified in this authority as to the scale, intensity or manner of carrying out of the ERA(s) then such conditions prevail to the extent of the inconsistency.

This integrated authority incorporates the following parts:

Part 2 - Licence/s (without development approval)

Each part consists of conditions relevant to various issues.

PART 2 - LICENCE(S) (WITHOUT DEVELOPMENT APPROVAL) (Section 93)

This part is for the carrying out of a level 1 environmentally relevant activity without a development approval, under chapter 4, part 3, division 2, subdivision 1 of the Environmental Protection Act 1994.

Schedule 2A - General conditions

Access to Copy of Environmental Authority

- (A3) A copy of this environmental authority must be kept in a location readily accessible to personnel carrying out the activity.

Records

- (A4) Any record or document required to be kept by a condition of this environmental authority must be kept at the licensed place for a period of at least five years and be available for examination by an authorised person. For daily and weekly records, the record retention requirements of this condition will be satisfied if any daily and weekly records are kept for a period of at least three (3) years and these records are then kept in the form of annual summaries after that period.

Alterations

- (A6) No change, replacement or operation of any plant or equipment is permitted if the change, replacement or operation of the plant or equipment increases, or is likely to substantially increase, the risk of environmental harm above that expressly provided by this environmental authority. An example of a substantial increase in the risk of environmental harm is an increase of 10% or more in the quantity of the contaminant to be released into the environment.

Monitoring and Measurements

- (A7) All instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority must be calibrated, and appropriately operated and maintained.
- (A25) All determinations of the quality of contaminants released to the environment and all measurement and reporting of noise levels that are required by this environmental authority must be undertaken by a person or body possessing appropriate experience and qualifications to perform the required determinations and the required measurements.

Integrated Environmental Management System (IEMS)

- (NS1) The holder of this environmental authority must:
- (a) Develop and implement an Integrated Environmental Management System which provides for the following functions:
- (i) The monitoring of releases of contaminants into the environment and an environmental assessment of the releases; and
 - (ii) Staff training and awareness of environmental issues; and
 - (iii) The conduct of environmental and energy audits; and
 - (iv) Waste prevention, treatment and disposal; and
 - (v) Avoidance or minimisation of contaminated stormwater, and re-use, treatment or disposal of it; and
 - (vi) Rehabilitation of site progressively and on completion of job; and

- (b) On or before six months prior to commencing environmentally relevant activities of the power station, lodge a proposed Integrated Environmental Management System and its documentation with the administering authority for its review and comment; and
 - (c) Have due regard to that comment in the finalisation of the Integrated Environmental Management System; and
 - (d) On or before six months after commencing environmentally relevant activities of the power station, have completed and implemented the Integrated Environmental Management System.
- (A10) A copy of the Integrated Environmental Management System must be kept in a location readily accessible to personnel carrying out the activity.

END OF CONDITIONS FOR SCHEDULE 2A

Schedule 2B - Air

Release of Contaminants to the Atmosphere

- (B1) Contaminants resulting from the operation of the sources described in Table 1 of the air schedule must only be released to the atmosphere from those release points specified in Table 1 of the air schedule.
- (B2) Contaminants released from each release point specified in Table 1 of the air schedule must be directed vertically upwards without any impedance or hindrance.
- (B3) Contaminants must be released to the atmosphere from a release point at a height not less than the corresponding height stated for that release point in Table 1 of the air schedule.
- (B4) Contaminants must be released to the atmosphere from a release point at a velocity not less than the corresponding velocity stated for that release point in Table 1 of the air schedule.
- (NS2) The concentration of oxides of nitrogen (NO_x) in the effluent gas at the release point number A1 and A2 (Table 1 of air schedule) is not to exceed 150 mg in each normal cubic metre of effluent gas calculated as NO_2 at a 15 percent oxygen reference level, under normal operating conditions.
- (NS3) Notwithstanding NS2, the concentration of oxides of nitrogen (NO_x) in the effluent gas at the release point number A1 and A2 (Table 1 of air schedule) is not to exceed 200 mg in each normal cubic metre of effluent gas calculated as NO_2 at a 15 percent oxygen reference level, under peak operating conditions.

Fuel Burning

- (B8) The sulphur content of any fuel burned in industrial fuel burning equipment is not to exceed 0.5 percent by weight.

SCHEDULE B - Table 1

SOURCE DESCRIPTION	RELEASE POINT NUMBER AND STACK DESCRIPTION	MINIMUM RELEASE HEIGHT (above ground level) (metres)	MINIMUM EFFLUX VELOCITY @ MAXIMUM RATED LOAD (metres/second)
Turbine Stack	A1	35	35
Turbine Stack	A2	35	35

END OF CONDITIONS FOR SCHEDULE 2B

Schedule 2C - Water

Release of Contaminants to Waters

- (NS4) Contaminants that may cause unlawful environmental harm must not be directly or indirectly released from any source on the licensed place to any waters at any location.

END OF CONDITIONS FOR SCHEDULE 2C

Schedule 2D - Stormwater Management

General

- (NS5) All ponds used for the storage or treatment of wastewater at the power plant must maintain a freeboard of at least 175 mm at all times to prevent the direct discharge of contaminated liquid through the banks or sides of the storage.
- (NS7) The holder of this environmental authority must take all reasonable and practical measures to ensure that oil spills are cleaned up, and the materials used must be disposed of in a way which minimises the likelihood of environmental harm being caused.

Fuel Unloading Area

- (NS8) The fuel unloading bay shall be roofed.
- (NS9) The fuel unloading facilities shall be designed, constructed and operated in accordance with Section 8 "Tank Loading Facilities" of AS 1940, "The storage and handling of Flammable and Combustible Liquids".

Spillage Control

- (NS10) Each tank which is used only for storage of oil must be enclosed by bunding so that the capacity of each bunded area is not less than 110% of the capacity of the largest tank it encloses.
- (NS11) Distillate storage and chemical storage tanks must be bunded in accordance with AS 1940 to prevent the spread of fire from one tank to another and to prevent cross contamination.
- (NS12) Each bunded area must be constructed and maintained so as to be sufficiently impervious to allow retention and recovery of any materials being stored within the bunded area.



- (NS13) Washing, degreasing, servicing or other maintenance of vehicles, plant, or other equipment must not occur on the licensed place in any area where resulting contaminants will or may be released to any stormwater drain or waters.
- (NS14) Stormwaters within the bunds are not to be released directly to waters.
- (NS15) All oil-contaminated or potentially oil-contaminated waters generated on the licensed place must be directed to an oil-water separator.

END OF CONDITIONS FOR SCHEDULE 2D

Schedule 2E - Land Application

Release of Contaminants to Land

- (NS16) A formal contractual agreement is to be entered into between Oakey Power Holdings Pty Ltd and the land owner who accepts wastewater from the power station for irrigation purpose. The agreement should consist of at least the following;

- Specify property description such as Lot No., Plan, Country, Parish, Title reference, Volume, and Folio of the proposed irrigation land.
- Define the roles, responsibilities and obligations of the parties with respect to managing the inflow, storage and disposal of wastewater.
- Specify the operational methods and practices that will be adopted by both parties to effectively manage the transportation, storage and disposal system. Information on the system's design, storage and flow rates and the provisions to manage the system in periods of wet weather is also to be provided.
- Define how both parties will comply with the General Environmental Duty under the *Environmental Protection Act 1994*.

A copy of this agreement must be submitted to the administering authority prior to the commencement of the irrigation activity.

Quantity of Contaminants Released to Land

- (E6) The contaminants released must comply, at the sampling and in-situ measurement point specified in Schedule H, with each of the release limits specified in schedule E Table 1 for each quality characteristic.

Wet Weather Storage

- (E9) When weather conditions or soil conditions preclude the release of contaminants, the contaminants must be directed to a wet weather storage.
- (E10) The wet weather storage must be designed to hold a volume equivalent to 10 days discharge.

SCHEDULE E TABLE 1 - RELEASE WATER QUALITY CHARACTERISTIC LIMITS

QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE
Total Dissolved Solids (calculated) (mg/l)	3000	not to exceed
Chloride (calculated) (mg/l)	1000	not to exceed

END OF CONDITIONS FOR SCHEDULE 2E

Schedule 2F - Noise

Emission of Noise

- (NS17) The operation of the power station shall not increase the background noise level at residences 1 to 7 by more than 5 dB(A) under neutral weather conditions as referenced in Table 2 of the Richard Heggie Associates Pty Ltd, Report C31\6762-R1, Proposed Power Station Noise Impact Assessment, dated 6 December 1996.

END OF CONDITIONS FOR SCHEDULE 2F

Schedule 2G - Waste Management

General

- (G1) The holder of this environmental authority must not:
- (i) Allow waste to burn or be burned at or on the licensed place; nor
 - (ii) Remove waste from the licensed place and burn such waste elsewhere.

Off Site Movement

- (G4) Where regulated waste is removed from the licensed places (other than by a release as permitted under another schedule of this environmental authority), the holder of this environmental authority must monitor and keep records of the following:
- (a) The date, quantity and type of waste removed; and
 - (b) Name of the waste transporter and/or disposal operator that removed the waste; and
 - (c) The intended treatment/disposal destination of the waste.

END OF CONDITIONS FOR SCHEDULE 2G

Schedule 2H - Self Monitoring And Reporting

Complaint Recording

- (H1) All complaints received by the holder of this environmental authority relating to releases of contaminants from operations at the licensed place must be recorded and kept with the following details:
- (i) Time, date and nature of complaint;
 - (ii) Type of communication (telephone, letter, personal etc.);
 - (iii) Name, contact address and contact telephone number of complainant (Note: if the complainant does not wish to be identified then "Not identified" is to be recorded);
 - (iv) Response and investigation undertaken as a result of the complaint;
 - (v) Name of person responsible for investigating complaint; and
 - (vi) Action taken as a result of the complaint investigation and signature of responsible person.

Monitoring of Contaminant Releases to the Atmosphere

- (H2) The holder of this environmental authority must conduct and keep records of a monitoring program of contaminant releases to the atmosphere at the release points, frequency, and for the parameters specified in Schedule H Table 1 and which complies with the following:



- (a) Monitoring provisions for the release points listed in Schedule H Table 1 must comply with the Australian Standard AS 4323.1 - 1995 "Stationary source emissions Method 1: Selection of sampling provisions".
- (b) The following tests must be performed for each required determination specified in Table 1:
- (i) Gas velocity and volume flow rate
 - (ii) Temperature
 - (iii) Water vapour concentration
- (c) Where practicable samples taken must be representative of the contaminants discharged when emissions are expected to be normal.

SCHEDULE H - Table 1
REQUIRED RELEASE POINT DETERMINATIONS

DETERMINATION REQUIRED	RELEASE POINT NUMBERS	FREQUENCY
Nitrogen Oxides (NO _x)	A1 and A2	During commissioning of the power plant and annually thereafter.
Sulphur Dioxide (SO ₂)	A1 and A2	During commissioning of the power plant and annually thereafter.

Monitoring of Contaminant Releases to the Atmosphere

- (NS19) Monitoring specified in Schedule H Table 1 may be conducted once every two years (instead of annually) if the actual cumulative operational hours of the generators (including periods for testing and maintenance) are less than 120 hours in a twelve month period of the annual return and the power station is not operated frequently.

Monitoring of Ground Level Air Quality

- (NS20) In order to evaluate modelling predictions, the holder of this environmental authority shall monitor hourly ground level sulphur dioxide and nitrogen dioxide concentration and meteorological data over a representative number of samples, during the first 12 months of operation of the power station.

Monitoring of Contaminant Releases to Land

- (H3) The holder of this environmental authority is responsible for the making of determinations and keeping of records of the quality of the contaminants released for the release points, quality characteristics, and at the frequency specified in Schedule H Table 2.
- (NS21) All determinations of the water quality of contaminants released to land must be made in accordance with methods prescribed in the Department of Environment and Heritage Water Quality Sampling Manual, 2nd Edition, February 1995, or more recent additions or supplements to that document as such become available.

Schedule H Table 2

QUALITY CHARACTERISTIC DETERMINATION	RELEASE POINTS*	FREQUENCY **
Total Dissolved Solids (calculated)	W1	quarterly
pH	W1	quarterly
Chloride (calculated) (mg/l)	W1	quarterly
Sodium (mg/l)	W1	quarterly
Calcium (mg/l)	W1	quarterly
Magnesium (mg/l)	W1	quarterly
Sodium Adsorption Ratio	W1	quarterly

* Monitoring Location - After dilution pond.

Monitoring of Volume of Release

- (NS22) On or before **1 March 2000**, a flow meter must be installed at the site and the daily quantity of wastewater released to the irrigation land must be determined by this flow meter.
- (H8) Records must be kept of the results of all determinations of the daily quantity of contaminants released to lands.

Soil Monitoring

- (NS23) The holder of this environmental authority is responsible for conducting a soil monitoring program as given below for the parameters listed in Table 3. The monitoring will comprise not less than five sampling locations on the irrigated land as described below. The designing of sampling locations, analysis of soil, analysis of data and preparation of reports must be carried out by a competent soil scientist.

Schedule H Table 3

PARAMETER	FREQUENCY	SOIL DEPTH
Electrical Conductivity	6 monthly	40, 90, 120 cm
pH	6 monthly	40, 90, 120 cm

Monitoring of Groundwater Quality

- (NS24) The holder of this environmental authority must maintain bores for the purpose of sampling and analysing groundwater at not less than three locations near the irrigation farm by **1 August 2000**.
- (NS25) The holder of this environmental authority must take all reasonable and practicable measures to obtain groundwater samples that are representative of the groundwater around bores maintained for the purpose of sampling and analysing groundwater.
- (NS26) The holder of this environmental authority is responsible for ensuring a groundwater monitoring program is performed which complies with the following requirements:
- All determinations of the quality of groundwater must be made in accordance with methods prescribed in the Department of Environment and Heritage Water Quality Sampling Manual, 2nd Edition, February 1995, or more recent additions or supplements to that document as such become available.
 - Samples of groundwater must be taken at least quarterly from each of the bores.
 - The samples obtained in accordance with paragraph (b) of this condition must be analysed for:



- (i) Total dissolved solids,
- (ii) Chloride,
- (iii) Sodium,
- (iv) Calcium,
- (v) Magnesium,
- (vi) Sodium Adsorption Ratio, and
- (vii) pH.

Monitoring of Surface water Quality

(NS27) The holder of this environmental authority is responsible for ensuring a surface water monitoring program is performed which complies with the following requirements:

- (a) All determinations of the quality of surface water must be made in accordance with methods prescribed in the Department of Environment and Heritage Water Quality Sampling Manual, 2nd Edition, February 1995, or more recent additions or supplements to that document as such become available.
- (b) Samples of surface water must be taken at least quarterly from two locations in Oakey Creek; one upstream and one downstream of the irrigation land.
- (c) The samples obtained in accordance with paragraph (b) of this condition must be analysed for:
 - (i) total dissolved solids,
 - (ii) pH.

Noise Monitoring

- (NS28) In order to evaluate noise modelling predictions, the holder of this environmental authority shall monitor noise levels and meteorological conditions over a representative number of samples, during the first 12 months of operation of the power station.
- (NS29) In the event of a complaint about noise that the administering authority considers is reasonable, then the holder of this environmental authority must monitor and record the "L(Amax adj,T)" and "Background" noise level at the place from where the complaint originates during the operation period.
- (H11) The method of measurement and reporting of noise levels must comply with the Department of Environment and Heritage Noise Measurement Manual, second edition, March 1995, or more recent additions or supplements to that document as become available.
- (H12) The measurement and reporting of noise levels must be undertaken by a person or body possessing appropriate experience and qualifications to perform the required measurements.

Report Submission

- (H14) The holder of this environmental authority must ensure that the results of all monitoring performed in accordance with this environmental authority for the period covered by the return are submitted with the Annual Return.

Incident Recording

- (H16) A record must be maintained of at least the following events:
- (i) The time, date and duration of equipment malfunctions where the failure of the equipment resulted in the release of contaminants reasonably likely to cause environmental harm;
 - (ii) Any uncontrolled release of contaminants reasonably likely to cause environmental harm and



- (iii) Any emergency involving the release of contaminants reasonably likely to cause material or serious environmental harm requiring the use of fire fighting equipment.

Notification of Emergencies and Incidents

- (H18) Where the licensee has not given notification to the administering authority under section 37 of the Environmental Protection Act, as soon as practicable after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority, the holder of this environmental authority must notify the administering authority of the release by telephone or facsimile.
- (H19) Where the licensee has not given notification to the administering authority under section 37 of the Environmental Protection Act, the notification of emergencies or incidents as required by condition number H18 must include but not be limited to the following:
- (i) The holder of the environmental authority;
 - (ii) The location of the emergency or incident;
 - (iii) The number of the environmental authority;
 - (iv) The name and telephone number of the designated contact person;
 - (iv) The time of the release;
 - (v) The time the holder of the environmental authority became aware of the release;
 - (vi) The suspected cause of the release;
 - (vii) The environmental harm and or environmental nuisance caused, threatened, or to be caused by the release; and
 - (viii) Actions taken to prevent further any release and mitigate any environmental harm and or environmental nuisance caused by the release.
- (H20) Where the licensee has not given notification to the administering authority under section 37 of the Environmental Protection Act, not more than 14 days following the initial notification of an emergency or incident, the holder of the environmental authority must provide written advice of the information supplied in accordance with condition number H19 in addition to:
- (i) Proposed actions to prevent a recurrence of the emergency or incident;
 - (ii) Outcomes of actions taken at the time to prevent or minimise environmental harm and or environmental nuisance, and

Exception Reporting

- (H21) The holder of this environmental authority must notify the administering authority in writing of any monitoring result which indicates an exceedance of any licence limit within 28 days of completion of analysis.
- (H22) The written notification required by condition number H21 above must include:
- (i) The full analysis results, and
 - (ii) Details of investigation or corrective actions taken, and
 - (iii) Any subsequent analysis.

End of Conditions for Schedule H

END OF CONDITIONS FOR SCHEDULE 2H

Schedule 2I - Definitions

For the purposes of this environmental authority the following definitions apply:



- (NS30) "normal cubic metre" ("Nm³") means the volume of dry gas which occupies 1 cubic metre at a temperature of zero degrees Celsius and at an absolute pressure of 101.3 kiloPascals.
- (NS31) "normal operating conditions" is the normal operating state of a unit, and means that the Unit is operating on a stable flame. For all practical purposes, this shall be defined as all operations other than during the first 15 minutes of station operation.
- (NS32) "peak operating conditions" is the peak operating state of a unit, and means that the Unit is operating on a short term high output requirements of 141 megawatt electricity or more. The peak operating conditions of a Unit is not to exceed 50 hours per annum.
- (I16) "L_{Amax adj,T}" means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over a time period of not less than 15 minutes, using Fast response.
- (I17) "Background noise level" means either:
- L_{A90,T} being the A-weighted sound pressure level exceeded for 90 percent of the time period of not less than 15 minutes, using Fast response, or
- L_{A90,T} being the arithmetic average of the minimum readings measured in the absence of the noise under investigation during a representative time period of not less than 15 minutes, using Fast response.
- (NS33) "freeboard" means the vertical distance between the water surface and any overflow point.
- (NS34) "regulated waste" has the meaning given in Schedule 10 of the Environmental Protection (Interim) Regulation 1995.

End of Conditions for Schedule I

END OF CONDITIONS FOR SCHEDULE 2I

Schedule 2J - Site Plans

No conditions for this Schedule

END OF CONDITIONS FOR SCHEDULE 2J

END OF PART 2

END OF INTEGRATED AUTHORITY

Cleary Amanda

Subject:

FW: Groundwater Contamination at Swartz Barracks [SEC=UNCLASSIFIED]

From: O'Connell, Mark MR 2

Sent: Tuesday, 4 December 2012 14:32

To: OAK Everyone; '126 Squadron'

Cc: Griffin, Gerald MR; lineham, Paul MR 1; Brown, Sarah MRS 1; Callinan, Scott MR 1; Andrews, Neil MR

Subject: Groundwater Contamination at Swartz Barracks [SEC=UNCLASSIFIED]

UNCLASSIFIED

The results of recent groundwater sampling conducted at Swartz Barracks have identified low level concentrations of Aqueous Film Forming Foam (AFFF), or Fire-fighting Foam constituents known as Perfluorooctane sulfonate (PFOS) and Perfluorooctanoic acid (PFOA), in surrounding groundwater aquifers from which water for the Oakey base pool is drawn. The base drinking water comes from the town supply.

What is the risk to people from AFFF contamination of the pool ?

Initial indications are that any risk to human health through use of the swimming pool is low however action will be taken to lower the levels of AFFF in the swimming pool water during the base reduced tempo period. There is no known acute level of health risk from skin exposure to this chemical.

An Indicative Human Health Assessment (IHHRA) has been completed, based on the values for exposure during swimming, cited by enHealth (2012). The assessment assumed that the incidental ingestion of pool water was the predominant pathway for exposure to PFOS and PFOA. The health risk from oral exposure to PFOS and PFOA, associated with water activities in the pool are based on general exposure assumptions and concentrations reported are considered to be "tolerable", based upon the IHHRA.

Based on the IHHRA report of "tolerable" and advice from Dr Ian Gardner, Defence Senior Physician in Occupational & Environmental Medicine, Defence consider the level of contamination does not pose an immediate risk to human health and the pool should remain open.

Defence will continue to monitor and manage this issue with the pool closing on 14 December 2012 to permit cleaning and refilling with water known to not contain contamination. Ongoing monitoring will continue to occur until the matter has been resolved.

Regards

Mark O'Connell
Base Support Manager - Darling Downs
Defence Support & Reform Group
Building B45
Swartz Barracks
OAKEY QLD 4401

Tel: (07) 4577 7100

Fax: (07) 4577 7910

Mark O'Connell (6) Personal information

E-mail: mark.oconnell2@defence.gov.au



Firefighting Foam Review

Your activity has been identified as potentially using firefighting foam.

Please complete the form below for the foam type, equipment and uses for each of your relevant sites.

Firefighting Foam Review						
Business/Company name:						EA/Permit number:
Site address/location:						ERA number:
Contact person & position:		Contact phone number:		Email:		
FOAM IN USE ON THE SITE (if more than one please use the table on the next page)						
Foam application area or location:		Foam brand/type(s): (If more than one fill in next page)		Do any contain fluorine? Yes / No	Manufacture or purchase date:	Quantity: Container type(s):
Is the foam concentrate storage/dispensing area bunded? Yes / No	Where does the foam concentrate area drain to?		What controls are there on drainage and spills from the foam concentrate storage area?			
Foam application system (deluge, cannon, CAFS, etc)	Discharge rate:	MSDS Yes / No	How is foam application triggered and controlled (e.g. automatic, remote, manually, etc):			
FOAM & WASTEWATER CONTAINMENT						
Outline the on-site containment (ponds, bunding, sumps, etc):		Containment capacity (cubic metres):		Containment area management & discharge controls (pumps, valves, weirs, etc):		
Is the containment area fully impervious? Yes / No	What are the locations that foam and wastewater could discharge to the environment?		If it is impossible to contain the foam discharge (e.g. on a wharf or firefighting tug), describe the area the discharge will go to:			
FOAM EQUIPMENT TESTING						
Frequency of testing:	Brand/type of foam used in tests:	Quantity of foam concentrate used:	Quantity of wastewater generated:	Measures to control discharges and for disposal/treatment of wastewater:		
FLUORINE-FREE WASTES DISPOSAL (Where <u>fluorine-free</u> foam, wastewaters, runoff or concentrate wastes are generated or held on site)						
How are fluorine-free wastes treated and disposed of (e.g. discharge to sewer, on-site- treatment pond, etc)?						
FLUORINATED WASTES CONTAINMENT & DISPOSAL (Where <u>fluorinated</u> foam, wastewaters, runoff or concentrate wastes are generated or held on site)						
Are fluorinated foam wastes held in a completely impervious area or containers? Yes / No	Where are fluorinated foam wastes stored prior to disposal?			Which licensed regulated waste company receives the fluorinated wastes?		

Firefighting Foam Review - Attachment

If you have more than one foam on site please list the foams here.

Where you have different brands/types and batches of foam concentrate on your site please use the table below to summarise your holdings.

Foam application area	Foam brand/type	Manufacture or purchase date	Quantity	Container type	Application system	MSDS Yes / No	Containment measures for foam and wastewater

Container type – bulk tank, IBC, 200L drum, 20L drum, etc.

Please attach the current Materials Safety Data Sheet (MSDS/SDS) for each foam type held.

Firefighting foam review - Explanatory Notes

The following notes are to assist you in completing the sections of the foam review reporting form attached.

Brand and type of foam

Please list the brand name and specific product name of the foam concentrate as listed on the packaging, product description or the MSDS that was supplied with the foam. This includes foams that are used for testing and training purposes.

Container type

Please indicate the foam container type foam is stored in and/or used from, such as bulk ###L tank, 1000L IBC, 200L drum, 20L drum or other type.

Containment measures

All discharges of foam during testing, maintenance, training, spills and incidents must be contained where possible. All *fluorinated* foam discharges must be contained. Please outline the containment measures in place to contain foam in the areas where the activities may occur. E.g. earthen bund, concrete lined impervious bund, concrete lined drain, stormwater pond, sump with manually operated valve, etc. Indicate the capacity of the containment measure and whether or not its release point is normally open to discharge from the site.

Direct discharges to the environment

Where it is impossible to contain the discharge of foam during testing, training or maintenance, such as a fuelling wharf system on a waterway, a shipboard system or a firefighting tug, fluorinated foams must not be used and a plan is required to demonstrate the procedures and measures that will be used to control the amount, timing, dilution and dispersion of releases so that the potential for environmental harm is minimised.

Disposal of wastes

Foam wastes must be properly treated and disposed of. Wastes containing fluorinated foams are regulated wastes and can not be released to the environment or discharged to sewer. Fluorine-free foam wastes can be disposed of according to local waste infrastructure provider licensing and conditions. E.g. trade waste arrangements or agreements for landfill and sewer.

EA/Permit number

This refers to the Environmental Authority or Permit number that authorises the environmentally relevant activities (ERAs) that are carried out on the site. If you do not have licensed ERAs on the site please enter "n/a" to indicate that this is not applicable.

Foam application area or location

Describe where the foam is located in terms of the location that it would be applied. E.g. *bulk tank area 1 & 2 and associated bunds, fuel wharf 6, truck loading bay, portable foam supply for bulk tanks area, etc.*

Foam application system

Outline the system(s) in place to apply foam for its intended purpose. E.g. foam cannons in bunded tank areas, foam deluge system in truck loading bay, fixed sprays over loading wharf, firefighting tug sprays, compressed air foam system, etc.

Fluorinated foams

Fluorinated foams are those that contain any fluorine as fluorinated organic compounds in their composition. This information may be mentioned in the MSDS or product brochure or on the manufacturers web site as "AFFF", "FFFP", "fluorosurfactant", "fluorotelomer", "fluoroprotein" or similar words with "fluor-" in them.

If the product information does not specifically state "*Fluorine-free*" it must be assumed to be fluorinated even if no mention is made of fluorinated compounds in the MSDS or in its product description. Additional information on whether the foam is fluorinated must be sought, e.g. from the manufacturer's web site or the supplier as to whether it contains any fluorinated compounds.

Product information to the effect that the foam *does not contain PFOS and/or PFOA* is not indicative that the foam is fluorine-free as there are many other fluorinated organic compounds that may be present. Fluorinated organic compounds are not biodegradable.

Fluorine-free foam

Fluorine-free foams are those that do not contain any fluorinated organic compounds of any sort. Foam stating that they are "*PFOS/PFOA free*" foams are generally not fluorine free.

Foam location

Where foam is distributed across the site at different locations or on mobile appliances, please list stocks individually. E.g. "tanker loading bay", "Bulk tank 1", "Loading dock", "pump shed on fuelling berth 6", "response trailer 3", "firefighting tug *Titan*", etc.

Foam purpose

Please describe the primary purpose for having firefighting foam on the site. E.g. bulk fuel storage protection, vessel firefighting from a tug, aircraft incident response, fuelling berth protection, etc.

Impervious containment area

Foam of any sort must not be discharged from the site directly to the environment unless it is a tug or wharf facility where it is impossible to contain releases. Fluorinated foams must be fully contained in an impervious area. For example fluorinated foam and wastewater must be contained in a bunded area that is lined with concrete or a plastic membrane liner. Clay or earth-lined bunds are not completely impervious and wastewater can leach into the soils and groundwater. Fluorine-free foams and related wastewater may be contained in clay or earthen bunds provided that the rate of infiltration or discharge is such that it has time to biodegrade and is unlikely to cause environmental harm.

Manufacture or Purchase date

Please enter the date that the foam was manufactured, this may be marked on the container or label. If this is not known then an approximate date of purchase should be entered.

Mixed foams

Foams types should generally not be mixed, however where different foam brands have been mixed together, e.g. in a foam system bulk feeder tank, please list the approximate proportions or quantities of each brand and type of foam in the mixed container.

Waste fluorinated materials

Fluorinated foam wastes include any concentrate, firewater, wastewater or runoff that has been contaminated by fluorinated foams used in testing, maintenance, training, spills and incidents. All fluorinated wastes must be fully contained, not released to the environment and be disposed of properly through high temperature destruction. Disposal to sewer of fluorinated wastes is not allowed as fluorinated compounds are not captured by sewage treatment plants and will be released in discharges to waterways and will contaminate sludge.



Australian Government

Department of Defence
Defence Support and Reform Group

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2 December 2013

Mr James McKenzie
Manager
Department of Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

Dear Mr McKenzie

Re: Groundwater investigation

Over recent years, Department of Defence at the Army Aviation Centre Oakey (AACO) has been proactively undertaking regular assessments of the groundwater system onsite at the base.

Results of these early assessments indicated there was an impact to the groundwater system that may be a legacy from fire fighting training that was undertaken on site between 1970 and 2005.

A community information session to inform local residents about this phase of the project was held in December 2012. Since then, further assessments have indicated the groundwater impacts may be further afield than the AACO facility.

Therefore, the next phase of the project will involve testing groundwater sources at existing bore locations, as well as drilling new groundwater bores at other locations to assess the extent of the impact. Results of this assessment will then be verified against previous test results, and compared to relevant acceptable guidelines.

It is anticipated the next round of assessments will be undertaken in December 2013 through to early 2014.

To learn more about this project, AACO personnel would like to invite you to a community information presentation to explain more about the project. Details of the presentation are as follows:

Date: Tuesday 10 December 2013

Time: 5.30pm for 6pm start

Location: Army Aviation Centre Oakey, Orr Road, Oakey

RSVP: by calling 1800 136 129. RSVP's accepted until 5pm on Friday 6 December 2013

As you can appreciate, as the Base is a secure facility, we require all attendees to RSVP so processing through the gatehouse is easier on the day.

Alert. →

Don't look backward / Let's do it?

fresh is very loud

We do look forward to meeting you at the presentation. In the meantime, should you have any questions about the project, please do not hesitate to contact the project team on 1800 136 129 or [mech4\(6\)@aeom.com](mailto:mech4(6)@aeom.com) or email defence.oakey.anz@aeom.com.

We look forward to seeing you at the presentation.

Yours Sincerely

sch4p4(6) Signature

Mark O'Connell

Base Support Manager Darling Downs
Defence Support Organisation

- Next steps and Ian
- Test ground water source at existing and new bore locations - off site
 - confirm previous result
 - Assess extent of the impact } Feb / April 2014
 - Undertake further risk assessments (potential health impacts)
 - provide recommendations

- community concern - groundwater impact - crops / livestock
- issue notification of landowners - duty to notify
- No complaints / no known health issues

Let Col. Steve Stirling
- Mark - Base

- Scott Coleman - Environmental team (Lambert) - dealt with
- Sarah - Director
- Linking Rediff
- Kate Armstrong

- 2010/11 - Why for fuel spills (hydrocarbon leaks)
- trial PFOs / PFOA - persistent & harmful

AFFF transverse excessive
massive through ground / soil & groundwater

2012/13 - Assess risk on site - swimming pool / irrigation on site
- risk on site low + acceptable

AEOM main contractor

- engaged containment - not a lot of data

Minister Department of Health - drinking water guideline

0.3 mg / litre - 2L per day / 27 years ^{no impact} ~~have been~~

Water flow - East to West - Activities in East of base may also be

No testing west of base / Oakey / Cooyah Rd.

Groundwater 14-20m and 30m

File A

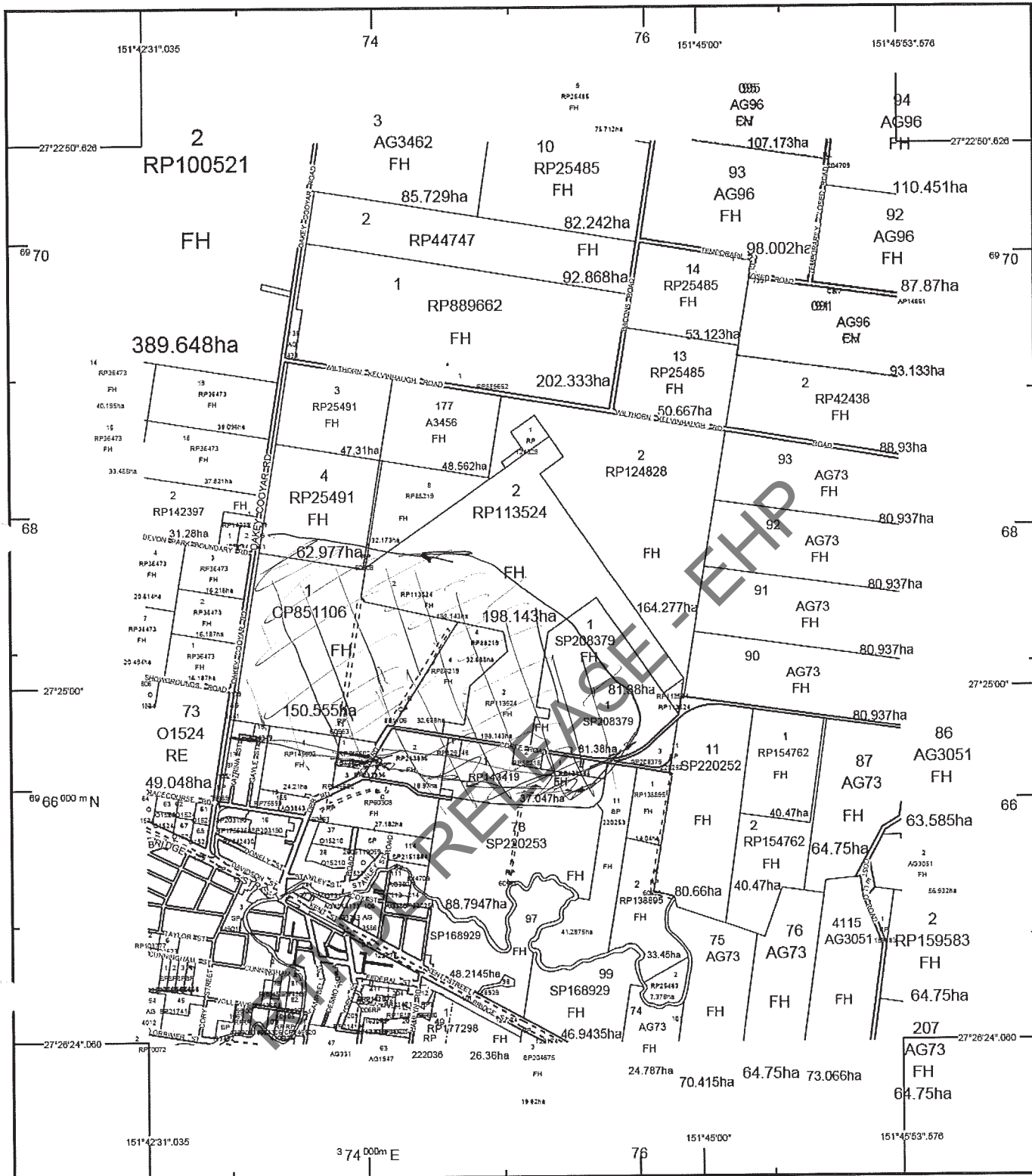
Defending Australia and its National Interests

1800 136 129

Jodie

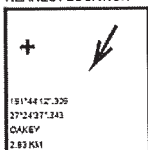
82604000

defence.oakey.anz@aeom.com



STANDARD MAP NUMBER
9243-32121

MAP WINDOW POSITION &
NEAREST LOCATION



SUBJECT PARCEL DESCRIPTION

DCDB
Lot/Plan 2/RP113524
Area/Volume 108.143ha
Tenure FREEHOLD
Local Government TOOWOOMBA REGIONAL
Locality OAKEY
Parish KING
County AUBIGNY
Segment/Parcel 43851/115

CLIENT SERVICE STANDARDS

PRINTED (dd/mm/yyyy) 10/12/2013

DCDB 09/12/2013 (Lots with an area less than 1.000ha are not shown)

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Cleary Amanda

From: Mackenzie James
Sent: Wednesday, 18 December 2013 4:56 PM
To: Cleary Amanda
Subject: FW: AFFF contamination at Oakey Army Base

Contact details are below;

From: AUBNE1 - Defence Oakey [<mailto:Defence.Oakey@aeacom.com>]
Sent: Tuesday, 17 December 2013 9:36 AM
To: Mackenzie James
Cc: AUBNE1 - Defence Oakey
Subject: RE: AFFF contamination at Oakey Army Base

REPORT IS 20MB. WILL BE SENT VIA SENDFILES

Dear James

As requested, please find attached more information about the current investigation underway for the Defence Oakey Groundwater Investigation project.

We understand you had originally requested a copy of the presentation held at the Oakey Defence base last Tuesday 10 December 2013. However, we consider that the attached offsite risk assessment report provides EHP with more relevant and detailed information.

We trust this will provide you with the information you require, however if you do have further enquiries, please do not hesitate to contact the project team on 1800 136 129.

The project office will be closed from midday Friday 20 December until 8.30am on Wednesday 8 January 2014.

Thank you for your enquiry and we wish you and your family a very Merry Christmas and a Happy New Year.

Kind regards

Jodie

Defence Oakey project team

From: Mackenzie James [<mailto:James.Mackenzie@ehp.qld.gov.au>]
Sent: Thursday, 12 December 2013 8:32 AM
To: AUBNE1 - Defence Oakey
Subject: AFFF contamination at Oakey Army Base

Dear Jodie,

I was wondering if it would be possible to get a copy of the slides presented at Tuesday's community meeting so that I can brief my manager / Director regarding the groundwater contamination issue at the Oakey Army base.

If it is not possible to release the full slide set, if I could just get a copy of the diagrams showing the extent of the contamination (with the concentration 'contours') it would be much appreciated.

Also, would it be possible to get a list of lots on plan where it is known / expected that the PFOS levels are above the Minnesota drinking standards.

Please feel free to give me a call if you wish to discuss.

Thanks & Best Regards,

James

James Mackenzie

Manager, Environmental Services & Regulation Division (ESR)

Department of Environment and Heritage Protection

Level 1 | 173 Hume Street | Toowoomba Q 4350

PO Box 731 | Toowoomba Q 4350

Telephone: 07 4615 3472 | **Facsimile:** 07 4699 4399

www.ehp.qld.gov.au



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Cleary Amanda

From: Mackenzie James
Sent: Wednesday, 18 December 2013 4:55 PM
To: Cleary Amanda
Subject: FW: ESR ALERT – Groundwater contamination - Oakey Defence Base

Hi Amanda,

I would like to pass this one over to you...

I have considered potential conflict of interest here, but given that, as I understand, Jakov is not actually employed by Defence, and that this base is managed completely separately from the flying operations, I do not see it as an issue. If you think otherwise, I am happy to discuss further.

The summary of the issue is below;

I will also send you a link to a copy of a report of the investigations so far.

Bottom line is that PFOS has been detected in water bores offsite that exceed US human drinking water standards, but the extent of the contamination is unknown.

I have not reported up since the meeting, but we do need to update this alert based on the information on the report.

I do not see this as time critical since the groundwater is moving very slowly (30m / year?) and the bore water is not being used by human drinking water.

We can discuss further,

Regards,

James

From: Mackenzie James
Sent: Tuesday, 10 December 2013 12:56 PM
To: Hill Chris
Subject: ESR ALERT – Groundwater contamination - Oakey Defence Base

Chris,

As discussed, Regards, James

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring conducted by the Department of Defence (Defence) has indicated that contaminants from fire fighting foam used in training exercises between 1970 and 2005 has contaminated groundwater below the AACO facility.
- It is likely that contaminants have now migrated outside the boundaries of the AACO facility onto privately owned land.
- Defence are establishing new bores and conducting further groundwater monitoring to determine the extent and concentration of the contaminants.
- A community meeting is being held on 10th December, 2013, to inform concerned parties about the issue.

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater extending beyond the boundary of the Defence facility.
- Possible media attention following community meeting.

CUSTOMER ACTIONS:

- Defence have conducted ground water monitoring and community engagement activities.

DEPARTMENT ACTIONS:

[HISTORICAL ACTIONS]

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue following the initial ground water monitoring in December 2012. JM advised EHP Contam Land unit of the potential issue.

[PLANNED ACTIONS]

- JM to attend the community meeting on 10th December, 2013, and will report back on extent of the issue.

LOCALITY DETAILS AND PHOTOGRAPHS:

- None

KEY COMMUNICATION MESSAGES:

- The department is aware of this issue and working closely with Defence to determine the extent of the problem.

CONTACT DETAILS:

- Name: James Mackenzie (Manager)
- Phone number: 4615 3472
- Division: ESR – Southern - West

This email is an initial alert in respect of this matter.

If further advice or action is required, it will be communicated via normal channels such as a briefing note.

END



Date : 20/12/13
FWB
SWR/ 125091 (1)
Item No : 2372218
Entered By : LS

Offsite Risk Assessment, PFOS and PFOA in Groundwater: Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey

Lead Consultant AZ5293

May 2013

Department of Defence

RTI DL RELEASE - EHP

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A GRI Rating: Sustainability Report 2011

2131374A-RPT-006-B-RJ PFCs Offsite

Revision	Details	Date	Amended By
A	Draft	6 March 2013	Ruth Jarman
B	Final	24 May 2013	Ruth Jarman

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Author: Ruth Jarman

Signed: sch4-Signature

Reviewer: Sim Ooi

Signed: sch4-Signature

Approved by: Jeff Thrupp

Signed: sch4-Signature

Date: 24 May 2013

Distribution: 1x electronic copy Defence, 1x PB file copy

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2131374A-RPT-006-B-RJ PFCs Offsite

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Glossary

Acronym	Definition
AACO	Army Aviation Centre Oakey
AFFF	Aqueous Film Forming Foam
COPC	Chemical of Potential Concern
CSM	Conceptual Site Model
DSRG	Department of Defence, Defence Support and Reform Group
EFSA	European Food Safety Authority
ERA	Ecological Risk Assessment
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
HHRA	Human Health Risk Assessment
HI	Hazard Index
HRL	Health Risk Limit
mBGL	Metres Below Ground Level
MDH	Minnesota Department of Health
NC Act	Nature Conservation Act 1992
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NJDEP	New Jersey Department of Environmental Protection
NOAEL	No Observed Adverse Effects Level
PFC	Perfluorocarbon
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
RA	Risk Assessment
RfD	Reference dose
RFI	Request for Information
SWL	Standing Water Level
TDS	Total Dissolved Solids
USEPA	United States Environmental Protection Agency
VM Act	Vegetation Management Act 1999

What about impact
on staff onsite?

Executive summary

Parsons Brinckerhoff Australia Pty Ltd (Parsons Brinckerhoff) has been retained by the Department of Defence, Defence Support and Reform Group (DSRG; referred to hereafter as Defence) as Lead Consultant (AZ5293) to provide risk assessment and remediation design services at the Army Aviation Centre Oakey (AACO) – Southern Queensland Region.

As part of these services, Parsons Brinckerhoff was commissioned to undertake a Risk Assessment (RA) for concentrations of Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) reported in offsite groundwater. For the purpose of the RA, 'offsite' is defined as the area outside the AACO base fence. This includes land to the west and south of the base that is owned by the Commonwealth but not utilised directly by the base.

The RA comprised a Human Health Risk Assessment (HHRA) and a Screening Ecological Risk Assessment (ERA).

The objective of the HHRA was to assess the potential for unacceptable risks to human health following:

- Incidental ingestion of groundwater impacted by PFOS and PFOA by adult and child residents during swimming in the pool at the property located at 66 Orr Road, Oakey. 66 Orr Road is located approximately 500 m to the southwest of the AACO gatehouse (i.e. offsite).
- Incidental ingestion of groundwater impacted by PFOS and PFOA by adult farm workers who may be responsible for undertaking irrigation activities at properties to the west and south of the site.
- Incidental ingestion of groundwater impacted by PFOS and PFOA by adult and child residents, who may be exposed to groundwater used for irrigation activities at properties to the west and south of the site (i.e. incidental exposure).

The objective of the Screening ERA was to assess the potential for unacceptable risks to identified offsite ecosystems following the discharge of groundwater impacted with PFOS and PFOA into the environment.

The HHRA concluded that:

- The estimated Hazard Indices (HI) were below the tolerable threshold (i.e. $HI < 1$). This indicated that adverse health effects from exposure to PFOS and PFOA concentrations in groundwater offsite, for the offsite populations and exposure pathways of concern, are unlikely.

The Screening ERA identified a potential risk to aquatic organisms (including the EPBC protected Murray Cod) and birds in the event that PFOS impacts identified in groundwater to the south/west of the site migrate to, or are identified in, Oakey Creek. While the significant distance (estimated to be up to 7.2 km) from the site to the point of discharge for groundwater into Oakey Creek is noted, and dilution of groundwater upon discharge to Oakey Creek is probable, the potential for adverse impact is unable to be excluded on the basis of the existing information. This includes the potential effect of groundwater extraction events on groundwater flow rates.

In addition, four threatened ecological communities and 41 species of flora/fauna may occur or are likely to occur within a 10 km radius of the site. The flora and fauna species may be adversely affected by the use of groundwater containing PFOS and PFOA for offsite irrigation activities, or by the discharge of impacted groundwater into Oakey Creek. The likelihood of adverse effect is unable to be determined based on the existing information.

Based on the findings of the Screening ERA, Parsons Brinckerhoff recommends that a higher level (i.e. Level 2) ERA is undertaken. This Level 2 ERA may include the following:

- Delineation of groundwater impacts in the vicinity of the site and/or groundwater contaminant fate and transport, and dilution/dispersion modelling to estimate the likely PFOS/PFOA concentrations within Oakey Creek.
- Measurement of PFOS/PFOA concentrations within Oakey Creek upstream and downstream of the estimated discharge point for groundwater to the Creek.
- Biodiversity assessment in the vicinity of the site, including Oakey Creek, to confirm the environmental values identified in the Screening ERA – this includes the presence of the Murray Cod, and other threatened flora and fauna species reported to be present in the vicinity of the site.
- Further review of groundwater use in the vicinity of the site to confirm source–receptor–pathways for the uptake of PFCs into the offsite ecological food chain. This will allow the CSM for ERA to be refined and any critical exposure pathways for key species identified. In the event that exposure pathways for key species are identified to be complete, a desktop study could be undertaken to determine what information is available in the scientific literature regarding benchmark doses for species similar to the identified key species.

RTI DL RELEASE - 2017

1. Introduction

Parsons Brinckerhoff Australia Pty Ltd (Parsons Brinckerhoff) has been retained by the Department of Defence, Defence Support and Reform Group (DSRG; referred to hereafter as Defence) as Lead Consultant (AZ5293) to provide risk assessment and remediation design services at the Army Aviation Centre Oakey (AACO) – Southern Queensland Region.

As part of these services, Parsons Brinckerhoff was commissioned to undertake a Risk Assessment (RA) for concentrations of Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) reported in groundwater to the west and south of the site (offsite).

AACO covers an approximate area of 850 hectares and is located in southeast Queensland, to the west of the Great Dividing Range, and approximately 3 km north of the township of Oakey. The site was initially developed as a Royal Australian Air Force Base during World War Two, and then used as a civilian airfield from 1948. In 1969 it was purchased by Defence for the development of AACO.

Investigations undertaken by Parsons Brinckerhoff in 2012 identified elevated concentrations of PFOS and PFOA, above the adopted groundwater assessment criteria, in offsite groundwater (groundwater to the south and west of the site) triggering the need for the current scope of RA works as a priority. The investigation works are detailed in the following reports:

- Parsons Brinckerhoff (2013a) *Groundwater Monitoring Event, December 2012 – Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey (AACO)*, February 2013.
- Parsons Brinckerhoff (2013b) *Draft February 2013 Addendum Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey Groundwater Monitoring Event*, February 2013.

For the purpose of the RA, 'offsite' is defined as the area outside the AACO base fence as shown on Figure 1, Appendix A. This includes land to the west and south of the base that is owned by the Commonwealth but not utilised directly by the base (shown as 'Defence Leased Land' on Figure 1, Appendix A).

1.1 Scope of works

1.1.1 Human Health Risk Assessment

The Human Health Risk Assessment (HHRA) component of the works comprised:

- Review of Parsons Brinckerhoff (2013a; 2013b) including review of Conceptual Site Model (CSM) for HHRA.
- Qualitative HHRA – PFOS/PFOA contamination in offsite groundwater: includes the review of identified PFOS/PFOA concentrations in offsite groundwater and comparison against screening criteria.

- Quantitative HHRA evaluation for farmers (adults) who may undertake irrigation activities with groundwater impacted with PFOS and PFOA.
- Quantitative HHRA evaluation for residents (adults and children), who may be incidentally exposed to groundwater impacted with PFOS and PFOA, during its use for irrigation activities at properties to the west and south of the site.
- Quantitative HHRA evaluation for residents (adults and children) who may swim in the pool located at 66 Orr Road, Oakey, which has been filled with groundwater impacted with PFOS and PFOA.

1.1.2 Ecological risk assessment

The screening ecological risk assessment (ERA) component of the works comprised:

- Review of existing ecological study information relevant to the site or potential offsite receptors for groundwater beneath the site (e.g. Oakey Creek).
- Screening ERA comprising development of a CSM for ERA and problem identification.

1.1.3 Summary

The scope of works is summarised in Table 1.1 below.

Table 1.1 Summary of scope of works

Item	Reference	Section of report
Data review and development of CSM for RA	Original proposal (8 March 2012)	Section 2
	Variation 1 (20 August 2012)	
	Variation 2 (4 October 2012)	
Qualitative HHRA	Original proposal (8 March 2012)	Section 3
Quantitative HHRA – use of pool and irrigation water	Variation 7 (12 February 2013)	Section 3
Review of Ecological Study Information	Variation 2 (4 October 2012)	Section 2
Screening ERA	Variation 2 (4 October 2012)	Section 4

1.2 Objectives

The RA comprised a HHRA and a Screening ERA.

The objective of the HHRA was to assess the potential for unacceptable risks to human health following:

- Incidental ingestion of groundwater impacted by PFOS and PFOA by adult and child residents during swimming in the pool at 66 Orr Road, Oakey.
- Incidental ingestion of groundwater impacted by PFOS and PFOA by adult farm workers who may be responsible for undertaking irrigation activities at properties to the west and south of the site.

- Incidental ingestion of groundwater impacted by PFOS and PFOA by adult and child residents, who may be exposed to groundwater used for irrigation activities at properties to the west and south of the site.

The objective of the Screening ERA was to assess the potential for unacceptable risks to identified offsite ecosystems following the discharge of groundwater impacted with PFOS and PFOA into the environment.

RTI DL RELEASE - EHP

2. Conceptual site model for risk assessment

2.1 Site assessment data

The following site specific assessment data obtained by Parsons Brinckerhoff has been used in the development of the CSM and RA:

- Parsons Brinckerhoff (2013a) *Groundwater Monitoring Event, December 2012 – Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey (AACO)*, February 2013.
- Parsons Brinckerhoff (2013b) *February 2013 Addendum Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey Groundwater Monitoring Event*, May 2013.

Relevant extracts from the site assessment data are presented in Appendices B1 to B5. The extracts provided in Appendices B1 to B5 are listed in Table 2.1 below.

Table 2.1 Extracts presented in Appendices B1 and B2

Report	Summary of extracted data included in this RA	Appendix reference
Parsons Brinckerhoff (2013b)	<ul style="list-style-type: none"> ■ Figures 1 to 4. ■ Extracts from gauging and tabulated groundwater results tables. 	Appendix B1
Parsons Brinckerhoff (2013a)	<ul style="list-style-type: none"> ■ Figures 3, 4, 6 and 8. 	Appendix B2

In addition, Parsons Brinckerhoff submitted a request (Request for Information; RFI #9) to Defence for any existing Ecological Study Information, including that relating to ecological receptors in the vicinity of the site. No ecological study information specific to ecological receptors in the vicinity of the site was available and an online search was subsequently undertaken by a Parsons Brinckerhoff Ecologist and Senior Environmental Scientist in January 2013. The following information sources were identified and reviewed:

- Queensland Government (2013), *Vegetation Management Act Regional Ecosystem and Remnant Map – Version 6.1* and *Vegetation Management Act Essential Habitat Map Version 3.1*.
- DSEWP (2013), *EPBC Act Protected Matters Report*, 7/01/12 for a 10 km radius around the site.
- DERM (2012), *Conceptual Model Case Study Series, Aquatic Connectivity: Dewfish*.
- DAFF/CA (2006), *Archers Crossing and Bowenville Reserves Recreational Fishing Report*.

The relevant site assessment data from Parsons Brinckerhoff (2013a; 2013b) is provided in Appendix B. Copies of the ecological documents reviewed are provided in Appendix C. The CSM for RA is summarised in Section 2.2 below.

2.2 Conceptual site model for risk assessment

The CSM for HHRA is presented in Figures 2 to 3, Appendix A and summarised in Sections 2.2.1 to 2.2.6 below.

2.2.1 Chemical properties of PFOS and PFOA

The chemical properties of PFOS and PFOA can be summarised as follows:

- PFOS and PFOA are chemicals made up of a carbon chain surrounded by fluorine atoms with an acid group at the end of the chain. They are also known as C8 perfluorocarbons (PFCs), because they contain eight carbon atoms in each molecule. PFCs have unique surfactant properties – repelling oil, grease and water – and are not naturally found in the environment. PFOS and PFOA are not volatile; at environmental pH they will exist as an ion in water (ATSDR, 2009).
- PFCs were historically manufactured in large amounts in the USA, production has ceased/decreased since 2000. It is understood that PFOS is still manufactured in China. PFCs are used in surface protection products (carpet, clothing treatments, coatings for paper and cardboard packaging) and fire fighting foams.
- PFOS and PFOA are resistant to biodegradation, photooxidation, direct photolysis and hydrolysis. They breakdown very slowly in air and are not known to breakdown in soil or water (ATSDR, 2009). They may undergo long range transport and bioaccumulate within the food chain, directly or indirectly affecting aquatic organisms (Environment Canada, 2012).

2.2.2 Use of PFOS and PFOA AFFF onsite

Aqueous fire forming foam (AFFF) containing PFOS and PFOA was used for fire fighting activities at the AACO base from the 1970s to approximately 2005.

2.2.3 Groundwater depth and aquifers

The groundwater depth and aquifers encountered at the site can be summarised as follows:

- The Oakey Alluvial Aquifer is the aquifer investigated during works at the site to date. The Oakey Alluvial Aquifer system consists of sandy clays that grade to sandy gravels with clay at a depth of approximately 19 metres below ground level (mBGL).
- The water table is typically 14.5 m below ground level at the site. The upper alluvial aquifer typically exists from 14.5 mBGL to 19 mBGL at the site.
- The lithology of the lower alluvial aquifer is not well understood. It appears that there are discrete discontinuous zones of sand and gravel and that the sand and gravel zones are approximately an order of magnitude greater in hydraulic conductivity, than the upper alluvial aquifer zone (above 19 mBGL). The thickness of the alluvial aquifer increases in a downstream direction from Oakey, to as much as 40 m.

- No distinct lithological breaks in the stratigraphy of the aquifer have been noted. Given this, there is the potential for the transport of PFOS and PFOA to occur both vertically and laterally within the aquifer.

2.2.4 Groundwater flow direction and velocity

Details pertaining to the groundwater flow direction and velocity can be summarised as follows:

- Groundwater within the Oakey Creek Alluvial Aquifer is inferred to flow westward towards the Condamine River and Oakey Creek. The vertical gradient is very small under natural conditions, but is expected to be highly negative (downward) between the upper and lower zones of the alluvial aquifer during periods of groundwater extraction.
- Oakey Creek is located approximately 1.2 km to the south of the site and flows in a general north-westerly direction into the Condamine River, part of the Murray–Darling Catchment. A branch of Doctors Creek also crosses the northwest corner of the site prior to discharging into Oakey Creek to the west of the site (URS, 2010).
- Although groundwater use in the region has resulted in a decrease in vertical connectivity between surface water and groundwater, Oakey Creek is also thought to be still connected to the groundwater and providing recharge to the central Condamine alluvium (DERM, 2011).
- Oakey Creek is deeply incised and is generally considered to be a losing stream that contributes surface water flow to the regional groundwater. Creek base flow through the town of Oakey is primarily attributed to discharge of treated municipal effluent, and the interaction of groundwater and surface water between the mouth of Oakey Creek and the town of Oakey is likely to act as a groundwater source and a discharge feature during different times of the year. While it is noted that the Creek is located 1.2 km south of the site, groundwater has been observed flowing west along a much longer flow path and the discharge point for groundwater to Oakey Creek may be up to 7.2 km west of the site.
- Drainage channels on the north side of the airfield flow toward Doctors Creek. Doctors Creek is an intermittent stream that loses water to the alluvial aquifer when surface water is present. The creek is not incised and occasionally floods the surrounding fields and roads during wet periods. A large sump and stormwater detention pond is located to the north of the site to assist farmers in draining their fields after wet periods. It is likely that this detention pond may act as a seasonal source of groundwater recharge. However, the groundwater mound is unlikely to be noticed during water level monitoring at the site because of the substantial distance from site (over 1 km north).
- URS (2010) estimates that regional groundwater velocity in the shallow aquifer is in the order of 0.03 to 3 m/year, with higher velocities of 58 to 1,275 m/year estimated in the lower aquifer.
- The results of aquifer tests conducted at the site by Parsons Brinckerhoff indicated that the geometric mean hydraulic conductivity of the lower alluvial aquifer is 15 m/day, with a range of 3.8 to 50 m/day.
- The mean calculated groundwater velocity under natural conditions (i.e. no extraction wells operating) for the lower alluvial aquifer is 36.1 m/year. This estimate does not

include any retardation factors such as biodegradation or adsorption, and therefore indicates an upper range of expected contaminant velocities under natural conditions. When extraction bores are operating, the groundwater hydraulic gradient will increase, and the groundwater velocity will also increase. The operation of extraction bores has the potential to cause contaminant plumes to migrate in any direction, including up-hydraulic gradient and downward into the lower alluvial aquifer.

2.2.5 Use of groundwater in the vicinity of the site

Details pertaining to the use of groundwater in the vicinity of the site can be summarised as follows:

- Land in the vicinity of the site is predominantly made up of rural allotments use for agricultural purposes, principally grain cropping and livestock production. Residential allotments are located adjacent to the site to the south (URS, 2010; Coffey, 2011) and a large portion of Defence land to the northwest of the airfield is leased for agricultural production (e.g. corn and cotton). To support these land uses there has been extensive development of water resources in the vicinity of the site since the 1950s e.g. use of groundwater for irrigation and stock watering.
- Five water supply bores have been identified in the vicinity of the site comprising:
 - ▶ Two irrigation bores, 66256 and 83264, are located 230 m west, and 660 m west northwest of the site respectively, on Defence leased property (note, quoted distances are approximated from onsite well MWA2-C). These bores are periodically used for crop irrigation (observed to be corn and cotton), typically one month per year (January to February; *pers. comm.* Lessee during Parsons Brinckerhoff site works in 2013). It is noted that cotton is not edible.
 - ▶ One dis-used irrigation bore, 35983, is located 940 m to the north of the site (note, quoted distance is approximated from onsite well MWA2-C). It is understood that the bore had not been operational for approximately 25 years (*pers. comm.* Lessee during Parsons Brinckerhoff site works in 2013).
 - ▶ Registered bore 87138 is located at the Oakey Community House (Koala House), Corfe Road, Oakey. This bore was found to be dis-used during 2012.
 - ▶ Registered bore 137030 is located approximately 500 southwest of the gatehouse at 66 Orr Road, Oakey (Lot 1 Registered Plan 213836). The water in this bore is brackish and is used for landscaping irrigation and pool water supply.
- Groundwater is not used for potable water offsite (*Pers. comm.*, neighbouring residents to the site at Oakey Neighbourhood Information Session on 14 December 2012). It is noted that electrical conductivity readings in the range 2,658 to 4,300 $\mu\text{S}/\text{cm}$ were measured during sampling of offsite bores (137030, 35983, 83264, 66256 and 87138) by Parsons Brinckerhoff (2012; 2013a). Based on a conversion factor of 0.68, this equates to a Total Dissolved Solids (TDS) concentration of 1,807 to 2,924 mg/L. In accordance with the 2011 Australian Drinking Water Guidelines (NHMRC/NRMMC, 2011), water from these bores is classified as 'unacceptable (unpalatable)'.
- Quantification of the extent of groundwater use in the surrounding agricultural fields was outside the scope of the RA. It is noted that with the exception of the anecdotal evidence provided above, the frequency of groundwater use, and the volume of groundwater used offsite, is not known.

It is also noted that a number of additional registered bores were identified during previous investigation works (URS, 2010; Coffey, 2011). These bores could not be located by Parsons Brinckerhoff in 2012/2013, and for the purpose of this RA it is assumed that they no longer exist.

The location and uses of identified offsite bores are shown on Figure 1, Appendix A.

2.2.6 Flora/fauna identified in the vicinity of the site

Details pertaining to the flora and fauna identified in the vicinity of the site can be summarised as follows:

- Oakey Creek downstream of AACO is heavily degraded and largely devoid of native vegetation (Queensland Government, 2013).
- Remnant vegetation containing an 'Of Concern' regional ecosystems listing under the *Vegetation Management Act 1999* (VM Act) is present along Oakey Creek upstream to the southeast of the AACO. This vegetation may contain suitable habitat for the plant species *Solanum stenopterum*, which is listed as Vulnerable under the *Nature Conservation Act 1992* (NC Act; mapped essential habitat for this species is present at the AACO site) (Queensland Government, 2013).
- Four threatened ecological communities may occur or are likely to occur within 10 km of the site. Forty one threatened species (seven birds, one fish, seven mammals, six plants, six reptiles and 14 migratory birds) or habitat for these species, may occur or is likely to occur within the area. The listed fish is the Murray Cod (*Maccullochella peelii*; listed as Vulnerable pursuant to the *Environment Protection and Biodiversity Conservation Act 1999*, EPBC Act) (DSEWP, 2013).
- The riparian habitat condition of Oakey Creek is generally poor due to a lack of significant native riparian vegetation and low level of riparian complexity. The entire reach of Oakey Creek has been heavily modified for agriculture and there are no naturally occurring wetlands on the floodplain as it has no gullies where water is able to pool (DERM, 2011).
- A demonstration project for riparian restoration called the 'Dewfish Demonstration Reach' is present along Oakey Creek downstream of the AACO near Dalby and Bowenville (DERM, 2011). The start of the Dewfish Demonstration Reach is located approximately 35 to 40km downstream of Oakey Creek at Oakey. One of the aims of the Demonstration Reach is to 're-snap to provide fish habitat'.
- The Murray Cod is generally found in fast flowing waters and is known to be affected by barriers (a number of weirs are present along the Dewfish Demonstration Reach). Oakey Creek is an ephemeral run-off-stream with low flows in the Creek provided by discharge of treated effluent from the Toowoomba Sewage Treatment Plant. Fish surveys in 2008 did not identify the presence of the Murray Cod within the Demonstration Reach however it was identified in the Condamine River in follow up surveys in 2011.
- A number of snags (at 10 sites) were placed in Oakey Creek near Bowenville Reserve during the 'Bowenville Reserve improvements for recreational fishing' project to improve fish habitat (date unclear). Murray Cod fingerlings were also released within the Creek in 2008. A 70 cm long, 3.5 kg Murray Cod was caught in Oakey Creek, at Bowenville Reserve (DAFF/CA, 2006).

3. Human health risk assessment

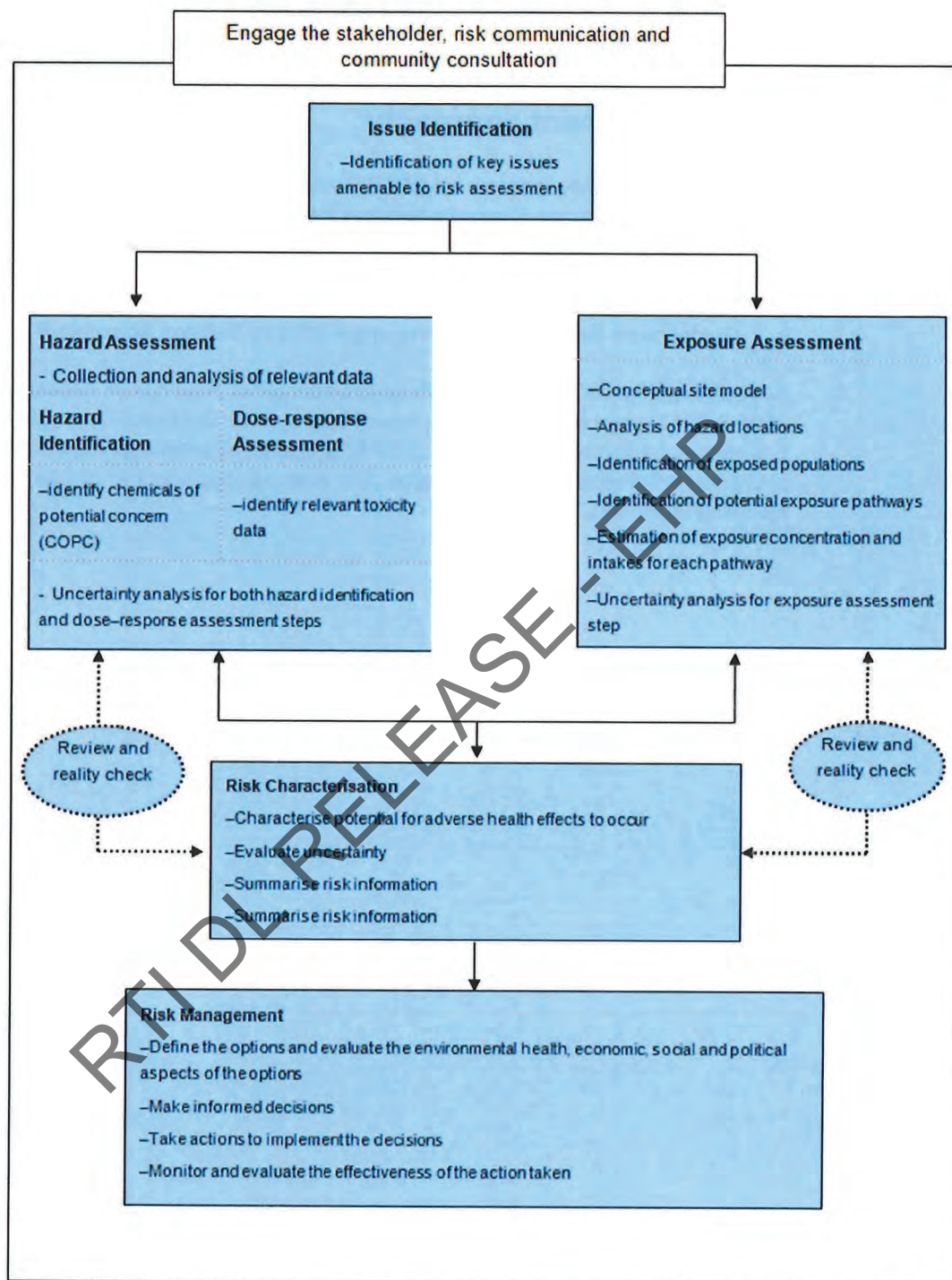
3.1 Risk assessment approach

The human health risk assessment (HHRA) was undertaken in accordance with the National Environmental Protection Council's National Environment Protection (Assessment of Site Contamination) Measure (i.e. NEPM; NEPC, 1999), and based on the following provisions:

- Guideline on Health Risk Assessment Methodology, Schedule B (4).
- Guideline on Exposure Scenarios and Exposure Settings Schedule B (7b).

Australian guidance documents such as Environmental Health Risk Assessment (enHealth, 2004 & 2012) have been referred to where appropriate. Guidance documents from the US Environmental Protection Agency (USEPA) and other international regulatory agencies have also been referred to, where applicable. The methodology adopted can be summarised as follows (Figure 3.1).

RTI DL RELEASE - EHP



Ref: enHealth (2012)

Figure 3.1 Risk assessment process – HHRA

3.2 Screening assessment – PFOS and PFOA

The chemicals of potential concern (COPC) in groundwater were selected on the basis of the comparison of groundwater concentrations reported in Parsons Brinckerhoff (2012), Parsons Brinckerhoff (2013a; 2013b), URS (2010) and Coffey (2011) with the Minnesota Department of Health Chronic Health Risk Limits (HRLs) for drinking water.

The MDH HRLs were adopted for the assessment of health effects from PFOS and PFOA in offsite groundwater. It is noted that guidelines within the same range and the MDH HRLs can be derived using the toxicity studies adopted by MDH, and guidance in the Australian Drinking Water Guidelines (NRMMC/NHMRC, 2011). It is also understood that the MDH HRLs have been adopted at other Defence sites; hence the adoption for AACO would ensure consistency of assessment across Defence sites.

A summary of the MDH HRLs, adopted for the assessment of PFOS and PFOA, is provided in Table 3.1 below. A summary of the maximum concentrations of PFOS and PFOA reported for offsite groundwater, with reference to the adopted guidelines, is provided in Table 3.2.

Table 3.1 Summary of adopted guideline values – PFOS and PFOA

Organisation	Guideline – PFOS (µg/L)	Guideline – PFOA (µg/L)	Guideline type/comment
Minnesota Department of Health ⁽¹⁾	0.3 µg/L	0.3 µg/L	Chronic Health Risk Limit, based on child exposure to drinking water.

Notes:

1. Ref. MDH (2009) *Health Risk Limits for Groundwater 2008 Rule Revision – Perfluorooctane sulfonate and Perfluorooctanoic Acid*.

Table 3.2 Summary of groundwater results – PFOS and PFOA offsite

Well ID	Location	No. sampling rounds (date)	PFOS conc. range (µg/L)	Conc. exceeding criteria?	PFOA conc. range (µg/L)	Conc. exceeding criteria?
87138	Water supply well at community house	1 (Dec 2012)	0.08	No	<0.02	No
66256	Existing irrigation bore located 230 m to the west northwest of the site [#] .	1 (Feb 2013)	1.31 – 3.3*	Yes	0.08 – 0.09*	No
83264	Existing irrigation bore located 660 m to the west of the site [#] .	1 (Feb 2013)	4.18	Yes	0.13	No
35983	Former irrigation bore near northwest airport fence, 940 m to the north of the site [#] .	1 (Feb 2013)	<0.02	No	<0.02	No
137030	Water supply well at 66 Orr Road	2 (15 Jan and 23 Jan 2013)	2.9* – 9.68	Yes	0.05* – 0.46	Yes (15 Jan 2013 primary sample only)
Pool	Pool at 66 Orr Road	1 (23 Jan 2013)	0.79	Yes	0.19	No

Notes: *indicates QA/QC sample result, # approximate distances as measured from onsite well MWA2-C.

*COPC = chemical
of potential
concern*

The screening assessment is summarized in Table 3.3 below.

Table 3.3 Summary of screening assessment – PFOS and PFOA

Location	Max. conc. PFOS (µg/L)	COPC for HHRA ?	Max. conc. PFOA (µg/L)	COPC for HHRA ?
Water supply well (137030) at 66 Orr Road	9.68	Yes	0.46	Yes
Pool at 66 Orr Road	0.79	Yes	0.19	No
Other irrigation/water supply wells (87138, 66256, 83264 and 35983)	4.18	Yes	0.13	No

3.3 Toxicity assessment

Toxicity assessment provides an evaluation of the inherent toxicity of chemicals. It is a process of determining whether human exposure to a chemical could cause an increase in the incidence of adverse health condition, either cancerous or non-cancerous in nature (ANZECC/NHMRC, 1992). It considers:

- the nature of adverse effects related to the exposure
- dose-response relationships
- the weight of evidence for effects such as carcinogenicity
- the relevance of animal data to humans.

The results of the toxicity assessment include a set of chemical specific toxicity criteria that are used in the assessment of health risks from chemical exposures.

3.3.1 Health effects of PFOS and PFOA

The toxicology of PFOS and PFOA is summarised in Table 3.4 below. A full toxicity summary for PFOS and PFOA is provided in Appendix E.

The toxicity summary has been based on ATSDR (2009). ATSDR (2009) provides Draft toxicity information for thirteen perfluoroalkyls including PFOS and PFOA. Where specific information relating to PFOS and PFOA was not provided, the toxicology summary has been based on information relating to perfluoroalkyls in general. Given that PFOS and PFOA are not volatile (refer to Table 3.4 below), the toxicity summary focuses on the oral and dermal routes of exposure.

Table 3.4 Toxicology summary – PFOS and PFOA

Parameter	Summary
Chemical description and properties	
Name	Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) (ATSDR, 2009)
CAS registry	PFOS: 1763-23-1, PFOA: 335-67-1 (ATSDR, 2009)
Volatility	Not volatile, at environmental pH they will exist as an ion in water (ATSDR, 2009).

Parameter	Summary
Adverse health effects – animals	
Database	Majority of data available from oral exposure studies. Limited data available from inhalation/dermal exposure studies (ATSDR, 2009).
Cancer	<p>Effects that have been correlated with oral exposure to PFCs include:</p> <ul style="list-style-type: none"> Induction of liver hepatocellular adenomas, Leydig cell adenomas, thyroid follicular cell adenomas and pancreatic acinar cell adenomas has been reported however relevance of the mode of action to humans is unclear (ATSDR, 2009). <p>No information is available regarding cancer effects in animals following dermal exposure (ATSDR, 2009).</p> <p>PFOS and PFOA have not been reported to be genotoxic from various <i>in vivo</i> and <i>in vitro</i> tests. Therefore it is assumed that carcinogenic effects are the result of an epigenetic mechanism and the trigger is considered a threshold concentration (Stahl <i>et al.</i>, 2011).</p>
Non cancer	<p>The main target for toxicity in animals following oral exposure is the liver (ATSDR, 2009; Stahl <i>et al.</i>, 2011).</p> <p>Effects that have been correlated with oral exposure to PFCs include:</p> <ul style="list-style-type: none"> Morphological and biochemical alterations to the liver (e.g. increase in absolute liver weight and beta-oxidation activity, hepatocellular hypertrophy and necrosis, reduction in serum cholesterol and triacylglycerols) (ATSDR, 2009). Alterations to serum thyroid hormone levels (ATSDR, 2009). Developmental adverse effects (e.g. prenatal loss, reduced neonate loss and viability, delays in eye opening). Note that results are inconclusive (ATSDR, 2009). Reduced growth noted following feeding of perfluoroalkyls (ATSDR, 2009). Neurotoxicity and immunotoxicity (Stahl <i>et al.</i>, 2011). <p>PFOS and PFOA have not been reported to interfere with reproduction or lead to any appreciable teratogenic effects.</p> <p>Developmental toxicity has however been reported (reduced increase in body weight after birth and reduced number of live births and viability of progeny) following exposure of the mother during pregnancy (Stahl <i>et al.</i>, 2011).</p> <p>Effects that have been correlated with dermal exposure to PFCs include:</p> <ul style="list-style-type: none"> Hepatic changes in rats (APFO) (ARSDR, 2009). Mild skin irritation and acute necrotizing dermatitis in rats. Conjunctival irritation in rabbits (ARSDR, 2009). Transient weight loss changes in rats (ARSDR, 2009). Increase the IgE response to environmental allergens in mice (ARSDR, 2009).
Adverse health effects – humans	
Database	<p>Data available from health evaluations of human subjects in occupational settings and epidemiological studies of communities with relatively high exposure (ATSDR, 2009). The significance of epidemiological studies is limited because of the small number of participants and the problematic classification of exposure (Stahl <i>et al.</i>, 2011).</p> <p>Limited data available regarding exposures for the general population and developmental effects in humans (ATSDR, 2009).</p>

Parameter	Summary
Cancer	<p>PFOS and PFOA have not classified by the IARC or USEPA.</p> <p>Some instances of increase in rate of prostate and bladder cancers in humans have been reported from a limited number of occupation exposure studies. Overall, the results are not conclusive (ATSDR, 2009; Stahl <i>et al.</i>, 2011).</p>
Non cancer	<p>Significant adverse health effects have not been associated with long term dermal/inhalation exposure to PFCs by workers.</p> <p>Effects that have been correlated with PFOS/PFOA concentrations in blood include:</p> <ul style="list-style-type: none"> Changes in levels of cholesterol, thyroid and sex hormones (Stahl <i>et al.</i>, 2011; ATSDR, 2009). Increased occurrence of angina, myocardial infarction, chronic bronchitis, shortness of breath and asthma (Stahl <i>et al.</i>, 2011). Thyroid disease (Stahl <i>et al.</i>, 2011). Change in glucose homeostasis/other indicators of metabolic syndrome (Stahl <i>et al.</i>, 2011). Fertility disorders (Stahl <i>et al.</i>, 2011). Miscarriages (Stahl <i>et al.</i>, 2011). Increased risk of ADHD (Stahl <i>et al.</i>, 2011). Occurrence of preeclampsia (Stahl <i>et al.</i>, 2011).
Summary	<p>For the most part, and with limited toxicity data, no significant adverse effects have been identified in humans following exposure to PFCs. However changes in clinical tests associated with serum levels of have been reported. In addition, numerous publications in the scientific literature allude to negative effects of PFCs on human health.</p> <p>Most health evaluations have focused on detecting possible hepatic and endocrine effects, and alterations in lipid metabolism, based on the extensive data available from animal studies however:</p> <ul style="list-style-type: none"> In general, adverse health effects in animals have been associated with doses/exposure concentrations that results in blood PFC concentrations significantly higher than those reported for the general population or PFC workers. Reproductive and developmental toxic effects observed in animals have only been partially observed in epidemiology studies. The relevance of observed adverse effects in animals, to humans, is difficult to determine due to the differences in the toxicokinetics between animals and humans and the limited information on the mode of action of PFC toxicity. As noted above, the half-life of PFOS/PFOA is approximately 4 years in humans compared to hours to days in rodents. In addition, while the mode of action of PFC toxicity is not well understood, in animals the liver has been found to be the main target organ for PFC toxicity regardless of the route of exposure. Liver toxicity in rodents is thought to be due to the activation on the PPARα receptor by PFCs. Rats and mice are most sensitive to PPARα antagonists, followed by hamsters, with non-human primates and humans less responsive. The excretion pathway (e.g. faeces, urine) and target organ for toxicity has also been reported to differ between species. <p>Given the above, the relevance of adverse effects reported in animals following exposure to perfluoroalkyls to humans requires further evaluation.</p>

3.3.2 Adopted toxicity criteria for PFOS and PFOA

Oral reference doses (RfDs) from MDH were adopted for the assessment of PFOS and PFOA at the site.

An RfD provides an estimate (with uncertainty spanning perhaps an order of magnitude) of the daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The MDH RfDs for PFOS and PFOA are derived from a No Observed Adverse Effects Level (NOAEL) for a critical effect obtained from animal studies, with the incorporation of safety factors to account for the uncertainty in inter-species and intra-species extrapolation.

No background concentration of PFOS and PFOA was assumed based on the information provided in ATSDR (2009); refer to Appendix E. The bioavailability of PFOS and PFOA was assumed to be 100%.

The toxicity reference values for threshold effects adopted in the HHRA are provided in Table 3.5 below. Further information regarding the selection of toxicity values for PFOS and PFOA is provided in Appendix E.

Table 3.5 Adopted toxicity criteria

COPC	Oral RfD (mg/kg-day)
PFOS	$8 \times 10^{-5(1)}$
PFOA	$7.7 \times 10^{-5(1)}$

Notes: RfD = reference dose.

- RfDs used by the Minnesota Department of Health (MDH) to derive chronic Health Risk Limits for drinking water. Ref. MDH (2009) *Health Risk Limits for Groundwater 2008 Rule Revision – Perfluorooctane sulfonate and Perfluorooctanoic Acid*.

3.4 Exposure assessment

3.4.1 Potential exposure pathways

The potential exposure pathways to groundwater impacted with PFOS and PFOA, based on the CSM outlined in Section 2, are summarised in Table 3.6 below.

For contaminated groundwater to pose a risk to human health, a complete exposure pathway must exist between the source of the impact and the receptor. Where the exposure pathway is incomplete, there is no exposure, hence no risk. A complete exposure pathway consists of the following elements:

- A source and mechanism for release.
- A storage and/or transport medium).
- An exposure point, where the receptor comes into contact with the contamination.
- An exposure route (i.e. inhalation or direct contact).

Table 3.6 Potential exposure pathways

Potential exposure pathway	Exposure pathway complete?	Receptors
1. Swimming in pool at 66 Orr Road, Oakey	Yes	Offsite residents (adults and children)
2. Use of groundwater for irrigation	Yes	Farm workers (adults) Offsite residents (adults and children)

As indicated in Section 2 (CSM for RA), groundwater to the south and west of the site is also used for stock watering and irrigation of crops (corn and cotton). Therefore human exposure to PFOS/PFOA may occur following the ingestion of impacted crops or livestock (it is noted that cotton is not edible). Similarly, human exposure to PFOS/PFOA in groundwater may occur during recreational activities at Oakey Creek (i.e. following the discharge of groundwater into the Creek). The assessment of these two potential exposure pathways was outside the scope of the HHRA.

3.4.2 Populations of concern

In accordance with Section 3.4.1 above, the populations of concern identified for the purpose of the HHRA were:

- Offsite residents (adults and children) who may be exposed to PFOS and PFOA impacted groundwater during swimming in the pool at 66 Orr Road, Oakey.
- Offsite farm workers (adults) who may be incidentally exposed to PFOS and PFOA impacts in irrigation water while undertaking irrigation activities.
- Offsite residents (adults and children) who may be incidentally exposed to PFOS and PFOA impacts in irrigation water.

3.4.3 Exposure route

The HHRA assumed that the incidental ingestion of groundwater was the dominant pathway for exposure to PFOS and PFOA in groundwater. Residents may accidentally ingest groundwater impacted with PFOS/PFOA while swimming in the pool at 66 Orr Road, Oakey, or during the use of groundwater for irrigation activities. A maximum exposure duration of 1.5 hours was assumed in the HHRA (refer to Table 3.8 below).

PFOS and PFOA are not volatile at environmental temperatures therefore the HHRA assumed that potential exposure to PFOS/PFOA in impacted groundwater via the inhalation route was negligible.

Similarly, potential exposure following dermal contact with impacted groundwater was assumed to be negligible. Anionic surfactants e.g. PFOS/PFOA, are thought to penetrate the whole skin poorly. Experimental values presented by Scala *et. al.* (1968) confirm that even at the highest surfactant concentrations studied (0.03 M or 1%), non-detectable concentrations of surfactants passed through the skin in the first two hours of exposure. Diffusion curves were observed to be non-linear (exponential), with surfactant able to be measured on the underside of the skin four hours following exposure.

3.4.4 Summary of exposure scenarios/routes

A summary of the exposure scenarios/routes assessed in the HHRA is provided in Table 3.7 below.

Table 3.7 Summary of exposure scenario/pathway of concern

Exposure scenario	Population of concern	Exposure route ⁽¹⁾		
		Oral	Dermal	Inhalation of vapours
Swimming in pool at 66 Orr Road, Oakey	Offsite residents (adult/child)	✓	–	–
Irrigation activities with groundwater	Offsite farm workers/residents (adult)	✓	–	–
Incidental exposure to irrigation water	Offsite residents (adult/child)	✓	–	–

Notes: ⁽¹⁾ ✓ = exposure pathway considered; – = exposure pathway not considered.

3.4.5 Adopted exposure parameters

Average and upper bound exposure assumptions were adopted for the offsite HHRA. The exposure parameters adopted were based on NEPC (1999), enHealth (2012), professional judgement and site specific data provided by for the AACO base (i.e. RFI #8).

Note that while it is expected that agricultural irrigation systems may run for longer than 1 hour per day, farmers are not expected to be in direct contact with groundwater during this whole time as irrigation of large fields is not generally undertaken using a hand held hose or similar (undertaken using an irrigation system that is turned on via a tap etc.). Therefore, irrigation with a hand held hose (e.g. for watering garden beds, assumed to be for 1 hour per day) was assessed as the more conservative exposure pathway, and was assessed in the RA.

The exposure parameters adopted in the HHRA for the populations of concern are shown in Table 3.8 below.

Table 3.8 Summary of exposure parameters

Parameter	Explanation	Units	Resident			Garden/farm worker	
			Swimming pool, adult	Swimming pool, child	Irrigation water, adult	Irrigation water, child	Irrigation water, adult
Exposure Frequency	Number of times/length of time swimming or exposed to irrigation water.	Events/year	156 ⁽¹⁾	156 ⁽¹⁾	75 (156) ⁽⁴⁾	75 (156) ⁽⁴⁾	75 (156) ⁽⁴⁾
		Hours/event	0.5 (1.5) ⁽²⁾	1 ⁽²⁾	0.5 ⁽⁵⁾	0.5 ⁽⁵⁾	1 ⁽⁵⁾
Incidental ingestion of water	Amount of water accidentally ingested per exposure.	mL/event	12.5 (187.5) ⁽²⁾	50 (150) ⁽²⁾	10 ⁽⁶⁾	10 ⁽⁶⁾	20 ⁽⁶⁾
Bodyweight	Assumed default.	Kg	70 ⁽³⁾	11 ⁽³⁾	70 ⁽³⁾	11 ⁽³⁾	70 ⁽³⁾
Averaging Time (AT) and Exposure Duration (ED)	Default	years	30	6	30	6	30
Threshold ⁽⁶⁾							

Notes:

1. Assumes swimming frequency of 3 times per week for 52 weeks per year (RFI #8).
2. Adult exposure based on the incidental ingestion of 25 mL/hour and 125 mL/hour (enHealth, 2012). Average and upper bound value (in parenthesis) presented where available.
3. Assumes 1–2 year old child is the most sensitive child receptor (enHealth, 2012).
4. Assumes a frequency of sprinkling events of 75 days per year on average, and 3 days per week (assume 52 weeks per year) in extreme heat conditions (RFI #8). Anecdotal evidence indicates that irrigation bores may be used one month per year (refer to Section 2.2.5).
5. Assumes a sprinkling duration of 1 hour /event (RFI #8). Assumes residents are exposed for half of this duration (professional judgement).
6. Ref. enHealth (2012).
7. Ref. enHealth (2012). AT = ED, based on a threshold approach.

3.4.6 Input COPC concentrations

The input COPC, PFOS and PFOA, concentrations for the HHRA are summarised in Table 3.9 below (also refer to Table 3.3 above).

What is
pool 2?
(where)

Table 3.9 Input COPC concentrations – PFOS and PFOA

Exposure scenario	Input PFOS conc. (µg/L)	Input PFOA conc. (µg/L)	Comments
Swimming pool at 66 Orr Road, Oakey			
Swimming in pool 1	0.79	— ⁽¹⁾	Concentrations reported in pool at 66 Orr Road, Oakey.
Swimming in pool 2	9.68	0.46	Concentrations reported in water supply well (pool source; bore 137030) at 66 Orr Road, Oakey.
Irrigation activities			
Irrigation activities with groundwater. Incidental exposure to irrigation water.	9.68	0.46	Maximum concentrations reported in offsite water supply bores i.e. in bore 137030.

Notes:

1. Not a COPC for this exposure pathway.

3.4.7 Estimation of intake dose in humans

When calculating the risk of exposure the estimated daily intake (EDI) associated with the oral exposure routes may be estimated using the following equation:

$$EDI_{oral} = \frac{C_g \times IR \times EvF \times EvD \times ED}{BW \times AT \times 365}$$

Where:

EDI = estimated daily intake (mg/kg/day).

C_g = groundwater concentration (mg/L).

IR = groundwater ingestion rate (L/hour).

EvF = event frequency (events/year)

EvD = event duration (hours/event).

ED = exposure duration (years).

BW = body weight (kg).

AT = averaging time (years).

3.5 Risk characterisation

The risk of health effects from exposure to the threshold chemicals is expressed in terms of the Hazard Quotient (HQ). The HQ is the ratio of the estimated daily intake (EDI) to the Reference Dose (RfD).

For multiple exposures to chemicals with a common toxic effect e.g. PFOS and PFOA, a Hazard Index (HI) is estimated. HI is the sum of all the relevant HQs.

Where HI is less than 1, there is unlikely to be any adverse health effects associated with exposure to the chemicals of concern. However, a HI exceeding 1 does not necessarily indicate an actual risk. Rather, it indicates a further assessment may be warranted.

The HQ is calculated as follows:

$$HQ = \frac{EDI}{RfD}$$

Where:

HQ = Hazard Quotient for a pathway specific exposure (unitless).

EDI = Estimated Daily Intake (mg/kg/day) (see Appendix F).

RfD = Reference Dose (mg/kg/day) (see Table 3.5, Section 3.3.2).

The calculated HI associated with the assumed exposure to PFOS and PFOA are presented in Appendix F and are summarised in Table 3.10 below.

Table 3.10 Summary of Hazard Index (HI) – PFOS and PFOA in groundwater

Scenario	Population of concern	Adult HQ ⁽¹⁾		Adult Total HI	Child HQ ⁽¹⁾		Child Total HI
		Pool	Irrigation water		Pool	Irrigation water	
Pool – Scenario 1 ⁽⁴⁾							
Swimming in Pool and Irrigation activities with groundwater.	Farm worker – average	7.5x10 ⁻⁴	7.5x10 ⁻³	8.3x10 ⁻³	_(2)	_(2)	_(2)
	Farm worker – upper bound	0.01	0.02	0.03	_(2)	_(2)	_(2)
Swimming in Pool and Incidental exposure to irrigation water.	Resident – average	7.5x10 ⁻⁴	1.9x10 ⁻³	2.7x10 ⁻³	0.02	0.01	0.03
	Resident – upper bound	0.01	3.9x10 ⁻³	0.01	0.06	0.03	0.09
Pool – Scenario 2 ⁽⁵⁾							
Swimming in Pool and Irrigation activities with groundwater.	Farm worker – average	9.7x10 ⁻³	7.5x10 ⁻³	0.02	_(2)	_(2)	_(2)
	Farm worker – upper bound	0.15	0.02	0.17	_(2))	_(2)	_(2)
Swimming in Pool and Incidental exposure to irrigation water.	Resident – average	9.7x10 ⁻³	1.9x10 ⁻³	0.01	0.25	0.01	0.26
	Resident – upper bound	0.15	3.9x10 ⁻³	0.15	0.74	0.03	0.77

Notes:

1. Refer Appendix F.
2. '-' denotes exposure scenario is not applicable for the population of concern.
3. Based on average and upper bound exposure assumptions (refer to Table 3.8 above).
4. PFOS concentrations of 0.79 µg/L as reported in the pool (refer to Table 3.9 above).
5. PFOS concentrations of 9.68 µg/L and PFOA concentrations of 0.46 µg/L, as reported in bore 137030 understood to be the source of pool water (refer to Table 3.9 above).

The results indicated the following:

- The estimated HI were below the tolerable threshold (i.e. $HI < 1$). This indicated that adverse health effects from exposure to PFOS and PFOA concentrations in groundwater offsite, for the offsite populations and exposure pathways of concern, are unlikely.

3.6 Uncertainty analysis

Risk assessments require a number of assumptions regarding site conditions, human exposure and chemical toxicity. Even though site-specific parameters were included (e.g. groundwater analytical and exposure assessment data), it is not possible to fully describe site conditions and human activities at the site for the entire period of time considered in the risk assessment. The assumptions considered for this risk assessment were reasonably conservative in nature, to account for uncertainty in the parameter estimates and to protect public health by providing a deliberate margin of safety. The risk assessment approach presented does not consider a fully probabilistic estimate of risk, but presents conditional estimates based on a number of assumptions regarding exposure and toxicity. Thus, it is necessary to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates into perspective.

The aim of this section is to provide a qualitative evaluation of the following uncertainties associated with this risk assessment:

- **Exposure Assumptions:**
 - ▶ Exposure assumptions were based on site specific information provided by Defence in RFI #8, and where site specific information was not available, conservative exposure assumptions based on enHealth (2012), professional judgement and anecdotal evidence were included in the RA. As noted previously, quantification of the extent of groundwater use in the surrounding agricultural fields was outside the scope of the RA. With the exception of the anecdotal evidence provided in Section 2.2.5 above, the frequency of groundwater use, and the volume of groundwater used offsite is not known. This RA has been based on a 'point estimates' approach using adopted average and upper bound exposure assumptions. Actual exposure is likely to be variable and may be higher than that assumed.
- **Groundwater assessment data:**
 - ▶ Maximum concentrations of PFOS and PFOA identified in the registered bores to the west/south of the site, where it is understood that irrigation water is sourced from, were adopted for the offsite risk assessment for irrigation water. Maximum concentrations of PFOS and PFOA identified in both the pool, and the source of pool water (bore 137030) at 66 Orr Road, Oakey were adopted for the offsite risk assessment for pool water. It is noted that additional un-registered groundwater bores, that have not yet been sampled, may be present to the south/west of the site. This RA has been based on the data available at the time of the assessment.

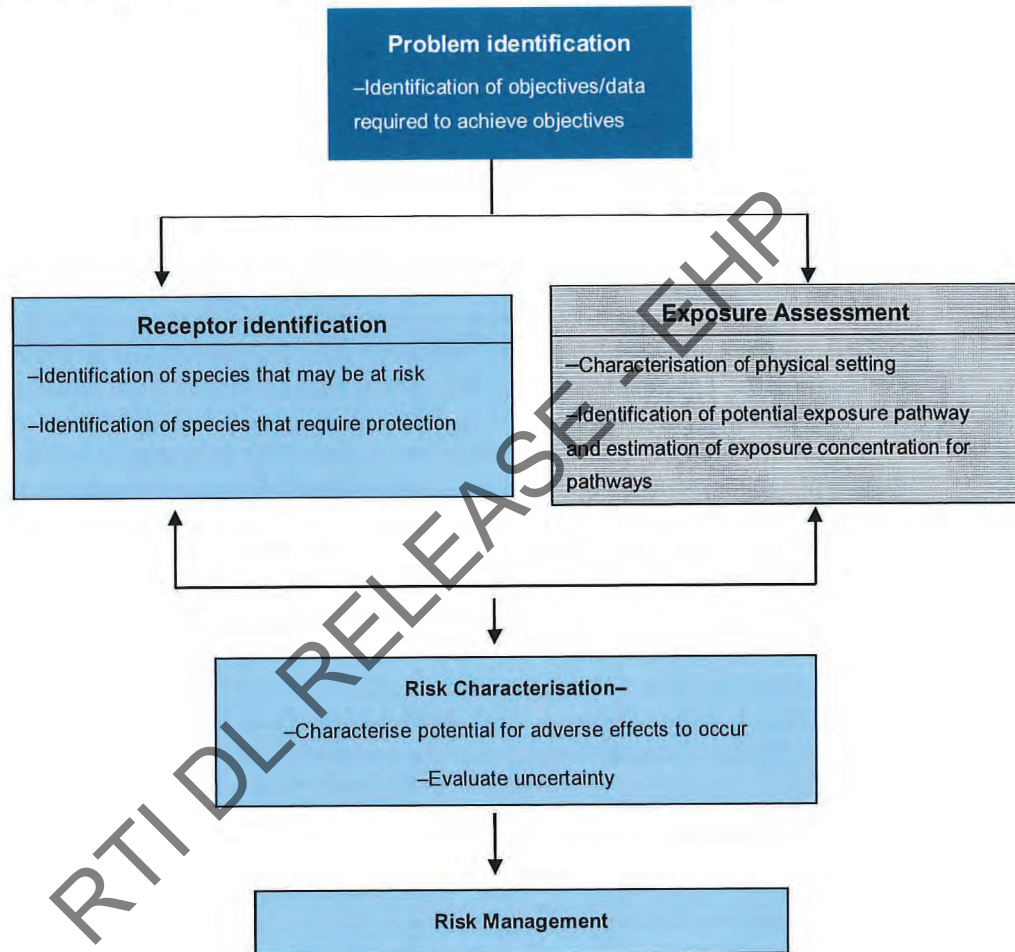
- Toxicity Criteria:
 - ▶ The oral toxicity criteria used in this assessment are derived from exposure levels shown to cause 'no adverse effect' following chronic exposure of animals and include safety factors, to provide an extra margin of protection. However, it should be noted that PFOS and PFOA are emerging contaminants and extensive research into potential carcinogenic effects and potential adverse effects following dermal exposure is ongoing. Our current understanding of the human toxicology of PFOS and PFOA is limited and further data is required for consolidation.

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4. Screening Ecological Risk Assessment

4.1 Risk assessment approach

The ERA comprised the first stage (problem identification) in an ERA as outlined in NEPC (1999). The methodology outlined in NEPC (1999) can be summarised as follows (Figure 4.1). The problem identification phase is highlighted in green.



Ref: NEPC (1999)

Figure 4.1 Risk assessment process – ERA

4.2 Conceptual site model for ERA

The CSM for ERA was summarised in Section 2 above. In summary:

- PFOS and PFOA are resistant to biodegradation, photooxidation, direct photolysis and hydrolysis. They breakdown very slowly in air and are not known to breakdown in soil or water (ATSDR, 2009). They may undergo long range transport and bioaccumulate within the food chain, directly or indirectly affecting aquatic organisms (Environment Canada, 2012).
- The Oakey Alluvial Aquifer is the main water table investigated during works at the site to date. Three levels of groundwater within the Oakey Creek Alluvial Aquifer have been identified. No distinct lithological breaks in the stratigraphy of the water table have been noted. Given this, there is the potential for the transport of PFOS and PFOA to occur both vertically and laterally within the aquifer.
- Groundwater within the Oakey Creek Alluvial Aquifer is inferred to flow westward towards the Condamine River and Oakey Creek. While it is noted that Oakey Creek is located 1.2 km south of the site, groundwater has been observed flowing west along a much longer flow path and the discharge point for groundwater to Oakey Creek may be up to 7.2 km west of the site. The vertical gradient is very small under natural conditions, but is expected to be highly negative (downward) between the upper and lower zones of the alluvial aquifer during periods of groundwater extraction. The results of aquifer tests conducted at the site by Parsons Brinckerhoff indicated that the geometric mean hydraulic conductivity of the lower alluvial aquifer is 15 m/day, with a range of 3.8 to 50 m/day. The mean calculated groundwater velocity under natural conditions (i.e. no extraction wells operating) is 36.1 m/year.
- Oakey Creek downstream of AACO is heavily degraded and largely devoid of native vegetation (Queensland Government, 2013). Four threatened ecological communities may occur or are likely to occur within 10 km of the site. Forty one threatened species, or habitat for these species, may occur or is likely to occur within the area. The listed fish is the Murray Cod (*Maccullochella peelii*; listed as Vulnerable pursuant to the EPBC Act) (DSEWP, 2013). Fish surveys in 2008 did not identify the presence of the Murray Cod within Oakey Creek however it was identified in the Condamine River in follow up surveys in 2011. A 70 cm long, 3.5 kg Murray Cod was caught in Oakey Creek, at Bowenville Reserve (DAFF/CA, 2006).
- A demonstration project for riparian restoration called the 'Dewfish Demonstration Reach' is present along Oakey Creek downstream of the AACO near Dalby and Bowenville (DERM, 2011). The start of the Dewfish Demonstration Reach is located approximately 35 to 40km downstream of Oakey Creek at Oakey.
- Drainage channels on the north side of the airfield flow toward Doctors Creek. Doctors Creek is an intermittent stream that loses water to the alluvial aquifer when surface water is present. The creek is not incised and occasionally floods the surrounding fields and roads during wet periods.

4.3 Problem identification

The results of the problem identification phase of the ERA are summarised in Table 4.1 below.

Table 4.1 Summary of Problem Identification

Identified receptors	Potential exposure pathways	Likelihood of adverse effect
Terrestrial ecosystems		
Four threatened ecological communities and 41 species of flora/fauna may occur or are likely to occur within a 10 km radius of the site.	Use of groundwater impacted with PFOS and PFOA for irrigation offsite.	Unable to be determined based on existing information.
	Discharge of PFOS/PFOA impacted groundwater, sourced from the site, into Oakey Creek	Unable to be determined based on existing information. The ecosystem along Oakey Creek downstream of the site is degraded. Threatened ecological communities have not been identified in this area, and terrestrial fauna species are likely to be restricted to areas of native vegetation and therefore are not likely to be present. However, avian species may utilise Oakey Creek downstream of the site.
Aquatic ecosystems		
The EPBC listed Murray Cod has previously been identified in Oakey Creek downstream of the site. The Dewfish Demonstration Reach is present approximately 35–40 km downstream from Oakey Creek at Weir Park.	Discharge of PFOS/PFOA impacted groundwater into Oakey Creek	Unable to be determined based on existing information. Further discussion provided in Section 0 below.

4.3.1 Potential for adverse impact to Oakey Creek

Groundwater beneath the site is likely to discharge into Oakey Creek approximately 1.2 to 7.2 km to the west of the site (Parsons Brinckerhoff, 2013a). The hydrogeological testing results provided in Parsons Brinckerhoff (2013a) indicate that the mean calculated groundwater velocity under natural conditions (i.e. no extraction wells operating) for the lower alluvial aquifer is 36.1 m/year. Under this scenario, and given that the use of AFFF containing PFOS/PFOA ceased at the site circa 2005, it is unlikely that groundwater discharging into Oakey Creek would be impacted with concentrations of PFOS/PFOA similar to that identified onsite under natural groundwater flow conditions.

However, if extraction wells are operating, groundwater velocities may reach theoretical speeds (i.e. may be similar to the estimated hydraulic conductivity of the aquifer which is estimated to be up to 50 m/d, refer to Section 2.2.4 above).

Therefore, an assessment of the potential for adverse impact to aquatic organisms within Oakey Creek, assuming that water in Oakey Creek was impacted with concentrations of PFOS similar to those identified in offsite groundwater, was undertaken.

A comparison of available aquatic toxicology criteria for PFOS alongside concentrations of PFOS reported in groundwater to the south/west of the site is provided in Table 4.2 below.

Table 4.2 Summary of aquatic toxicity criteria

Receptor	Toxicity criterion	Description/Reference	Criteria exceeded by max. PFOS conc. offsite?
Maximum PFOS concentrations identified in lower aquifer offsite = 9.68 µg/L⁽¹⁾			
Aquatic organisms	19 µg/L PFOS	Chronic toxicity criterion of for aquatic organisms (animals and plants) ⁽²⁾ (MPCA, 2007)	No
	21 µg/L PFOS	Criteria maximum concentration (Giesy <i>et.al.</i> , 2010)	No
	5.1 µg/L PFOS	Criteria continuous concentration (Giesy <i>et.al.</i> , 2010)	Yes
	17 µg/L PFOS	Secondary acute value for aquatic organisms (Beach <i>et.al.</i> , 2006)	No
	1.2 µg/L PFOS	Secondary chronic value for aquatic organisms (Beach <i>et.al.</i> , 2006)	Yes
	0.61 to 6.66 µg/L PFOS	Aquatic Predicted No Effect Concentration (PNEC) range (Qi <i>et.al.</i> , 2011)	Yes
Aquatic animals	460 µg/L PFOS	Aquatic animals (chronic) (Giesy <i>et.al.</i> , 2010)	No
	780 µg/L PFOS	Aquatic animals (acute) (Giesy <i>et.al.</i> , 2010)	No
Aquatic plants	8,200 µg/L PFOS	Aquatic plants (Giesy <i>et.al.</i> , 2010)	No
	2,300 µg/L PFOS	Screening benchmark for plants (Beach <i>et.al.</i> , 2006)	No
Birds	0.047 µg/L PFOS	Avian wildlife value (Giesy <i>et.al.</i> , 2010)	Yes

Notes:

1. Refer to Table 3.3 above.
2. It is not known if this criterion is protective of amphibians.

Table 4.2 indicates a potential risk to aquatic organisms and birds in the event PFCs impacts identified in groundwater to the south/west of the site migrate to, or are identified in, Oakey Creek. While the significant distance (estimated to be up to 7.2 km) from the site to the point of discharge for groundwater into Oakey Creek is noted, and dilution of groundwater upon discharge to Oakey Creek is probable, the potential for adverse impact is unable to be excluded on the basis of the existing information. This includes the potential effect of groundwater extraction events on groundwater flow rates, and the bioaccumulation of PFOS and PFOA in the biota.

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5. Summary and conclusions

Parsons Brinckerhoff was commissioned to undertake a RA for concentrations of PFOS and PFOA reported in groundwater to the west and south of the site (offsite) of the AACO. For the purpose of the RA, 'offsite' is defined as the area outside the AACO base fence as shown on Figure 1, Appendix A. This includes land to the west and south of the base that is owned by the Commonwealth but not utilised directly by the base (shown as 'Defence Leased Land' on Figure 1, Appendix A).

The RA comprised a HHRA and a Screening ERA.

The HHRA concluded that:

- The estimated HI were below the tolerable threshold (i.e. $HI < 1$). This indicated that adverse health effects from exposure to PFOS and PFOA concentrations in groundwater offsite, for the offsite populations and exposure pathways of concern, are unlikely.

The Screening ERA identified a potential risk to aquatic organisms (including the EPBC protected Murray Cod) and birds in the event that PFOS impacts identified in groundwater to the south/west of the site migrate to, or are identified in, Oakey Creek. While the significant distance (estimated to be up to 7.2 km) from the site to the point of discharge for groundwater into Oakey Creek is noted, and dilution of groundwater upon discharge to Oakey Creek is probable, the potential for adverse impact is unable to be excluded on the basis of the existing information. This includes the potential effect of groundwater extraction events on groundwater flow rates, and the bioaccumulation of PFOS and PFOA in the biota.

In addition, four threatened ecological communities and 41 species of flora/fauna may occur or are likely to occur within a 10 km radius of the site. The flora and fauna species may be adversely affected by the use of groundwater containing PFOS and PFOA for offsite irrigation activities, or by the discharge of impacted groundwater into Oakey Creek. The likelihood of adverse effect is unable to be determined based on the existing information.

6. Recommendations

Based on the findings of the Screening ERA, Parsons Brinckerhoff recommends that a higher level (i.e. Level 2) ERA is undertaken. This Level 2 ERA may include the following:

- Delineation of groundwater impacts in the vicinity of the site and/or groundwater contaminant fate and transport, and dilution/dispersion modelling to estimate the likely PFOS/PFOA concentrations within Oakey Creek. While it is noted that the Creek is located 1.2 km south of the site, groundwater has been observed flowing west along a much longer flow path and the discharge point for groundwater to Oakey Creek may be up to 7.2 km west of the site.
- Measurement of PFOS/PFOA concentrations within Oakey Creek upstream and downstream of the estimated discharge point for groundwater to the Creek.
- Biodiversity assessment in the vicinity of the site, including Oakey Creek, to confirm the environmental values identified in the Screening ERA—this includes the presence of the Murray Cod, and other threatened flora and fauna species reported to be present in the vicinity of the site.
- Further review of groundwater use in the vicinity of the site to confirm source–receptor–pathways for the uptake of PFCs into the offsite ecological food chain. This will allow the CSM for ERA to be refined and any critical exposure pathways for key species identified. In the event that exposure pathways for key species are identified to be complete, a desktop study could be undertaken to determine what information is available in the scientific literature regarding benchmark doses for species similar to the identified key species.

7. References

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8. Limitations

8.1 Scope of services

This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and Parsons Brinckerhoff (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

8.2 Reliance on data

In preparing the report, Parsons Brinckerhoff has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, Parsons Brinckerhoff has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Parsons Brinckerhoff will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Parsons Brinckerhoff.

8.3 Environmental conclusions

In accordance with the scope of services, Parsons Brinckerhoff has relied upon the data and has not conducted any environmental field monitoring or testing in the preparation of the report. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Within the limitations imposed by the scope of services, the assessment of the site and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

8.4 Report for benefit of client

The report has been prepared for the benefit of the client and no other party. Parsons Brinckerhoff assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Parsons Brinckerhoff or for any loss or damage suffered by any other party in relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of

any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

8.5 Other limitations

Parsons Brinckerhoff will not be liable to update or revise the report to take into account any events, emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to nor ownership of the properties, buildings and structures referred to in the report, nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

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Estimation of Hazard Index (HI) - Swimming in offsite pool, scenario 1, average estimate

Exposure Setting: Swimming in pool at 66 Orr Road, Oakley
Receptor: Resident - adult

Ingestion rate 0.025 L/hour
Body weight 70 kg
Event frequency: 156 events/year
Event duration: 0.5 hours/event
Exposure duration: 30 years
Averaging time: Threshold 30 years

Exposure concentrations: PFOS 7.90E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	6.03E-08	7.5E-04
HI			7.5E-04

Exposure Setting: Swimming in pool at 66 Orr Road, Oakley
Receptor: Resident - child

Ingestion rate 0.05 L/hour
Body weight 11 kg
Event frequency: 156 events/year
Event duration: 1 hours/event
Exposure duration: 6 years
Averaging time: Threshold 6 years

Exposure concentrations: PFOS 7.90E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	1.53E-06	1.9E-02
HI			1.9E-02

Estimation of Hazard Index (HI) - Swimming in offsite pool, scenario 1, upper bound estimate

Exposure Setting: Swimming in pool at 66 Orr Road, Oakey
Receptor: Resident - adult

Ingestion rate 0.125 L/hour
Body weight 70 kg
Event frequency: 156 events/year
Event duration: 1.5 hours/event
Exposure duration: 30 years
Averaging time: Threshold 30 years

Exposure concentrations: PFOS 7.90E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	9.04E-07	1.1E-02
HI			1.1E-02

Exposure Setting: Swimming in pool at 66 Orr Road, Oakey
Receptor: Resident - child

Ingestion rate 0.15 L/hour
Body weight 11 kg
Event frequency: 156 events/year
Event duration: 1 hours/event
Exposure duration: 6 years
Averaging time: Threshold 6 years

Exposure concentrations: PFOS 7.90E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	4.60E-06	5.8E-02
HI			5.8E-02

Estimation of Hazard Index (HI) - Swimming in offsite pool, scenario 2, average estimate

Exposure Setting: Swimming in pool at 66 Orr Road, Oakey
Receptor: Resident - adult

Ingestion rate 0.025 L/hour
Body weight 70 kg
Event frequency: 156 events/year
Event duration: 0.5 hours/event
Exposure duration: 30 years
Averaging time: Threshold 30 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	7.39E-07	9.2E-03
PFOA	7.70E-05	3.51E-08	4.6E-04
HI			9.7E-03

Exposure Setting: Swimming in pool at 66 Orr Road, Oakey
Receptor: Resident - child

Ingestion rate 0.05 L/hour
Body weight 11 kg
Event frequency: 156 events/year
Event duration: 1 hours/event
Exposure duration: 6 years
Averaging time: Threshold 6 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	1.88E-05	2.4E-01
PFOA	7.70E-05	8.94E-07	1.2E-02
HI			2.5E-01

Estimation of Hazard Index (HI) - Swimming in offsite pool, scenario 2, upper bound estimate

Exposure Setting: Swimming in pool at 66 Orr Road, Oakey
Receptor: Resident - adult

Ingestion rate 0.125 L/hour
Body weight 70 kg
Event frequency: 156 events/year
Event duration: 1.5 hours/event
Exposure duration: 30 years
Averaging time: Threshold 30 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	1.11E-05	1.4E-01
PFOA	7.70E-05	5.27E-07	6.8E-03
HI			1.5E-01

Exposure Setting: Swimming in pool at 66 Orr Road, Oakey
Receptor: Resident - child

Ingestion rate 0.15 L/hour
Body weight 11 kg
Event frequency: 156 events/year
Event duration: 1 hours/event
Exposure duration: 6 years
Averaging time: Threshold 6 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	5.64E-05	7.1E-01
PFOA	7.70E-05	2.68E-06	3.5E-02
HI			7.4E-01

Estimation of Hazard Index (HI) - Irrigation activities with impacted groundwater, average estimate

Exposure Setting: Irrigation activities with impacted groundwater
 Receptor: Adult (e.g. farmer)

Ingestion rate 0.02 L/hour
 Body weight 70 kg
 Event frequency: 75 events/year
 Event duration: 1 hours/event
 Exposure duration: 30 years
 Averaging time: Threshold 30 years

Exposure concentrations: PFOS 9.68E-03 mg/L
 PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	5.68E-07	7.1E-03
PFOA	7.70E-05	2.70E-08	3.5E-04
HI			7.5E-03

Estimation of Hazard Index (HI) - Irrigation activities with impacted groundwater, upper bound estimate

Exposure Setting: Irrigation activities with impacted groundwater
 Receptor: Adult (e.g. farmer)

Ingestion rate 0.02 L/hour
 Body weight 70 kg
 Event frequency: 156 events/year
 Event duration: 1 hours/event
 Exposure duration: 30 years
 Averaging time: Threshold 30 years

Exposure concentrations: PFOS 9.68E-03 mg/L
 PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	1.18E-06	1.5E-02
PFOA	7.70E-05	5.62E-08	7.3E-04
HI			1.6E-02

Estimation of Hazard Index (HI) - Irrigation activities with impacted groundwater, average estimate

Exposure Setting: Incidental exposure to irrigation water
Receptor: Offsite resident - adult

Ingestion rate 0.01 L/hour
Body weight 70 kg
Event frequency: 75 events/year
Event duration: 0.5 hours/event
Exposure duration: 30 years
Averaging time: Threshold 30 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	1.42E-07	1.8E-03
PFOA	7.70E-05	6.75E-09	8.8E-05
HI			1.9E-03

Exposure Setting: Incidental exposure to irrigation water
Receptor: Offsite resident - child

Ingestion rate 0.01 L/hour
Body weight 11 kg
Event frequency: 75 events/year
Event duration: 0.5 hours/event
Exposure duration: 6 years
Averaging time: Threshold 6 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	9.04E-07	1.1E-02
PFOA	7.70E-05	4.30E-08	5.6E-04
HI			1.2E-02

Estimation of Hazard Index (HI) - Irrigation activities with impacted groundwater, upper bound estimate

Exposure Setting: Incidental exposure to irrigation water
Receptor: Offsite resident - adult

Ingestion rate 0.01 L/hour
Body weight 70 kg
Event frequency: 156 events/year
Event duration: 0.5 hours/event
Exposure duration: 30 years
Averaging time: Threshold 30 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	2.96E-07	3.7E-03
PFOA	7.70E-05	1.40E-08	1.8E-04
HI			3.9E-03

Exposure Setting: Incidental exposure to irrigation water
Receptor: Offsite resident - child

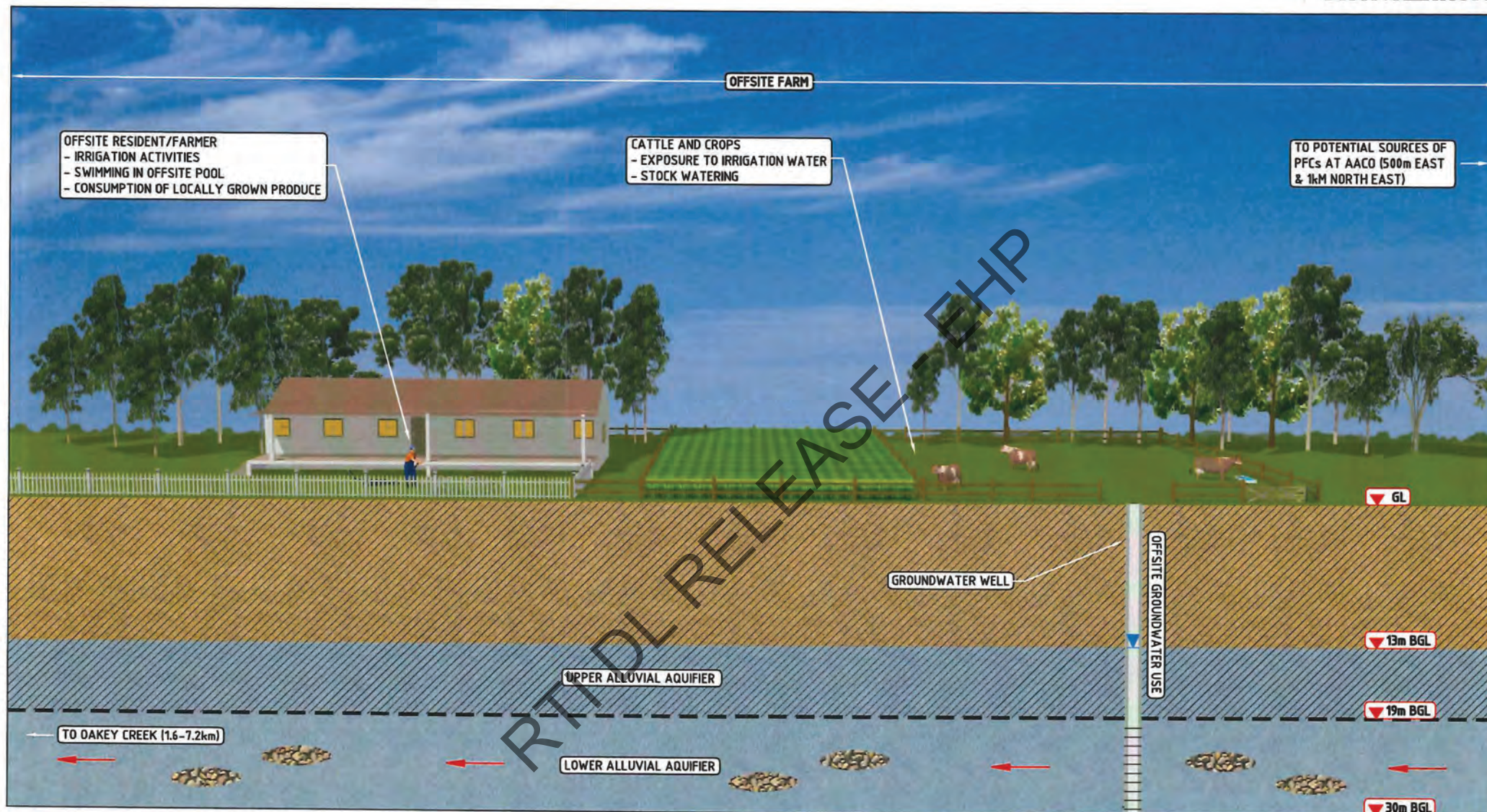
Ingestion rate 0.01 L/hour
Body weight 11 kg
Event frequency: 156 events/year
Event duration: 0.5 hours/event
Exposure duration: 6 years
Averaging time: Threshold 6 years

Exposure concentrations: PFOS 9.68E-03 mg/L
PFOA 4.6E-04 mg/L

COPC	RfD mg/kg/day	EDI mg/kg/day	HQ
PFOS	8.00E-05	1.88E-06	2.4E-02
PFOA	7.70E-05	8.94E-08	1.2E-03
HI			2.5E-02

Appendix A

Figures – CSM for risk assessment



LEGEND

- CLAY SOIL PROFILE
- CLAYEY SAND SOIL PROFILE
- GRAVEL DEPOSITS
- GROUNDWATER FLOW DIRECTION
- WATER TABLE

NOTE:

PFC: PERFLUOROCARBON

FIGURE 2
CONCEPTUAL SITE MODEL FOR RISK ASSESSMENT (OFFSITE) -1

AAC-OAKEY 2171374A

 CLAY SOIL PROFILE
 CLAYEY SAND SOIL PROFILE
 GRAVEL DEPOSITS
 GROUNDWATER FLOW DIRECTION
 WATER TABLE

AAC-OAKEY 2171374A

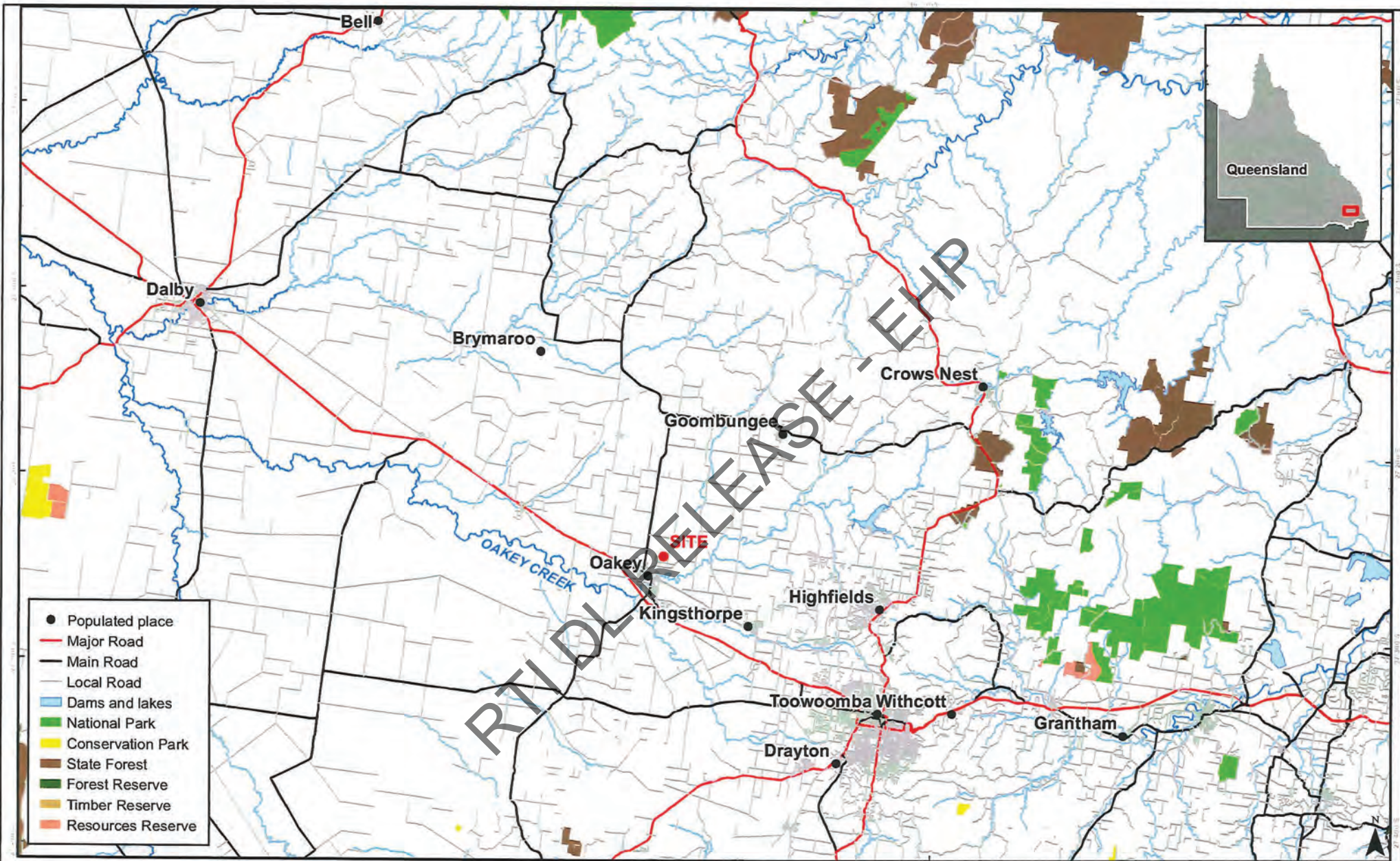
RTI DL RELEASE - EHP

Appendix B

Site assessment data

Appendix B1

Extracts from Parsons Brinckerhoff
(2013b)



Data Source: Queensland Department of Environment and Resource Management 31/03/2011

Drawing No.: 2171374A_GIS_F027_A2

Scale 1:500,000

Author: JF Date: 21/05/2012

0 4,900 9,800 metres

Editor: WK Print Date: 2/08/2012

Projection: Transverse Mercator
Coordinate System: GDA 1984 MGA Zone 56

Revision: A2 Review: DH

Scale correct when printed at A4 Landscape

AACO Groundwater Monitoring Event 2012, February 2013 Addendum

Figure 1
Site location

Department of Defence

\\pb\p01\jms\DOCS\GIS\Drawing\2171374A_GIS_F027_A2.mxd

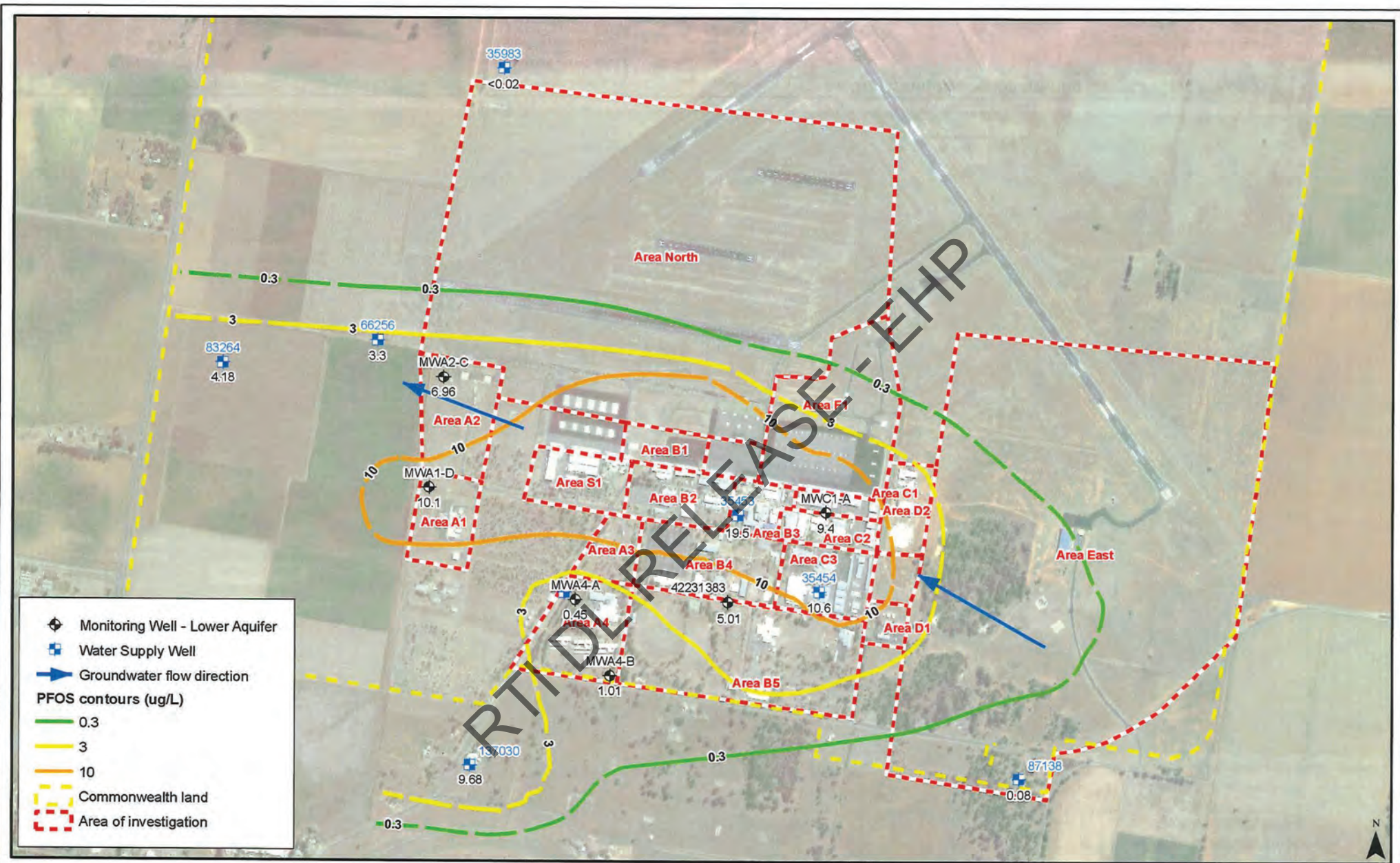
www.pb.com.au

File A

**PARSONS
BRINCKERHOFF**

145 of 417





Date Source: Google Earth 8/22/2009
 PB data: groundwater analysis from 8/12 to 12/12
 Note: Location 137030 was sampled from a tap on 15 January 2013
 Locations 35983, 66256, 83264, MWA4-B sampled between 7/2/13 and 8/2/13

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Drawing No.: 2171374A_GIS_F029_A5
 Author: WK
 Date: 10/01/2013
 Editor: WK
 Print Date: 10/05/2013
 Revision: A4
 Review: DH

Scale 1:15,000
 0 150 300 metres
 Projection: Transverse Mercator
 Coordinate System: ODA 1994 MOA Zone 56
 Scale correct when printed at A4 Landscape

AACO Groundwater Monitoring Event 2012, February 2013 Addendum

Figure 3
 Lower Alluvial Aquifer PFOS Contour Map - Feb 2013

**PARSONS
 BRINCKERHOFF**

TABLE C1
CLIENT
SITE/PROJECT
PHASE
ELEVATION DATUM
PETROLEUM SG.
ABBREVIATIONS:

Groundwater Gauging and Purge Results
Department of Defence
Army Aviation Centre Oakey
Groundwater Monitoring Event, Stage 3 Risk Assessment and Remediation Variation 1-6, December 2012
Data Entered: 25/02/2013
GAC: J.T.
AHD (m)
0.60

AHD: Relative Level NA: Not Available

SAMPLE LOCATION	Eastings	Northings	AREA	DATE	DEPTH TO WATER (mBTC)	TOP OF CASING (mRL)*	RELATIVE SWL (mRL)	SUBJECTIVE ANALYSIS			FINAL PURGE VOLUME RECORD							COMMENTS
								COLOUR	ODOUR	SHEN	pH	EC (mS/cm)	Redox (mV)	Calculated DO (mg/L)	DO (%)	Temp °C	MSLP hPa	
Water Supply Features																		
66 Orr RD Pool			66 Orr RD	23/01/2012	-	-	-	clear	-	none	7.21	7.310	331	1.95	-	-		Sampled
137030			66 Orr RD	15/01/2012	-	-	-	clear	none	none	7.02	4.300	211	2.38	-	-		Sampled
				23/01/2012	-	-	-	clear	none	none	7.02	3.720	-	-	-	-		Sampled
Lower Alluvial Aquifer Wells																		
35983	-	-	North	7/02/2013	-	-	-	clear	none	none	7.21	3.231	208.6	0.88	10.7	23.8	1013.7	Sampled - micropurge
68256	-	-	OS leased	7/02/2013	-	-	-	clear	none	none	6.70	2.658	52	-	-	24.2		Sampled - tap at wellhead
83264	-	-	OS leased	7/02/2013	-	-	-	clear	none	none	7.41	3.327	191.5	-	-	25.3		Sampled - tap at wellhead
87138	375649.620	6966151.930	OS Commur	13/12/2012	14.688	406.590	391.902	grey	none	none	7.22	4.165	-58	1.0	-	22.7		Sampled - micropurge

Notes:

MSLP = Mean Seal Level Pressure (atmospheric pressure used in DO calculation) #REF!
DO Calculations are based on USGS 1981 and adopted from US National Park Service calculations.
USGS, QUALITY OF WATER BRANCH, TECHNICAL MEMORANDUM NO. 81.11
*From survey data, Coffey 2011 Report

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Table 1 Analytical Results

Field ID	0701-00004-01-0007	0201-00009-01-0007	0202-00010-01-0007	0201-00008-01-0007	0206-13700-01-0015	0206-00005-100105	0206-13700-01-0015	0206-00005-100105	0206-13700-01-0015	0206-00005-100105	0206-13700-01-0015	0206-00005-100105	0206-13700-01-0015	0206-00005-100105
Location Code	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Well Type	Northwest airport fence line	Leased agricultural bore, west of Area A2 (corn field)	Leased agricultural bore, west of Area A2 (corn field)	Leased agricultural bore, west of Area A2 (corn field)	65 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	66 Off Road Water supply well	AAAO Community House, dis-poses domestic
Sample Date Time	7/10/2013	7/10/2013	7/10/2013	7/10/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013	12/01/2013
Chemical Group	Chemical Name	Units	EOL	Minnesota Department of Health (2008)										
PFCs	0.7 Fluorobenzene Sulfonate (0.7 FBS)	ug/L	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.05	<0.1	<0.1
	Perfluorooctanoic Acid (PFOA)	ug/L	0.02	0.2	<0.02	0.08	0.09	0.13	0.46	0.09	0.28	0.02	0.02	<0.02
	Perfluorooctane Sulfonate (PFOS)	ug/L	0.02	0.2	<0.02	1.12	2.30	4.18	8.65	2.9	2.69	2.9	2.9	0.09

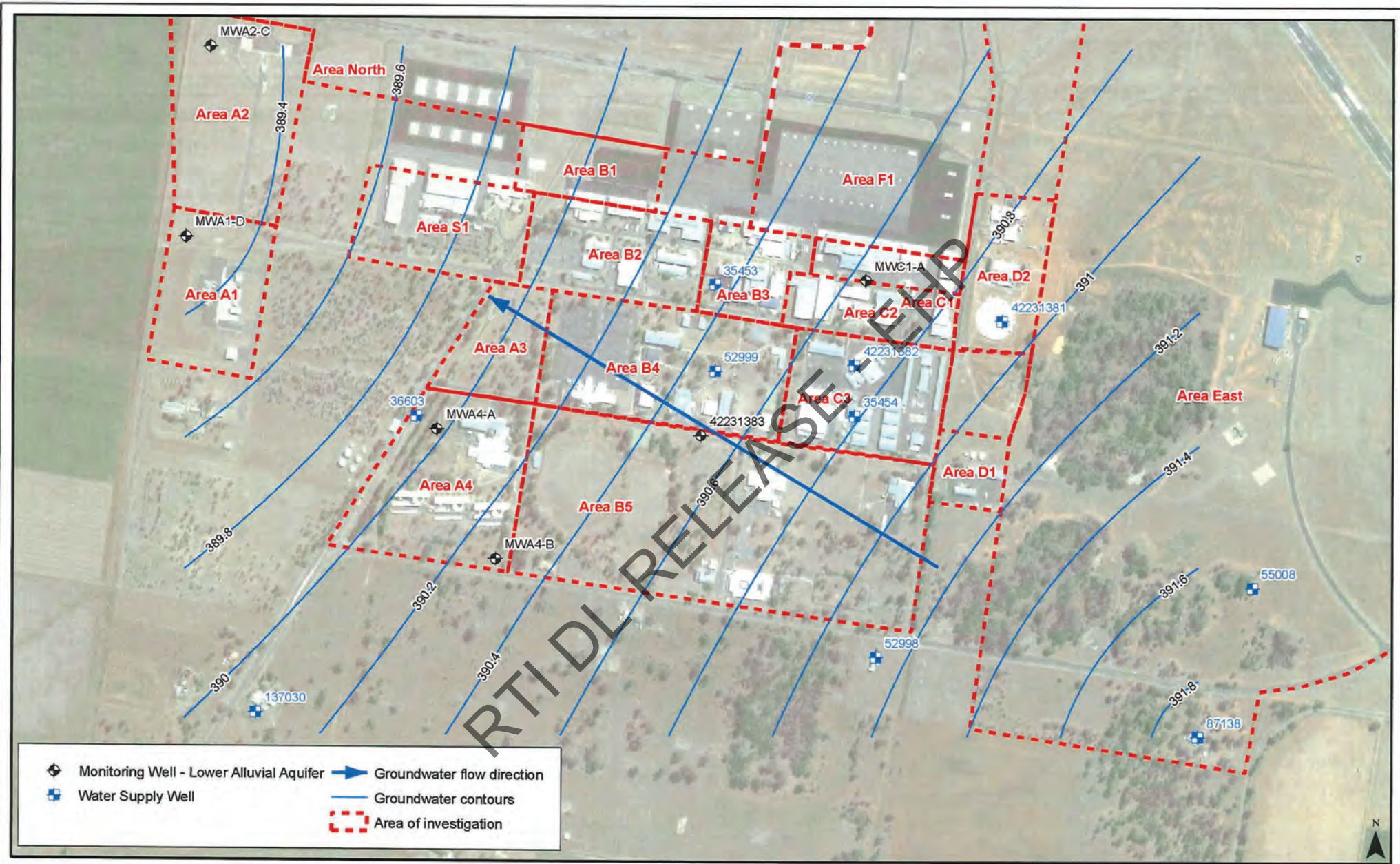
References
1 Minnesota Department of Health (2008). Health Risk Limits for Perfluoroochemicals. Report to the Minnesota Legislature, 2008 Final Report. Groundwater Health Based Value (HBV)

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Appendix B2

Extracts from Parsons Brinckerhoff
(2013a)





Date Source: Google Earth 8/22/2009
PB data: groundwater measurements from 11/12/12 to 14/12/12

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Drawing No.: 2171374A_GIS_F018_A7
Author: WK
Date: 10/01/2013
Editor: WK
Print Date: 10/05/2013
Revision: A4
Review: DH

Scale 1:8,750
0 90 180 metres
Projection: Transverse Mercator
Coordinate System: ODA 1984 MGA Zone 56
Scale correct when printed at A4 Landscape

AACO Groundwater Monitoring Event - Dec 2012

Figure 4
Lower Alluvial Aquifer Potentiometric Surface Contour Map - December 2012

**PARSONS
BRINCKERHOFF**

Appendix C

Ecological study information



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/01/13 14:11:27

[Summary](#)

[Details](#)

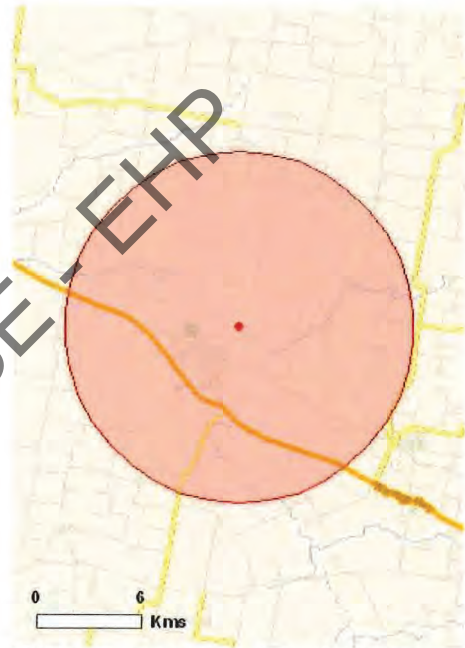
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	27
Listed Migratory Species:	14

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	1
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Narran lake nature reserve	Upstream from Ramsar

Listed Threatened Ecological Communities

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Endangered	Species or species habitat may occur within area
Erythroriarchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Geophaps scripta scripta		
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor		
Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Poephila cincta cincta		
Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Digitaria porrecta Finger Panic Grass [12768]	Endangered	Species or species habitat likely to occur within area
Homopholis belsonii [2406]	Vulnerable	Species or species habitat may occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Picris evae Hawkweed [10839]	Vulnerable	Species or species habitat likely to occur within area
Rhaponticum australe Austral Cornflower, Native Thistle [22647]	Vulnerable	Species or species habitat likely to occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat may occur within area
Reptiles		
Anomalopus mackayi Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Delma torquata Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat known to occur within area
Paradelma orientalis Brigalow Scaly-foot [59134]	Vulnerable	Species or species habitat may occur within area
Tympanocryptis pinguicolla Grassland Earless Dragon [66727]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Xanthomyza phrygia Regent Honeyeater [430]	Endangered*	Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - HQ ARMY AVIATION CENTRE

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Myiagra cyanoleuca Satin Flycatcher [612]		within area Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Jondaryan East Roadside Remnant Grassland	QLD	Indicative Place

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area

Mammals

Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
--	--	--

Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
--	--	--

Sus scrofa Pig [6]		Species or species habitat likely to occur within area
---------------------------------------	--	--

Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
--	--	--

Plants

Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
---	--	--

Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White		Species or species habitat likely to occur within area
--	--	--

Name	Status	Type of Presence
Sage, Wild Sage [10892] Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

RTI DL RELEASE - EHP

Coordinates

-27.41822 151.73604

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations. bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
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The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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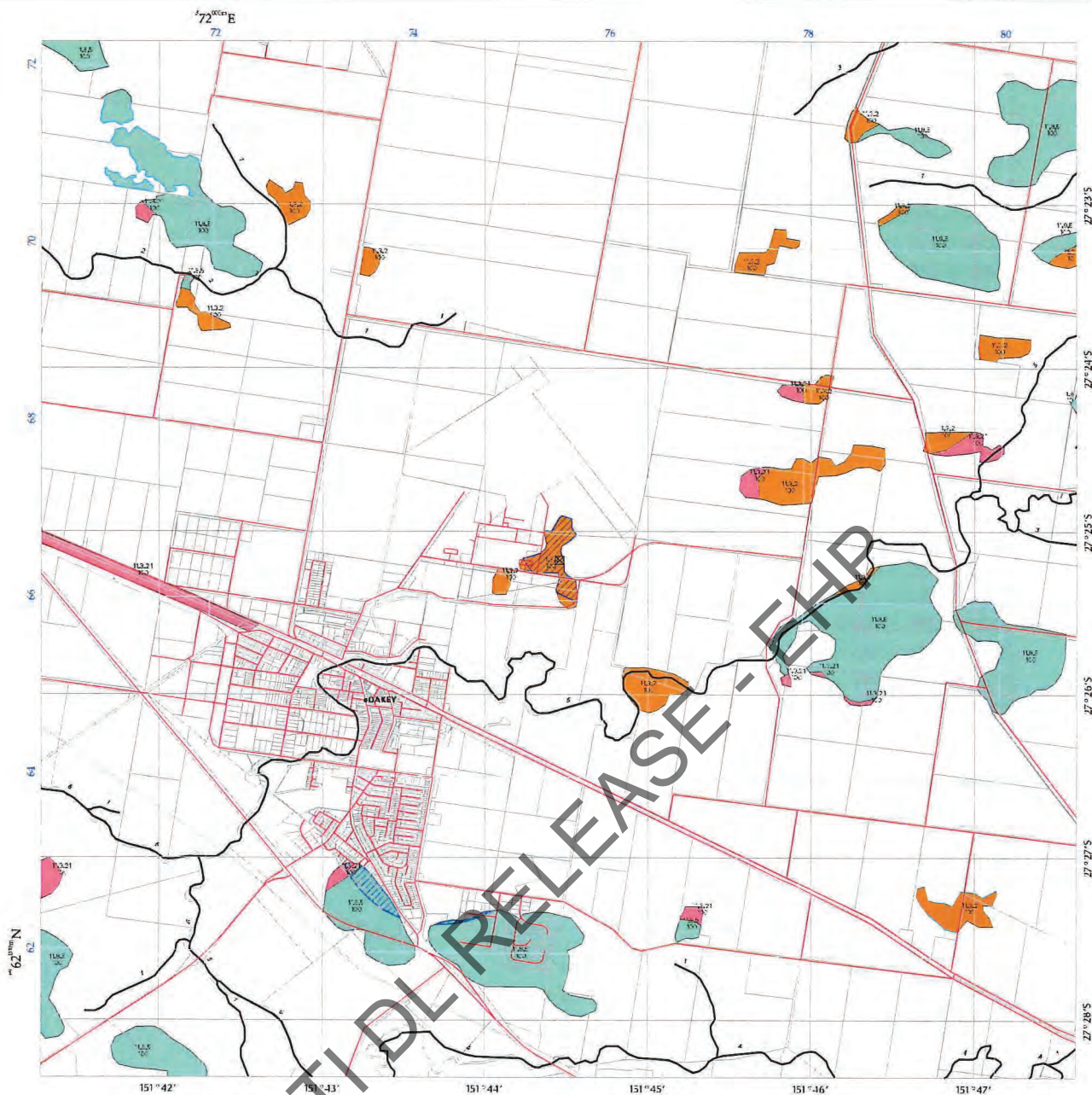
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Canberra ACT 2601 Australia

+61 2 6274 1111



Vegetation Management Act Regional Ecosystem and Remnant Map-Version 6.1

Based on 2006 Landsat TM imagery

Requested By: LCLEWS@PB.COM.AU
Date: 07 Jan 13 Time: 12.54.27

Centered on Coordinate:

Latitude: -27.419586 Longitude: 151.740932 (decimal degrees)
Bioregion: Brigalow Belt

- Remnant vegetation containing endangered regional ecosystems
- Remnant vegetation containing of concern regional ecosystems
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PMAV Category X area
- Great Barrier Reef Wetlands
- Vegetation Management Act Essential Habitat
- For further information on VMA Essential Habitat, please see the attached VMA Essential Habitat map.
- Subject Lot
- Watercourse (Stream order shown as black number against stream where available)
- Bioregion boundary
- Roads
- Pitney Bowes Software 2012
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
- Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered



LOCALITY DIAGRAM



A remnant map covers areas not covered by a regional ecosystem map.

Defined map areas are labelled with the regional ecosystem (RE) code along with the percentage breakdown if more than one RE occurs within the area. Detailed definitions of regional ecosystems are available from www.derm.qld.gov.au/REDD. Defined map areas smaller than 5ha may not be labelled.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/-100 metres. The extent of remnant regional ecosystems as of 2006, depicted on this map is based on rectified 2006 Landsat TM imagery (supplied by the Statewide Landcover and Trees Study (SLATS), Queensland Government).

Some watercourse lines are derived from GeoScience Australia 1:250 000 mapping.

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All datasets are updated as they become available to provide the most current information as of the date shown on this map.

Additional information is required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.derm.qld.gov.au/vegetation or contact the Department of Natural Resources and Mines.

Digital regional ecosystem data is available in shapefile format, for Lot on Plans from www.derm.qld.gov.au/REDDATA or from DNRM for larger areas.



Vegetation Management Act Essential Habitat Map Version 3.1

- Remnant vegetation containing endangered regional ecosystems
- Remnant vegetation containing of concern regional ecosystems
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PMAV Category X area
- Vegetation Management Act Essential Habitat
- Vegetation Management Act Essential Habitat Species Records
- Subject Lot
- Roads
- Pitney Bowes Software 2012
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
- Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

Requested By: LCLEWS@PB.COM.AU
Date: 07 Jan 13 Time: 12.54.29

Centered on Coordinate:
Latitude: -27.419586 Longitude: 151.740932 (decimal degrees)



Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

Labels for the Vegetation Management Act Essential Habitat are centred on the subject lot (1.1km surrounding and including a Lot on Plan). Labels correlate to the label field in the attached essential habitat database.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/-100 metres. The extent of remnant regional ecosystems as of 2006, depicted on this map is based on rectified 2006 Landsat TM Imagery (supplied by SLATS, Queensland Government).

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Digital regional ecosystem data is available in shapefile format, for Lot on Plans from www.dnrm.qld.gov.au/REDATA or from DNRM for larger areas.

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Aquatic connectivity: Dewfish

Dewfish Demonstration Reach

The Dewfish Demonstration Reach* extends for approximately 110 km in the Condamine–Balonne catchment in south-central Queensland. Close to Dalby, it sits in an area of low relief and shallow stream slope. The majority of the reach comprises Oakey Creek, an ephemeral, run-off-fed stream originating in the western slopes of the Great Dividing Range, north of Toowoomba and flowing north-west. Low flows in the creek are provided by the treated effluent from Toowoomba's sewage treatment plant (STP). The rest of the demonstration reach comprises sections of Myall Creek and the Condamine River. A diagram on page 4 shows the extent of the demonstration reach.

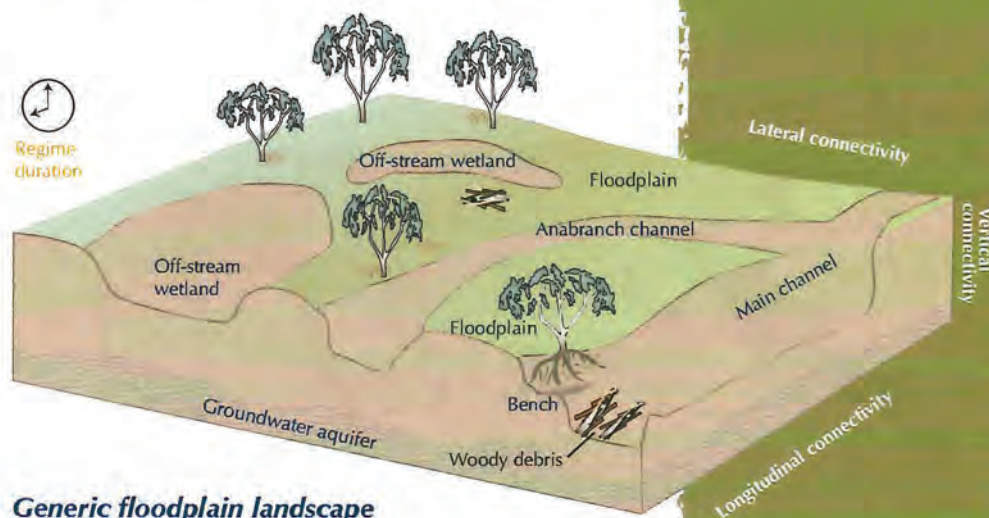
The entire reach and much of the catchment has been heavily modified for agriculture. There are few naturally occurring off-stream wetlands along the demonstration reach and they are particularly absent from the floodplains of Oakey and Myall creeks. Off-channel dams and impoundments along Oakey Creek have been excavated or constructed from existing depressions in the landscape. None of these were historically natural wetlands. The remaining natural wetlands along the reach occur around and upstream of Loudoun Weir on the Condamine River. According to the Queensland Wetlands Classification, these are semi-arid floodplain tree swamps, with some modified semi-arid floodplain lakes

* a definition of the term 'demonstration reach' is given on page 7

Flow regimes and connectivity

The Dewfish demonstration reach is primarily fed by river flow from higher in the catchment and the associated off-stream wetlands receive most of their inundation from the river (rather than rainfall run-off or other water sources). Conceptual diagrams on the following pages show how different flow conditions (flow regimes) influence connectivity at the local scale across a generalised floodplain landscape.

The generic floodplain landscape is linked in three dimensions: longitudinally along the main river channel, laterally along anabranches, across the floodplain and into off-stream wetlands, and vertically through the groundwater. Flow regimes are general



Generic floodplain landscape

About this case study:

This case study was created by the Department of Environment and Resource Management (DERM) Aquatic Ecosystem Health Science Integration and Capacity Building Team as part of the Queensland Wetlands Program. The study is written for wetland managers. Its purpose is to synthesise and present information about aspects of wetland connectivity. Hydrological, biotic and ecological connectivity are discussed, as well as how these types of connectivity influence each other, and how they change over time.

The Integrated Quantity–Quality Model (IQQM), developed by the Department of Land and Water Conservation (DLWC 1996), was used as the source of the flow data for the analysis of connectivity in this wetland guide. The IQQM model simulates flows under natural conditions and under conditions which assume human water use (i.e. water resource allocation) is at a maximum. The term 'developed condition' is used through this guide to refer to the condition under maximum human use. A flow regime analysis was based on the modelled IQQM flow data. The analysis will be used to discuss the impacts of changes in water resource allocations on a range of connectivity processes.

descriptions of water discharge levels that result in different levels of connection. The diagrams include an indication of the expected duration for each flow regime.

No flow

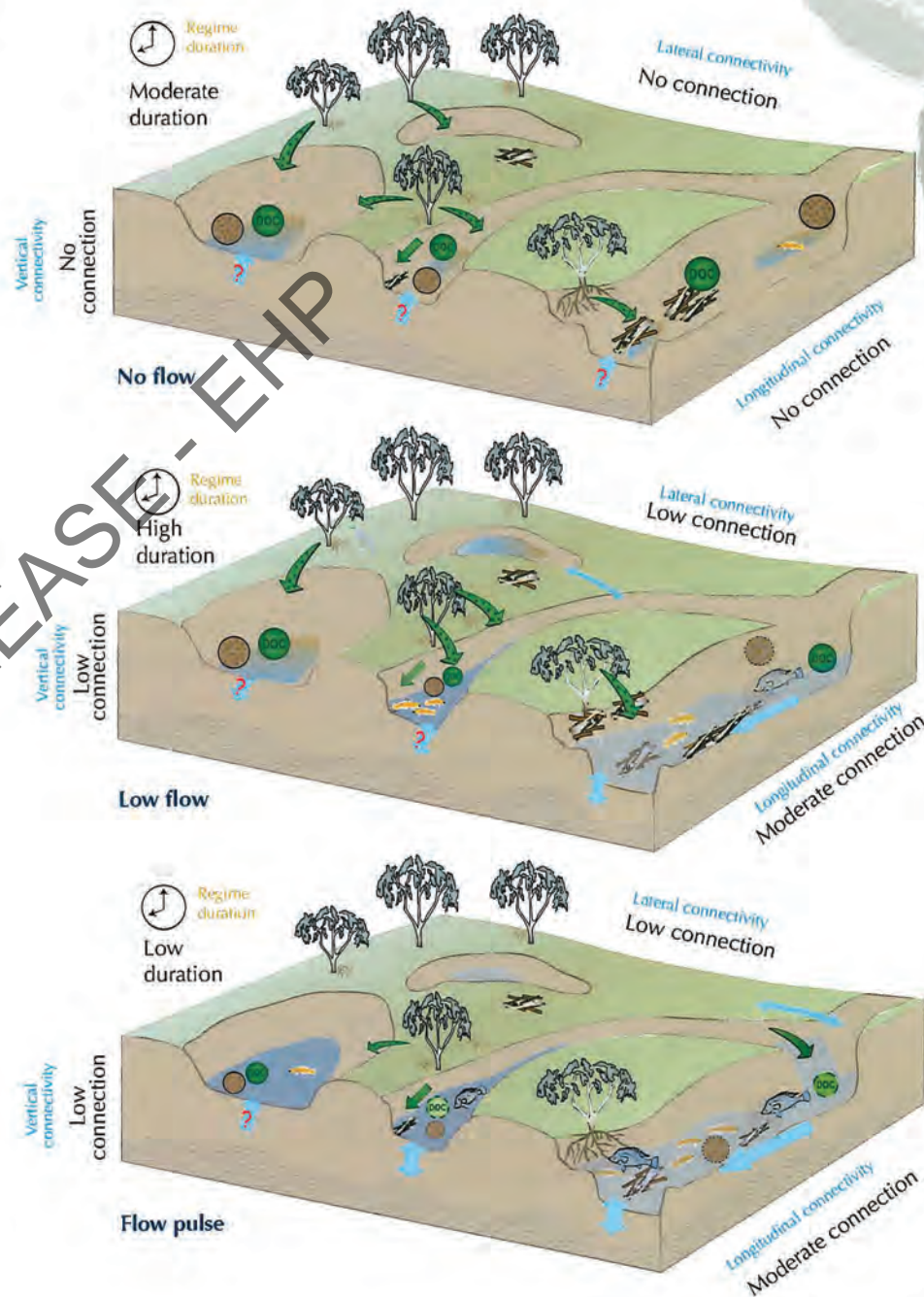
Though periods of no flow are normal for the Queensland Murray–Darling Basin and plants and animals are generally adapted to cope with it, extended dry periods can stress the system. Dry periods can be advantageous to ‘reset’ the system and kill off pest fish. Water in disconnected pools tends to be turbid and its quality decreases with time as part of the natural process of drying. If these periods are protracted, biota in these waterbodies might suffer and aquatic species can be lost completely until subsequent recolonisation when/if connection to other populations occurs. Furthermore, ecosystem processes (e.g. decomposition) slow down in the absence of water. Nutrients accumulate after they are deposited from the riparian zone and other terrestrial sources (e.g. leaf litter and woody debris) into the stream bed, off-stream wetlands and onto floodplains. There may be some vertical connectivity between groundwater and surface water; this will be dependent on local geomorphology and the state of the groundwater.

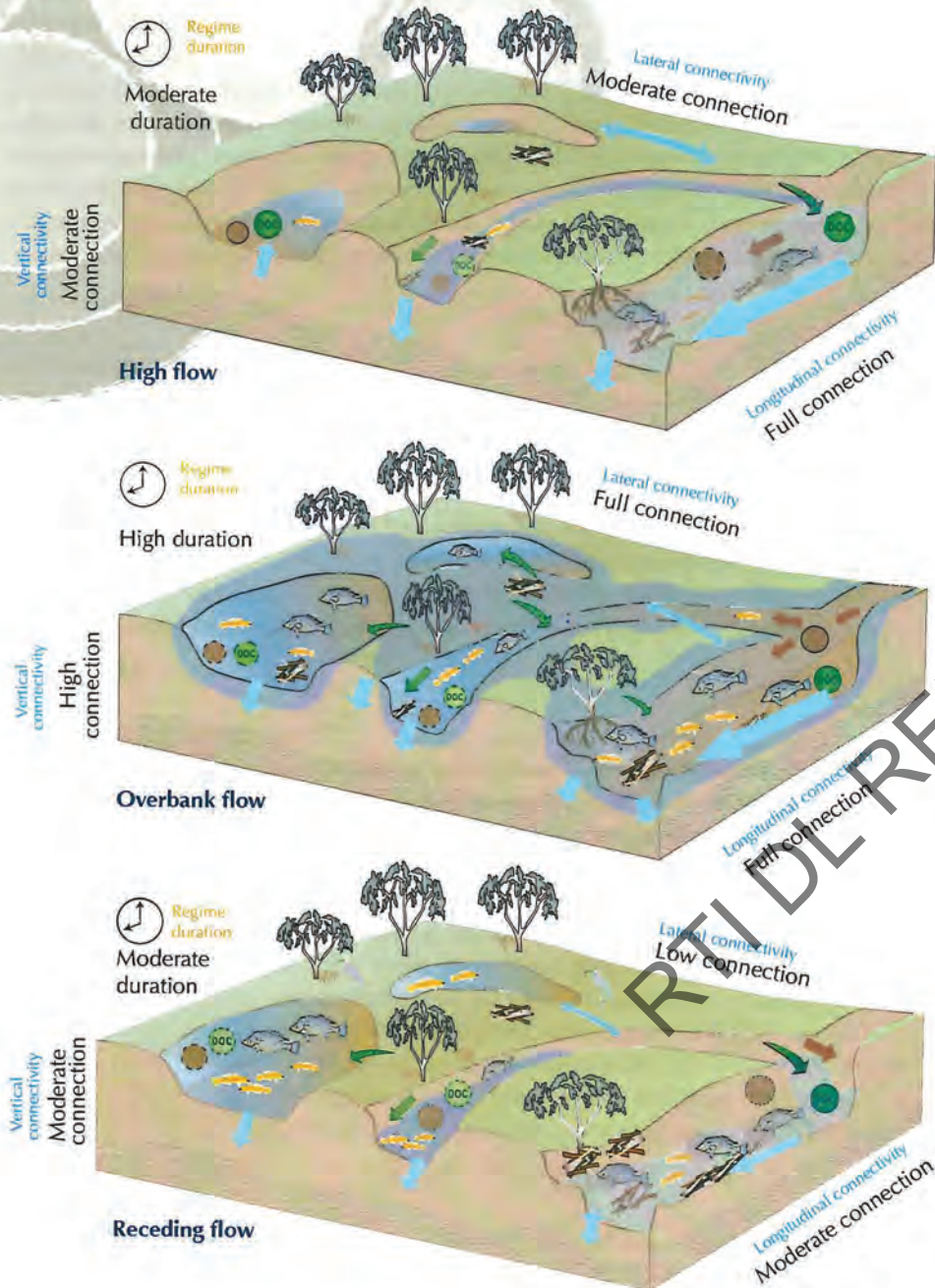
Low flow

Compared with no flow, low flow benefits fish populations by helping to maintain water quality. Low flows link in-stream habitats, sustain longitudinal connectivity for movement of biota, raise water levels increasing available habitat and refresh in-channel pools improving water quality. Connection to groundwater can occur in either direction, depending on the local geomorphology. In some cases the low flows of surface water may be provided entirely by the groundwater (this is known as baseflow) or low flow may seep into the earth and recharge the groundwater. Groundwater recharge during low flow is likely to be limited because hydraulic pressure from the stream will be low.

Flow pulse

Short flow pulses cause rapid changes to physicochemical aspects of water quality. These may be used as biological triggers (e.g. flow pulses bring food sources into an area, followed by low flows to maintain water quality). Pulses can briefly connect anabranches and off-stream wetlands, depending on the size of the flow pulse and the local topography, resulting in improved water quality and therefore improved health of aquatic habitats. Nutrients accumulated in the channels of anabranches can mobilise as a result of these pulses and sediments can be flushed out, resulting in reduced turbidity.





High flow

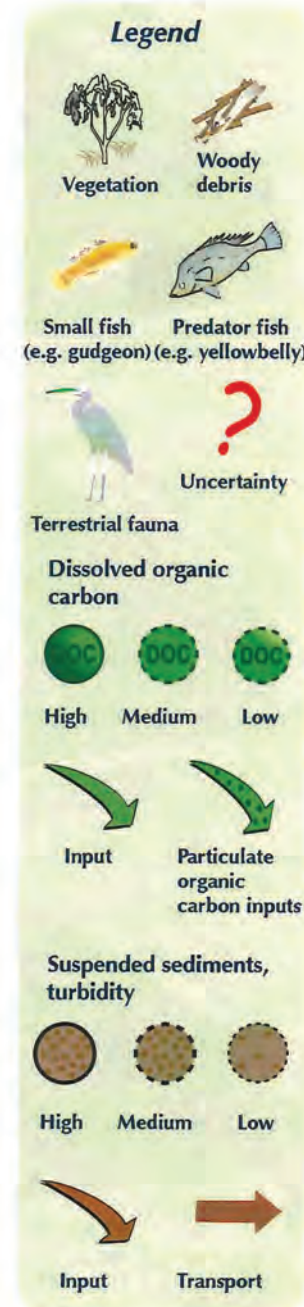
High flows inundate or mobilise organic material accumulating in dry stream beds, increase turbidity in channels by increasing sediment transport and allow fish to migrate. High flows provide connectivity to anabranches and secondary channels (depending on flow level and channel shape). High flows can benefit fauna by inundating benches and areas of sediment deposited in stream channels above the bed but below the banks) providing more habitat. This is especially important during summer for breeding purposes. Higher water levels increase water flow vertically into the groundwater. The increased hydraulic pressure in the groundwater aquifer can result in lateral movement of water to off-stream wetlands and anabranches through subsurface flows, depending on local geomorphology.

Overbank flow

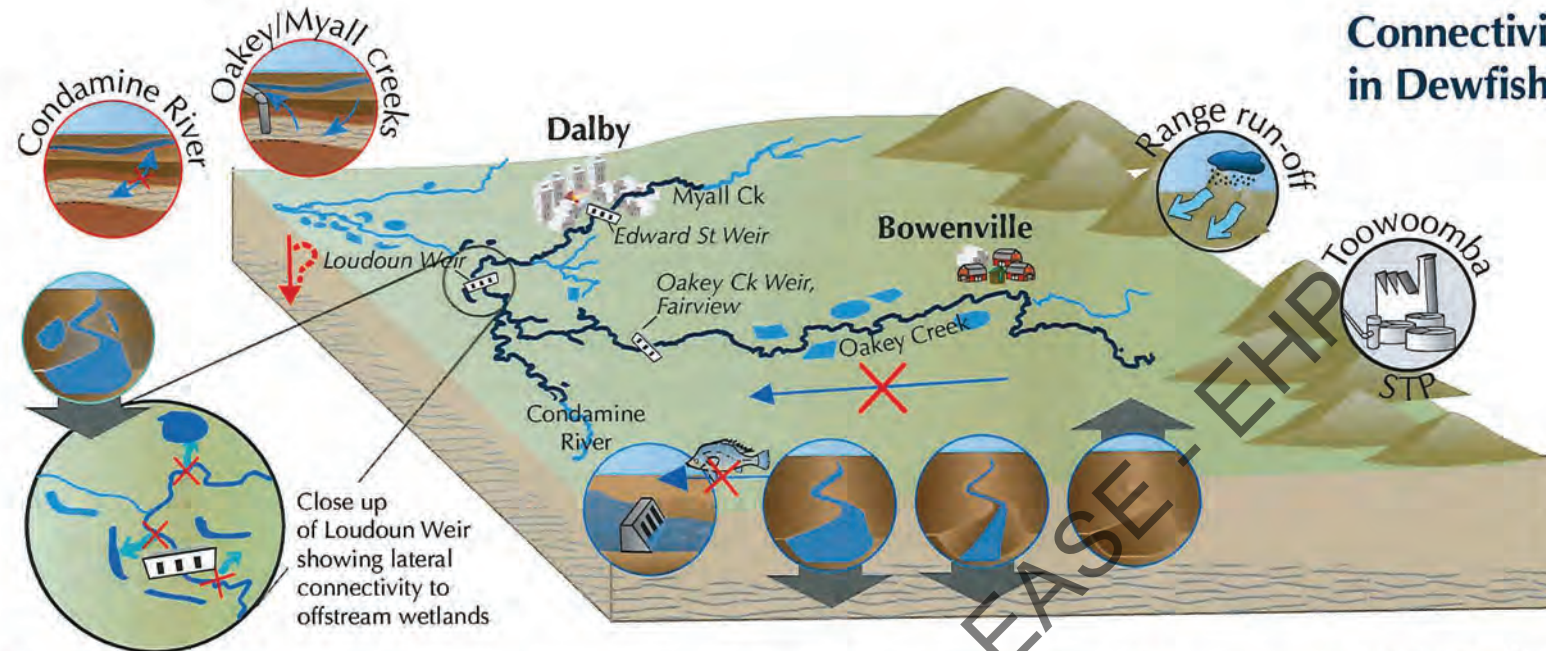
Overbank flows inundate the floodplain and refresh water supplies in off-stream wetlands, improving water quality. Floodplains can be accessed by biota; organisms and seeds can move into off-stream wetlands. Nutrients accumulated in the floodplain can move into the channel ecosystem. Vertical water movement into the groundwater is at its greatest rate.

Receding flow

As flow drops back, off-stream wetlands retain water and can become hotspots for biological processes (e.g. decomposition, habitat for fish populations). Animals leave the receding floodplains and their associated wetlands or remain in off-stream wetlands. Nutrients and sediments drain from the anabranches back into the main channel or off-stream wetlands. Over time, the disconnected pools dry through evaporation or seepage into the groundwater, either partially or completely returning the system to no flow or low flow.



Connectivity in Dewfish Demonstration Reach



Hydrological connectivity

Longitudinal connectivity

In its natural state the Dewfish Demonstration Reach would have had relatively consistent levels of longitudinal connectivity, punctuated by several short periods of no flow or high flow, each lasting eight days on average. This regime has been disrupted by catchment development and water use. No-flow spells now occur less frequently but last for much longer.

Modelling suggests no-flow spells last three times longer under developed conditions than they would have in natural conditions. Modelling also suggests that the magnitude of high-flow events has been lowered by 30 per cent in the Condamine River and 40 per cent in Oakey Creek.

Alterations to natural flow regimes and connectivity in Dewfish Demonstration Reach

Vertical connectivity

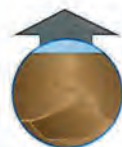


Connection between surface water and groundwater disrupted



Groundwater removal increases pressure gradient, lowering surface water levels

Longitudinal connectivity



Increase in no-flow periods



Reduction in low flows



Reduction in high flows

Lateral connectivity



Reduction in overbank flows

Disrupted longitudinal connection for biota



Dams/weirs reducing connectivity



Streams and wetlands of the Dewfish Demonstration Reach



Streams and wetlands (not part of demonstration reach)



Knowledge gap



Impaired



Range run-off



Currently water along the reach is primarily sourced from Toowoomba STP

Lateral connectivity

Information is sparse regarding overland flows, such as those caused by run-off or main channels overflowing their banks. Estimates of bank-overflow frequency were based on relationships between discharge and water level and how these interacted with the shape of river cross-sections. The resulting estimates of overbank-flow rates for the length of the creeks can be used to generate a coarse estimate of the area of inundation.

The cross-sections for Oakey Creek and Condamine River are different: Oakey Creek has a simple cross-section, whereas the Condamine River cross-section has multiple depressions, both anabranches and off-stream wetlands, identified by wetland mapping as palustrine areas. These depressions or 'gullies' are within 200–500 metres of the main channel and fill at different stages of inundation. They are connected by high-flow events.

The floodplain around the Condamine River floods more frequently than the floodplain of Oakey Creek due to the topography of the respective floodplains. An examination of the cross-section suggests a flood whose average recurrence interval of 1.5 years (ARI=1.5 yrs) would extend across approximately 75 metres of the floodplain on the Condamine River compared to 25 metres on Oakey Creek. Season also affects flood magnitude, so lateral connectivity would be greater in the wet season (January to May).

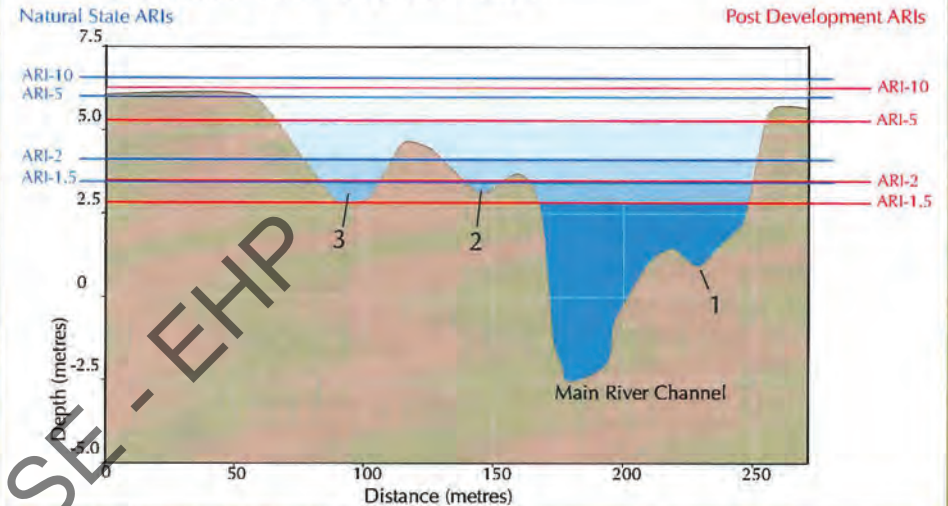
Condamine River at Loudoun Weir

Modelling suggests that water use, extraction and storage have reduced flood recurrence times, that is, floods of a given size occur less frequently. This reduction appears to have relatively little impact on the flooding regime of the various gullies around the main channel. Three gullies with different flow levels are evident in a cross-section of the river at Loudon Weir:

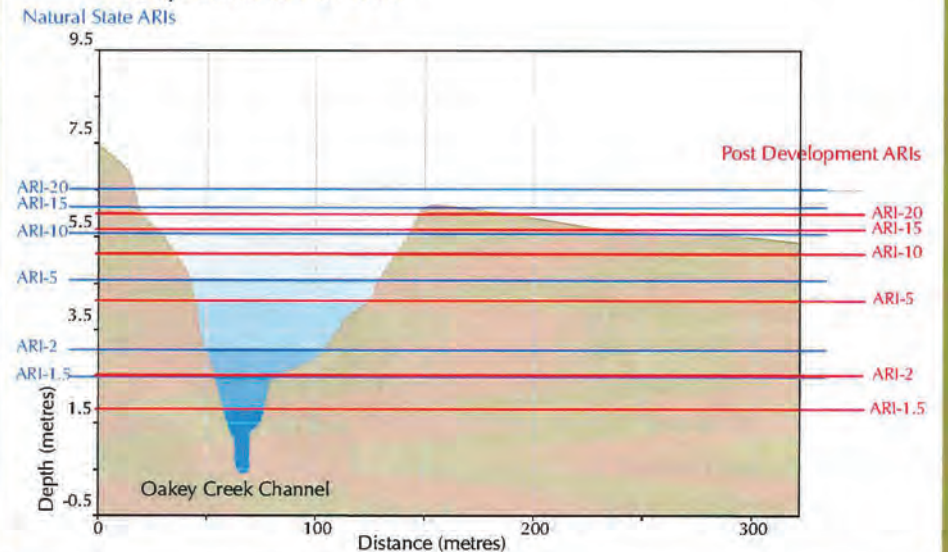
- Gully 1 floods at ARI<1.5 yrs under both natural and developed conditions.
- Gully 2 floods at an ARI=2 yrs under natural conditions and an ARI=2–5 under developed conditions
- Gully 3 floods at ARI=5 yrs under both natural and developed conditions.
- Peaks of the floodplain will flood at approximately ARI=5 yrs under natural conditions and an ARI=5–10 yrs under developed conditions.

This summary only indicates the level of water, not the volume entering the various wetlands. In all cases even if the overbank level is breached, less water would be entering the floodplain wetlands associated with the gullies under developed conditions compared with the natural state.

Condamine River at Loudoun Weir



Oakey Creek at Fairview



The average recurrence interval (ARI) refers to specific flow levels and the average frequency at which they are expected to occur (e.g. a flood of ARI=5 yrs would be expected to occur every five years on average).

Oakey Creek at Fairview

The floodplain at Oakey Creek has no gullies where water is able to pool, so it lacks natural off-stream wetlands along the reach. Due to the presence of a natural levee along the creek, the floodplain surrounding Oakey Creek floods less frequently than that of the Condamine River. A flood with an ARI=5 would be expected to inundate approximately 125 metres of the floodplain. Under natural conditions the bank peak at approximately 150 metres would be breached every 15 years. With the current level of development the interval between these events extends to more than 20 years.

Vertical connectivity

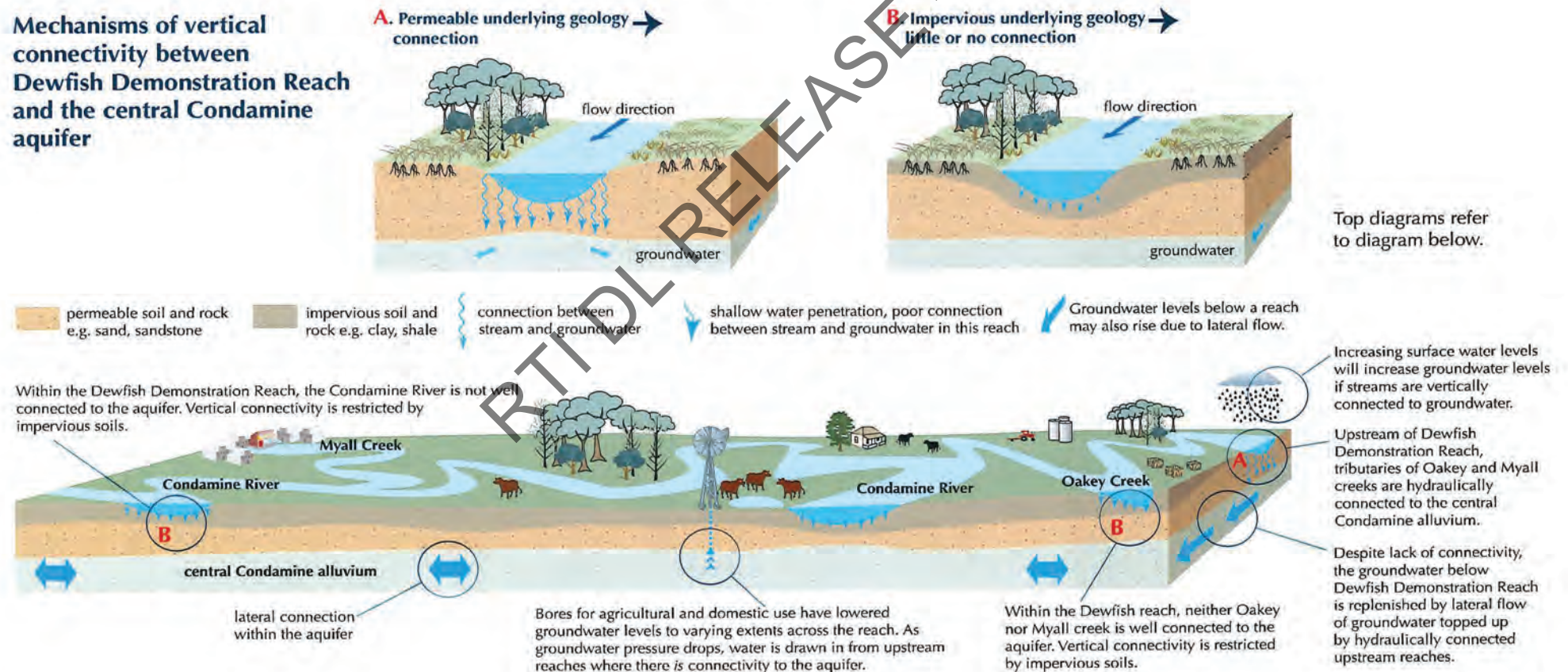
Little data is available for the natural state of the groundwater in this reach, however, the scientific consensus is that, historically, the groundwater was closer to the surface. Since extractions began in the 1960s there has been significant drawdown in the area. Estimates for the reach range from a 20 metre drawdown of groundwater in the east of Oakey Creek, to 10 metres in the west of Myall Creek, with an estimate of 5 metres for the rest of the region.

Even after extended wet periods, groundwater is not well connected to the surface through the Condamine

River. This lack of vertical connection is mainly due to the nature of soils along the reach, primarily clays and other fine sediments that conduct water poorly. A significant demonstration of this was the 1974 floods, which resulted in extremely low groundwater recharge (<1 metre rise) despite four months of flooding.

The tributaries of Oakey Creek and, to a lesser extent, Myall Creek are thought to be still connected to the groundwater and providing recharge to the central Condamine alluvium. This occurs *outside* the Dewfish Demonstration Reach through the permeable soil

Mechanisms of vertical connectivity between Dewfish Demonstration Reach and the central Condamine aquifer



and rock underlying upstream tributaries of those two creeks. This recharge is still relevant to the Dewfish system because these upstream connections influence conditions within the demonstration reach.

Because the aquifer underneath the Condamine River and its tributaries (the central Condamine alluvium) is continuous (i.e. laterally connected underground), reduced groundwater pressure due to extraction (e.g. by bores) *anywhere* in the system will increase seepage of water from the surface into the groundwater to equalise the pressure. This seepage will likely come from the surface waters of Oakey and Myall creeks, which have the highest vertical connection to the groundwater.

There is also a spring in the main channel of Oakey Creek at Bowenville. Although little information is available about this spring, it has been suggested that the source of this is not the central Condamine alluvium, which underlies the reach. Rather, it is discharge from the Main Range volcanics, a series of basaltic aquifers underlying most of the upper eastern part of the catchment. If this is the case there is some connectivity between this other groundwater system and the surface water along the reach.

Ecological connectivity

Specific, detailed research into the connectivity ecology of organisms and communities within the demonstration reach has not yet been carried out. However the changes in lateral, vertical and longitudinal aquatic connectivity from natural state have had a number of likely impacts on abiotic and biotic connections:

- Fish passage along the streams of the reach may be limited by dams, reducing biological connectivity.
- The increase in incidence of no-flow events will reduce water quality, likely stressing fish populations in the in-stream pools along the reach.

- The reduction in occurrence of overbank flows will reduce floodplain inundation, potentially limiting processes required for ecosystem function.

Abiotic connectivity

Fewer low-flow periods and more no-flow periods reduce in-stream habitat provided by inundated benches (flat areas of sediment deposited in stream channels above the bed but below the banks) and potentially reduce water quality along the length of the reach.

Abiotic (and biotic) connection is supported by riparian zones, which contribute to connectivity to the surrounding landscape and provide carbon inputs to the local aquatic system, stimulating the food web. Rehabilitation of the riparian zone along the reach is included in the demonstration reach's whole of life plan.

The groundwater in the central Condamine alluvium shows spatial variability in water chemistry throughout the catchment. Along the demonstration reach, the groundwater is salty, dominated by sodium and chloride ions. Groundwater also tends to have variable sulphate, bicarbonate, magnesium and calcium composition. All these substances can be found in higher concentrations in the groundwater to the east of Oakey Creek.

Biotic connectivity

A number of weirs along the demonstration reach disrupt biotic connectivity by acting as barriers to fish passage. The most significant of these are Edward Street Weir at Dalby and Oakey Creek Weir on Oakey Creek. In addition to these, there are several private weirs that are potential barriers. In late 2010, Loudoun Weir had its fishway upgraded to improve fish passage and connectivity when it is operating.

Reduced connectivity and habitat access may influence the distribution and populations of various fish species found in creeks upstream of the Dewfish Demonstration

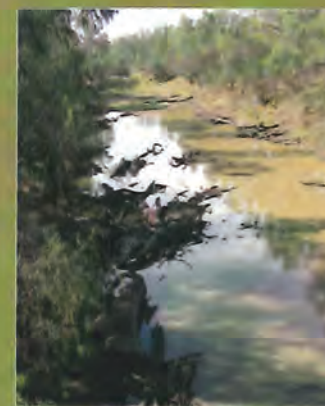
What is a demonstration reach?

Demonstration reaches are the focus for integrated rehabilitation activities. They are established to demonstrate to the community the cumulative benefits of using a number of actions for rehabilitating native fish populations and communities (Murray–Darling Basin Commission 2003).

The Condamine Alliance has developed a strategic program for river rehabilitation along the whole length of the Condamine catchment. The Dewfish Demonstration Reach is being developed as the catchment's first demonstration reach.

The Whole of Life Plan for Dewfish Demonstration Reach includes works to:

- fence and revegetate riparian areas to reduce erosion and sediment load
- re-snap to provide fish habitat and stabilise banks
- weed control to reduce pressure on native species
- modify the construction and fishway at the Loudoun Weir



- carry out activities to raise community awareness, build capacity and increase adoption of rehabilitation activities
- establish a monitoring and evaluation program (Condamine Alliance, 2008).

Returning the Condamine River to a more natural flow regime would increase longitudinal connectivity.

Reach and within the reach itself. Fish surveys conducted in 2008 found two long-ranging migratory species expected to occur in the reach—Murray cod and silver perch—were absent. Both species are found in fast flowing waters and are known to be affected by barriers. However, both the Murray Cod and the silver perch were found in the Condamine section of the reach in follow-up surveys (A. Butcher, pers. comm. August 2011). These later results may reflect the improved connectivity provided by the upgraded Loudoun Weir fishway or the impacts of local fish stocking or both. Further research is needed to clarify the situation.

There are also biotic connections within the regional aquifer; stygofauna (groundwater invertebrates) are found in the alluvia of both the Oakey Creek tributary and the central Condamine alluvium. As there is no connection from the Condamine River to the groundwater in the area and water has been noted to flow from the Oakey Creek alluvium to the Condamine River aquifers, it is likely that this Oakey Creek alluvium groundwater connection is the source of stygofauna populations in the central Condamine alluvium. This connection is under threat from habitat fragmentation caused by drawdown.

Table 1. These fish species were found in surveys of the creeks in the Dewfish Demonstration Reach (conducted in 2008). Fish marked with an X were found in the reach, those marked with O were expected to be found but were absent. Some of the 'missing' fish were found in followup studies conducted 2009–2011. These followup occurrences are indicated in brackets.

Fish	Myall Creek	Oakey Creek	Condamine River
Olive perchlet			X
Carp gudgeon	X	X	X
Spangled perch	X	X	X
Murray–Darling rainbowfish	X	X	
Golden perch	X	X	X
Bony bream	X	X	X
Hyrtl's tandan	X		
Unspeckled hardyhead		X	X
Smelt		X	X
Carp*	X		X
Goldfish*	X		X
Eastern gambusia*		X	X
Murray cod	O	O	O (X)
Eel-tailed catfish (Dewfish)	O (X)	X	X
Silver perch		O	O (X)

* exotic species

Synthesis of hydrological and ecological information

Connectivity has been significantly affected along the reach. Longitudinal connectivity has been disrupted by water extraction, despite water inputs from the Toowoomba STP. Increasing the frequency and magnitude of high-flow events would benefit the off-stream wetlands around Loudoun Weir and allow for better hydrological connection with the floodplain and the nutrients and habitats it contains. This would also increase carbon inputs into the stream network and improve population health. Weirs along the reach disrupt biotic connection and mitigation of these should improve the biodiversity and resilience of the system.

Summary

Longitudinal connectivity

Status

- Extraction has reduced flow and changed the flow regime of the demonstration reach.
- Longitudinal connectivity has been reduced by water extraction, despite water inputs from the Toowoomba STP.
- Longitudinal connectivity in the demonstration reach is interrupted during no-flow periods. Changes to natural flow regimes have seen a threefold increase in the amount of time with no flow through the reach.
- Barriers to fish movement reduce longitudinal connectivity.

Outcomes from improving connectivity

- Species richness and carrying capacity of the reach will increase with access to additional habitats.
- Improved water quality along the reach will result from reduced isolation of in-channel waterholes.

- Connecting populations will increase resilience of biota.
- With connection to the larger stream network, biodiversity will be maximised at the landscape scale.

Lateral connectivity

Status

- Reduction in high-flow peaks reduces lateral connection to off-stream wetlands surrounding the Condamine River.
- Offstream wetlands flood much less frequently and receive less water than under natural conditions. Reduced inundation rates will reduce the water quality of wetlands, affecting their utility as habitats for biota.
- Reduction in high-flow peaks reduces lateral connection to the floodplain.
- Reduction in lateral connectivity may affect nutrient dynamics and ecosystem function.
- High-flow peaks have been noted to be of importance to biota, for example, as a dispersal cue for fish species like the yellowbelly, but the exact local importance is unknown.

Outcomes from improving connectivity

There is general scientific consensus that improving lateral/floodplain connectivity will provide benefits to ecosystem function. Greater knowledge is needed, especially with regards to the timing of connections and how this allows the accumulation/mobilisation of nutrients.

- Movement through the landscape of ecologically important components (e.g. sediments, nutrients and biota) will benefit wetland function and biodiversity.

- There may be improvement in population success through connectivity to the floodplain.

Vertical connectivity

Status

- There has been significant drawdown of groundwater.
- Groundwater no longer provides baseflow to Oakey and Myall creeks within the Dewfish Demonstration reach.
- Reduced groundwater pressure around Oakey and Myall creeks will reduce longitudinal connectivity of the surface flows.
- Oakey Creek is a likely source for stygofauna populations in the central Condamine alluvium. The connection between Oakey Creek and the central Condamine alluvium is under threat from habitat fragmentation caused by drawdown.
- More research is needed into the ecological role and benefits of vertical connectivity in general and specifically for this area.

Outcomes from improving connectivity

- Improved groundwater-surface connection would support increased longitudinal connectivity by contributing to in-channel flow. This has benefits for biota and water quality processes.



Periods of no flow in the Dewfish Demonstration Reach have increased threefold since development.



Groundwater extraction around the demonstration reach decreases longitudinal connectivity of upstream tributaries of Oakey and Myall creeks.

Recommended reading and references

Butcher A and Kerezy A 2008a, *Oakey Creek Fish Biodiversity: 1 Bowenville Reserve. A short report on the pre-restoration fish biodiversity in Oakey Creek, August 2008*, Prepared by the Department of Employment, Economic Development and Innovation: Primary Industries and Fisheries for the Condamine Alliance, Brisbane QLD.

Butcher A and Kerezy A 2008b, *Myall Creek Fish Biodiversity. A short report on the pre-restoration fish biodiversity in Myall Creek, Dalby in August 2008*, Prepared by the Department of Employment, Economic Development and Innovation: Primary Industries and Fisheries for the Condamine Alliance, Brisbane QLD.

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Murray Darling Basin Commission 2003, *Native Fish strategy for the Murray–Darling Basin 2003–2013*. Murray–Darling Basin Commission Ministerial Council, Canberra.



Photo: Stan Cochrane

High flow in the Condamine River at Loudoun Weir

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Archers Crossing and Bowenville Reserves Recreational Fishing

2006



Australian Government

Department of Agriculture, Fisheries and Forestry

Recreational Fishing Community Grants Programme





FINAL REPORT

**CA Project CA06001
Submitted to
Recreational Fishing
Community Grants Programme
Projects R2096 & R2100**

**Archers Crossing
&
Bowenville Reserve**



Australian Government

Department of Agriculture, Fisheries and Forestry

Recreational Fishing Community Grants Programme





FINAL REPORT
Project CA06001
Recreational Fishing Community Grants
Archers Crossing and Bowenville Reserve
(R2096) (R2100)

1.0 Introduction

Native fish populations have long been under pressure in the headwaters of the Murray Darling Basin and the implementation of the Murray Darling Basin Commission's Native Fish Strategy through the development of a Demonstration Reach was seen as a positive first step in beginning to address the issue.

The Recreational Fishing Community Grants provided an opportune vehicle to assist in the development of the first two demonstration sites at Bowenville Reserve (5km from Bowenville, 30km south east of Dalby) and Archer's Crossing (15km from Chinchilla). The sites were identified with assistance from local government and fishing clubs and were assessed as suitable by a team of scientists applying the selection criteria and intervention methods recommended by the Native Fish Strategy. These recommendations were supported by the funding principles of the Recreational Fishing Community Grants Program and applications prepared and administered by The Alliance with Chinchilla and Jondaryan Shire Councils as proponents (and co-investors) were ultimately successful in bringing the plans to fruition.

The project aimed to enhance the environment at Bowenville Reserve and Archers Crossing for breeding and survival of native fish species including the vulnerable and iconic Murray Cod through

- Re-snagging to provide protective habitat
 - Vegetation protection and re-vegetation of native species to provide shade for water temperature control and new habitat "snags" from future old timber (
- Re-stocking to reduce pressure on natural native fish populations
- Reduction of litter and its associated impacts on water quality and fish health by improvements to camping and fishing facilities
- Increase community awareness of the requirements of native fish and healthy waterways through high quality interpretive signage

2.0 Recommendations

- ❖ Recognition of the delivery capacity value of Regional Bodies and their networks as "non traditional" partners to the Recreational Fishing Community Grants Programme.
- ❖ Continued recognition for the in-kind and cash contributions provided by project partners, in particular the local fishing group volunteers and local government.
- ❖ Continuation of the Recreational Fishing Community Grants Programme for its ability to generate the following values:
 - Considerably **increased profile** of recreational fishing
 - Considerably **increased opportunities** for recreational fishing and
 - Significant **leverage of investment** – in this case with a ratio of approximately 1:3 (RFCG:Other cash and in-kind)

3.0 Achievements against Outcomes

3.1 Recreational Fishing Community Grant Outcomes:

Improve recreational fishing opportunities, access and participation

- Improvements to habitat and the fish environment undertaken with the intent to increase the native fish population, particularly of prized species (Murray Cod and Golden Perch) for the enjoyment of recreational fishers. The Oakey Freshwater Fish Stocking Association reported increased incidence of sightings and catches of native fish in the re-snagged areas much sooner than we expected. Whilst this is likely to be partially due to the fresh flows in the creek from heavy rainfall it remains testament to the fact that the snags were doing their job and encouraging native fish to take up residence
- New concrete pathway access to fishing spots constructed by Chinchilla Shire Council at Archers Crossing.
- Media reports have increased the interest in recreational fishing at both locations.

Enhance sustainable resource use and fishing practices by recreational fishers

- Detailed interpretive signage erected at both sites highlight requirements for sustainable resource use and new facilities complement sustainable fishing practices.

Develop a sense of ownership, awareness and responsibility amongst recreational fishers for the sustainable use of fish resources and fish habitats

- the Local fishing groups at both locations became drivers of the projects and have demonstrated their ability to take responsibility for sustainable resource and the promotion of relevant practices in their area of influence

Maintain or enhance fish habitats for present and future generations

- The project conducted the **first re-snagging operation in the Queensland** section of the Murray Darling Basin to enhance fish habitat.

- Revegetation activities will provide a future source of snags for habitat to support native fish populations in years to come.

Develop partnerships between governments, the recreational fishing community, and associated industries to conserve, restore and enhance the values of recreational fisheries throughout Australia

- Two local shire councils, two local fishing clubs, the fisheries extension officer, the Native Fish Strategy Officer, the Department of Natural Resources and Water, local Landcare groups and Condamine Alliance cooperated together to implement the project.
- The partnerships delivered significant in-kind and cash contributions to achieving the outcomes plus provided a solid platform for continuation of the partnership through the newly endorsed and launched River Rescue Program

3.2 Contribution to the Condamine Catchment Natural Resource Management Plan

The project has contributed to the following NRM Plan Resource Condition Targets as follows:

W1. Maintain water quality at Chinchilla Weir within current national guidelines, or state or local guidelines from 2004 levels by 2020

- The Archers Crossing demonstration is upstream from Chinchilla weir. The completed works will reduce sediment runoff and associated turbidity and increase awareness of the value of this requirement to the general public

W4. Achieve a 10% improvement (from 43% of major stream lengths in moderate condition, and 42% in degraded condition,) in condition of stream reaches across the catchment by 2020.

- The works at both Archers Crossing and Bowenville Reserve will improve the condition of the riparian areas at these locations and inform the public of the value of riparian areas to stream condition and the necessary attributes for good riparian condition.

NC2. No net increase in the extent and impact of priority pest animals by 2020

- Improved natural habitat conditions and increased native fish populations (from re-stocking) will work together to place pressure on European Carp – a priority pest species that has invaded the Murray Darling Basin.

NC7. Increase the abundance and distribution of national and state endangered species from 2006 levels by 2020

- The project works will demonstrate activities to increasing habitat for species protection of all species including endangered species and vulnerable species (like the iconic Murray Cod).

C4. Cultural heritage values and aspirations incorporated in NRM outcomes by 2015

As a result of the cultural inspection, scar trees were identified at Archers Crossing and fenced for protection. Their value to our traditional owners is now explained with interpretive signage on site.

4.0 Key Findings

1. **Leverage of Investment:** The Recreational Fishing Community Grants Program proved to be an excellent vehicle for leveraging financial investment, in-kind commitment and community engagement in the improving the river ecosystem and the outcomes for both recreational fishers and community at large.
2. **Strong partnerships deliver better outcomes:** Local fishing groups and local governments were invaluable partners to the program. They provide significant in-kind assistance and valuable local knowledge. The two local fishing groups involved were more interested in environmental outcomes than we expected.
3. **Re-snagging is a complex activity that requires expert advice:** The re-snagging permit process in Queensland is somewhat unclear and further works should make provision for reasonable lead time to make the necessary arrangements. In this project Condamine Alliance was advised re-snagging permission was required by the relative council involved as owners of the sites. Expert advice is necessary to ensure problems are not introduced as a result of this activity.
4. **Hazard warning signs** are a must to reduce the risks associated with use of the waterway once new snags have been introduced.
5. **Community interest in native fish is higher than expected:** Project media releases were highly successful – reflecting the broad community interest in “fishing”. This proved to be excellent “bait” for delivering key messages to the public.
6. **High quality interpretive signage provides a long term communication opportunity:** Excellent feedback has been received regarding the high quality and effectiveness of the interpretative signage which has been very well received. The signs appear to be working well to increase awareness.
7. **Tackling smaller more manageable reaches has delivered results:** The demonstration sites were easier to plan and develop than an entire reach and have been effective in providing the community with “something to do” and “results to view” as a means of maintaining momentum for the bigger Demonstration Reach project.

5.0 Unintended Outcomes/Findings

1. Both local government and the fishing groups invested much more time than initially expected. Their support for the program helped forge new and stronger relationships for future programs.

2. The Demonstration Site concept has delivered new partnerships and the opportunity to better understand partner skills and knowledge and their potential role in the development of the demonstration reach.

6.0 Partnership Formation

Partner Group or Organisation	Actual involvement in project
Jondaryan Shire Council	Machinery and Labour for re-snagging, re-vegetation and fencing
Chinchilla Shire Council	Machinery and Labour for re-snagging, re-vegetation, pathway construction and fencing
Oakey Freshwater Fish Stocking Association	Labour and materials for re-snagging, fish releases and media releases
Chinchilla and District Amateur Fishing Club	Labour and materials for re-snagging, fish releases and media releases
Landloch Pty Ltd	Site review and recommendations report
GHD	Assisted site review and recommendations
Department of Primary Industries & Fisheries	Assisted site review and recommendations, Fisheries Extensions Officer information for restocking and assistance with releases
Murray Darling Basin Commission	Planning assistance from Native Fish Strategy Coordinator, Demonstration Reach Guidelines
NSW Department of Agriculture	Professional advice and workshop for Re-snagging activities
Chinchilla Landcare	Assistance with revegetation and riparian protection works
Greening Australia	Advice and assistance for revegetation
New partnerships formed during project	Involvement in project
Adjoining Landholders	Assistance with revegetation and riparian rehabilitation and protection activities

7.0 Information Gaps and Associated Catchment Risks

- Investment in public areas is at risk of vandalism. Local governments in particular were concerned about damage to interpretive signage and revegetation. Consideration should be given to increasing awareness and environmental respect in local communities as much as possible through appropriate communication. Methods are currently being discussed with both Jondaryan and Chinchilla shire councils for the erection of barriers to help protect the investment at Bowenville Reserve and Archers Crossing.

9.0 Attachments

Individual Reports for Recreational Fishing Community Grants Round 3

R2096 – Improvements to Enhance the Recreational Fishing and Tourism
Experience at Archers Crossing

R2100 – Bowenville Reserve Improvements for Recreational Fishing



Recreational Fishing Community Grants

Round 3

FINAL REPORT R2096

Improvements to Enhance the Recreational Fishing and Tourism Experience at Archer's Crossing



Recreational Fishing Community Grants Programme

..helping to improve the recreational fishing experience

Final Project Report

Project Title:	Improvements to Enhance the Recreational Fishing and Tourism Experience at Archer's Crossing
Name of Grantee:	Condamine Alliance
Contact person and telephone number:	Ms Fran Holt 07 4620 0117

1. What *was* your project trying to achieve?

1. Increase the naturally occurring population of native fish – particularly Murray cod and Yellow belly in this section of the river.
2. Re-snagging
3. Erect interpretive signage
4. Provide fish cleaning tables

2. What *has* your project achieved?

All of the objectives listed above were achieved by the project, however, ***Improvements to Enhance the Recreational Fishing and Tourism Experience at Archer's Crossing*** involved many more activities over and above those listed in the Recreational Fishing Community Grants Programme and their achievements will also be included in this report.

Prior to the commencement of the project the Chinchilla Fishing Club noted that the numbers of native fish in this section of the river as well as the other sections of the Condamine River in the Chinchilla district were on decline. While the percentage of exotic fish species when compared with native fish caught by recreational anglers were on the increase. As well at Chinchilla the Condamine Catchment is affected by Chinchilla Weir, which backs up the river past Archer's Crossing and the Town Weir on the Charleys and Rocky Creeks. Both of these weirs are barriers to fish passage upstream for spawning. Therefore to aid an increase in the native fish populations, Chinchilla Fishing Club and the Queensland Department of Primary Industries and Fisheries worked together to identify suitable locations for the release of native fish fingerlings that could benefit the wider Condamine River catchment. The sites eventually chosen for restocking were excellent; Archers Crossing was one of the locations identified for the restocking programme. Releasing the fingerlings was delayed as long as possible to ensure that the

project's initial objectives were achieved or surpassed. The timing of the fingerling release was excellent because this reach of the river was at maximum capacity allowing the river's water to gently spill over the weir and as well the holes in the creeks were full. These conditions will help ensure the fingerlings have a better chance of survival from predators. From the combined funding of this programme and QDPI&F – 7,000 Murray Cod... 21,000 Silver Perch... 112,000 Golden Perch fingerlings were released at Charleys Creek, Rocky Creek, Wombo Creek, the River upstream from Chinchilla Weir and Archer's Crossing on Sunday 13 January 2008.

This section of the river did have some areas of natural snags; other sections were identified as sites that native fish and wildlife would benefit from the addition of suitable woody-debris and trees. Trees suitable for re-snagging were not easy to find because of the past practices of neighbouring landholders and visitors to the reserve, using fallen timber and trees for fire wood; after some difficulty the Chinchilla Shire Council found trees suitable for placement at the reserve and the locations for their placement have been recorded; also signs are now erected warning visitors of the re-snagging in this reach of the river and the dangers that they may face. These re-snagging sites will provide improved fish habitat.

Natural beauty is in abundance at Archers Crossing, many visitors to the reserve are not aware of the intrinsic value of these natural features to the overall health of the river system. As a result of this lack of knowledge some visitors misuse them. As part of this project, interpretive signage for community education has been erected. To ensure that the signs were informative but did not put visitors off reading them because of information overload, Condamine Alliance worked with John Wiffen of YOU ARE HERE, a design illustration company with considerable experience designing parks and wildlife signage. Three (3) top quality interpretive signs were produced which provide visitors with excellent information; "**Reviving our rivers**" describes simple actions that taken now will restore the health of our waterways to ensure future generations enjoy a healthy river ecosystem; "**Snagged on a river reef**" describes how woody debris are one of the natural wonders of a waterway; and "**Breathing life back into our waterways**" illustrates actions that if adopted will decrease the environmental pressures that have been placed on the catchment, to allow our waterways to recover. As part of this project a Cultural site assessment was completed at Archers Crossing. Two (2) scar trees were identified on the site and these have now been fenced for protection and preservation. To help visitors enjoy their tourism experience at Archers Crossing additional signage has been erected that provides information on the history and cultural importance of the reserve.

Archers Crossing like most recreational fishing spots was devoid of facilities for cleaning fish which often led to fish remains being left around BBQs and tables used by visitors for preparing and eating their meals. To allow this

practice to continue was unsafe for all concerned, not only because of the health risks but also because of the extra maintenance and upkeep of the facilities already in place. The installation of a stainless steel fish cleaning table with shelter achieved our objective to help address these problems for visitors. The quality of this new facility meets our expectations.

The fishing reserve, Archers Crossing is a popular and well known site for locals and visiting recreational anglers and is situated only 15km south of Chinchilla. Because of its close proximity to a large town and major roads many people visit the reserve, however due to the extensive size of the reserve and its popularity, facilities for enhancing any fishing or tourism experience at Archers Crossing were limited. This project provided funding for the construction of a 400M concrete pathway to allow visitors better access along the river. The pathway's construction was completed by the Chinchilla Shire Council in December 2007. Condamine Alliance commends Chinchilla Shire Council for their outstanding commitment to this project. The workmanship from the council work's team was of excellent quality and far exceeded our initial expectations. Council's own funding contributions of \$37,750.00 ensured the project achieved its aims for improvements to enhance the facilities and visit to Archers Crossing. Already Chinchilla Fishing Club members have commented on the fact that the pathway has allowed easy access for the disabled to see the river along the reserve and has given them a chance to enjoy fishing with other family members.

Land management practices of the neighbours adjoining Archers Crossing on the opposite side of the river allowed for cattle to water directly at the water's edge. This practice causes a great deal of damage to both the in-stream habitat and the river banks. Chinchilla and District Landcare worked with the neighbours to develop a plan to ensure these practices were no longer to be continued. The plan called for the access of the cattle to the river be fenced off, off site water points be installed and the area fenced off to be revegetated. This project provided funding for revegetation of the area with native trees and ground cover which included Red River Gums and She Oaks. Even though it will take some considerable time before we are able to measure the outcomes of this work, it is felt that this aspect of the project has achieved our initial objectives. Once these trees are established they will be an important part in assisting the natural river snagging process and provide shade and shelter as well as nesting places for birds and other wildlife.

3. Did you encounter any difficulties while carrying out your project? What would you have done differently?

Apart from a few minor hiccups as would be encountered in any project, the major difficulty encountered was the on-going drought conditions. The drought impacted the timing of revegetation works and local volunteer labour as landholders were understandably focused on the day-to-day needs of keeping crops and livestock alive.

Vandalism in the form of visitors leaving all sorts of rubbish along the river bank and lighting open fire along the riparian zone, glass beer bottles, aluminium cans and plastic bottles are being thrown into these fires. These actions did not give us any difficulties in completing the project but they will provide difficulties for the upkeep at the reserve.

The outcomes for this project were very good, however this project being the first of its type for Condamine Alliance, provided key learning experiences particularly associated with the processes of ordering native fish fingerlings. If and when we are given the opportunity to undertake a similar project we would carry out the project in the same manner.

4. How has your project benefited the recreational fishing community (eg increased community awareness regarding sustainable fishing practices)?

Construction of the cement walkway has allowed recreational fishers an opportunity to better access alternative fishing spots along the river's bank and provides visitors to the reserve a pathway so that they can easily view the river and the native vegetation. The camping reserve at Chinchilla Weir is a very popular spot for recreational anglers and those who partake in water sports and sometimes these two (2) activities do not blend well together.

Now that the facilities at Archers Crossing have been upgraded, this site will provide the people who are more interested in fishing a spot where they can enjoy some peace and quite as they fish.

Also when travelling anglers are planning their trip Archers Crossing will provide them with an additional site to visit in the Chinchilla district.

One the project's key partners were the Chinchilla Fishing Club. Members of the club are well attuned to their need for sustainable fishing practices and a beneficial outcome this project has delivered to them directly is an increased community awareness of the club and their activities. The club has reported increased interest from local anglers to become club members. Furthermore, the club acknowledges a newfound understanding of the importance of better management of the stream bank habitat so that it will not have negative impacts on native fish populations.

5. Has there been an increase in community use of the project site and/or project materials? If yes, describe.

The project site is a very popular spot for the recreational fishing community when fishing for native fish. The numbers of exotic fish species are affecting this site and the Chinchilla Fishing Club is seeking ways to have the Condamine River at Archers Crossing included in any future carp management program.

Carers for some of the disabled at Chinchilla have acknowledged to the local fishing club that with the cement walkway at Archers Crossing, they are now using the facilities at the site and will encourage other locals with disabilities to do likewise.

6. What follow-up activities are you intending to perform?

On going maintenance of the facilities and sites are undertaken by the Chinchilla Shire Council. The Chinchilla Fishing Club is also maintaining the new facilities and will conduct regular working bees and fishing competitions at Archers Crossing and they will provide Condamine Alliance with feedback.

7. Please attach any project photos, letters of recognition, newspaper articles, media events, publicity, survey feedback results and success stories.

Interpretive signs:- Copy material for themed signs "Reviving our rivers"; "Snagged on a river reef"; "Breathing life back into our waterways" attached.

Warning sign: Copy material for warning signage attached.

Photographs: - stainless steel fish cleaning table; erected interpretive signage; pathway and its construction; scar trees; vandalism and fingerlings release.

Visitor information signage – Copy material for the following attached:
Walking Pathway; Scarred Trees; Scar tree

Published Media stories – Copies attached include:

- Condamine Catchment Re-snagging Program
- The Bugle 25 January 2007 pages 2 & 3 – Something fishy about these snags
- Chinchilla News & Murilla Advertiser 1/2/2007 – Breathing life into popular fishing spot
- Chinchilla News & Murilla Advertiser 17 January 2008 – Fish fingerlings wet the appetite at Chinchilla

Letter of recognition – Chinchilla and District Amateur Fishing Club

8. Other information or comments.

1. Re-snagging permits were difficult to obtain as this work together with the re-snagging at Bowenville was a first for Queensland. Further comment is included in the Final Report for Bowenville Reserve Project number R2100.
2. Condamine Alliance intends to use this site as a demonstration site supporting works associated with the Condamine River Rescue Program for the Condamine Catchment region.
3. The project itself proved an excellent vehicle for community engagement – particularly with groups that Condamine Alliance had not worked with previously.

4. The program has demonstrated to the local fishing club the value of the Recreational Fishing Community Grants to provide support for their activities and local community.

RTI DL RELEASE - EHP

R2096 Final Report

Attachments

- ❖ Artwork for signage
- ❖ Photos
- ❖ Media
- ❖ Letter of Appreciation

RTI DL RELEASE - EHP

Condemning Alliance
condemning homophobic bias

The Condamine Catchment's Regional Body for natural resource management – Condamine Alliance, is working with Greening Australia, local governments, community groups such as Landcare and local fishing clubs, businesses and individuals to implement a program to rescue the wetlands of the catchment. If you would like to be involved in any future Wetland Rescue activities, please visit www.condaalliance.com.au for further information.

Snagged on a river reef...

One of the natural wonders of a waterway is the woody debris—alias snags—which fall or lodge themselves in the water creating a dynamic ecosystem. These are the reefs of the inland river. As one of the few hard surfaces found in waterways, they not only provide an important refugia for life above and below the surface, but they help shape the riverbed and strengthen it against erosion.

Introducing snags back into our rivers, creeks and streams is one rehabilitation activity being undertaken that will no doubt achieve a wide range of ecological benefits for all users of our waterways.

Snags also provide homes for many semi-aquatic species. They can be used as a bridge to gain access to the river, a sunny resting spot for insects, birds and frogs, as well as providing nesting sites for many bird species.

By snagging debris on a riverbed, the flow speeds from high velocities of flood. These fast moving waters are habitats for nesting egrets and other water-dependent birds. In turn, because a hard surface for a wide variety of invertebrates and their predators exist, as fish, freshwater turtles and water birds.

Sufficient water flowing around snags on the bottom of a river allows cut the fast and creates the clear holes that provide refugia for water in dry times.

Snags provide fish such as Murray cod, flat black fish and blue-spotted gudgeon with protection from predators and others, such as golden perch, snappers, and catfish. Snags also provide a refuge for many other species, including crabs and other invertebrates.

Murray cod usually occupy a snag. They can migrate up to 100m to spawn, returning to their natal snag.

Snags can protect river banks from too strong water by blocking and deflecting the flow away from the base of the bank.

The misunderstood snag.

In the past, snags were removed as they were thought to:

- Reduce the rivers capacity to deliver water;
- Increase the severity of flooding;
- cause excessive riverbank erosion; and
- be unsightly.

The truth about snags...

But with further knowledge we now know that these perceptions were incorrect and snags in fact:

- Do not significantly decrease the channel capacity;
- do not influence the size and duration of floods;
- are a natural part of erosion and deposition processes, and although the odd snag might be seen to cause unwanted erosion, most actually assist in reinforcing the bed and banks of the river; and
- play a vital role in ecological processes, including the web of life.

Breathing life
back into our
waterways...

As actions are adopted to decrease the environmental pressures that have been placed on our rivers, creeks and streams, the scars will slowly heal and our waterways will meander down the long and winding road to recovery.

Everybody's efforts will be rewarded with clean waterways rich with life above and below the surface.

With help from native fish stocking organizations, populations of cutthroat trout have been falling rapidly (e.g., golden perch, bluegill, and white perch) will return to healthy levels and may even dominate and displace introduced fish species such as bass, crappie, and muskellunge.

Healthy native vegetation brings us waterways with clear, oxygen-rich water. Improving treatment and pollution control water quality and better toxic blooms of algae and bacteria. Frogs, turtles and native fish (columbian and herring) are a result of this.

In the deep pools covered by currents swirling around logs in the riverbed, golden perch and muskie wait all day under slabs and overhanging banks waiting for their prey. Bowfin (see below) certainly will forage in the depths below.

Unlike juggling from the same old juggle places for the past few decades, today's jugglers have a wide variety of choices.

The return of a variety of habitats will encourage fish of all types and sizes, including spawning aggregations of past years.

Reducing use of a single-use plastic container. International Airports without backpacking, such as London, Tokyo, Atlanta, Dallas and Mexico City, have been successful. Although backpacking has been used off and on.

Populations of show
orchids, once present
and widespread
nowhere but in the
presence of suitable
vegetation, and might be
classified as they derive
from one plant to another
having advantages of the
same provided.

With rich, hot air,
Irradiate people in a
healthy manner. Use
small, gentle and water
into each air cluster
contains and hence
will cause the (light)
the watery heat to rise

blasting used will
allow controlled
fracturing, saving in
wings today. Fast
strong eggs.

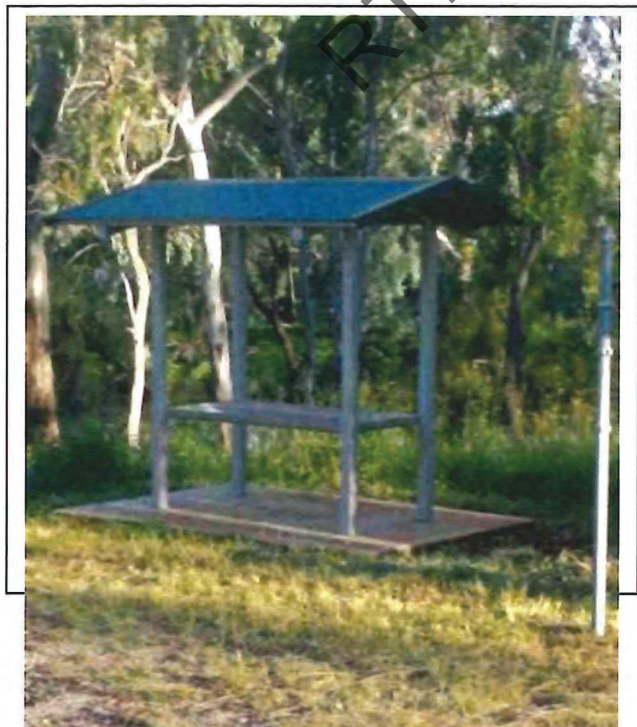
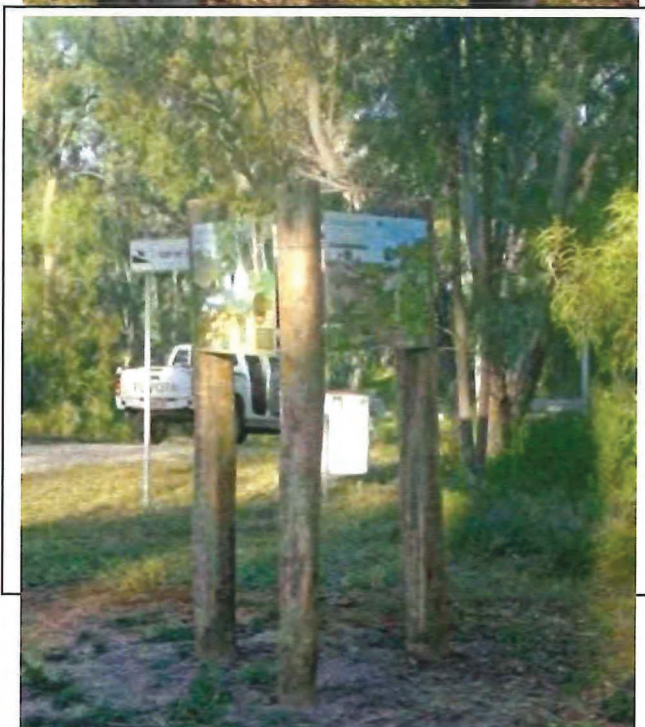
Everybody will benefit as we help return the health of our waterways in the years to come. Most importantly, nature's web of life will thrive!

WARNING



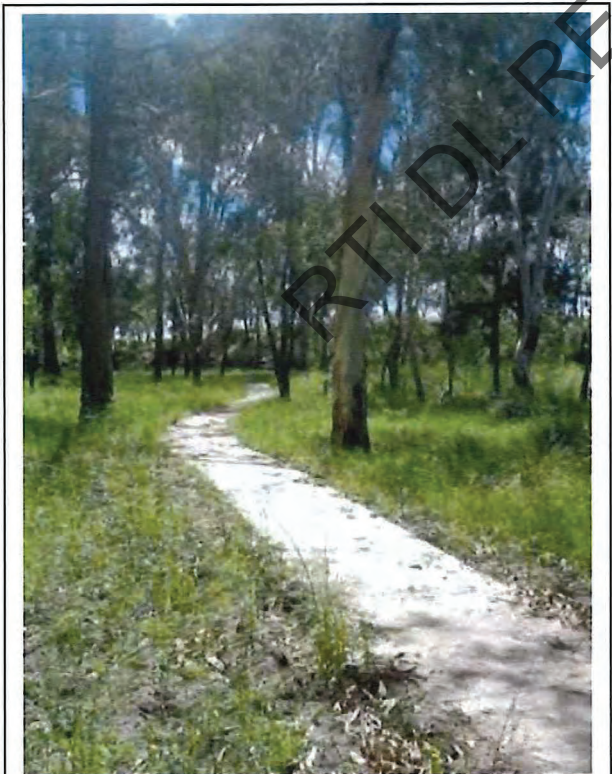
Submerged logs in these waters

New interpretive signage erected on-site at Archers Crossing – “Reviving our rivers”; “Snagged on a river reef” and “Breathing life back into our waterways”. Plus – the newly constructed stainless steel fish cleaning table with shelter now available for use by recreational fishers.



Pathway construction at Archers Crossing

The pathway extends 400m and provides easy access to new fishing spots at the Reserve with minimal disturbance to the natural environment.





Above – Scar trees at Archer's Crossing now fenced for protection

Right – Fire damage caused by vandals at Archer's Crossing.



Right – eroded banks at Archer's Crossing result in increased sedimentations. Revegetation and stock exclusion will, in time, reduce the sediment load of the river.



Fingerling release at Archer's Crossing by project partners - The Chinchilla and District Amateur Fishing Club.





PRESIDENT Gary Sheridan
SECRETARY Peter Jefferies
TREASURER Gaylene Sheridan

Address: PO Box 342,
Chinchilla, Q4413

CHINCHILLA and DISTRICT AMATEUR FISHING CLUB INC

Condamine Alliance
3 Clifford Street
Toowoomba, Qld. 4350

23rd January, 2008

Dear Kevin,

The Committee and Members of the Chinchilla Fishing club would like to sincerely thank Condamine Alliance for giving the Club the opportunity to be involved in the restoration and revamping of Archers Crossing.

The club very much appreciates being given this opportunity do a full restocking of the native fish breeds in the Chinchilla water ways.

The members have found it exciting and have enjoyed the challenge of the distribution of such a large number of fish fingerlings, to appropriate waterways.

Thank you,

Yours truly,

sch4-Signature

Gary Sheridan
President



Recreational Fishing Community Grants

Round 3 FINAL REPORT R2100

Bowenville Reserve Improvements for Recreational Fishing



Recreational Fishing Community Grants Programme

..helping to improve the recreational fishing experience

Final Project Report

Project Reference Number:	R2100
Project Title:	Bowenville Reserve improvements for recreational fishing.
Name of Grantee:	Condamine Alliance
Contact person and telephone number:	Ms Fran Holt 07 4620 0117

1. What *was* your project trying to achieve?

Resnagging

Fishing re-stocking – Murray cod, Silver perch and Golden perch

Development and Erection of interpretive signage

Surveys and Monitoring

* Revegetation of riparian growth

* Installation of fish cleaning tables

* Boat ramp repairs

2. What *has* your project achieved?

The project was designed to enhance the recreational fishing experience at this well known and popular fishing and camping location. Over the years the site has been heavily fished and high numbers of campers have caused damage to the riparian area. We knew fish numbers could be improved from re-stocking, however, re-snagging was essential to provide sufficient habitat and shelter to encourage fish to remain in the area and eventually breed sufficient numbers naturally. Furthermore, future natural re-snagging would be possible if new plantings of trees could be established along the banks. It was also important to educate visitors to understand the impact of their actions and encourage them to take up practices that would ensure the longevity of the site and sustain its value to the community.

As the project developed it became apparent that some components of the original application would not proceed due to various reasons and permission was granted from the funding manager on 30 March 2007 to reallocate the associated funding to fish restocking activities. The reasons for requesting the reallocation of the funding will be covered in this report see * and Appendix 1 – Email: Project # R2100. All objectives listed above were achieved by the project however quantities were affected by this reallocation of funding. These achievements will deliver a number of benefits to the native fish habitat together with recreational fishers, however, considering the heavy use this reserve receives during vacation periods, the question needs to be asked are

Bowenville Reserve improvements for recreational fishing adequate enough? Situated less than 5km from the Warrego Highway along an all-weather bitumen road, access to the reserve is made easy for travellers. Many hundreds of campers visit the site annually, with in excess of 300 visitors recorded to have been at the reserve during the Easter weekend. Outside school vacation periods campers are always evident.

Resnagging

This reach of the Oakey Creek was not able to provide native fish with good habitat due to a lack of natural snags. As a component of the project, Jenny Fredrickson, Conservation Manager of the Living Murray Resnagging Project, NSW DPI visited the project site and conducted a resnagging workshop covering all aspects of resnagging planning and implementation for the project's partners. This was followed by a thorough inspection of the creek to identify suitable points for snag introduction. 10 resnagging sites were identified at the Bowenville Reserve. Logs meeting the recommended requirements for resnagging were located by members of Oakey Freshwater Fish Stocking Association (OFFSA) and transported to the reserve for placement. Members of OFFSA, the Jondaryan Shire Council, neighbouring landholders and Condamine Alliance personnel placed the logs at the reserve on both sides of the creek bank. Some of the logs were totally submerged while others were left to overhang from the bank.

The locations of their placement have been GPS recorded and the information has been supplied to the Department of Natural Resources and Water at Toowoomba; also signs are now erected warning visitors of the re-s snagging in this reach of the creek and the dangers that they may face. Placement of these snags has allowed the project to achieve our initial objectives and these re-s snagging sites will provide improved fish habitat at this section of Oakey Creek.

Interpretive signs

Bowenville Reserve's popularity has increased as a recreational fishing spot for families and is in close proximity to Oakey, Toowoomba and Brisbane. The increasing human impact is placing the reserve under enormous pressure along both the stream bank habitat and the in-stream habitat. Oakey Creek at the reserve provides visitors an area of peace and quiet for fishing and camping; many of the visitors enjoy this tranquillity so much that they establish their camp sites right by the water's edge. Currently the reserve is in danger of being loved to death. A large majority of the campers to the reserve are not aware of the impact they are having on the overall health of the river system. As a means of improving community knowledge and awareness, interpretive signage for community education has been erected. To ensure that the signs were informative but did not become information overload, Condamine Alliance worked with John Wiffen of YOU ARE HERE, a design illustration company with considerable experience designing parks and wildlife signage. Three (3) top quality interpretive signs were produced which provide visitors

with excellent information; "**Reviving our rivers**" describes simple actions that taken now will restore the health of our waterways to ensure future generations enjoy a healthy river ecosystem; "**Snagged on a river reef**" describes how woody debris are one of the natural wonders of a waterway; and "**Breathing life back into our waterways**" illustrates actions that if adopted will decrease the environmental pressures that have been placed on the catchment, to allow our waterways to recover.

Fishing re-stocking – Murray cod, Silver perch and Golden perch

The road crossing on Oakey Creek downstream of Bowenville Reserve impedes native fish passage in the times of low flows and in times of increased water flows only large native fish could transit this reach of the creek upstream for spawning. Therefore OFFSA and Queensland Department of Primary Industries and Fisheries (QDPI&F) in an attempt to assist an increase in the native fish populations, worked together to identify suitable locations for the release of native fish fingerlings that could benefit local recreational fishing spots and the wider Condamine River catchment. The locations agreed upon for the placement of the fingerlings were at Oakey Weir, along Oakey Creek and the Condamine River.

At the time when some of the on-ground works for the project were planned to be completed on the country surrounding Oakey Creek at Bowenville Reserve, drought conditions made it difficult for some of them to even be started. But at the same time effects of the drought on the creek itself were not a factor because it was elevated by the continuous supply of water from the Toowoomba waste water treatment (via Gowrie Creek) thus ensuring that there was always water in the creeks for the fish.

With the approval of Recreational Fishing Community Grants Programme, OFFSA took advantage of the room within their permitted restocking allocation from QDPI&F to add to the restocking component of the project.

Timing for the placement of the fingerlings at the selected site on Saturday 19 January, 2008 was excellent as recent good rains at the headwaters of Gowrie Creek had made their way down into Oakey Creek. The conditions will help ensure the fingerlings have a better chance of survival from predators.

Releasing the fingerlings was lead by members of OFFSA and Rod Cheetham, Fisheries Extension Officer – QDPI&F and supported by the many campers visiting Bowenville Reserve.

Revegetation of riparian growth

Unfortunately Bowenville Reserve has been negatively impacted by the ignorance of some visitors who have destroyed tress and ground cover on the southern bank of Oakey Creek and revegetation was planned for this area. Drought conditions prevailing at the reserve during the first half of 2007 made it difficult for planting to even be started. The project received approval from Recreational Fishing Community Grants Programme to the allocation of funding for revegetation, reducing it by half, with the remaining funds re-allocated to the re-stocking program. It was agreed that if rain was received in

the area prior to or during spring it would be possible that some revegetation work could be undertaken before the end of the project. However it was also acknowledged that the numbers of plants used would be substantially reduced from the original expectations.

Following good beneficial rains received during late spring, and armed with advice from Greening Australia native trees species and ground cover, including river red gums were acquired for planting.

Jondaryan Shire Council approved revegetation work to be done at the reserve and agreed to plant the selected native vegetation.

Surveys

Over a number of years OFFSA have conducted Creel Surveys on the native fish species in this section of Oakey Creek, these surveys have shown improvements leading up to the finalisation of our project. No survey data is available that shows what is happening with the native fish species since the last of the on-ground work at Bowenville Reserve. Surveys planned in the area as part of the project could not be completed because of other work pressures on QDPI&F. Arrangements are being finalised with them to do this survey work as a matter of urgency, the results of this survey will be made available.

Work undertaken additional to the project

As noted earlier in this report, there is a need to discourage indiscriminate camping by the water's edge as well as providing protection to the riparian area. Damage is created by open camp fires and unrestricted vehicular access in these areas. At Condamine Alliance we acknowledged that if no action were taken, the problem would continue to exacerbate because of the ever increasing number of campers to this particular reserve.

Acting with the support of the Jondaryan Shire Council a plan has been developed to restrict vehicle access to this fragile area. To control vehicle access onto the reserve to just one entry point, Council has erected bollards and posted a notice which informs visitors of the change.

Ergon Energy at Toowoomba has agreed to supply re-cycled power poles to be used as the bollards along Oakey Creek at Bowenville Reserve to restrict vehicle access to the water's edge. The bollards will be suitably spaced to allow pedestrian access to the creek. Jondaryan Shire Council has undertaken to do the installation work.

To increase awareness of the importance of responsible fishing and camping, Condamine Alliance has planned a television advertising campaign featuring well known and popular Queensland identity, Shane Webcke a former rugby league player, to raise awareness in the lead up to the Easter holidays – a popular fishing and camping time. This campaign was inspired by concerns raised during the implementation of this project and other projects supporting the Condamine Alliance "River Rescue Program".

3. Did you encounter any difficulties while carrying out your project? What would you have done differently?

*** Installation of fish cleaning tables**

Following concerns raised by both OFFSA and Jondaryan Shire Council, it was decided that due to a known vandalism problem and the lack of available water at the most suitable site (out of flood damage zone - potentially creating problems in terms of cleaning of the facilities) that installation of fish cleaning tables on the Reserve was not wise. The funds for this activity were approved for re-allocated to the re-stocking program.

*** Boat ramp repairs**

As the project developed it became apparent that concrete budgeted for boat ramp repairs was unnecessary as the existing boat ramp was gravel and fully serviceable and did not require repair. Funds for this activity were re-allocated to re-stocking.

*** Revegetation of riparian growth**

The prolonged drought in the area (as noted in this report previously) did not allow for all of this activity to proceed. The planting window prior to the 2007 winter closed and no trees were able to be planted as it was feared the trees would not establish well enough before severe frost set in. As it turned out this fear was well grounded, the 2007 winter was one of the coldest in the area for many years and heavy frost were recorded.

*** Re-snagging guidelines**

The re-snagging at Oakey Creek is the first re-snagging operation in Queensland and as a relatively "new" activity was not accommodated by government processes and legislation. Timing can be critical for this type of activity being implemented, during the early stage of this project, coordination was excessively time consuming and frustrating for all involved. Now that the Queensland State Government agency responsible for approving this activity is receiving more requests for resnagging work, the fuzziness surrounding the guidelines is becoming clearer.

4. How has your project benefited the recreational fishing community (eg increased community awareness regarding sustainable fishing practices)?

Noted through-out the report is the popularity of the reserve with campers and the upgrade of the facilities provided from this project are adding to this popularity. Recreational fishers and the wider community were provided a hands-on educational experience when they assisted with the placement of the native fish at Bowenville Reserve and lead by OFFSA and QDPI&F. At the end of the day when the fingerlings were released one of the people assisting with the project caught and released several good sized Golden perch.

Increasing the "catch"

OFFSA are a very pro-active recreational fishing group with a strong interest in environmental sustainability. For some time the group had been interested in re-snagging sections of Oakey Creek but did not have the capacity to make the necessary arrangements. OFFSA is delighted with the new in-stream habitat and have already reported increased catches of native fish at Bowenville Reserve.

Signage

Signage erected at Bowenville Reserve as part of the project, has been acknowledged by QDPI&F as the best educational signs for caring for the environment that they have seen in helping recreational fishers increase their awareness about natural resource management.

5. Has there been an increase in community use of the project site and/or project materials? If yes, describe.

Yes – use of Bowenville Reserve itself – OFFSA used to fish upstream or downstream from the reserve on private property as Bowenville had a reputation of being "fished out" and habitat poor. One of the activities as part of the project was the resnagging workshop. The workshop was attended by neighbouring recreational fishing clubs, Shire Council personal and Landcare groups. The lessons learnt at the workshop have helped them understand the need for sustainable fishing practices and this information has been taken back to their groups for adoption in their local communities.

6. What follow-up activities are you intending to perform?

On going maintenance of the facilities and sites are undertaken by the Jondaryan Shire Council. OFFSA will regularly monitor the facilities and will conduct surveys on the native fish species and their habitat at Bowenville Reserve and they will provide Condamine Alliance with feedback

7. Please attach any project photos, letters of recognition, newspaper articles, media events, publicity, survey feedback results and success stories.

Interpretive signs: - Copy material for themed signs "Reviving our rivers"; "Snagged on a river reef"; "Breathing life back into our waterways" attached.

Warning signs: Copy material for warning signage attached.

Photographs:- Photos of re-snagging; OFFSA & Condamine re-snagging workers; fingerling release and interpretive signage

Published Media stories – Copies attached include:

Condamine Catchment Re-snagging Program

The Champion 21 February – More fish for waterways and 7 March 2007 – photo page 15

The Bugle 25 January 2007 pages 2 & 3 – Something fishy about these snags

Bush 'n Beach Fishing, April 2007

The Chronicle, Monday January 28, 2008

The Chronicle, Tuesday, January 29, 2008

Letter of Recognition – Oakey Freshwater Fish Stocking Assn. copies attached.

8. Other information or comments.

After understanding the benefits that resnagging can offer to the habitat for native fish and wildlife, neighbours to the project site are impressed and have expressed interest in conducting similar works in their reaches of the creek. Some of this initial interest dissipates as soon as the landholder is told that a permit must be applied for and approved before any such work can be attempted. We at Condamine Alliance acknowledge that re-snagging guidelines need to be adhered to. But we seek your assistance in encouraging the state government to consider the development of "user-friendly" guidelines for landholders carrying out resnagging work with Catchment Authorities.

Condamine Alliance intends to use this site as a demonstration site supporting works associated with the Condamine River Rescue Program for the Condamine Catchment region.

The project itself proved an excellent vehicle for community engagement – particularly with groups that Condamine Alliance had not worked with previously.

The program has demonstrated to the local fishing club the value of the Recreational Fishing Community Grants to provide support for their activities and local community.

R2100 Final Report

Attachments

- ❖ **Approval for variation to contract**
- ❖ **Artwork for signage**
- ❖ **Photos**
- ❖ **Media**
- ❖ **Letter of Appreciation**

RTI DL RELEASE - EHP

Condemned Alliance
www.condemnedalliance.org

The Condamine Catchment's Regional Body for natural resource management—Condamine Alliance, is working with Greening Australia, local government, community groups such as Landcare and local fishing clubs, businesses and individuals to implement a program to rescue the waterways of the catchment. If you would like to be involved in any of our River Rescue activities, please visit www.condaminealliance.com.au for further information.

[illegible]

Snagged on a river reef...

One of the natural wonders of a waterway is the woody debris—alias snags—which fall or lodge themselves in the water creating a dynamic ecosystem. These are the reefs of the inland river. As one of the few hard surfaces found in waterways, they not only provide an important refuge for life above and below the surface, but they help shape the riverbed and strengthen it against erosion.

Introducing snags back into our rivers, creeks and streams is one rehabilitation activity being undertaken that will no doubt achieve a wide range of ecological benefits for all users of our waterways.

Snags also provide habitat for many non-aquatic species. They can be used as a bridge to gain access to the river, a sunny resting spot for lizards, turtles and frogs, or even as perching, roosting sites for many bird species.

By trapping debris as it moves down the river, snags form rich deposits of food. These food deposits become habitats for nesting eagles and other raptors, and other river organisms, who in turn become a food source for a wide variety of invertebrates and their predators such as fish, freshwater turtles and water birds.

Sufficient water flowing around snags on the bottom of a river scours out the bed and creates the channels that provide meandering of water in dry times.

Snags provide food such as Murray cod, blue swimmer fish and murray-umbrell goby with predators feeding wire and others such as golden perch, bream, and silver perch. Spotted catfish, with their long protruding, strong corners, and black stinging.

Snags also protect river banks from soil being washed by flooding and deflecting the flow away from the base of the bank.

Murray cod usually choose a forked snag. They can dig up to 10cm to reach flanking to their forked snag.

The misunderstood snag...

In the past, snags were removed as they were thought to:

- Reduce the rivers capacity to deliver water;
- Increase the severity of flooding;
- cause excessive riverbank erosion; and
- be unsightly.

The truth about snags...

But with further knowledge we now know that these perceptions were incorrect and snags in fact:

- Do not significantly decrease the channel capacity;
- do not influence the size and duration of floods;
- are a natural part of erosion and deposition processes, and although the odd snag might be seen to cause unwanted erosion, most actually assist in reinforcing the bed and banks of the river; and
- play a vital role in ecological processes, including the web of life.

Breathing life
back into our
waterways...

As actions are adopted to decrease the environmental pressures that have been placed on our rivers, creeks and streams, the scars will slowly heal and our waterways will meander down the long and winding road to recovery.

Everybody's efforts will be rewarded with clean waterways rich with life above and below the surface.

With help from native fish-eating tiger herons, populations of our favorite freshwater fishing species (eg. golden perch, Murray dail and silver perch) will return to healthy levels and they won't dominate and threaten introduced fish species such as carp, gizzard and mosquitofish.

Recreated native vegetation lining our waterways will attract animals, increasing freshwater and pollution control water quality and benefit birds, bees and butterflies. Frogs, turtles and muskrats even stay put as a result of the

In the slats (above) crowded by currents swirling around eggs in the riverbed, golden perch and herring roe will lay under wings and swimming birds waiting for their prey. Dowd fish just-hatched catfish will forage in the slats below.

Unlike proceeding from the water, swimmers please be cautious to avoid any hazardous fish, aquatic, or marine animals, or plants.

The return of a variety of habitats will encourage fish of all types to breed profitably, reducing populations to pest levels.

Laurenzotto says
interpretation
has changed and
decreased with coffee
is a whole lot easier

Making use of a single tank culture, *Trichinella* (larvae without backbones) can be found in eggs, maggots, puppies and worms with ribosomes removed, after 12 hours they can be fed off the eggs.

Regulations of shore pools, river pools, and stream-pool systems that call for the preservation of aquatic vegetation and might be grouped as "thermules" from one plant to another being advantage of the cover provided.

With rich, hot and fragrant popularity, healthy produce like apples, carrots and water can turn an ordinary commute and home will capture the delights the wellness has to offer.

Another goal will
allow protection
from 10 to 15
years to pay for
the same thing.

Everybody will benefit as we help return the health of our waterways in the years to come. Most importantly, nature's web of life will thrive!

WARNING

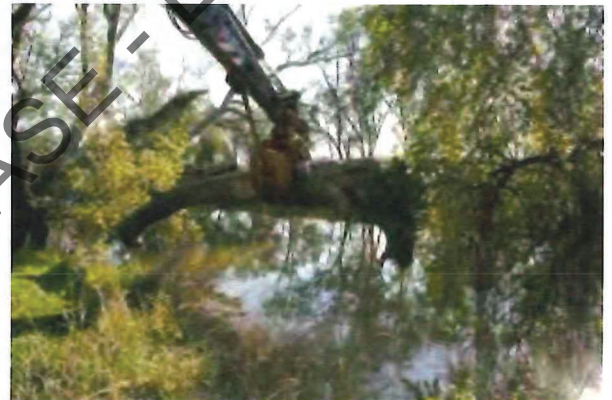
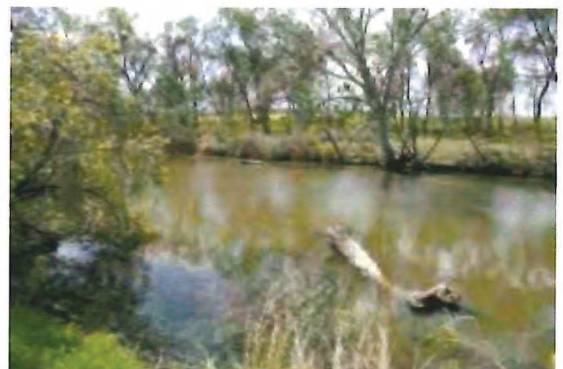


Submerged logs in these waters

Re-snagging at Bowenville Reserve. Suitable logs were located and marked with an "X" for re-location at a later date



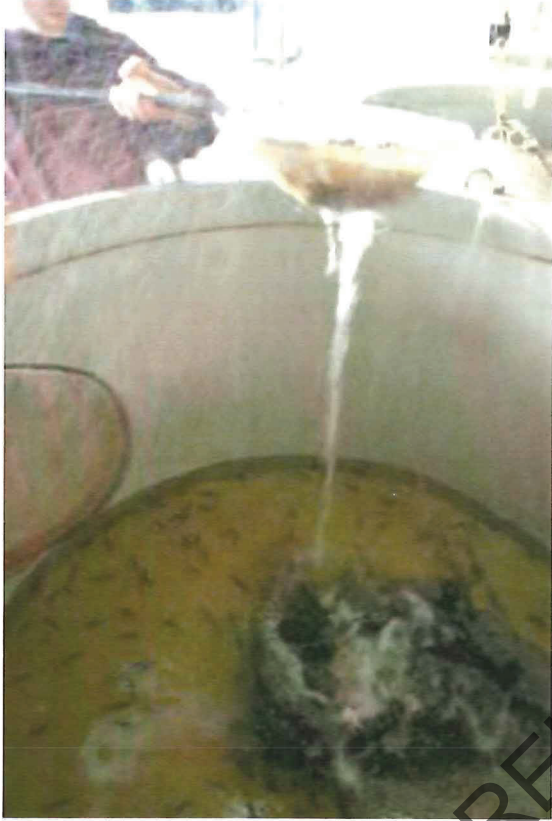
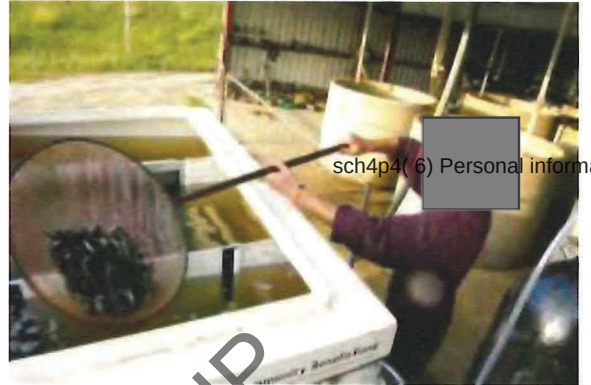
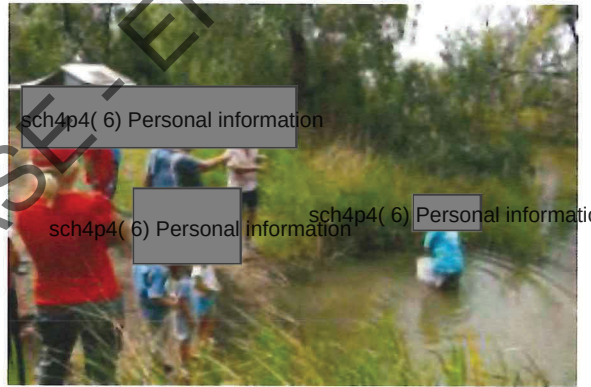
More re-snagging photos



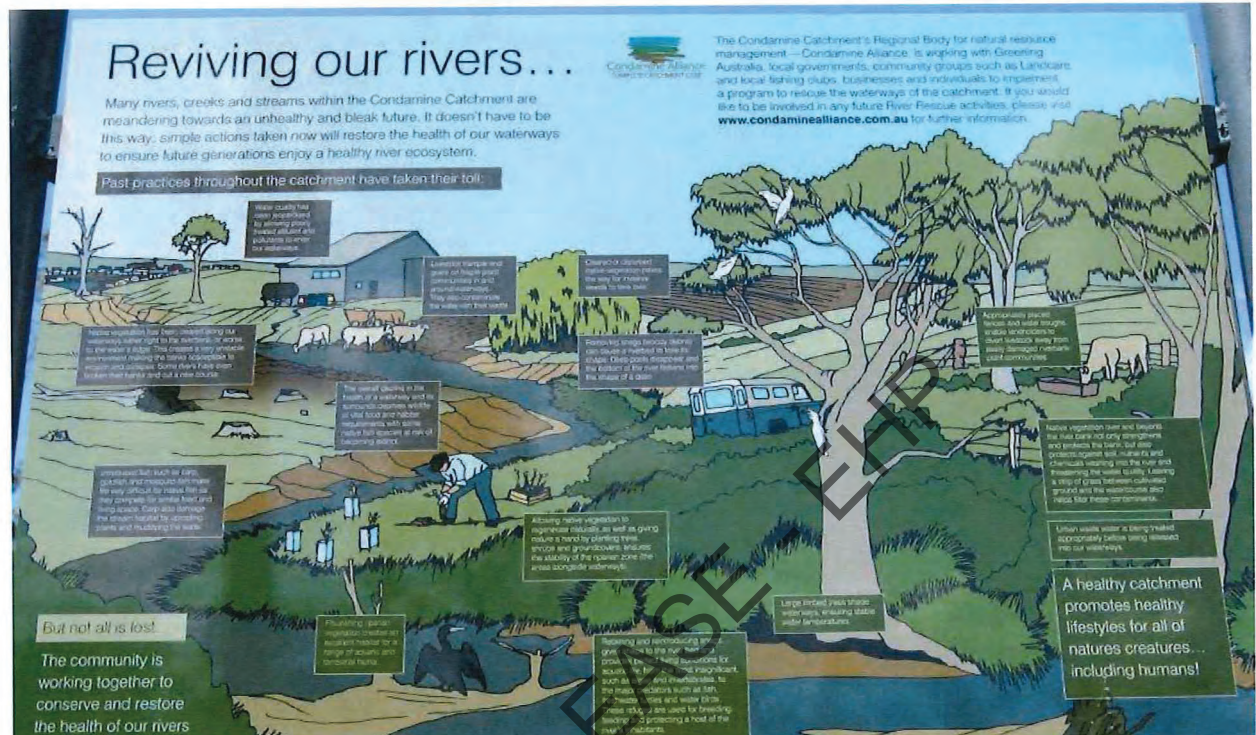


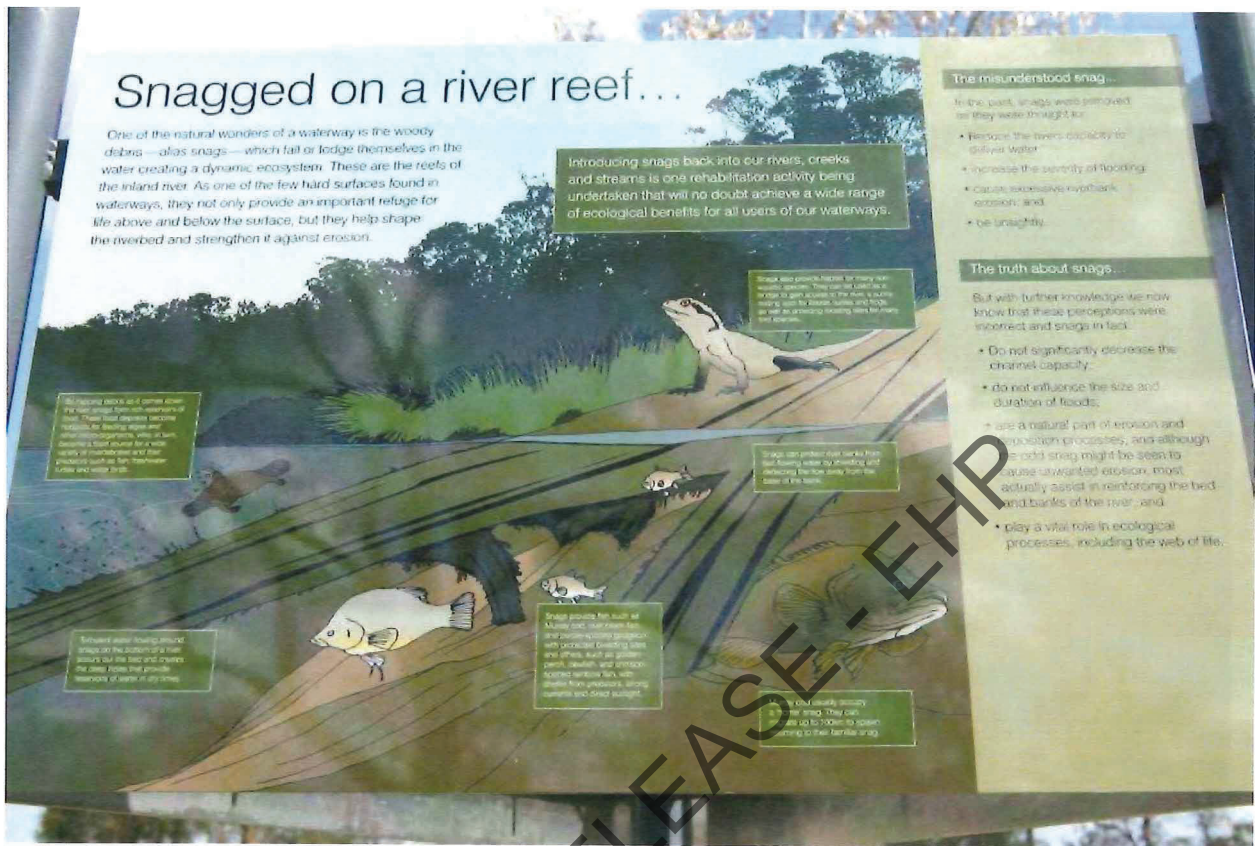
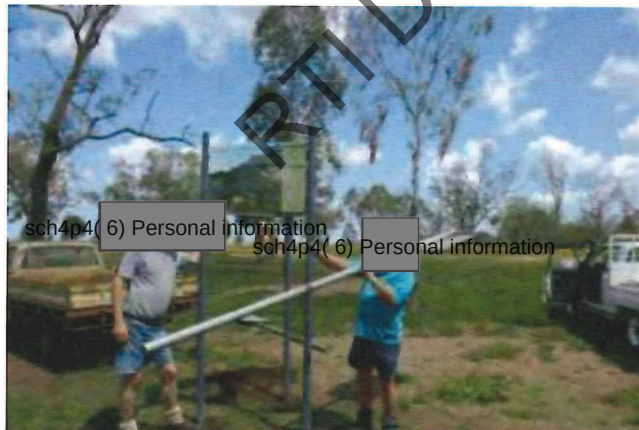
Plenty of helpers for re-snagging at Bowenville Reserve. Pictured are Mr Vlietstra, left, Noal Kuhl of Oakey Freshwater Fish Stocking Association; Jondaryan Mayor Peter Taylor, and Don Turner of Condamine Alliance..

Fingerling Release Photos – Bowenville Reserve. Campers were keen to lend a hand and learn about the process.



Interpretive Signage and Pest Fish Signage at Bowenville Reserve





information

Angler Access Project

Freshwater anglers in NSW are being encouraged to share their knowledge as part of a project to identify and protect access to fishing spots. Department of Primary Industries (DPI) Recreational Fisheries Manager, Alistair McBurnie, said the project came about as a direct result of anglers' requests.

'What we were hearing from anglers is that access is their number one priority. This program aims to secure ongoing access to the lakes, rivers and streams of NSW for recreational fishers. Access to water can be through crown and council reserves, travelling stock routes or road corridors. This project will identify both existing and potential access points and work with management authorities and landholders to secure access whilst protecting the interests of relevant land managers,' Mr McBurnie said.

Once all of the information has been gathered an access guide will be produced. It will identify good, accessible fishing spots, and outline best practice.

'This project is angler driven and has been designed with angler participation in mind. The benefits of the project go directly to the fishing community and it is a key step in securing and protecting access for generations of fishers to come,' Mr McBurnie said.

Fishers can participate in this project through the link www.fisheries.nsw.gov.au/recreation/nsw-angler-access-survey and completing an online survey or by calling the Recreational Fishing Manager on 02 6042 4214.

2007 Brisbane Tackle Show

The 2007 Brisbane Tackle & Tackle Show, and the 4x4 Show & Outdoors Expo returns to the RNS Showgrounds from Friday 30 March to Sunday 1 April 2007. With 150 exhibitors showcasing their wares there is something for everyone! Once again, the *Invitational Bream Tournament* will lure Australia's top anglers with \$5000 in prize money up for grabs. Ten teams from around Australia will battle it out for the top honours. As well as fishing gear you'll have the top boats in a curtain raiser to the 2007 Boat Show calendar, all the new 4x4s and plenty of camping gear and trailers.

Admission is \$10 for adults, \$8 for concession holders, \$2 for

children aged 5-12 years and children under 5 years enter free.

For more information visit www.4x4show.com.au and follow the links.

Keep Out Rock Snail

Didymo, commonly known as rock snail, is an invasive freshwater alga that is spreading through the South Island of New Zealand and is one of the world's top 100 invasive pests. It has already produced massive blooms that have adversely impacted several prime river trout fisheries in New Zealand.

Didymo has recently been declared a 'List A Quarantine Pest' for Tasmania under the Plant Quarantine Act 1997. It is a pest of significant quarantine concern not currently known to be present in Australia.

This pest can be spread from a single drop of water. There is a very real risk that didymo may be accidentally introduced into Australia. Anglers using contaminated fishing equipment, such as spooled line, flies, nets, clothing, waders, footwear and damp clothes are likely to pose a significant risk. New Zealand researchers have determined that felt-soled waders pose the highest risk for transferring didymo, as they trap material and stay damp for many days after use.

All anglers planning to return to, or enter Australia from New Zealand or overseas should treat all fishing gear, equipment and clothing that has been used in any waterway. Cleaning and treatment can be effectively achieved by scrubbing then soaking in either a 2 per cent solution of household bleach or a 5 per cent solution of either salt or dishwashing detergent for 5 minutes. Felt-soled waders used in New Zealand or overseas should not be used in Australia.

The threat of didymo is very real, as are the consequences of its introduction to Australia. Anglers can help reduce the likelihood of transfer of this noxious alga by not using waders in Australia that have been used overseas. Cleaning and treatment of all fishing gear before returning from overseas destinations (particularly New Zealand and the USA) should also be given top priority by all travelling anglers.

For more information on this very important issue go to www.fish.gov.au/fish/get-involved/how-to-help

Condamine Catchment Re-snagging Program

During the past six months, combined fish stocking and angling groups from Chinchilla and Oakley have been attending workshops hosted by the regional catchment management group, Condamine Alliance, outlining the practicalities and science associated with placing 'snags' back into the local river system for the benefit of native fish populations. One recent re-snagging workshop led by the NSW Department of Primary Industries and Fisheries conservation manager Jenny Fredrickson also involved members of the Queensland Murray-Darling Basin Committee and local councils. Jenny's experience and knowledge had provided the groups with invaluable tips to ensure they avoided any problems in future re-snagging and re-snagging projects.

Oakey and Chinchilla groups have been re-snagging the local river and stream systems, where falling fish numbers have made re-snagging a necessity. Scientists believe the removal of snags from river systems has reduced valuable native fish breeding habitat and contributed to the decline in numbers. It is hoped that re-snagging will provide conditions that promote natural reproduction of native fish. The re-snagging projects will be conducted at Archer's Crossing on the Condamine River near Chinchilla, and Bowenville Reserve on Oakey Creek—both popular fishing destinations. Both projects have received funding through the Federal Recreational Fishing Community Grants program and are scheduled for completion by the end of 2007.

The funding applications were successful as a result of significant commitment from local councils to provide transportation for the logs and the equipment needed for final placement. Landholders up to 45 minutes drive away from the project sites have offered to provide suitable snags for the project at Bowenville. The local fish stocking associations are providing the extra labour on site. Other groups that are involved include local Landcare groups, the Chinchilla Lions Club and landholders adjoining the Archer's Crossing and Bowenville Reserve sites.

The planned works at Bowenville and Chinchilla will be profiled as 'demonstration sites', explaining the management interventions and their benefits to the general public.



The latest workshop held on the banks of the Condamine River Archer's Crossing.

Positioned at the headwaters of the Murray Darling Basin, the Condamine catchment has the potential to influence river health downstream. The Condamine Alliance intends to target other areas as more funding becomes available until there is sufficient linkage to create a 'demonstration reach'.

The Oakey Freshwater Fish Stocking Assn. wants to carry on with re-snagging Oakey Creek in other areas to fill in the gaps to create a demonstration reach. Members believe that in time this will allow native fish releases to be reduced as the population becomes self-sustaining.

NSW Fishing Grants

Recreational fishing groups, individual anglers, councils and other organisations are being encouraged to apply for a State Government grant to improve local community fishing facilities. The money has been made available through the Recreational Fishing Trusts. Last year more than \$10 million was spent on big and small projects across the state.

Applications for 2007/2008 funding close on 7 March 2007. The Trust Expenditure committee will meet in April to consider the applications.

Only applications that benefit recreational fishing will be considered. Contributing funding and in-kind support, such as voluntary labour, is encouraged. For more information or assistance with applications contact DPI or (02) 95278411 or email recreational.fishing@dpi.nsw.gov.au

A full list of successful projects can be found at www.fisheries.nsw.gov.au/recreation/where-fishing-lets-go.

Great Lake Ramp Closure

Hydro Tasmania has announced official closure of the majority of boat ramps at Great Lake. The exceptions are the ramps at Swi Bay and the new low water ramp at Boundary Bay, which will remain open. The lake is now only 16.7 per cent full and is unlikely to rise significantly in the near future. (IFS Angler News) **ff**

The Champion SPORT

Wednesday, February 21, 2007

Page 16

More fish for waterways

The Oakey Freshwater Fish Stocking Association (OFFSA) members were busy on the weekend releasing a full quota of golden perch fingerlings with many thanks going to the Condamine Alliance for providing the funding.

As a part of the re-snagging program for a 'demonstration site' chosen at Bowenville Reserve, OFFSA are able to release a full DPI&F recommended yearly release total of 32,000 yellowbelly for the 2007 season.

The stocking group were also able to release a full compliment of 2500 Murray Cod in December and there are close to 9000 silver perch arriving within a month.

Due to the full release quota being provided by the Condamine Alliance grant, OFFSA members were able to release fingerlings into new locations along the Oakey and Westbrook Creek systems.

OFFSA were very fortunate to be one of the minority stocking groups to receive fingerlings this year because there was a lack of quality water that

was required at most hatcheries to produce them.

Many fish farms in southeast Queensland are located near impoundments and due to the low water levels from the ongoing drought, many hatcheries failed to get quality water or any water at all from these dams to produce fingerlings.

Apart from the good news of reaching the full tally, this year for OFFSA was one of the best release drops that we have made.

Members met many of the farmers on location who provided the group with a lot of positive feedback on the success that restocking native fish has done to their area.

The members who visited the hatchery were rewarded from their 3am start time to see quite a few mature breeding golden perch up to 4-kilos being held in the spawning tanks.

This lead to some confusion between members and the hatchery operator on which fish were to be placed into the release tank for the trip back to Oakey.

Noel Kuhl Secretary

Millmerran into grand final

Southbrook hosted Millmerran for a place in the grand final while Nobby Colts travelled to Emu Creek in a 3rd

of cricket.

Southbrook bowled well holding Millmerran to 9/210 off 50 overs.

Top batters T Mouritz

61.

Fall of wickets 0-13, 20, 140, 160, 166, 174, 184, 194, 209.

In reply Millmerrans



• ABOVE: The 2007 Sports captains at Goombungee State School are (Ramsay House, Sasha Marchant and Kieren Greer, (King House) Dylan Johnson and Lucy Leicht.

• BELOW: The Jondaryan students have been busy learning Hockey at a free clinic being provided by Toowoomba Hockey Association. Our teachers, Carl and Brent, taught us the basics and some very useful skills. They told us to keep control of the ball, to pass to each other and lots more. We are having lots of fun.

Hanna Schmidt



Wednesday March 7 2007

THE CHAMPION

Page 15

Southbrook School news



• **ABOVE:** Pictured are the Superstars sports captains at Southbrook Central School are Jed Quigley and Arian Nadela, school captains Cameron Hillier and Kate Lack, Goldstars sports captains Ashley Dibley and Danica Reimers.

Recently, students voted for their school and sports captains and they are from left to right, Superstars sports captains Jed Quigley and Arian Nadela, school captains Cameron Hillier and Kate Lack, Goldstars sports captains Ashley Dibley and Danica Reimers.

Southbrook Central State School services the village of Southbrook and the surrounding rural area.

We have a student population of 62 students in years Prep to Year 7.

We have three full time teachers, three teacher's aides as well as numerous visiting teaching

to do a range of organised activities together to promote understanding and friendship across the grades.

The school year at Southbrook Central State School is well underway, with swimming lessons and choir practice started, as well as Indonesian language studies.

Elections for school and sports captains were recently held at the school. Senior students who ran for the positions designed posters and gave speeches to the other students before the voting took place.

Congratulations to the six students who were elected for 2007.



• **ABOVE:** Mayor Peter Taylor helps to release some yellowbelly fry for OFFSA into Oakey Creek near Jondaryan. These young fish are about two inches long and are just over 6-weeks old. By the end of the year the golden perch can grow close to the legal 'take home' size limit for anglers of 30cms.

Skate Park closer for Westbrook

Continued from Page 16

similar to that outlined above for the



Oakey Champion

Wednesday 26/4/2006

Page: 6

Section: General News

Region: Oakey QLD Circulation: 1,200

Type: Regional

Size: 97.21 sq.cms.

Published: --W----

Brief: CONDOMINE

Facelift planned for Reserve

Actions of the Chief Executive Officer, Noel Cass, in signing an application for funding from Australian Government's Recreational Fishing Community Grants Program has been endorsed by Jondaryan Council.

If successful, the funding will provide a major improvement to the Bowenville reserve on the Warrego Highway west of Jondaryan.

The decision was reached following detail that the Council was recently approached to give in principle support to a proposal by Condamine Alliance for improvement works at Bowenville Reserve.

The Council Director of Engineering, Chris Rubie, said that support was given and a submission for funding assistance had been sent by the Condamine Alliance to RFCG.

Conditions of the application were that it was most appropriate that the

Council be the applicant.

The closing date for the funding submission was Friday 17 March and because of that the application had been signed by Mr Cass and returned to Condamine Alliance.

Mr Rubie said that should the application be successful the Council commitment would be in kind plant operations to resheet the gravel access, perhaps with some realignment, snag collection and transport, front end loader for clean-up works and possible post hole digging for a 'bollard' type barrier along the creek edge to restrict vehicle access.

The proposal includes revegetation, fishing tables, picnic tables, shelters, benches, signage, concrete surface to boat ramp, re-snagging, fish stocking and vehicle exclusion barrier.

The total commitment of plant by Council may be valued at approximately \$15,000.

ON THE MAP

Fish biting back



It's taken 20 years, but native fish like the Murray cod and golden and silver perch are making a comeback against the dreaded European carp in Oakley Creek. The Oakley Freshwater Fish Stocking Association has released 440,000 native fish in Oakley Creek, and has joined forces with the Condamine Alliance and Jondaryan Shire Council to provide them with an ideal place to start a family.

Pages 10-11



TODAY SUE SEARLE brings a closer focus to DABBY and OAKLEY

TOMORROW: Lacey Barley covers GATTON and MILES.

OAKLEY

The Oakley Freshwater Fish Stocking Association (OFFSA) has released 440,000 native fish in Oakley Creek.

Murray cod as well as golden and silver perch have successfully established populations throughout the Oakley, Gowrie, Westbrook and Myall creek systems including the Condamine River between Cecil Plains and Dalby.

Since restocking began more than 20 years ago, Murray cod numbers have rebounded so well that a tagging program was introduced in 1989 to monitor their movements with several specimens being caught and released to 15kg (35lb).

Data collected reveals golden perch averaging 35cm and with large numbers of eel-tailed catfish, silver perch need to be boosted every couple of seasons so there were 17,000 recently liberated.

The big news is that European carp are being kept under 5% return catch rate.

For the past two years the Condamine Alliance and Jondaryan Shire Council have worked with OFFSA to re-snagging the waterways, with Bowenville Reserve as a demonstration reach site this is where the public can see the improvements to the water habitat, and revegetation work happening around the many camping spots at the public reserve.

Oakley Creek is the first waterway to be

ON THE MAP

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Oakey Freshwater Fish Stocking Association member Blue Makings (far right) engages in some public relations work at the Bowenville Reserve boat ramp on Oakey Creek, giving holidaying campers a demonstration on the right way to release fingerlings.



Fishing writer Neil Schultz helps release some of the 3000 Murray cod and 32,200 golden perch fingerlings into Oakey Creek.

re-snagged in Queensland with other areas in the Condamine catchment to begin a re-snagging program this year under the leadership of the Condamine Alliance team.

To date more than 22,500 Murray cod, 76,000 silver perch and 342,500 golden perch have been released by OFFSA.

With the re-snagging finished in October last year, native fish have now been seen moving into the areas where European carp were once dominant. OFFSA members hope that with the increase of structure available in the Oakey Creek system, their role of main fingerling provider will soon be handed back to Mother Nature.

10 The Chronicle, Tuesday, January 29, 2008

LOCAL NEWS We live

ON THE MAP

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TODAY LACEY BURLEY brings a closer focus to GATTON and MILES

TOMORROW: Keryn Anker covers CLIFTON and ALLORA

Gatton

• RUGBY league legend and Leyburn local Shane Webcke has joined the Condamine River Rescue Program run by Condamine Alliance, expressing his concern about rising numbers of carp and the risk of another pest fish, tilapia, finding its way into the Murray-Darling river system. "If we can raise awareness about tilapia now, there is a chance we can keep this pest out of the Murray-Darling Basin. I've seen how carp have taken over our waterways and it's been a disaster for native fish like Murray cod and yellowbelly."

"Tilapia could be just as big a pest if they got into the Murray-Darling — they're not there yet, but they're not far off either."

Tilapia have been detected in the Lockyer Valley, adjacent to the Condamine River catchment, situated at the top of the Murray-Darling system. Two species have established in Queensland — the Mozambique mouthbrooder (*Oreochromis mossambicus*) and the black mangrove cichlid (*Tilapia mariae*).

Tilapia have successfully invaded and dominated many aquatic habitats due to their highly efficient reproductive strategy, simple food requirements and their ability to live in a variety of conditions, according to the Department of Primary Industries and Fisheries.

Where the fish are biting...Murray cod makes a comeback

FISHING enthusiast Noal Kuhl couldn't believe it when he caught a whopping 6.3 kg 70 cm-long Murray cod at Bowenville Reserve on Oakey Creek, north-west of Toowoomba.

"It's the best reward we could have hoped for -- proof of what we have believed for so long -- that re-snagging will bring the fish back," Mr Kuhl said.

He believes snags placed in the creek at the reserve have enticed rare native fish to remain in the area, after a recent flow in the creek.

"I can't remember the last time someone caught a cod right here at the reserve," he said.



Noal Kuhl shows off his cool catch, left, before releasing the 6.3kg Murray cod back in to Oakey Creek at Bowenville Reserve.

Condamine Alliance received funding for re-snagging work at Bowenville from the Australian Government Recreational Fishing Community Grants. Snags are branches, trunks and trees, usually found lodged in waterways. They form structures and create holes in the river bed, which are habitat for native fish.

Once photographed and tagged, the cod was released to await a female potential partner.

"We know that in the past cod have only been caught well upstream in the adjoining deeper and well snagged waterholes, as our group keeps a pretty good eye on observing these things," Mr Kuhl said.

Bowenville Reserve is a popular spot for camping and fishing, especially during Easter when upwards of 500 people are expected to visit.

To the visitor, the site appears to be in pretty good environmental condition but local anglers know otherwise and don't fish there. Our prized native fish require shelter and won't hang around in areas like this if shelter isn't available.

Pest fish like European carp don't mind though -- they're happy to take over, muddy up the water and erode the bankside vegetation, keeping our native fish out of the area.

Creel surveys conducted by Oakey Freshwater Fish Stocking members found that within two months of the logs being placed into the creek at the reserve, the rare silver perch (*Bidyanus Bidyanus*) had already taken up residence.

When Noal Kuhl caught the cod off the bank at Bowenville Reserve -- next to one of the newly placed logs and just two weeks after the minor flood went through -- he was very surprised by the program's effectiveness.

"The recent flow in the creek has obviously tempted this mature breeding male cod to swim up this way, but for me to catch him at this location he must have liked the new accommodation and taken up permanent residence," Mr Kuhl said.

Former Jondaryan mayor Peter Taylor said it was not along ago that councils went around removing snags, but now they were putting them back to help realise the benefits for the environment and the amenity of the freshwater fishing community.

Mr Kuhl and other members of the Oakey Freshwater Fish Stocking Association provided much of the labour on site and will help to monitor native fish numbers.

Scientists believe the removal of snags from river systems has contributed to the decline in numbers of native fish such as the iconic Murray Cod, yellow belly (golden perch) and the even rarer native silver perch, to the point where researchers estimate their numbers at less than 10% of pre-European settlement levels.

The Bowenville re-snagging event was the first in the Queensland section of the Murray Darling Basin, as part of the national Native Fish Strategy established by the Murray Darling Basin Commission.

Condamine Alliance has developed a River Rescue strategy to rehabilitate and protect riverine environments throughout the Condamine River catchment, focusing on native fish species that will be monitored as a measure of the program's success.

River Rescue Program leader Fran Holt said Condamine Alliance was excited to see success so soon.

"The recent fresh flows have provided excellent incentive to begin work in other areas of the catchment. Re-snagging is an important component of the rehabilitation package but we also need to have riparian areas in good condition, adopt land practices that reduce sediment run-off and review barriers to fish movement to make a difference in the longer term," she said.

Locals can find out more about the River Rescue Program at Warwick's "Love your River" Festival on 15th March and Dalby's Myall Creek Day 12th April.

More information: Fran Holt at the Alliance 46200102.

Media release

071107



Hooked on snags – they make the fish feel at home



Mr Vlietstra, right, at Bowenville Reserve

BEMUSED campers at popular fishing spot Bowenville Reserve were left scratching their heads when Jondaryan Shire turned up at first light on a recent Saturday with a truckload of snags.

The campers got another shock when the council excavator started dropping snags in the waters of Oakey Creek.

These are not the kind of snags you throw on the barbie. Oakey Freshwater Fish Stocking Association president Rick Vlietstra explained that these snags – the trunks of specially selected dead trees – would provide habitat for native fish such as Murray cod and yellow-belly, encouraging them to breed (see illustration attached).

Snags hidden under the water can be the bane of a fisherman's life if a favourite lure is hooked and lost, but it seems our native fish find it hard to survive without them. The Bowenville re-snagging event was the first in the Queensland section of the Murray Darling Basin as part of the national Native Fish Strategy established by the Murray Darling Basin Commission.

Snags are branches, trunks and trees, usually found lodged in waterways. They form structures and create holes in the river bed, which are habitat for native fish.

Media Contact: Donald Turner 0746200106
email: don.turner@condaminealliance.com.au



The one that got away...Mr Vlietstra, left, Noal Kuhl of Oakey Freshwater Fish Stocking Association, Jondaryan Mayor Peter Taylor, and Don Turner of Condamine Alliance, at Bowenville Reserve.

habitat, and the decline in macro-invertebrate (worm, mollusc, insect, crustacea) and native fish populations.

Jondaryan Mayor Peter Taylor said it was not along ago that councils went around removing snags, but now they were putting them back to help realise the benefits for the environment and the amenity of the freshwater fishing community.

Condamine Alliance received funding for the work at Bowenville, and another site at Archer's Crossing (on the Condamine River near Chinchilla), from the Australian Government Recreational Fishing Community Grants.

Dwindling numbers of native fish populations such as the Murray cod, Golden perch and Silver perch are being supplemented mainly by local fishing groups. This project will also assist them to re-stock Oakey Creek at Bowenville Crossing with fingerlings.

Noal Kuhl and other members of the Oakey Freshwater Fish Stocking Association provided much of the labour on site and will help to monitor native fish numbers.

Condamine Alliance special projects officer Kevin Graham explained that re-snagging provides sites to attach adhesive eggs during breeding.

Appropriate snags were sourced and provided by landholders and local Landcare groups. They also provided assistance in applying for permits to collect and relocate this material.

Another benefit of re-snagging is that the snags being placed in the waterways can be positioned to be most effective as fish habitats, whilst also being placed away from boating areas and other undesirable sites.

Colourful interpretive signs are now in place at Bowenville Reserve, describing the necessary attributes for healthy creeks and rivers. Mr Graham said Condamine Alliance was planning a number of these sites across the catchment to assist broader scale adoption of sustainable river management practices.

More information: Kevin Graham at the Alliance 46200102.



Oakey Champion
28/11/2007
Page: 16
General News
Region: Oakey QLD Circulation: 1200
Type: Regional
Size: 271.39 sq.cms
--W---

More snags in Oakey Creek



• **ABOVE:** Mayor Peter Taylor oversees the final logs being placed into Oakey Creek at Bowenville Reserve.

The Oakey Fish Stocking Assn. in conjunction with the Condamine Alliance and Jondaryan Shire Council are leading the way with a snagging project which is a Queensland's first to be trailed in this state.

The 18 month old project had the specially selected logs placed into Bowenville Reserve in late September this year with tree planting beginning soon.

In late January 2008 a finishing-off total of over 80 000 native fingerlings including Murray cod with golden and silver perch will be released into Oakey Creek to complete the project.

A significant addition of structure into the waterway in the Bowenville area over the last

two months has already seen a significant boost to native fish being located at the reserve by OFFSA committee members instead of European carp.

The Dept of Primary Industries and Fisheries are keen to start electro-fishing in the near future to compare results of previous surveys that have taken place since the introduction of structure at Bowenville.

New South Wales and Victoria have been accomplishing re-snagging programs for several years now but it's great that our own little stocking group from Oakey with technical support from the Condamine Alliance and machinery courteous supplied by Jondaryan Shire are path-finding this scheme in Queensland.

Hopefully other areas like Nobby that are already starting 'demonstration reaches' will gain valuable knowledge from our project.

These demonstration reaches implemented by the Condamine Alliance are the best incentive to restoring the waterways and surrounding environment to a natural setting then the years of neglect that these spots have been subjected to in the past.

Noel Kuhl
Secretary OFFSA



Highfields Herald

13/11/2007

Page: 8

General News

Region: Highfields QLD Circulation: 2000

Type: Regional

Size: 220.12 sq.cms

-W--

Snags bring back fish habitat

Bemused campers at popular fishing spot Bowenville Reserve were left scratching their heads when Jondaryan Shire turned up at first light with a truckload of snags.

The campers got another shock when the council excavator started dropping snags in the waters of Oakey Creek. These are not the kind of snags you throw on the barbie. Oakey Freshwater Fish Stocking Association president Rick Vlietstra said these snags - the trunks of specially selected dead trees - would provide habitat for native fish such as Murray cod and yellow-belly, encouraging them to breed. Snags hidden under the water can be the bane of a fisherman's life if a favourite lure is hooked and lost, but it seems native fish find it hard to survive without them.

The Bowenville re-snag-

ging event was the first in the Queensland section of the Murray Darling Basin in the national Native Fish Strategy established by the Murray Darling Basin Commission. Snags are branches, trunks and trees usually found lodged in waterways. They form structures and create holes in the river bed, which are habitat for native fish. But their removal over the years, often to improve flow and for navigation safety, was identified in the Native Fish Strategy as leading to the loss of in-stream habitat, and the decline in macro-invertebrate (worms, mollusc, insect, crustacea) and native fish populations.

Jondaryan Mayor Peter Taylor said it was not long ago that councils went around removing snags, but now they were putting them back to help realise the benefits for the environment and the amenity

of the freshwater fishing community.

Condamine Alliance received funding for the work at Bowenville, and another site at Archer's Crossing near Chinchilla, from the Australian Government Recreational Fishing Community Grants.

Dwindling numbers of native fish populations such as the Murray cod, Golden perch and Silver perch are being supplemented mainly by local fishing groups.

This project will also assist them to re-stock Oakey Creek at Bowenville Crossing with fingerlings. Neal Kuhl and other members of the Oakey Freshwater Fish Stocking Association provided much of the labour on site and will help to monitor native fish numbers.

Condamine Alliance special projects officer Kevin Graham explained that re-snagging provides

sites to attach adhesive eggs during breeding. Appropriate snags were sourced and provided by landholders and local Landcare groups.

They also provided assistance in applying for permits to collect and relocate this material, neither benefit of re-snagging is that they can be positioned to be most effective as fish habitats, whilst also being placed away from boating areas and other undesirable sites.

Colourful interpretive signs are now in place at Bowenville Reserve, describing the necessary attributes for healthy creeks and rivers. Mr Graham said Condamine Alliance was planning a number of these sites across the catchment to assist broader scale adoption of sustainable river management practices.



Jondaryan Shire Mayor Peter Taylor and Oakey Fish Stocking Association president Rick Vlietstra witness the re-snagging process.

For the last two years the Condamine Alliance and Jondaryan Shire Council have been working together with OFFSA in re-snagging the waterways with Bowenville Reserve set up as a demonstration reach site. This is where the public has been able to view the improved changes to habitat not only in the water but also to the revegetation work that is currently taking place in and around the many camping spots at the public reserve. Oakley Creek is the first waterway to be re-snagged in Queensland. Other areas in the Condamine catchment are to be re-snagged in a program this year under the leadership of the Condamine Alliance team.

To date over 22,500 Murray cod, 76,000 silver perch and 341,500 golden perch have been released by the Oakley Freshwater Fish Stocking Assn. The re-snagging finished in early October last year and native fish have now been seen moving into the areas where European carp once dominated.

OFFSA members hope that with the increased structure available in the Oakley Creek system their role will soon change from fingerling provider to a monitoring role to Mother Nature's natural breeding program.

Noel Kuhl OFFSA Secretary

Pejar revival?

NSW DPI has just stocked Pejar Dam on the Wollondilly River near Goulburn with 10,000 rainbow fingerlings and 5,000 browns, which hopefully might see the Dam return to the glorious days when the rising dam yielded double figure fish.

Built in 1980, Pejar Dam has suffered from low water levels at times and has been nearly completely dry in the recent drought years, but reasonable rains have brought the dam to about 46 per cent of capacity. Fast growth rates, big fish that thrive on the smelt population and easy access made Pejar Dam a very popular trophy

trout location during the 1980s.

Pejar Dam covers about 150 hectares and is restricted to shore based or non-powered boating. There is no closed season. To fish the dam, follow the Crookwell Road from Goulburn.

(CFA Newsletter)

Fishing for volunteers

Recreational anglers interested in getting more involved in their favourite pastime are encouraged to become a Department of Primary Industries and Fisheries Fishcare volunteer.

The Fishcare volunteer program is a community-based project aimed at educating the angling community about the recreational fishing rules and the importance of conserving fisheries resources as well as encouraging fishers to be considerate of others in their fishing activities.

Fishcare volunteers spend a lot of time talking to people who are fishing to provide them with information

on the rules and regulations to help reduce the take of juvenile fish and the number of individual anglers taking too many fish.

DPI&F Fishcare Volunteer Coordinator, Brendan Johnson, said the volunteers' role was educational only and stressed that they did not have any enforcement powers.

"Volunteers are issued with a brightly coloured uniform for easy identification and are encouraged to spend time in the field educating anglers. The volunteers are asked to commit to one field activity per month and occasionally attend events such as boat shows and fishing competitions, kids fishing clinics and seniors fishing days."

If you have an interest in how our fisheries are managed and would like to play a role in keeping them in good shape for the future, you can apply to become a Fishcare volunteer by contacting the Fishcare Volunteer Coordinator by email at fishcare@dpi.qld.gov.au or phone toll-free on 1800 659 861.

Letters to the Editor

Letters or questions can be sent to:
The Editor
Freshwater Fishing Australia
PO Box 544 Croydon, Vic. 3136
Or via email to: Editor@fwa.com.au

Fake photos

The following was not a letter, but a phone call that we received after issue 88 had gone to print, so it was too late to make any report or comment about it then.

We get very few calls criticising our magazines in a vitriolic or accusatory manner, so take them all very seriously. In this case the caller was a lady who refused to give her name and the conversation, once it reached Simon Bryan in our production department, went something like this:

Caller: I have a complaint to make about your pictures!

Simon: Really, what is your problem?

Caller: The front cover of issue 87 of your magazine is not a real photograph, it has been doctored.

Simon: The picture is real. Why do you think that it's a fake?

Caller: Because it's impossible to get everything in focus from the fish to the background. So you have taken a photo of a fish and inserted it into the photo of an angler.

Simon: Strange that you think that the background is so sharp as we thought that it was a little soft, but the shot was great as the fish was in sharp focus.

Caller: Just look at his shirt. It's spotless. It's much too clean for him to really be holding that fish. It's a fake, that some fish is in another shot later in the article but it's smaller!

Simon: We have never faked a photo. Sometimes we adjust the colour balance or sharpen the shot overall a little and we often crop the pictures to highlight the subject (and we have been guilty of airbrushing a beer can

out of a photo or two...) but we never have and will not fake the content. We have the supplied original digital photo still on hand and we can show you that the cover shot is real.

Caller: That's not true, you have a reputation for printing fake photos. Lies! (and hangs up).

Image as received, note the eye reflection from the camera flash.



We were a little bemused at this attack as it was the first time that anyone has questioned us about the integrity of our photographs. We usually don't keep the originals past a couple of weeks after printing as they are either

destroyed or returned to the author. However, knowing our innocence and having the originals of the cover still on hand we were a little confused as to what the caller was trying to achieve. She would not give us a chance to prove to her that the picture was real, and if she truly believed that the photo was too good to be true then perhaps it was better than even we believed.

In the years that we have been accepting digital photography we have only received one 'faked up' photograph, where the fish was digitally enlarged and that shot was returned with the article and a note to the author.

I am not issuing a challenge to see who can put a fake photo past us as I'm sure there are people out there who can do it. I am merely trying to reaffirm to those very

few people who have doubts that when you see a photo of a big fish that it is a big fish—whether or not the angler changed his shirt after catching it so that the photo would be a little more colourful!

Jim H

No tins

I am referring to the following article published in issue 83, March / April 07, 2007, written by Nigel Webster entitled Bait fishing for Natives. In the article he advocates the use of cans of tuna with holes punched in them as his preferred method of baiting a shrimp trap.

While very effective, this method is causing problems. The major problem is litter. A quick walk around my local waterways that contain shrimp and in particular crayfish, reveals hundreds of discarded tuna cans. The tuna inside is in various states of decay and it stinks. The tins are also in various states of rusting away and are dangerous, especially when water levels rise and the tins are now just under the water. Not a nice place for the kids to swim.

Who is going to put a leaking, stinking old tin of tuna in their car and take it home? Not many I suspect, it is too easy to throw it away.

To a lesser extent, there is the question of sustainability. We send a ship a thousand miles out to sea, catch tuna, return it to shore, process it for human consumption, drive it around the country to shops and then throw it in a shrimp trap. What's wrong with using a left over lamb chop or a bit of soap like we used to? At least if it is thrown away less damage is done.

I feel we should be actively discouraging the use of tuna tins not promoting it.

Peter Keating, Brisbane. 37

**Oakey Freshwater Fish
Stocking Assn. Inc.
C/- THE SECRETARY PO BOX 262 Oakey QLD**



**Condamine Alliance
3 Clifford St.
P.O.Box 3477
Toowoomba Village Fair
Qld. 4350**

29 January 2008
To Condamine Alliance Team,

The Committee and members of the Oakey Freshwater Fish Stocking Assn. would like to express our greatest appreciation to the Condamine Alliance team that were involved in the 'Demonstration Reach' re-snagging project at Bowenville Reserve on Oakey Creek between 2006 and 2007. Jo Voller's tireless efforts to meet with and convince the Jondaryan Shire Council that returning logs to Oakey Creek will benefit the habit of native fish was something that our group had failed to succeed in negotiating for the last decade. Jo's ability to involve interstate groups (mainly from the govt. sector) and to get them to share their knowledge with us has help our group to understand that the creek needs more than fish to make it survive.

Creek landowners from Oakey Creek that were watching the progress of re-snagging Bowenville Reserve have been recently holding discussions with members of our fish-stocking group on how they can help to improve the waterway in their area. This maybe an issue that can be worked over in the near future?

OFFSA would also like to thank the Condamine Alliance for allowing us to stock Bowenville reserve with native fish fingerlings such as Murray cod as well as golden and silver perch. Our group has always heavily stocked the reserve due to the public access and to the popularity of fishing in this location. Some of our members conducted a creel survey at the reserve 4-weeks after the logs were placed in and they were able to catch silver perch (*Bidyanus Bidyanus*) from several of the re-snagging spots already. Due to shallow water located at the reserve it was a notorious spot for holding european carp. This is one reason why OFFSA were in favour of Bowenville Reserve being voted as the ideal 'demonstration reach' site. With the snags placed in the water here, we hoped that the native fish would be able to move in from upstream pools and flush out the noxious carp. These early creel results are certainly proving our theory that we were right! With silver perch declining in population at an alarming rate throughout the Murray-Darling system, it's nice to know that the snags at Bowenville Reserve on Oakey Creek are keeping them alive and in good numbers.

The aesthetic signage display (courtesy provided by the Condamine Alliance) that has been cemented in at Bowenville reserve was well applauded by the DPI & Fisheries after a recent visit by several members of their staff. All that were present agreed that it is very informative and contains great educational value to the general public that visits the reserve. With easy to read wording and suitable diagrams illustrated I'm sure that it will have some effect on those people who view it.

Fran Holt's organizational skills should be commended, as this lady was able to unify all interested stakeholders to discuss the best options for the 'demonstration reach' at various workshops. This broad interest can only prove that even though there are many groups involved looking after one area such as fish or trees, ground vegetation or maintaining the public reserve, that if we work as a team we can all achieve the same results. Making the Condamine catchment better for the future generations to use and still be able to work in harmony with the environment.

We would like to Thank Kevin Graham also of the Condamine Alliance for his input during the final stages of re-snagging and OFFSA would like to thank him for his attendance on the day the logs were placed in at the reserve.

We hope that more areas in Oakey Creek can be re-snagged in the near future and our team would be very happy to work with the Condamine Alliance team at anytime.

Yours Gratefully,

OFFSA Committee and members

Noal Kuhl Secretary

RTI DL RELEASE - EHP

OFFSA

TO:

CONDAMINE ALLIANCE
STAFF

We wish to express our appreciation for your contribution to enhancing Oakey Creek with the 'demonstration reach' at Bowenville Reserve and to help with increasing the native fish stocks in the waterways of Jondaryan Shire.



FROM



Oakey Freshwater Fish Restocking Assn. Inc
Committee & Members

RTI DL RELEASE - EHP

Appendix D

Response to RFI #8



AF12604164

Rodney Weller

Senior Project Manager
Project & Program Management

Parsons Brinckerhoff

Level 2, 2 Emporio Place
Maroochydore QLD 4558
PO Box 754
Cotton Tree QLD 4558
AUSTRALIA

Parsons Brinckerhoff (PB) contractor for Army Aviation Centre Oakey (AACO) Stage 3 Risk Assessment and Remediation Design tender AZ5293 – Response to Request for Information (RFI) #8 - Assumptions for Human Health Risk Assessment (HHRA), PFOS/PFOA in groundwater.

Dear Rodney,

The purpose of this letter is to provide responses to PB's questions regarding HHRA - AFFF input parameters that were raised to Defence within a request for information (RFI (#8)) letter received on 15 November 2012. A copy of the RFI #8 documentation has been provided as an attachment to this letter.

Defence have consulted both AACO base and ground support staff to acquire the most appropriate response to each of PB's questions. These questions (*italic text*) and the respective responses have been provided below:

- *Please provide information relating to the irrigation method/s (e.g. automated sprinklers, manual sprinklers, hand held hose etc.) used at AACO.*

Irrigation methods known to be in use at AACO include: A mixture of automated (e.g. soccer field but manually programmed i.e. not automatic), manual sprinklers (man-handled) into place and hand held hoses.

- *Please provide details on how often irrigation systems are turned on at the site i.e. how many days per year and for how long each day.*

Use of irrigation systems is dependent on prevailing weather conditions. Usage is at least once per week on average with up to 3 times per week in extreme heat conditions. A figure of approximately 75 days per year would not be unreasonable. Duration of use also varies but an average of 1 hour duration per sprinkling activity.

- *Who (i.e. which site users) may be exposed to irrigation water e.g. gardeners, maintenance contractors, site residents including children?*

Gardeners would certainly have the most (and closest) exposure during each manual irrigation event with site residents including children having incidental exposure.

- *Please advise the irrigation method/s used in the vicinity of the site (surrounding properties)?*

Defence understand that mostly manual methods are used.

- *Please advise if any source other than groundwater is used to fill the swimming pool at the site. If so what is the origin of this source?*

Water used comprises of groundwater/bore water (sourced from nearby hydrant) topped up very occasionally by tank water.

- *Discussion during the remediation options feasibility study (ROFS) meeting held on the 20th September 2012 identified the residence time of an adult at the site may range between 5 and >40 years, with comparable results for a child. Based on your understanding of the history at the base your assistance is required to better determine an appropriate input value/s for these parameters.*

It is understood that the residence time of persons occupying AACO grounds is required when undertaking the exposure assessment for the HHRA. Consultation with AACO staff has identified that defined input values for an adult/child's occupation at AACO is not possible. This is due to the absence and/or limitations in available data.

As such, it is suggested that a multi-scenario approach be undertaken to assess exposure risk.

Consideration may be based on the following:

Worst case scenario

The base was established in 1972 and anecdotal evidence suggests that a number of staff have worked at/occupied the site since establishment up to and including the present day. Select staff members have indicated frequent use (3 times per week) of the pool and occasional exposure to irrigation water. This includes frequent usage of pool facilities by family members of varying ages from child to adult.

Average occupation time / values based on literature

With consideration to the time of which the AACO site has been operational, an average service time of approximately 3-5 years and making reference to published literature values/scenarios for average residence time and pool usage (ie examples provided within *Environmental Health Risk Assessment – Guidelines for assessing human health risks from environmental hazards, Enhealth June 2002*) standardised values may be used as a means for a conservative exposure assessment.



Australian Government
Department of Defence

Incidental exposure

A staff member or visitor to AACO who was to use the pool once and/or a gardener/resident being exposed to irrigation water while undertaking a single sprinkling activity.

Regards,

sch4p4(6)Signature

Scott Callinan

Assistant Director

Directorate of Environmental Remediation Programs (DERP)

BP26 – 2 – B043

Environment & Engineering

Department of Defence

CANBERRA ACT 2600

scott.callinan1@defence.gov.au

Tel: 02 6266 8076

Fax: 02 6266 8166

28 November 2012

Enclosure:

1. RFI #8 - Assumptions for Human Health Risk Assessment, PFOS/PFOA in groundwater - Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey (PB, 15 November 2012)

REQUEST FOR INFORMATION			
Oakey - Risk Assessment and Remediation Design			
RFI No :	8	RE :	Assumptions for HHRA
TO :	Department of Defence		FAX # :
ATTENTION	Tim Hamilton		DATE : 14-Nov-12
FROM :	Ruth Jarman		PAGES : 4
CC :	<div style="border: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border: 1px solid black; height: 1.2em;"></div>		
Details: Please see attached letter.			
Information Required By : 23-Nov-12			
Reply To Request For Information			
SIGNED :	<div style="background-color: #cccccc; border: 1px solid black; padding: 2px; display: inline-block;">sch4p4(6) Signature</div> <div style="border: 1px solid black; display: inline-block; width: 100px; height: 1.2em; vertical-align: middle;"></div>		NAME : Ruth Jarman
COMPANY :	Parsons Brinckerhoff		DATE : 14-Nov-12

Parsons Brinckerhoff Australia Pty Limited

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Certified to ISO 9001, ISO 14001, AS/NZS 4801
A GRI Rating: Sustainability Report 2011

Our reference 2171374A-LTR-001-A-RJ

14 November 2012

Department of Defence
Attention: Tim Hamilton
Defence Mail Service
Queanbeyan Annex 6
14-22 Wycombe Street
Queanbeyan NSW 2620

Email: THamilton@otek.com.au

Dear Tim,

Assumptions for Human Health Risk Assessment, PFOS/PFOA in groundwater - Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey

Parsons Brinckerhoff Australia Pty Ltd (Parsons Brinckerhoff) has been retained by the Department of Defence (Defence) as Lead Consultant (AZ5293) to provide risk assessment and remediation design services at the Army Aviation Centre Oakey (AACO) – Southern Queensland Region.

As part of these services, Parsons Brinckerhoff is currently undertaking a Quantitative Human Health Risk Assessment (HHRA) for:

- Onsite and/or offsite workers (adults) who may be in direct contact with irrigation water impacted with PFOS & PFOA.
- Onsite adults and children who may be in direct contact with swimming pool water impacted with PFOS & PFOA.

We are pleased to present this letter outlining our proposed exposure assessment assumptions for comment, and requesting additional information regarding the use of groundwater for irrigation and swimming at the site.

1. Use of groundwater for irrigation

To assist us with the HHRA for this exposure pathway, can you please provide us with any information you have regarding:

- The irrigation method/s (e.g. automated sprinklers, manual sprinklers, hand held hose etc.) used at the site.
- How often irrigation systems are turned on at the site i.e. how many days per year and for how long each day.
- Who (i.e. which site users) may be exposed to irrigation water e.g. gardeners, maintenance contractors, site residents including children?
- The irrigation method/s used in the vicinity of the site.

We would also be happy to talk to the relevant person e.g. site gardener/site contractor to obtain the above information (where available) if you can provide us with contact details?

2. Use of groundwater for swimming

Based on the advice provided to us to date, our HHRA will assume that the swimming pool at the site is filled with groundwater.

Our proposed exposure assumptions for the swimming pool HHRA are outlined in Table 1 (adults) and Table 2 (children) below. Our proposed assumptions have been sourced from NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Measure* and enHealth (2012) *Environmental Health Risk Assessment – Guidelines for Assessing Human Health Risks from Environmental Hazards*.

Can you please confirm that our assumptions are appropriate based on your knowledge of the use of the AACO swimming pool? Where we have indicated "??" this means that your (i.e. site specific) input is required to determine an appropriate value for this parameter as it is likely to be specific to AACO. For example, at our meeting on 20 September 2012, we discussed that residence time at the site may range between 5 and >40 years, therefore your assistance is required to determine appropriate input value/s for this parameter.

Table 1 Summary of exposure parameters for adults

Parameter	Explanation	Units	Swimming pool user - adult
Exposure Duration	Time in residence at base as an adult.	Years	??
Exposure Frequency	Number of times/length of time swimming per year.	Events/year	365
		Hours/event	0.5 (1.5) ⁽¹⁾
Incidental ingestion of water	Amount of water accidentally ingested per swimming event.	mL/event	12.5 (187.5) ^(1,2)
Bodyweight	-	Kg	70

NOTES:

1. Average and upper bound value (in parenthesis) presented.
2. Based on the incidental ingestion of 25 mL/hour and 125 mL/hour.

Table 2 Summary of exposure parameters for children

Parameter	Explanation	Units	Swimming pool user - child
Exposure Duration	Time in residence at base as a child.	Years	??
Exposure Frequency	Number of times/length of time swimming per year.	Events/year	23
		Hours/event	1
Incidental ingestion of water	Amount of water accidentally ingested per swimming event.	mL/event	50 (150) ⁽¹⁾
Bodyweight	-	Kg	15

NOTES:

1. Average and upper bound value (in parenthesis) presented.

3. Closure

If you have any questions or need further information please do not hesitate to contact the undersigned to discuss further.

Yours sincerely,

sch4p4(6) Signature

Ruth Jarman
Senior Environmental Scientist
Parsons Brinckerhoff Australia Pty Limited

sch4p4(6) Signature

Jeff Thrupp
Principal Consultant
Parsons Brinckerhoff Australia Pty Limited

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Appendix E

Toxicology of PFOS and PFOA

E.1 Toxicology of PFOS and PFOA

1.1 Toxicity summary

The toxicology of PFOS and PFOA is summarised in Table E.1 below. The toxicity summary has been based on ATSDR (2009) and Stahl *et al.* (2011) unless otherwise noted. ATSDR (2009) provides Draft toxicity information for thirteen perfluoroalkyls including PFOS and PFOA. Stahl *et al.* (2011) provides a more recent toxicological review of perfluorinated compounds. Where specific information relating to PFOS and PFOA was not provided, the toxicology summary has been based on information relating to perfluoroalkyls in general.

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Table E.1 Toxicity summary for PFOS and PFOA

Parameter	Summary
Chemical description and properties	
Name	Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) (ATSDR, 2009)
CAS registry	PFOS: 1763-23-1, PFOA: 335-67-1 (ATSDR, 2009)
Description	<p>PFCs are:</p> <ul style="list-style-type: none"> Stable chemicals made up of a carbon chain surrounded by fluorine atoms with an acid group at the end of the chain (ATSDR, 2009). Substances that repel oil, grease and water (ATSDR, 2009). Not naturally found in the environment however may be formed in the environment when other related chemicals degrade (ATSDR, 2009). Chemically and thermally stable and therefore highly resistant to biodegradation, photooxidation, direct photolysis and hydrolysis due to the strength of the carbon/fluorine bond. Breakdown very slowly in air and are not known to breakdown in soil or water. May leach from soil in groundwater be carried over great distances by ocean currents (ATSDR, 2009; Stahl <i>et al.</i>, 2011). Proposed as a new class of 'persistent organic pollutants' (Stahl <i>et al.</i>, 2011). <p>PFOS and PFOA are generally considered to be reference substances within the class of PFC compounds (Stahl <i>et al.</i>, 2011).</p>
Uses	<p>PFCs have been historically synthesized in large amounts for nearly 50 years and are used in numerous industrial and consumer products (Stahl <i>et al.</i>, 2011).</p> <p>Used in surface protection products (carpet, clothing treatments, coatings for paper and cardboard packaging) and fire fighting foams. Production has ceased/decreased since 2000 (ATSDR, 2009).</p>
Solubility in water	PFOS: 570 mg/L, PFOA: 9,500 mg/L at 25°C (ATSDR, 2009).
Octanol-water partition co-efficient	Not measurable (USEPA, 2012). PFCs are expected to form separate layers when mixed with hydrocarbons and water therefore measurement of the n-octanol water partition coefficient is not practicable (ATSDR, 2009).
Volatility	Not volatile, at environmental pH they will exist as an ion in water (ATSDR, 2009).
Background exposure.	<p>PFCs can be detected almost ubiquitously in the environment e.g. in water, plants, foodstuffs, animals including fish, birds, mammals and in human breast milk and blood. The uptake of PFCs from contaminated soil by plants enables the entrance of PFCs into, and may explain the presence of, PFCs in the food chain of humans (Stahl <i>et al.</i>, 2011).</p> <p>The following background exposure ranges are quoted by ATSDR (2009):</p> <ul style="list-style-type: none"> Groundwater, drinking water, soil and sediment: not established. Outdoor urban air: PFOS – 919 pg/m³, PFOA – 46 pg/m³.

Parameter	Summary
	<ul style="list-style-type: none"> Indoor air: <5 pg/m³. Surface water: generally <50 ng/L. Food: 0.05 to 10,000 ng/g fresh weight. Serum: PFOS – 14.7 to 55.8 ng/mL, PFOA – 2.1 to 9.6 ng/mL. Breast milk: PFOS – 0.360 to 0.639 ng/mL, PFOA – 0.210 to 0.490 ng/mL. Umbilical cord sample: PFOS – 4.9 to 11 ng/mL, PFOA – 1.6 to 3.7 ng/mL. <p>Stahl <i>et al.</i> (2011) quotes the following daily total PFC uptakes:</p> <ul style="list-style-type: none"> PFOS - 2 ng/kg body weight to 200 ng/kg body weight depending on the amount of fish consumed. PFOA - 3 ng/kg body weight to 14 ng/kg body weight depending on the amount of fish consumed. <p>As is evident from the above, PFC accumulation in fish is particularly important in the context of human exposure (Stahl <i>et al.</i>, 2011).</p>
Toxicokinetics	
Adsorption	<p>On the basis of animal experimental data, PFC uptake can occur via the oral, dermal and inhalation pathways (Stahl <i>et al.</i>, 2011).</p> <p>Inhalation: Partially absorbed (ATSDR, 2009).</p> <p>Oral: Readily absorbed with almost complete assimilation observed (ATSDR, 2009; Stahl <i>et al.</i>, 2011).</p> <p>Dermal: It is possible that only a small amount of PFCs may be absorbed through the skin following contact. Short-term application of large amounts of PFOA to the skin of rats has resulted in skin irritation and liver changes, indicating that PFOA can be absorbed through the skin. However rat skin may be more permeable to PFOS/PFOA as compared to human skin (e.g. 1.44% absorption in rat vs 0.043% in human; the estimated dermal penetration co-efficients for isolated skin are 3.25×10^{-5} cm/hr for a rat and 9.49×10^{-7} cm/hr for a human (ATSDR, 2009).</p>
Distribution	<p>PFCs accumulate in the serum, kidney and liver, they do not accumulate in the fatty tissue (ATSDR, 2009).</p> <p>PFOS and PFOA preferentially bind to proteins (principally albumin) as they are weakly lipophilic and very water soluble. PFCs are considered to cross the placental barrier in animals and humans. In addition to the blood serum, kidneys and liver, small amounts have been reported in other tissues (Stahl <i>et al.</i>, 2011).</p>
Metabolism	Persistent, not metabolically converted to other compounds in mammals ATSDR, 2009; Stahl <i>et al.</i> , 2011).
Excretion	<p>Elimination of PFCs from humans occurs slowly (Stahl <i>et al.</i>, 2011).</p> <p>The highest PFC concentrations are measured in apex predators indicating perfluoroalkyls biomagnify in food webs. Bioaccumulation potential thought to increase with increasing chain length (ATSDR, 2009).</p> <p>PFOS and PFOA have a low rate of elimination from serum. The half-life of PFOS and PFOA in humans is approximately 4 years (ATSDR, 2009). The half-life of PFOS in rats, mice and monkeys is less than humans (in the order of hours to 100's of days). In addition, the excretion pathway</p>

Parameter	Summary
	(e.g. faeces, urine) differs between species and may be dependent on the structure of the PFC (Stahl <i>et al.</i> , 2011).
Mode of action	Limited information is available regarding the toxicokinetics of PFCs in humans. In animals the liver has been found to be the main target organ for PFC toxicity regardless of the route of exposure. Liver toxicity in rodents is thought to be due to the activation on the PPAR α receptor by PFCs (refer below for further information) (ARSDR, 2009; Stahl <i>et al.</i> , 2011).
Adverse health effects – animals	
Database	Majority of data available from oral exposure studies. Limited data available from inhalation/dermal exposure studies (ATSDR, 2009).
Cancer	<p>Effects that have been correlated with oral exposure to PFCs include:</p> <ul style="list-style-type: none"> Induction of liver hepatocellular adenomas, Leydig cell adenomas, thyroid follicular cell adenomas and pancreatic acinar cell adenomas has been reported however relevance of the mode of action to humans is unclear (ATSDR, 2009). <p>No information is available regarding cancer effects in animals following dermal exposure (ATSDR, 2009).</p> <p>PFOS and PFOA have not been reported to be genotoxic from various <i>in vivo</i> and <i>in vitro</i> tests. Therefore it is assumed that carcinogenic effects are the result of an epigenetic mechanism and the trigger is considered a threshold concentration (Stahl <i>et al.</i>, 2011).</p>
Non cancer	<p>The main target for toxicity in animals following oral exposure is the liver (ATSDR, 2009; Stahl <i>et al.</i>, 2011).</p> <p>Effects that have been correlated with oral exposure to PFCs include:</p> <ul style="list-style-type: none"> Morphological and biochemical alterations to the liver (e.g. increase in absolute liver weight and beta-oxidation activity, hepatocellular hypertrophy and necrosis, reduction in serum cholesterol and triacylglycerols) (ATSDR, 2009). Alterations to serum thyroid hormone levels (ATSDR, 2009). Developmental adverse effects (e.g. prenatal loss, reduced neonate loss and viability, delays in eye opening). Note that results are inconclusive (ATSDR, 2009). Reduced growth noted following feeding of perfluoroalkyls (ATSDR, 2009). Neurotoxicity and immunotoxicity (Stahl <i>et al.</i>, 2011). <p>PFOS and PFOA have not been reported to interfere with reproduction or lead to any appreciable teratogenic effects. Developmental toxicity has however been reported (reduced increase in body weight after birth and reduced number of live births and viability of progeny) following exposure of the mother during pregnancy (Stahl <i>et al.</i>, 2011).</p> <p>Effects that have been correlated with dermal exposure to PFCs include:</p> <ul style="list-style-type: none"> Hepatic changes in rats following intermittent dermal application of ammonium perfluorooctanoate (APFO) (ARSDR, 2009). Mild skin irritation and acute necrotizing dermatitis has been reported in one study with rats. The same effects were not reported in rabbits however limited, but persistent, conjunctival irritation has been reported in rabbits following application of APFO to the eye (ARSDR, 2009).

Parameter	Summary
	<ul style="list-style-type: none"> Transient weight loss changes have been reported in rats. The same effects have not been reported in mice (ARSDR, 2009). From a study with mice, it is thought that dermal exposure to PFOA may increase the IgE response to environmental allergens (ARSDR, 2009). <p>No information is available regarding musculoskeletal or developmental effects in animals following dermal exposure to PFCs. No gross or microscopic alterations to the eye, lung, trachea, heart, kidneys, spleen, thymus, lymph nodes, gastrointestinal tract, brain or reproductive system of rats has been reported following dermal exposure studies. Similarly, no morphological alterations to the endocrine system have been observed. Inconsistent alterations or changes of unlikely biological significance in have been reported for hematology tests following dermal exposure studies with rats (ARSDR, 2009).</p>
Adverse health effects – humans	
Database	<p>Data available from health evaluations of human subjects in occupational settings and epidemiological studies of communities with relatively high exposure (ATSDR, 2009). The significance of epidemiological studies is limited because of the small number of participants and the problematic classification of exposure (Stahl <i>et al.</i>, 2011).</p> <p>Limited data available regarding exposures for the general population and developmental effects in humans (ATSDR, 2009).</p>
Cancer	<p>PFOS and PFOA have not classified by the IARC or USEPA.</p> <p>Some instances of increase in rate of prostate and bladder cancers in humans have been reported from a limited number of occupation exposure studies. Overall, the results are not conclusive (ATSDR, 2009; Stahl <i>et al.</i>, 2011).</p>
Non cancer	<p>Significant adverse health effects have not been associated with long term dermal/inhalation exposure to PFCs by workers.</p> <p>Effects that have been correlated with PFOS/PFOA concentrations in blood include:</p> <ul style="list-style-type: none"> Changes in levels of cholesterol, thyroid and sex hormones (e.g. total serum cholesterol, serum estradiol, low-density lipoproteins, very low density lipoprotein, serum aspartate aminotransferase, gamma-glutamyltransferase activity and testosterone) have been noted in a limited number of studies (Stahl <i>et al.</i>, 2011; ATSDR, 2009). Increased occurrence of angina, myocardial infarction, chronic bronchitis, shortness of breath and asthma (566 people exposed to PFOA via drinking water) (Stahl <i>et al.</i>, 2011). Thyroid disease (Stahl <i>et al.</i>, 2011). Change in glucose homeostasis/other indicators of metabolic syndrome (Stahl <i>et al.</i>, 2011). Fertility disorders (Stahl <i>et al.</i>, 2011). Miscarriages (Stahl <i>et al.</i>, 2011). Increased risk of ADHD (Stahl <i>et al.</i>, 2011). Occurrence of preeclampsia (Stahl <i>et al.</i>, 2011).

Parameter	Summary
	<p>No reports of death in humans following dermal or oral exposure to PFCs have been identified in the literature. No information is available regarding systemic, immunological or lymphoreticular, neurological, reproductive or developmental effects in humans following dermal exposure to PFCs. Similarly, no studies were located regarding respiratory, cardiovascular, gastrointestinal, musculoskeletal, dermal, ocular or body weight effects in humans following oral exposure (ATSDR, 2009).</p>
Summary	<p>For the most part, and with limited toxicity data, no significant adverse effects have been identified in humans following exposure to PFCs. However changes in clinical tests associated with serum levels of have been reported. In addition, numerous publications in the scientific literature allude to negative effects of PFCs on human health.</p> <p>Most health evaluations have focused on detecting possible hepatic and endocrine effects, and alterations in lipid metabolism, based on the extensive data available from animal studies however:</p> <ul style="list-style-type: none"> ▪ In general, adverse health effects in animals have been associated with doses/exposure concentrations that results in blood PFC concentrations significantly higher than those reported for the general population or PFC workers. ▪ Reproductive and developmental toxic effects observed in animals have only been partially observed in epidemiology studies. ▪ The relevance of observed adverse effects in animals, to humans, is difficult to determine due to the differences in the toxicokinetics between animals and humans and the limited information on the mode of action of PFC toxicity. As noted above, the half-life of PFOS/PFOA is approximately 4 years in humans compared to hours to days in rodents. In addition, while the mode of action of PFC toxicity is not well understood, in animals the liver has been found to be the main target organ for PFC toxicity regardless of the route of exposure. Liver toxicity in rodents is thought to be due to the activation on the PPARα receptor by PFCs. Rats and mice are most sensitive to PPARα antagonists, followed by hamsters, with non-human primates and humans less responsive. The excretion pathway (e.g. faeces, urine) and target organ for toxicity has also been reported to differ between species. <p>Given the above, the relevance of adverse effects reported in animals following exposure to perfluoroalkyls to humans requires further evaluation.</p>

1.2 Toxicity criteria for PFOS and PFOA

Toxicity criteria are generally well established and available from a number of different regulatory agencies including Australian Authorities, the World Health Organisation (WHO) and United States Environmental Protection Agency (USEPA). However this is not the case for emerging contaminants such as PFOS and PFOA.

Toxicity criteria for PFOS and PFOA for the oral route of exposure are available from the USEPA and Minnesota Department of Health (MDH); the criteria are considered provisional and used primarily to protect against the potential risk from exposure to drinking water. The provisional USEPA toxicity criteria have also been used by regional USEPA offices to develop soil screening levels. The USEPA and MHD toxicity criteria are summarised in Table E.2 below.

A Reference Dose (RfD) provides an estimate (with uncertainty spanning perhaps an order of magnitude) of the daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The MDH RfDs for PFOS and PFOA are derived from a no-observed-adverse-effects-level (NOAEL) for a critical effect obtained from animal studies, with the incorporation of safety factors to account for the uncertainty in inter-species and intra-species extrapolation.

Table E.2 Available toxicity criteria

MHD ⁽¹⁾		USEPA ⁽²⁾	
Oral RfD (mg/kg-day)	Comments	Oral RfD (mg/kg-day)	Comments
PFOS			
8x10 ⁻⁵	Study animal: Cynomolgus monkey Critical effects: Decreased HDL, cholesterol, total T3 and TSH. Uncertainty factor: 30	7.7x10 ⁻⁵	Study animal: Cynomolgus monkey Critical effects: Increased levels of TSH, decreased total T3 & decreased HDL cholesterol. Uncertainty factor: 390
PFOA			
7.7x10 ⁻⁵	Study animal: Cynomolgus monkey Critical effects: Increased relative liver weight. Uncertainty factor: 30	1.89x10 ⁻⁴	Study animal: Mice Critical effects: Increased maternal liver weight at term. Uncertainty factor: 2,430

Notes:

RfD = reference dose, MDH= Minnesota Department of Health, USEPA = United States Environmental Protection Agency, HDL=high density lipoproteins, TSH=thyroid stimulating hormone, T3= triiodothyronine.

1. Ref. MDH (2009) *Health Risk Limits for Groundwater 2008 Rule Revision – Perfluorooctane sulfonate and Perfluorooctanoic Acid*.
2. Ref. USEPA (2009) *Provisional Health Advisories for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)*.

Table E.2 above indicates that the toxicity criteria available for the assessment of threshold health effects from MDH and USEPA are similar (i.e. based on similar critical effects and for PFOS, the same study animal), with a slightly less conservative RfD for PFOA presented by USEPA. Given the similarity in available toxicity values, and the use of the MDH Health Risk Limits for the assessment of PFOS and PFOA in groundwater at Defence sites, the MDH RfDs were adopted for use in the HHRA. It is also noted that the MDH RfDs are derived based on toxicity studies with monkeys considered to provide data more relevant to humans compared to mice.

In addition to the oral RfDs listed in Table E.2 above, tolerable daily intakes (TDIs) of 1.5×10^{-4} mg/kg-day (150 ng/kg-day) for PFOS and 1.5×10^{-3} mg/kg-day (1,500 ng/kg-day) for PFOA have been developed by the European Food Safety Authority (EFSA; Stahl *et al.*, 2011) for the assessment of dietary exposure to PFCs. It should be noted however that the EFSA also indicates a daily dietary exposure of 60 to 200 ng/kg bodyweight for PFOS and 2 to 6 ng/kg bodyweight for PFOA should be considered. The use of the EFSA TDIs, with consideration of the background dietary exposure, has not been applied to contaminated sites and thus warrants further assessment. The USEPA is currently undertaking further assessment of PFC compounds with the aim of establishing toxicity criteria.

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AACO OFFSITE ASSESSMENT STAGE 2B PROJECT- KEY STAKEHOLDER BRIEF

Meeting Agenda

Date: Tuesday 29 July 2014
Timing: Commencement 14.30, intended close at 15.30 (AEST - Brisbane)
Location: 203 Tor Street, Toowoomba QLD 4350 - 'Clapham' conference room (reception - contact Jason Chavasse)
POC: Jason Chavasse (6) Personal information (07) 4529 1233

Invitees:

SB Sarah Brown - DERP
SC Scott Callinan - DERP
VP Vicki Pearce - DERP
PM Paul McCabe - AECOM
FL Frances Lee - AECOM
JC Jason Chavasse - DNRM
AC Amanda Cleary - EHP
SG Steve Goudie - DNRM 45291279
RC Ray Clarke - BSOM, AACO
MO Mark O'connell - BSM, AACO
JM John Mills - TRC
AK Alan Kleinschmidt - TRC

Apologies:

RP Richard Poli - SEM SE-QLD
TH Tim Hamilton - Golder Associates, PMCA

Chair: Scott Callinan

Distribution: All

AACO OFFSITE ASSESSMENT STAGE 2B PROJECT– KEY STAKEHOLDER BRIEF

Agenda Items				
#	Item Description	Follow up Actions	Who	When
1.0	Broad overview of Stage 2b Project <ul style="list-style-type: none"> - Scope/investigation overview - Current technical understanding - Proposed future works 			
2.0	PPT slide overview <ul style="list-style-type: none"> - Investigation chronology - Key messages 			
3.0	Stakeholder consultation <ul style="list-style-type: none"> - stakeholder engagement strategy - Community information session/s - Consultation Mgt database 			
4.0	Other business <ul style="list-style-type: none"> - - - - - - 			
5.0	Meeting close <ul style="list-style-type: none"> - Summarise follow up actions - All members depart 			

Cleary Amanda

From: Mackenzie James
Sent: Wednesday, 8 January 2014 5:02 PM
To: Cleary Amanda
Subject: FW: EHP Draft Policy on the Management of Firefighting Foam available for comment from councils
Attachments: FoamPolicyStakeholderLetter.pdf; Policy-QLDFirefightingFoamsV3-0.pdf; IRPG-2-15Firewater-V2-3.pdf

FYI – May be relevant to Oakey Air base?

Regards,

James

From: Blanchard Scott
Sent: Wednesday, 8 January 2014 1:42 PM
To: Mackenzie James; Immisch Eugene; Horton Sarah
Subject: FW: EHP Draft Policy on the Management of Firefighting Foam available for comment from councils

Hi All

FYI. You may already be aware of this proposed policy.

Regards

Scott

Scott Blanchard
A/Regional Manager
Southern Region (West)
Environmental Services and Regulation
Department of Environment and Heritage Protection

Ph: (07) 3381 7558
Fax: (07) 3381 7560



 Please consider the environment before printing.

From: Harden John
Sent: Wednesday, 8 January 2014 1:38 PM
To: Brain Tim (EHP); Sale Ben; Cook David; Murphy Shari; Glosko Brett; Blanchard Scott
Cc: Clough Leonie; Henderson Denise; Hindmarsh Sasha; Karle Matt; Salomone Daniel; Sims Shanna
Subject: FYI: EHP Draft Policy on the Management of Firefighting Foam available for comment from councils

John Harden
Manager (Moreton Bay)
Telephone: 5316 8401

From: Holmes Nigel
Sent: Wednesday, 8 January 2014 1:32 PM
To: Harden John
Cc: Sims Shanna; Carl.Peterson@moretonbay.qld.gov.au; Bruce.BunKum@moretonbay.qld.gov.au
Subject: RE: EHP Draft Policy on the Management of Firefighting Foam available for comment

John

Attached is a copy of the draft firefighting foam management Policy and the general stakeholder letter. The request for comment went to a range of Qld and Australian peak stakeholder organisations including LGAQ. WA will release a similar policy.

An issue we will need to address down the track has been the past practice of some operators dumping fluorinated foam wastes to sewer resulting in the fluorinated organic compounds being discharged to waterways or exported in sludge. Fluorinated organics can be highly dispersive and are not captured by STPs. Fluorine free foams do not have this problem and are generally readily biodegradable.

The article below provides some further recent background on fluorinated foams.
<http://www.hemmingfire.com/news/fullstory.php/aid/1961/Foam: the cost 96 and still counting!.html>

Also last year's foam conference proceedings.
<http://www.hemmingfire.com/news/fullstory.php/aid/1749/Fifth Reebok Fire Fighting Foam Conference - part 1.html>
<http://www.hemmingfire.com/news/fullstory.php/aid/1748/The final definitive version of 91Fire Fighting Foams with Perfluorochemicals 96 Environmental Review 92, by Dr Jimmy Seow, Manager, Pollution Response Unit, Department of Environment and Conservation Western Australia.html>

We also have an internal Procedural Guide on the management of firewater at incidents. This will be duly reviewed in the light of the final policy content. The PG makes specific mention of Solberg RF6 and 3x6ATC foams as these are the (fluorine-free) foams in use by Qld Fire Services and therefore most likely to be encountered by us at small highway and fire incidents. However the same principles apply to any brands of foam.

We do not have significant concerns over the use of fluorine-free foams apart from short-term toxicity and BOD impacts as they biodegrade relatively quickly, can be treated by STPs or held in ponds for about 28 days to degrade. For fires at private facilities the foam on site would be the foam used first and it may or may not be a fluorinated type, hence we are reviewing all foam users to map our risk.

Regards

Nigel Holmes
Principal Advisor Incident Management
Central Queensland
Incident Response Unit
Environmental Services & Regulation
Queensland Department of Environment & Heritage Protection

PO Box 3130 Rockhampton QLD 4701
61 Yeppoon Road, North Rockhampton QLD 4702
Ph: 07 4936 0503

Mailbox (6) Personal information

Pollution Hotline: 1300 130 372
<mailto:nigel.holmes@ehp.qld.gov.au>





From: Harden John
Sent: Wednesday, 8 January 2014 11:10 AM
To: Holmes Nigel
Cc: Kane Gary; Sims Shanna
Subject: EHP Draft Policy on the Management of Firefighting Foam available for comment

Nigel, could you please forward a copy of your draft Policy on the Management of Firefighting Foam, to Carl Peterson and Bruce Bunkum thanks.

If possible, Shanna would appreciate a copy as well.

John Harden
Manager (Moreton Bay)
Telephone: 5316 8401

From: Carl Peterson [<mailto:Carl.Peterson@moretonbay.qld.gov.au>]
Sent: Wednesday, 8 January 2014 11:00 AM
To: Harden John
Cc: Bruce Bunkum
Subject: FW: LGOnline Circular

Hi John

Any idea where I can get my hands on this draft policy?

Carl Peterson
Coordinator Disaster Management
Moreton Bay Regional Council
P: (07) 3480 6689 4p4(6) Personal information

From: Dianne Rosenlund
Sent: Wednesday, 8 January 2014 9:22 AM
To: Anthony Martini; Carl Peterson
Subject: LGOnline Circular

Circular

Authorised by: Greg Hallam PSM Chief Executive Officer Tuesday, 7 January 2014

Draft Policy on the Management of Firefighting Foam available for comment

Circular: 2014-002 | For Comment

The Queensland Government is seeking comments from councils on the draft Policy on the Management of Firefighting Foam.

In response to the health and environmental concerns that have emerged in the recent years surrounding the use of firefighting foams, the Queensland Department of Environment and Heritage Protection (DEHP) has written to the LGAQ seeking feedback on its draft Policy on the Management of Firefighting Foam (draft Policy).

The draft Policy aims to:

- address the impacts of the release of firefighting foams on public health and environmental values;
- provide guidance on the Department's expectations for the storage, use, treatment, release, disposal and environmental protection measures relevant to firefighting foam; and

provide standards against which users and regulators can make informed decisions about the uses of foam and the protective measures that are necessary to ensure compliance with environmental legislation.

Councils wishing to contribute to LGAQ's submission should email to Beth Norman by **25 January 2014**. Alternatively, councils who wish to make their own submission should email Nigel.Holmes@ehp.qld.gov.au by 4 February 2014.

Dianne Rosenlund
Governance Officer
Executive Services - Governance
Chief Executive Office
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Department of
**Environment and
Heritage Protection**

Ref CTS 30948/13

20 December 2013

Re: Draft Policies on the Management of Firefighting Foam

Dear Stakeholder

Your organisation has been identified as an Australian stakeholder that may have an interest in the management of firefighting foams and their related wastes.

In recent years concerns have emerged regarding the significant impacts that firefighting foams can have on public health and environmental values. The Queensland Department of Environment and Heritage Protection has in conjunction with the Western Australian Department of Environment Regulation (DER) researched the associated issues extensively consulting experts and regulatory authorities in Australia and overseas and as a result Western Australia and Queensland have drafted complementary policies on the management of firefighting foams for our respective states.

A wide variety of current and legacy firefighting foams with different formulations are in use across Australia. Some of the components used in the formulations are of environmental concern through various combinations of their persistence, bioaccumulation potential, toxicity (short and long term) and biochemical oxygen demand.

The draft Management of Firefighting Foam policy seeks to address those concerns and provide guidance on the department's expectations for the storage, use, treatment, release, disposal and environmental protection measures relevant to firefighting foam.

The draft policy also seeks to provide standards against which users and regulators can make informed decisions about the uses of foam and the protective measures that are necessary to ensure compliance with environmental legislation.

As the WA DER Director-General has yet to endorse the WA draft policy please find only the Queensland draft policy at this stage. DER will release the WA version of the joint policy once it is endorsed for consultation with key stakeholder groups which are similar organisations to those consulted in Queensland. There will be an opportunity for stakeholders with a WA-specific perspective to comment in due course. The differences in

policies will primarily be in the references to specific state legislative and regulatory requirements. The departments will consider all comments jointly before formulating the final content of the policies to ensure consistency.

The Department is seeking comments from stakeholders on any issues that they feel are relevant to their particular application. Please distribute this letter and the attached draft policy to any of your members or associates that you feel are relevant.

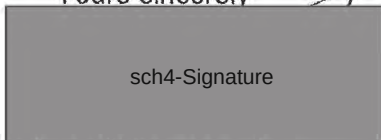
Written comments should be received by **3 February 2014** and be addressed to:

Department of Environment and Heritage Protection
Attention: Firefighting Foam Stakeholder Comments
PO Box 3130
Red Hill Rockhampton, Queensland, 4701.

Alternatively comments may be sent by email to - nigel.holmes@ehp.qld.gov.au.

All comments will be considered by Western Australia and Queensland in deciding the final policy content for both states.

Yours sincerely

sch4-Signature

Dean Ellwood
Deputy Director-General

Att

Management of Firefighting Foam

This Policy provides direction for government and industry on the environmental protection requirements of the Queensland Department of Environment and Heritage Protection when making decisions on activities with the potential to impact on the environment.

1 Purpose

The purpose of this policy is to outline the Department of Environment and Heritage Protection's requirements and expectations for the storage, use, treatment, release, disposal and environmental protection measures relevant to the use of firefighting foam, with particular regard to those containing fluorinated organic compounds.

2 Scope

This policy applies to any person or corporation that stores, uses, treats, releases or disposes of any products, compounds, water, soils, wastes or other materials associated with or contaminated by firefighting foams at any concentration at any place in the state of Queensland and its waters.

This policy does not consider the range of other possible contaminants in addition to firefighting foam that might be in firewater or runoff such as hydrocarbons, chemicals, combustion products, sediments, etc which may have significant environmental impacts.

3 Policy

The Department of Environment and Heritage Protection is committed to managing the health of Queensland's environment by protecting the state's unique ecosystems, including its landscapes and waterways, as well as its native plants, animals and biodiversity through strong environmental regulation that supports sustainable long-term economic development.

All firefighting foams pose a range of hazards to the environment when released during activities such as training, maintenance, testing, incident response, fires and waste disposal. The combination of chemicals used in firefighting foams can have direct and indirect acute and chronic impacts on biota, soils and waterways through their persistence, bioaccumulation, toxicity (PBT) and their biochemical oxygen demand (BOD) when they degrade. The impacts of the release of firefighting foams can also extend to public and economic use of resources such as recreational activities, public amenity, water supply, aquaculture and fisheries.

Of particular concern for firefighting foams is the significant body of existing and growing evidence that fluorinated organic compounds, which have been and are commonly used in some Class B firefighting foams, pose very significant risks to the environment through their extreme persistence, bioaccumulation potential and toxicity.

3.1 Firefighting foams

When choosing a firefighting foam and assessing its suitability for a particular application and its potential to cause undesirable environmental effects the user must take into account the:

- composition of the foam and the best available technology for the intended application
- types and quantities of concentrate to be held on site
- potential volume of firewater that could be generated during an incident
- ability to fully contain spills and firewater on site
- measures to prevent release to soils, groundwater, waterways and air

Policy Management of Firefighting Foam

- facility location and proximity to environmental sensitivities
- circumstances under which an intended or unintended release might occur
- pathways for foam and other incident contaminants to be released to the environment
- potential PBT and BOD impacts on the local and wider environmental values
- on-site and off-site treatment and disposal of wastewater and contaminated materials
- remediation of contaminated soils, waterways and groundwater
- training and testing needs and requirements.

3.1.1 Fluorine-free firefighting foams

Although fluorine-free foams do not contain highly persistent fluorinated organic compounds their potential to cause environmental harm and the need for containment and protective measures and procedures must be assessed in terms of:

- Persistence in the environment.
- Bioaccumulation potential in the biota.
- Toxicity (both acute and chronic impacts).
- Biochemical oxygen demand and biodegradability.

Where fluorine-free firefighting foams are used the user must be able to demonstrate that they are able to adequately contain, treat or properly dispose of the foam, firewater, wastewater, runoff from activities or incidents on the site such that any release to the environment is not likely to cause significant short-term or long-term environmental harm.

3.1.2 Fluorinated firefighting foams

Fluorinated foams are any foams that have in their composition any fluorinated organic compound(s) (see Definitions). If fluorinated foams are to be held for use then the user must be aware of the composition of the foam and specifically what fluorinated organic compounds are present and their concentrations. Where foam stocks are held that are of unknown or mixed composition samples should be analysed to determine their composition including what fluorinated organic compounds are present.

Where fluorinated foams are held their potential to cause environmental harm must be assessed in terms of their persistence, bioaccumulation potential, toxicity and biochemical oxygen demand as per Section 3.1.1, especially given the extreme persistence of highly fluorinated organic substances.

Where there is any potential for spill or release the user must be able to demonstrate that they are able to fully and completely contain and properly dispose of the concentrate, foam solution, produced foam, firewater, wastewater, runoff, contaminated soils and other materials. This includes during the testing and maintenance of fixed or mobile equipment.

PFOS/PFOA foams not permitted

Use of foams that contain the fluorinated organic compounds PFOS (perfluorooctanesulphonate) and PFOA (perfluorooctanoic acid) or any compound that degrades or converts to those compounds at a concentration of greater than 10mg/kg* (in concentrate) are not to be used and must be withdrawn from service immediately and managed as a regulated waste. A disposal plan for such waste must be drawn up as soon as is practical. Existing stocks of such foams must be held securely and disposed of to an approved facility *without undue delay*. Such foams must not

* UK Environment Agency, Use and disposal information 2011

Policy Management of Firefighting Foam

be used in training, maintenance, testing or other activities that may result in their release to the environment on or off the user's site.

Foams that contain the fluorinated organic compounds PFOS and PFOA or any compound that degrades or converts to those compounds must not be on-sold, traded or otherwise provided to any person other than for the purposes of proper disposal.

Wastewater from the cleaning of PFOS/PFOA contaminants from equipment and pipe-work must also be fully contained and removed for disposal to an approved facility.

3.1.3 Training and testing foams

For the purposes of this policy "training foams" are regarded as the same as firefighting foams for all intents and purposes. Foams used for training, testing or maintenance purposes must not contain any fluorinated organic compounds. Suitable alternative fluorine-free foams are available for testing and training purposes.

Where fluorine-free firefighting foams or training foams are used in training, testing or maintenance activities the user must minimise the amount released directly to the environment and where possible take all reasonable and practical measures to adequately contain, treat and dispose of the foam, firewater, wastewater or runoff so as to prevent or minimise environmental harm.

For systems where it is not possible to contain releases, such as training, testing or maintenance activities for fuel berths and firefighting tugs at ports, protection measures and procedures must be put into place to minimise impacts. For example, an environmental risk assessment should be done to determine the local environmental sensitivities and what controls on amount, timing, location, dilution, etc are necessary to minimise the potential for impact to the environment from direct releases.

3.2 Environmental acceptability

Environmental acceptability of any foam to be held for use or used must be assessed in terms of overall impact upon the environment including consideration of all of the following:

- Persistence in the environment.
- Bioaccumulation potential in the biota
- Toxicity (both acute and chronic impacts).
- Biochemical oxygen demand and biodegradability.

This assessment must be undertaken for the combined formulation of all the ingredients, that is, the concentrate as is normally marketed or the mix of concentrates that is intended for final use, and not just the principal ingredients in isolation. Note that assessment of toxicity must include both chronic longer-term toxicity impacts as well as acute toxicity.

3.2.1 Persistence and bioaccumulation

Safety Data Sheets (SDS) for any firefighting foam product intended to be used or stored on a site must be held and readily available for inspection on that site. The SDS must include environmental persistence and bioaccumulation data derived from accepted and recognised best practice Australian, USEPA or OECD methods or tests. The tests must be conducted by an internationally certified test house laboratory in order to demonstrate that the firefighting foam has ALARP bioaccumulation and persistence risks to the environment.

Policy Management of Firefighting Foam

3.2.2 Toxicity testing

Toxicity testing should be conducted against standards and methodologies, such as those accepted and recognised in Australia, the USA, Canada, New Zealand and OECD, by an independent laboratory or organisation. Australian or test species equivalent should include fresh water and marine test species, for example but not limited only to:

- 48hr acute (immobilisation) test using a freshwater species, e.g. the daphnid *Ceriodaphnia dubia* (using USEPA 2002 method) or Australian or equivalent test species.
- 72-hr micro-algal growth inhibition (cell yield) tests using, e.g. freshwater alga *Selenastrum capricornutum* (using USEPA Method 1003.0) or Australian or equivalent test species.
- 96-h fish imbalance tests using a freshwater fish species, e.g. Rainbow fish *Melanotaenia splendida splendida* (based on OECD Method 203) or Australian or equivalent test species.
- 72-h micro-algal growth inhibition tests using *Isochrysis* aff. *galbana* or *Nitzschia closterium* (based on USEPA Method 1003.0 and Stauber *et. al.* 1996 for the National Pulp Mills Research Program) or Australian or equivalent test species.
- 96-hour acute toxicity tests using juvenile tiger prawn *Penaeus monodon* (based on USEPA OPPTS 850.1045), or the amphipod *Melita plumulosa* should tiger prawns not be available or Australian or equivalent test species.

3.2.3 Biochemical oxygen demand and biodegradability

Biochemical oxygen demand (BOD) has the potential to cause severe depletion of oxygen levels in waterways. The SDS for any foam held for use or stored on a site must include information on its BOD and biodegradability.

The BOD must be expressed as biochemical oxygen demand measured at the very least over 5 day and 28 day periods in milligrams per litre for foam concentrate - i.e., BOD₅ and BOD₂₈ values - and reported together with a value for the chemical oxygen demand (COD), also in milligrams per litre for foam concentrate.

The biodegradability of the foam must be expressed as the ratio of the 28 day BOD to the total chemically oxidisable organics (COD). The 28 day BOD is considered to be a better indicator of overall likely impact in the environment and biodegradability given that it would be expected that for most commercially available foam formulations 90% or more of the BOD impact will have occurred within 28 days. This implies a half-life for BOD, as measured by standard protocols, of 7 to 10 days.

3.3 Disposal of wastes

All solid and liquid wastes that contain fluorinated organic compounds (e.g concentrates, firewater, wash-water, run-off, soils, absorbents, etc) are regarded as regulated wastes and must only be disposed of through a facility that is licensed to take regulated wastes.

3.3.1 Contaminated sites and contaminated soil disposal

Where investigation of a site suspected of being contaminated finds that concentrations of fluorinated organic compounds in soils exceed the trigger values in the table below a detailed site investigation should be carried out according to the Australian Standard AS4482 – *Guide to the Sampling and Investigation of Potentially Contaminated Soil* to determine the nature and extent of the contamination in terms of the:

- maximum and average concentrations of the fluorinated organic components
- volumes of soil requiring disposal

Policy Management of Firefighting Foam

- leachability and mobility of the fluorinated organic components
- permeability of soils and potential for groundwater contamination
- possibility of off-site migration through soil, sediment, dust, runoff and groundwater.

The results of the detailed site investigation should be used to determine the potential for human exposure and environmental impact from releases. Remediation of a site contaminated by fluorinated organic compounds should be by removal and proper disposal of the contaminated soil, water or other materials.

Soils contaminated by fluorinated organic compounds must be disposed of under the contaminated sites provisions of the EP Act and must only be disposed of to facilities that are suitable for and licensed to accept such materials. A soil shall be deemed a contaminated soil with respect to fluorinated organic compounds if any of the trigger levels in Table 3.1 are exceeded.

Table 3.1

Compound(s)	Soils trigger value (mg/kg)
PFOS (Perfluoro-octane sulfonate)	6 [†]
PFOA (Perfluoro-octanoic acid)	16 [‡]
Total fluorinated organic compounds	10 [§] (not including PFOS & PFOA)

Where soils contaminated with fluorinated organic compounds are to be stockpiled on a site, (e.g. as part of a remediation plan for a site while awaiting transport or disposal) they shall be contained and covered in such a way as to prevent the release of contaminants in leachate, runoff, sediment or dust that may lead to contamination of land, waterways or groundwater.

Transitional arrangements – Disposal to landfill of contaminated soils

The following conditions shall apply to the landfill disposal of soils contaminated with fluorinated organic compounds for a period of three years from the date of approval of this policy. After this period has expired no disposal to landfill of soil contaminated by fluorinated organics will be allowed unless new policy provisions are determined. These transitional arrangements may be reviewed and varied in the light of any national or international obligations that may change or arise during this period.

During the transitional period contaminated soil or other material disposed of to landfill must be treated, stabilised or fixed such that the soil or material does not have a leachability of fluorinated organic compounds greater than that stipulated in the limits below according to how the leachate is managed. Leachability is to be determined by a standard TCLP laboratory test and analysis for total fluorinated organics in the extract solution.

Table 3.2

Compound(s)	TCLP leachate maximum value (µg/L)
Total fluorinated organic compounds where leachate is reused on or off-site	0.3 ^{**}
Total fluorinated organic compounds for lined landfill disposal without leachate reuse	50 ^{††}

[†] US EPA Region 4 Soil Screening Levels (residential) for PFOS & PFOA, 2009

[‡] US EPA Region 4 Soil Screening Levels (residential) for PFOS & PFOA, 2009

[§] WA & Qld Agreed total fluorinated organics compounds maximum for soils

^{**} Germany (Bavaria) soil leachate (reuse) http://www.lfu.bayern.de/analytik_stoffe/loeschschaume/rechtliches/index.htm

^{††} Germany (Bavaria) soil leachate landfill disposal (as above)

Policy Management of Firefighting Foam

Disposal of soils contaminated with fluorinated organic compounds must only be to landfills that have a compacted clay liner or impervious liner system to prevent the release of leachate and are approved to accept regulated wastes.

3.3.2 Contaminated water disposal

Notwithstanding that firefighting foams containing PFOS and PFOA must not be held or used, water contaminated by fluorinated organic compounds must not be released to the environment if the levels of fluorinated organics exceed the following levels:

Table 3.3

Compound(s)	Water trigger value (µg/L)
PFOS	0.3 ^{††}
PFOA	0.3
Total fluorinated organic compounds	0.3 (total excluding PFOS & PFOA)

4 Authority

The *Environmental Protection Act 1994* (EP Act) requires that all persons undertaking any activity that impacts or has the potential to impact the environment in Queensland is required to take all reasonable and practical measures to prevent such harm from occurring (s319). This includes having regard for the nature of the harm or potential harm, the sensitivity of the receiving environment and the current state of technical knowledge for the activity.

This policy has as its objective the prevention of short-term and long-term environmental harm taking into account the precautionary principle as set out in the *Intergovernmental Agreement on the Environment* and best practice environmental management.

5 Allied Standards and Procedures

The *EHP Procedural Guide 2.15 – Managing contaminated firewater* is allied to this policy and guides the measures to be undertaken when dealing with wastewater or firewater (whether the result of a fire or not) that contain fluorinated or fluorine-free firefighting foam.

Standards for soil and water trigger values and leachability thresholds have been derived from those sources listed in the notes on each page.

6 Definitions/Glossary of terms

The following definitions apply for the purposes of this policy:

ALARP

As Low As Reasonably Practical—Such that the risks from the activity must be averted unless there is a gross disproportion between the costs and benefits of doing so.

Best practice environmental management

The management of the activity to achieve an ongoing minimisation of the activity's environmental harm through cost-effective measures assessed against the measures currently used nationally and internationally for the activity.

^{††} Minnesota Health Based Value 2007 <http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/drinkingwater.html>

Policy Management of Firefighting Foam

Biochemical Oxygen Demand (BOD)

BOD as measured over 5, 10, 20 and 28 day periods expressed in milligrams of oxygen per litre for each period. The terms *biochemical* oxygen demand and *biological* oxygen demand are interchangeable for the purposes of this policy.

Biodegradability

The degradability of the product or waste, determined as the ratio of the 28 day biochemical oxygen demand (BOD₂₈) to the total chemical oxygen demand (COD), expressed as a percentage.

Contamination

Contamination of the environment is the release into the environment (whether by act or omission) of a contaminant that could cause environmental harm.

Firewater, wastewater or runoff

Any contaminated water generated where water sprays, mists, deluge, monitors or foam generators have been used to extinguish a fire, dilute a contaminant, cool a container or stockpile, blanket a spill with foam, disperse or dissolve a gas or vapour release or wash down a contaminated area. This includes firewater, wastewater or runoff produced during testing, training, maintenance, accidental release or an incident whether or not a fire was involved.

Fluorinated organic compounds

All organic compounds that contain the elements fluorine and carbon where the fluorine has replaced some or all of the hydrogen in the straight or branched organic carbon chain including perfluorinated or polyfluorinated compounds. This commonly includes, but is not limited to, PFOS, PFOA, fluorotelomers, fluorosurfactants and their breakdown products.

Fluorinated organics analyses

For the purposes of assessing the environmental risks of fluorinated organics in soil, water or concentrate samples analyses shall be done for at least PFOS, PFOA, 6:2FtS and 8:2 FtS (6:2 and 8:2 fluorotelomer sulphonates) content whether in derivatised or free form (i.e. total content) and total fluorinated organics.

General environmental duty (GED)

A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm having regard to the current state of technical knowledge for the activity and other relevant matters.

Intergovernmental Agreement on the Environment (IGAE)

The agreement made on 1 May 1992 between the Commonwealth, the States, the Australian Capital Territory, the Northern Territory and the Australian Local Government Association.

PFOS/PFOA

The fluorinated organics compounds perfluoro-octane sulphonate (PFOS-C₈F₁₇SO₃⁻) and perfluoro-octanoic acid (PFOA-C₇F₁₅CO₂H).

Safety Data Sheet (SDS or MSDS)

Safety data sheet according to EC Commission Directive 91/155/EC of 5th March 1991. Sometimes referred to as a material safety data sheet (MSDS).

Policy
Management of Firefighting Foam

Toxicity characteristic leaching procedure (TCLP)

The standard laboratory sample extraction method for chemical analysis employed as an analytical method to simulate leachability of particular elements or compounds under landfill conditions. The leachate is then analysed for the relevant constituents of concern.

7 Effective date

This policy will be in effect from the date of approval.

8 Further information

For further information please contact the Policy Branch of the Queensland Department of Environment and Heritage Protection.

9 Review

This policy may be reviewed and amended on the basis of any significant new information or changes in technology or best practice that become evident. This policy will be reviewed no later than five years after the date of approval.

Approved by:

--

Signature

Date

Dean Ellwood
Deputy Director-General
Environmental Services and Regulation

DRAFT - 2.15 – Managing contaminated fire water

Procedural guides further define complex decision-making processes or requirements of the Department of Environment and Heritage Protection. Procedural guides provide guidance and information to assist staff in the completion of specific tasks or in making certain judgments. Procedural guides are for internal use only.

Purpose and scope

This document guides EHP personnel on the issues, responsibilities and roles in managing and dealing with contaminated fire water (including use of fire-fighting foam) and its release to the environment from emergency incidents involving fires and spills.

Background

The term "fire water" is used to describe the contaminated water generated during the response phase of an incident where the emergency responders use water sprays, mists, deluge or monitors to extinguish a fire, dilute a contaminant, cool a container or stockpile, blanket a spill with foam, disperse or dissolve a gas release or wash down a contaminated area. There does not need to be a fire for "fire water" to be generated. The types of incidents involved range from precautionary fire-fighting foam blanketing at a petroleum tanker roll-over to wash-down of spilled chemicals off roadways to major chemical and petroleum storage facilities fires and spills where megalitres of fire water may be generated.

Large volumes of contaminated fire water can be generated as a result of the bulk application of water by fire fighters or fixed spray and deluge systems to an incident involving hazardous or other materials that have the potential to become dissolved or suspended in the fire water and washed off-site where they may cause environmental harm. For example each urban fire truck can pump 3,000L/min to 5,000L/min of water onto an incident (180KL/hr to 300KL/hr) which can be contaminated by chemicals, fire-fighting foam or products of combustion from the incident.

It is important to assess the potential impacts of actual and projected fire water release early in the incident and, where necessary, take measures to contain or divert the anticipated volumes of contaminated water. The primary impacts would be expected to occur in the adjacent waterway that the fire water drains to, including impacts from immediate toxicity and delayed impact from sub-lethal effects or biochemical oxygen demand (BOD).

Where it is evident that a large volume of fire water has been, or will be generated, it is important to establish what contaminants are likely to be in the water, what pathways exist for it to reach sensitive environmental receptors and what are the opportunities to contain the firewater in bunds or by blocking drains or bunding waterways.

Once the immediate threats to public safety and property have been dealt with, the lead combat agency will pass the responsibility for the ongoing response and recovery to the site owner/agent or EHP for management and disposal of the fire water. If the site owner is unwilling or unable to carry out the necessary works a clean-up notice or some other order may need to be issued to the responsible party or EHP may need to undertake the works directly to ensure prompt measures are taken to prevent environmental harm.



The scale and nature of the impacts from small fire water releases, such as from small fires and minor vehicle accidents and spills, will generally not be very extensive, however if the substances are toxic at low concentrations (e.g. pesticides or cyanide) or cause a high COD/BOD (e.g. when fire-fighting foam is used) there is the potential to affect a large area where firewater or rain runoff carry the toxic materials beyond the immediate incident location, especially to adjacent waterways.

For an effective response and recovery plan to be put into place all incidents need to be assessed in terms of the actual and potential direct harm from the firewater generated as well as the potential for delayed environmental harm or further spread of contaminants later on.

Procedure

Initial Incident Classification

The following thresholds can be used as an *initial guide* to classifying incidents. The specific determination of the incident classification level for the response will be assessed on a case-by-case basis considering:

- The quantity of fire water likely to be generated (seek advice from QFRS IC & site manager).
- The likely contaminants and their concentrations (materials on site & combustion products).
- The likely immediate toxicity and delayed impacts (chemicals, BOD/COD, putrescibles).
- The use of fire-fighting foam for blanketing spills or fire fighting (type & quantity).
- Pathways for fire water release and spread (drains, waterways, over-land flow).
- Options for on-site and off-site containment and treatment including fall-back options. (bundled areas, stormwater dams, blocking drains, interceptor trenches & damming waterways)
- Fate, persistence and bioaccumulation of the contaminants in the environment.
- Proximity, size, value and sensitivity of adjacent environmental areas.
- The potential for rainfall/stormwater (occurring or predicted) to overwhelm any bundled areas.

Waterways are particularly important when considering releases of large volumes of contaminated fire water as a significant downstream area can be impacted if the fire water is uncontained and the release is uncontrolled.

Where fire-fighting foams are used it is important to establish whether or not a FLUORINATED foam was used, QFRS use non-fluorinated foams but some airports, bulk terminals and Defence facilities may use fluorinated foams (AFFF, PFOS, PFOA, 6:2FTS or similar product or composition description) which immediately escalate the incident to one where ALL firewater must be captured and treated. Fluorinated foams may contain bio-accumulating persistent organic pollutants (PoPs), as defined under the *Stockholm Convention*, that must not be released to the environment and must be contained and disposed of properly.

Putrescibles in firewater, such as foodstuffs and organic products (milk, molasses, etc), must also be treated as significant contaminants due to the impacts from the process of decay on water BOD, pH, pathogen growth and secondary contaminant generation.

Minor Incident – Fire water containing:		
Low toxicity compounds, no fire-fighting foam or combustion products	Release to land	<20,000 L
Low toxicity compounds, no fire-fighting foam or combustion products	Release to water or to a drain and likely to reach a waterway	<5,000 L
Moderate toxicity compounds (e.g. inorganic acids, caustic soda, etc)	Release to land or water	<5,000 L
High toxicity compounds (e.g. pesticides, herbicides, cyanide, ammonia, etc)	See Hazardous materials Procedural Guide	–
Fire-fighting foam <u>NON-FLUORINATED</u> used for blanketing spills or extinguishing a fire (RF6 & RF3x6ATC or similar)	Release to land, soaking in and not likely to reach a waterway	< 500 L foam concentrate used
Fire-fighting foam <u>NON-FLUORINATED</u> used for blanketing spills or extinguishing a fire (RF6 & RF3x6ATC or similar)	Release to waterway or to a drain and likely to reach a waterway immediately or within 10 days	< 250 L foam concentrate used

Medium Incident – Firewater containing:		
Low toxicity compounds, no fire-fighting foam or combustion products	Release to land	20,000 L to 50,000 L
Low toxicity compounds, no fire-fighting foam or combustion products	Release to waterway or to a drain and likely to reach a waterway	5,000 L to 50,000 L
Moderate toxicity compounds (e.g. inorganic acids, caustic soda, etc)	Release to land or water	5,000 L to 10,000 L
High toxicity compounds (e.g. pesticides, herbicides, cyanide, ammonia, etc)	See Hazardous materials Procedural Guide	–
Fire-fighting foam <u>NON-FLUORINATED</u> used for blanketing spills or extinguishing a fire (RF6 & RF3x6ATC or similar)	Release to land	500 L to 2,000 L foam concentrate used
Fire-fighting foam <u>NON-FLUORINATED</u> used for blanketing spills or extinguishing a fire (RF6 & RF3x6ATC or similar)	Release to water	250 L to 1,000 L foam concentrate used
Fire-fighting foam <u>FLUORINATED</u> used for blanketing spills or extinguishing a fire (e.g. AFFF, PFOS, PFOA, 6:2FTS)	Release to land or water of fluorinated foam concentrate, mixed foam solution or firewater containing foam	<10 L foam concentrate used

Major Incident – Firewater containing:		
Low toxicity compounds, no fire-fighting foam or combustion products	Release to land	>50,000L
Low toxicity compounds, no fire-fighting foam or combustion products	Release to waterway or to a drain and likely to reach a waterway	>50,000 L
Moderate toxicity compounds (e.g. inorganic acids, caustic soda, etc)	Release to land or water	>10,000 L
High toxicity compounds (e.g. pesticides, herbicides, cyanide, ammonia, etc)	See Hazardous materials Procedural Guide	–
Fire-fighting foam <u>NON-FLUORINATED</u> used for blanketing spills or extinguishing a fire (RF6 & RF3x6ATC or similar)	Release to land	>2,000 L foam concentrate used
Fire-fighting foam <u>NON-FLUORINATED</u> used for blanketing spills or extinguishing a fire (RF6 & RF3x6ATC or similar)	Release to water	>1,000 L foam concentrate used
Fire-fighting foam <u>FLUORINATED</u> used for blanketing spills or extinguishing a fire (e.g. AFFF, PFOS, PFOA, 6:2FTS)	Release to land or water of fluorinated foam concentrate, mixed foam solution or firewater containing foam	>10 L foam concentrate used

Note – QFRS primarily use RF3x6ATC, alcohol resistant fire-fighting foam at 6% on petroleum fuel spills due to the potential for E10 ethanol 10% blend fuel to be present. This foam is suitable for both polar (ethanol) and non-polar (alkane hydrocarbon) fuels and solvents. High toxicity contaminants need to be assessed on a case-by-case basis according to the specific contaminant, its concentrations and persistence (see HazMat PG).

Special considerations for fire-fighting foams

The following are issues to consider where fire fighting foams have been used:

- *All fire-fighting foams can cause environmental harm, especially in waterways.*
- *Fluorinated foams can be directly toxic, contain highly persistent organic pollutants, have high BOD and must be contained and removed for proper disposal.*
- *Non-fluorinated foams can be directly toxic and have high BOD and should be contained and allowed to degrade in a detention pond or irrigated onto land to degrade.*
- *The 5 day and 10 day BOD potentials are about 200,000mg/L and 400,000mg/L for the foam concentrate respectively (Reference A). Careful allowance for dilution during application (~6%) and for dilution into any waterway must be made to assess the potential impacts.*
- *Irrigation of non-fluorinated foam to land or holding it in bunds for at least 10 days before release or rainfall washes it away should mitigate most of the potential impact from BOD.*

Actions

Minor Incidents - Business Hours & After Hours

- *To be managed by the relevant Region only.*
- *Responses only during normal business hours.*
- *Contact and brief all relevant parties.*
- *Regional staff may attend as is appropriate.*
- *Local Government may investigate minor releases of contaminants under Section 440ZG of the Environmental Protection Act 1994.*
- *Polluters will need to provide incident notification reports.*
- *All incidents to be recorded.*

Medium Incidents

Business Hours

- *Region to manage any response requirements.*
- *Regional staff to be mobilised and attend as required.*
- *Regional may contact SIRN for technical support and direction.*
- *Contact and brief all relevant parties.*
- *Polluters will need to provide incident notification reports.*
- *All incidents to be recorded.*

After Hours

- *SIRN to manage initial assessment and decide on any response requirements.*
- *Regional staff to be mobilised and attend as directed by SIRN (24 hour response capacity may be required).*
- *Regional staff to act as field support for SIRN with technical support and direction from SIRN.*
- *Contact and brief all relevant parties.*
- *Polluters will need to provide incident notification reports.*
- *All incidents to be recorded.*

Major Incidents - Business Hours & After Hours

- *Incident Response Unit (IRU) to manage any response requirements.*

- SIRN personnel to be mobilised on site to manage EHP response (24 hour response capacity may be required).
- Regional staff may also be mobilised to bridge time frames for SIRN staff to attend and to assist SIRN with on-site actions (24 hour response support may be required).
- Contact and brief all relevant parties.
- Polluters will need to provide incident notification reports.
- All incidents to be recorded.

Response Action Considerations

As part of the initial response actions, confirm that the principal hazardous materials and contaminants have been identified. Ensure that there is sufficient information available to confidently assess the safety and environmental hazards and use this to help develop the response action plans. Some pesticides and herbicides may not be regarded as hazardous materials but should be treated as such unless there is very clear information to the contrary. Key issues in responding to environmental emergencies should include:

1. Confirm MSDS information considering:

- Safety warnings.
- PPE requirements.
- Reactivity Alerts and Profiles.
- Air and water reactivity.
- Health hazards from fumes and contact.
- Response recommendations (Fire fighting, containment, neutralising and cleanup, first aid).
- Disposal requirements.

2. Identify environmental threat considering:

- Proximity to human communities.
- Habitat type.
- Size/area of habitat at risk.
- Sensitivity of the area to threat.
- Listed threatened status of habitat.
- Wildlife species at risk.
- Wildlife numbers at risk.
- Wildlife diversity at risk.
- Threatened status of wildlife.
- Environmental toxicity issues.
- Potential for impacts on downstream water supply / beneficial uses.

3. Response options:

- Secure area.
- Stop or minimise the flow or escape of material from primary source.
- Minimise or stop the movement of contaminants by appropriate containment.
- Look at soaking up contaminants with sand, earth, cement or other absorbents.
- Construct earthen bunds in catchments as primary and secondary containment options.
- Implement other containment devices (e.g. booms).
- Use vacuum trucks and tip trucks to remove contaminants.
- Look at dilution and neutralisation options.
- Minimise mixing of contaminants with other reactive sources.
- Minimise generation of excess contaminated soil or water.
- Manage fire and fire risks.
- Consider burning as a disposal option.

4. Contact the owner of the site or transport company for a copy of their emergency response plan.

5. **Notify compliance investigators.**
6. **Request sampling activity for evidence and recovery purposes.**
7. **Internal Agency briefings (potentially) include:**
 - Office of Water Supply Regulator, Water authorities and Users.
 - Regional Manager (Regional Service Delivery and QPWS).
 - Regional Service Director (Regional Service Delivery and QPWS).
 - State Compliance Unit.
 - Assistant Director-General (Regional Service Delivery and QPWS).
 - Media Unit.
 - Director Generals Office.
 - Minister's Office.
 - Premier's Office.
 - State Disaster Management Group.
 - Contaminated Lands Unit.
 - Petroleum and Gas Group.
 - Regulated Dams Group.
8. **External agency briefings (potentially) include:**
 - Emergency Services (QFRS, QPS, QAS & EMQ).
 - Local Authorities.
 - Water supply authorities.
 - Downstream water users / stakeholders.
 - Qld Health.
 - Biosecurity Queensland.
 - Transport and Main Roads.
 - Mines and Energy.
 - Maritime Safety Queensland.
 - Great Barrier Reef Marine Park Authority.
 - Australian Maritime Safety Authority.
9. **Private industry support for:**
 - Waste transport.
 - Waste storage.
 - Waste treatment.
 - Response support.

Roles and Responsibilities

Environment & Heritage Protection (EHP)

Provides advice on environmental protection issues; cleanup, recovery and waste disposal matters.

EHP Participates within established incident control systems as required, generally under the direction of QPS or QFRS.

For incidents involving EHP workplaces and/or EHP staff, Workplace Health and Safety Queensland need to be notified for *Major Accidents* as defined under the *Dangerous Goods Safety Management Act 2001 (DGSM Act)*. *Major Accidents* under the *DGSM Act* include incidents that cause the death of a person; or impairs a person to such an extent that because of the harm that the person becomes an overnight or longer stay person in a hospital; or results in costs of more than \$50,000 being incurred to prevent, minimise or repair harm to property or the environment. Irrespective of the incident all EHP workplace and/or EHP staff incidents are to be reported and recorded through EHPs intranet system for hazards and incidents. The notification processes for EHP workplaces and/or staff would normally be undertaken by the relevant Regional Manager or delegate.

Queensland Parks & Wildlife Service (QPWS)

QPWS provides combat agency support as requested by the QPS or Emergency Services.

Office of Water Supply Regulator, Water authorities and Users

Where there is the potential for contaminants to adversely affect public drinking water supplies, for both surface and groundwater situations, the Office of Water Supply Regulator and relevant water authorities and users should be contacted.

- Office of Water Supply Regulator, in conjunction with Queensland Health, may provide; public health advice and direction, interpretation of laboratory results and advice on safe levels of contaminants.
- Water supply authorities are responsible for water impoundments, water treatment and supply.
- Stakeholders within the likely affected downstream areas should be notified of the incident and advised the necessary precautionary actions to take.

Qld Police Service (QPS)

Where the *Public Safety Preservation Act* has been declared the responsibilities of the QPS are to provide:

- Control and coordination of the incident (including the on-site and off-site emergency environment);
- Coordination of the efforts of contributory agencies;
- Securing the incident scene from unauthorised entry or departure;
- Crowd and traffic control.

Additional Police responsibilities include:

- Establish and maintain Police Forward Command Post (PFCP) including the media centre;
- Security support for Queensland Ambulance Service casualty collection, treatment and transport loading areas;
- Facilitating resource supply through State Crisis Centre (when applicable);
- The rendering safe of explosive devices;
- Establishing registration of evacuees;
- Establishing victim registration both deceased and alive;
- Controlling entry/egress points from the cold zone and outer cordon;
- Staging and marshalling areas off-site for supporting agencies and resources;
- Coordination of public protection strategies including evacuation and adjacent refuge;
- Liaison with QFRS/QAS/QH (at on and off-site locations);
- Evidence security – where criminal or negligence origins are evident;
- Engaging with the Media in concert with the QFRS Incident Controller.

Queensland Fire & Rescue Service (QFRS)

QFRS has lead responsibility for protection of persons, property and the environment from fire and hazardous materials emergencies. It also provides an advisory service, and other measures to promote safety and protect property if a fire or hazardous materials emergency happens.

The QFRS will act as the lead Chemical/HazMat combat agency and will:

- Identify, contain and mitigate the hazard;
- Identify Chemical/HazMat operating zones for the safety of personnel including those of other agencies;
- Rescue and decontamination of persons who are not fully ambulant and are known to be contaminated;
- Engage with the media in liaison with the Police Forward Commander.

Additional QFRS responsibilities may include:

- Establish and maintain incident hot/warm/cold zones with controlled entry/egress points;
- Maintain appropriate Chemical/HazMat Control Procedures;
- Identify and tag contaminated articles including clothing;
- Decontaminate incident personnel and the public;
- Assist in off-site decontamination where possible;
- Control entry operations within the hot zone such as rescue and identification;
- Provide a Liaison Officer to interact with the Police Forward Command Post;
- Provide Chemical/HazMat assistance to other responding agencies where biological or radiological hazards are present.

The QFRS HazMat function is supported by the Response Advice to Chemical Emergencies (RACE) team. RACE support includes:

- An expert mobile advisory service on and off site in respect to chemical incidents;
- Specialist training for emergency services for response to Chemical/HazMat Incidents;
- Carrying out on-site tests to determine the type, concentration and distribution of the hazardous substance involved;
- Providing expert advice to the QFRS Controller and QAS Commander and liaison with Qld Health in respect to determining the threat from the particular hazard;
- Providing information and advice to the QFRS Controller and the Police Forward Commander and the QAS Commander, about Chemical/HazMat implications for management of the incident. This advice may be about the degree of threat from the hazard, the location and dimensions of the spread of the hazard and assistance in establishing Chemical/HazMat Control Zones and Public Protection Strategies;
- Sample management that may include retrieval and liaison with Qld Health and other agencies.

Queensland Ambulance Service (QAS)

QAS is responsible for on site medical care in consultation with Qld Health including establishment of casualty collection, triage, treatment and assessment areas and transportation of patients to appropriate health facilities. Additional Responsibilities include:

- Maintain casualty collection, triage and treatment areas;
- Establish and maintain ambulance transport area;
- Establish the casualty collection post adjacent to the decontamination corridor exit (on advice from the QFRS Controller);
- Establish the casualty triage and treatment areas at a distance, which will provide optimum protection to casualties and personnel (on advice from the QFRS Controller);
- Provide a Liaison Officer to the Police Forward Command Post;
- Estimate and obtain on and off-site medical and health resources as required;
- Notify Multi-Casualty Incidents (MCI) to Queensland Health.

Queensland Health (QH)

QH provides public health advice and direction including advice to the Medical and Ambulance Commanders on the clinical management of casualties as well as:

- Hospital or other health facility casualty response as required;
- On-site medical team support in consultation with Ambulance Commander;
- Off-site laboratory analysis of materials, including biological samples;
- Advice on decontamination.

Biosecurity Queensland

Biosecurity Queensland is the lead combat agency for emergency animal and plant diseases that occur in Queensland. Biosecurity may become involved in a HazMat incident when:

- The release of a pollutant may destroy or render livestock or agricultural products unsafe for use as food for humans or other livestock.
- The release of a pollutant may destroy, damage or render unusable land or waters that are used for farming or fishing related purposes.

Any of the above situations can present a serious threat to the food chain and the natural environment and are guided under arrangements outlined in the *Queensland Veterinary Emergency Plan*.

Biosecurity may provide; advice and direction on agricultural issues, interpretation of laboratory results and advice on safe levels of contaminants.

State Emergency Services (SES)

The SES is a volunteer based organisation providing response personnel support. SES is mobilised by the Department of Emergency Services in times of general emergencies and disasters.

Workplace Health & Safety (WH&S)

The Chemical Hazardous Industries and Chemicals Branch administers transport and storage of hazardous materials under the *Dangerous Goods Safety Management Act 2001*.

Transport and Main Roads (TMR)

In the event of road accidents, TMR may have a management or investigation support role as determined on a case by case basis. TMR administers the *Transport Operations (Road Use Management - Dangerous Goods) Regulation 1998*.

Local Authorities

The release of small amounts of fuel and other contaminants to freshwaters is the responsibility of local governments under Section 440ZG of the *Environmental Protection Act 1994*. Local government staff will usually be present at vehicle-related emergencies to clean-up fuel spilt on the road and on adjacent land. Councils may also clean-up small amounts of fuel or firewater in adjacent waters.

Transporters

The transport company of a vehicle involved in a spill of hazardous or dangerous goods is generally responsible for clean up costs and arrangements (via their insurer). Transporters often have private contract systems in place for the clean up of released contaminants.

Consigners & Consignees Dangerous Goods

Under the *Transport Operations (Road Use Management - Dangerous Goods) Regulation 1998* consigners and consignees must have in place appropriate emergency response plans that can be activated during accident or emergency events. As a part of this, consigners and consignees often have private contract systems in place for the clean-up of released goods.

Site Owners

Site owners are responsible for clean-up costs and arrangements where contaminants are released from a particular site. Under the *Dangerous Goods Safety Management Act 2001* occupiers of the major hazard facilities and dangerous goods locations must have in place appropriate emergency response plans that can be activated during accident or emergency events.

Contacts

Refer to Procedural Guides for Environmental Incidents: Appendix 2 - Contact List

Relevant legislation

Public Safety Preservation Act 1986
Ambulance Service Act 1991
Commonwealth Quarantine Act 1908
Dangerous Goods Safety Management Act 2001
Environmental Protection Act 1994
Exotic Diseases in Animals Act 1981
Explosives Act 1999
Transport Operations (Road Use Management - Dangerous Goods) Regulation 1998
Fire and Rescue Service Act 1990
Public Safety Preservation Act 1986
Police Powers and Responsibilities Act 2000
WH&S Act 1995 & WH&S Regulation 2008

Resource References

Emergency Services <http://www.emergency.qld.gov.au/>
State CBR Plan, Chemical/HazMat Plan, Biological Disaster Plan, Radiological Disaster Plan
Australian Veterinary Emergency Plan
National Plan to Combat Pollution of the Sea by Oil and other Substances
Marine Pollution Response Plan
Hazardous Materials Incident Recovery Plan
MOU between EPA and QH
MOU between QFRS and EPA
MOU between GBRMPA and EPA
MOU between QT and EPA

Other issues to consider

Nil.

Approved by:

Signature

Date

Dean Ellwood
Deputy Director-General
Environmental Services and Regulation

REFERENCE A

Estimating BOD potential for firewater containing foam (based on Solberg RF6 & 3x6 ATC)

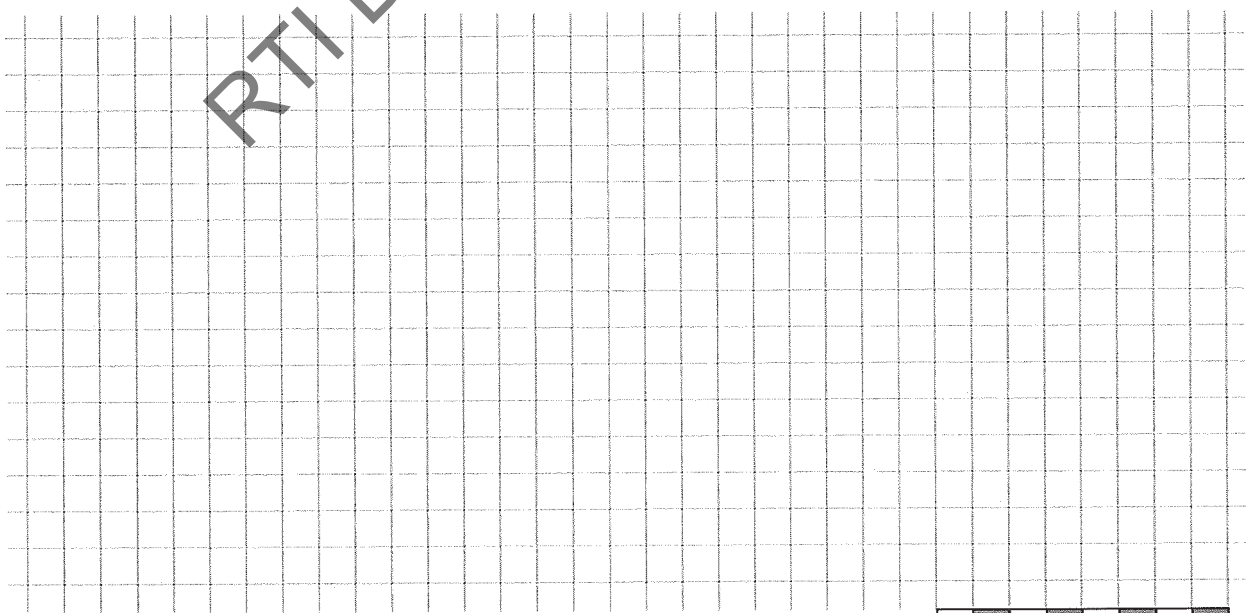
	Concentrate	@ 6%	6% 200:1 dilution	6% 1000:1 dilution
5 day BOD	210,000 mg/L	12,600 mg/L	63 mg/L	13 mg/L
10 day BOD	405,000 mg/L	24,300 mg/L	122 mg/L	24 mg/L
20 day BOD	440,000 mg/L	26,400 mg/L	132 mg/L	26 mg/L
Halve the estimates for foam applied at 3%.				

Allow for overall content in total firewater, dilution in waterway/pond and the size of the mixing zone based on local conditions to assess potential impact.

Fire water risks summary and management planner

Fill this sheet in to record risk issues considered and management options.

Issues	Details
1 QUANTITY Volume of fire water likely to be generated (seek advice from QFRS IC & site manager)	Rate: _____ KL/min Period: _____ hours Total: _____ KL
2 CONTAMINANTS Type, quantity and likely concentrations (materials on site & combustion products)	
3 TOXICITY & PERSISTENCE Immediate and delayed impact potential Persistence of contaminants (chemicals, BOD, putrescibles)	
4 FIREFIGHTING FOAM Type used for blanketing or fire fighting	Type: _____ Fluorinated? ☐ Yes / ☐ No If YES contain ALL fire water on site for disposal. Total quantity concentrate used: _____ L
5 PATHWAYS & CONTAINMENT Drains, waterways & overland flow Contain in bunded areas, stormwater dams, blocked drains, interceptor trenches & dammed waterways. Estimate dilution and mixing in waterway/pond.	Release pathways: Bund/drain holding capacity: _____ KL
6 ENVIRONMENTAL SENSITIVITIES Location, size, importance, proximity & pathways for impacts	Primary risk(s):
7 WEATHER INFLUENCES Potential for occurring or predicted rain to overwhelm detention basins or flush streams.	Forecast: Drain catchment size: Cover/divert options:



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SCALE

Cleary Amanda

From: Cleary Amanda
Sent: Thursday, 9 January 2014 12:52 PM
To: Mackenzie James
Subject: ESR report - Groundwater Contamination – Oakey Defence Base

Hi James

Please find below my ESR for the AACO. Due to the nature of the issue and potential impact on the environment, I have recommended the department formally request additional information from Defence as to the intended course of action they intend to take and in what timeframes.

Happy to discuss.

9 January 2014

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring in and around the AACO base (the Base) has detected contaminants namely Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) from fire fighting foam used in training exercises between 1970 and 2005.
- A Human Health Risk Assessment undertaken on behalf of the Department of Defence (Defence) of offsite populations concluded that the levels of contaminants detected were below the tolerable threshold and exposure to offsite populations was unlikely.
- An Ecological Risk Assessment (ERA) however identified potential risks to aquatic organisms including the EPBC protected Murray Cod and birds if the groundwater migrates to the Oakey Creek located 7.2 km from the Base.
- Groundwater is used in the area primarily for irrigation. The ERA identified four threatened ecological communities and 41 species of flora/fauna that may be adversely affected by the contaminants.
- Defence has engaged a new consultant to undertake a higher level ERA which will include a detailed biodiversity assessment and confirm source-receptor pathways into the offsite ecological food chain.
- No details have been provided regarding the management of potentially contaminated soil from the Base or potential impact of contaminants onsite.
- The Base is a federal government site and is not listed on the Contaminated Land Register or Environmental Management Register.
- A community meeting was held on 10 December 2013 to inform concerned parties about the monitoring that had been undertaken in the previous 12 months. During this meeting potential health issues were raised by a local doctor.

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater potentially affecting water quality of Oakey Creek.
- Potential ecological impact on flora and fauna in and around the Base.
- Community concern about the potential impact on human health and local ecology.
- Unknown fate/management of contaminated soil at the Base.

CUSTOMER ACTIONS:

- Defence have engaged a new consultant to undertake additional groundwater monitoring and ERA of the area surrounding the Base.
- Defence offered to test individual groundwater bores at resident's request.

DEPARTMENT ACTIONS:**[HISTORICAL ACTIONS]**

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue following the initial ground water monitoring in December 2012. JM advised EHP Contaminated Land unit of the potential issue.

[PLANNED ACTIONS]

- Formally request additional information from Defence regarding management/disposal of contaminated soil located on site; confirmation if the recommendations made in the report submitted to EHP are to be undertaken and in what timeframes.

LOCALITY DETAILS AND PHOTOGRAPHS:

- None

KEY COMMUNICATION MESSAGES:

- The department is aware of this issue and working with Defence to determine the extent of the problem.

CONTACT DETAILS:

- Name: James Mackenzie (Manager)
- Phone number: 4615 3472
- Division: ESR – Southern - West

This email is an initial alert in respect of this matter.

If further advice or action is required, it will be communicated via normal channels such as a briefing note.

END

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.



RTI DL RELEASE - EHP

Cleary Amanda

From: Mackenzie James
Sent: Thursday, 9 January 2014 1:56 PM
To: Blanchard Scott
Cc: Cleary Amanda
Subject: FW: ESR Alert - UPDATE - Groundwater Contamination – Oakey Defence Base

Scott,

Please find below an updated ESR Alert regarding PFOS groundwater contamination at Oakey Defence Base.

Updates to the previous alert are shown in red.

Please will you review and forward to Andrew.

If you have any queries please contact Amanda or myself.

Best Regards,

James

9 January 2014

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring in and around the AACO base (the Base) has detected contaminants namely **Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)** from fire fighting foam used in training exercises between 1970 and 2005.
- A Human Health Risk Assessment undertaken on behalf of the Department of Defence (Defence) of offsite populations concluded that the levels of contaminants detected were below the tolerable threshold and exposure to offsite populations was unlikely.
- An Ecological Risk Assessment (ERA) however identified potential risks to aquatic organisms including the EPBC protected Murray Cod and birds if the groundwater migrates to the Oakey Creek located 7.2 km from the Base.
- Groundwater is used in the area primarily for irrigation. The ERA identified four threatened ecological communities and 41 species of flora/fauna that may be adversely affected by the contaminants.
- Defence has engaged a new consultant to undertake a higher level ERA which will include a detailed biodiversity assessment and confirm source-receptor pathways into the offsite ecological food chain.
- No details have been provided regarding the management of potentially contaminated soil from the Base or potential impact of contaminants onsite.

- The Base is a federal government site and is not listed on the Contaminated Land Register or Environmental Management Register.
- A community meeting **was** held on 10 December 2013 to inform concerned parties about the monitoring that had been undertaken in the previous 12 months. **During this meeting potential health issues were raised by a local doctor.**

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater **potentially affecting water quality of Oakey Creek.**
- **Potential ecological impact on flora and fauna in and around the Base.**
- **Community concern about the potential impact on human health and local ecology.**
- **Unknown fate/management of contaminated soil at the Base.**
- Possible media attention following community meeting.

CUSTOMER ACTIONS:

- Defence have conducted ground water monitoring and community engagement activities.
- **Defence have engaged a new consultant to undertake additional groundwater monitoring and ERA of the area surrounding the Base.**
- **Defence offered to test individual groundwater bores at resident's request.**
- **Defence have provided EHP with copies of existing consultant reports.**

DEPARTMENT ACTIONS:

[HISTORICAL ACTIONS]

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue following the initial ground water monitoring in December 2012.
- JM advised EHP Contaminated Land unit of the potential issue.
- **JM attended community meeting on 10th December, 2013.**

[PLANNED ACTIONS]

- **Formally request additional information from Defence regarding management/disposal of contaminated soil located on site, confirmation if the recommendations made in the report submitted to EHP are to be undertaken and in what timeframes.**

LOCALITY DETAILS AND PHOTOGRAPHS:

- None

KEY COMMUNICATION MESSAGES:

- The department is aware of this issue and working with Defence to determine the extent of the problem.

CONTACT DETAILS:

- Name: James Mackenzie (Manager)
- Phone number: 4615 3472
- Division: ESR – Southern - West

This email is an initial alert in respect of this matter.

If further advice or action is required, it will be communicated via normal channels such as a briefing note.

END

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399

E: Amanda.Cleary@ehp.qld.gov.au

W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.



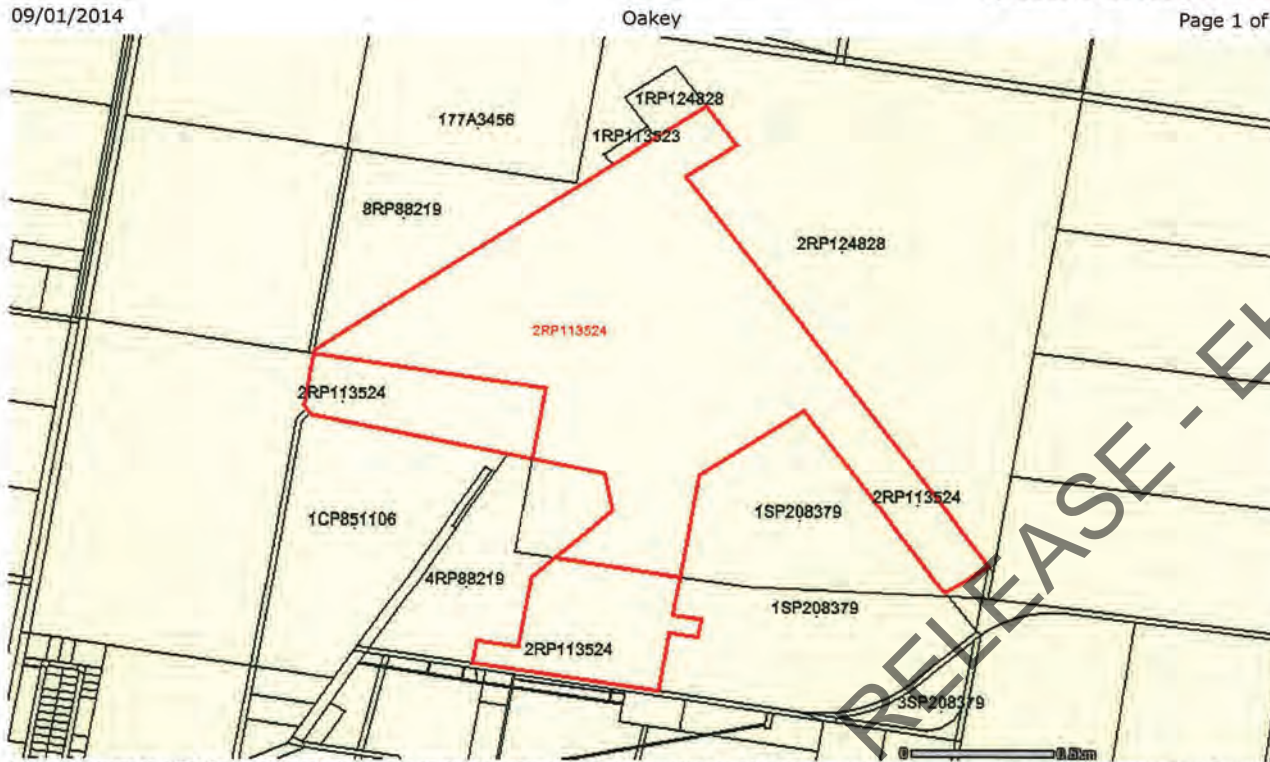
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eco maps

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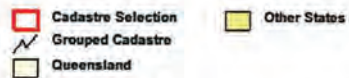
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Oakey
ecomaps Layers

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Cleary Amanda

From: Blanchard Scott
Sent: Thursday, 9 January 2014 3:01 PM
To: Connor Andrew
Cc: Mackenzie James; Cleary Amanda
Subject: FW: ESR Alert - UPDATE - Groundwater Contamination – Oakey Defence Base

Hi Andrew

Updated ESR Alert from James and Amanda below for your consideration.

Thanks

Scott

Scott Blanchard
A/Regional Manager
Southern Region (West)
Environmental Services and Regulation
Department of Environment and Heritage Protection

Ph: (07) 3381 7558
Fax: (07) 3381 7560



 Please consider the environment before printing.

From: Mackenzie James
Sent: Thursday, 9 January 2014 1:56 PM
To: Blanchard Scott
Cc: Cleary Amanda
Subject: FW: ESR Alert - UPDATE - Groundwater Contamination – Oakey Defence Base

Scott,

Please find below an updated ESR Alert regarding PFOS groundwater contamination at Oakey Defence Base.

Updates to the previous alert are shown in red.

Please will you review and forward to Andrew.

If you have any queries please contact Amanda or myself.

Best Regards,

James

9 January 2014

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring in and around the AACO base (the Base) has detected contaminants namely Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) from fire fighting foam used in training exercises between 1970 and 2005.
- A Human Health Risk Assessment undertaken on behalf of the Department of Defence (Defence) of offsite populations concluded that the levels of contaminants detected were below the tolerable threshold and exposure to offsite populations was unlikely.
- An Ecological Risk Assessment (ERA) however identified potential risks to aquatic organisms including the EPBC protected Murray Cod and birds if the groundwater migrates to the Oakey Creek located 7.2 km from the Base.
- Groundwater is used in the area primarily for irrigation. The ERA identified four threatened ecological communities and 41 species of flora/fauna that may be adversely affected by the contaminants.
- Defence has engaged a new consultant to undertake a higher level ERA which will include a detailed biodiversity assessment and confirm source-receptor pathways into the offsite ecological food chain.
- No details have been provided regarding the management of potentially contaminated soil from the Base or potential impact of contaminants onsite.
- The Base is a federal government site and is not listed on the Contaminated Land Register or Environmental Management Register.
- A community meeting was held on 10 December 2013 to inform concerned parties about the monitoring that had been undertaken in the previous 12 months. During this meeting potential health issues were raised by a local doctor.

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater potentially affecting water quality of Oakey Creek.
- Potential ecological impact on flora and fauna in and around the Base.
- Community concern about the potential impact on human health and local ecology.
- Unknown fate/management of contaminated soil at the Base.
- Possible media attention following community meeting.

CUSTOMER ACTIONS:

- Defence have conducted ground water monitoring and community engagement activities.
- Defence have engaged a new consultant to undertake additional groundwater monitoring and ERA of the area surrounding the Base.
- Defence offered to test individual groundwater bores at resident's request.
- Defence have provided EHP with copies of existing consultant reports.

DEPARTMENT ACTIONS:**[HISTORICAL ACTIONS]**

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue following the initial ground water monitoring in December 2012.

- JM advised EHP Contaminated Land unit of the potential issue.
- JM attended community meeting on 10th December, 2013.

[PLANNED ACTIONS]

- Formally request additional information from Defence regarding management/disposal of contaminated soil located on site; confirmation if the recommendations made in the report submitted to EHP are to be undertaken and in what timeframes.

LOCALITY DETAILS AND PHOTOGRAPHS:

- None

KEY COMMUNICATION MESSAGES:

- The department is aware of this issue and working with Defence to determine the extent of the problem.

CONTACT DETAILS:

- Name: James Mackenzie (Manager)
- Phone number: 4615 3472
- Division: ESR – Southern - West

This email is an initial alert in respect of this matter.

If further advice or action is required, it will be communicated via normal channels such as a briefing note.

END

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.





Department of Environment and Heritage Protection (EHP)
ABN 46 640 294 485
400 George St Brisbane, Queensland 4000
GPO Box 2454 Brisbane QLD 4001 AUSTRALIA
www.ehp.qld.gov.au

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Transaction ID: 49485607 EMR Site Id: 09 January 2014
This response relates to a search request received for the site:
Lot: 2 Plan: RP113524

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

From the 18th October 2013, the price of an EMR/CLR search will increase to \$43.00 per lot for internet based searches and \$50.55 per lot for EMR/CLR searches done by means other than the internet.

If you have any queries in relation to this search please phone 13QGOV (13 74 68)

Registrar
Administering Authority

Cleary Amanda

From: Cleary Amanda
Sent: Wednesday, 12 February 2014 11:42 AM
To: 'Defence.Oakey@aecom.com'
Subject: Request for further information

Hi Jodie,

As discussed previously, the department has a few questions (please see below) regarding the investigation into the groundwater contaminants detected in and around the Oakey Army Aviation Defence Base. Could you please review these questions and provide a response to the department. If you have any questions please do not hesitate to contact me.

Questions pertaining to the Parsons Brickerhoff *Offsite Risk Assessment, PFOS and PFOA in Groundwater: Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey* report (the Report) May 2013.

- The report looks at the environmental and health impacts of finding of PFOS and PFOA offsite. Whilst the State Government does not have jurisdiction onsite, could you please confirm if any investigation been undertaken into the impacts on environmental values onsite for example the impact of these contaminants on the state significant regional ecosystem (*Eucalyptus populnea*) located on lot 1 plan SP208379 and lot 1 SP208379 also identified as endangered Weeping Myall Woodlands under the *Environment Protection and Biodiversity Conservation Act 1999* (which is administered by the Commonwealth Government)
- Has any of the ecological risk assessments of groundwater looked at, or identified petroleum based products? If so, is there any potential for these contaminants to cause or have the potential to cause environmental harm offsite?
- Has the site where the fire fighting foam that contained PFOS and PFOA been remediated or capped to prevent further leaching of contaminants to groundwater which could migrate offsite?
- Groundwater monitoring offsite recorded exceedance PFOS and PFOA criteria set by the Minnesota Department of Health Risk Limit (HRL). Please confirm if affected users have been notified and if any other precautionary measures will be taken.
- The report acknowledges that there is potential for contaminated groundwater to discharge to Oakey Creek, and whilst there is potential risk to aquatic ecosystems and birds the impact is difficult to predict as there would be dilution of the contaminants by the time the contaminants reached the Creek. Please confirm if modelling has been undertaken to gauge how long the potential for contaminant plume to be below concentrations of concern in the groundwater and the Oakey Creek.
- Please confirm if downstream users been notified and if any other precautionary measures will be taken.
- Are the four recommendations made in the Report being implemented? And if so what are the timeframes to which they will be completed.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.



Cleary Amanda

From: AUBNE1 - Defence Oakey <Defence.Oakey@aecom.com>
Sent: Thursday, 13 February 2014 8:45 AM
To: Cleary Amanda
Cc: AUBNE1 - Defence Oakey
Subject: RE: Request for further information

Good morning Amanda

Thank you for your email.

I have sent it onto the project management team for their consideration.

Kind regards

Jodie

Defence Oakey project team

From: Cleary Amanda [mailto:Amanda.Cleary@ehp.qld.gov.au]
Sent: Wednesday, 12 February 2014 11:42 AM
To: AUBNE1 - Defence Oakey
Subject: Request for further information

Hi Jodie,

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Kind Regards,

Dr Amanda Cleary | Principal Environmental Officer

Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region

173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

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CLEARY Amanda

From: CLEARY Amanda
Sent: Tuesday, 15 April 2014 10:32 AM
To: Defence.Oakey@aecom.com
Subject: Oakey groundwater

Good morning Jodie

I was wondering if you have received a response to the departments questions listed in my email on 12 February 2014?

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

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Please note I only work Tuesdays, Wednesdays and Thursdays.



RTI DL RELEASE - EHP

CLEARY Amanda

From: AUBNE1 - Defence Oakey <Defence.Oakey@aecom.com>
Sent: Monday, 5 May 2014 3:11 PM
To: CLEARY Amanda
Cc: Lee, Frances; TiHamilton@golder.com.au; scott.callinan1@defence.gov.au
Subject: RE: Oakey groundwater enquiries responses

Dear Amanda

Thank you for your email enquiries received 12 February 2014, about the Parsons Brinckerhoff *Offsite Risk Assessment, PFOS and PFOA in Groundwater: Stage 3 Risk Assessment and Remediation Design*, Army Aviation Centre Oakey Report, May 2103.

Please find responses to your questions below:

Q1. *The report looks at the environmental and health impacts of finding of PFOS and PFOA offsite. Whilst the State Government does not have jurisdiction onsite, could you please confirm if any investigation been undertaken into the impacts on environmental values onsite for example the impact of these contaminants on the state significant regional ecosystem (Eucalyptus populnea) located on lot 1 plan SP208379 and lot 1 SP208379 also identified as endangered Weeping Myall Woodlands under the Environment Protection and Biodiversity Conservation Act 1999 (which is administered by the Commonwealth Government).*

Response:

The subject areas of concern (Lot 1 plan SP208379 and Lot 1 SP208379) are located hydraulically up-gradient relative to the identified area of known groundwater impacts. Migration of groundwater within the upper alluvial aquifer at the time of PB's investigation was inferred to be flowing to the west / north-west in a direction bearing away from mapped zones of Eucalyptus populnea. It is therefore concluded that the PFOS contaminated groundwater is not having an impact on environmental values onsite.

Q2. *Has any of the ecological risk assessments of groundwater looked at, or identified petroleum based products. If so, is there any potential for these contaminants to cause or have the potential to cause environmental harm offsite?*

Response:

The data collected to date indicates that there is no petroleum hydrocarbon contaminated groundwater migrating offsite.

Q3. *Has the site where the fire-fighting foam that contained PFOS and PFOA been remediated or capped to prevent further leaching of contaminants to groundwater which could migrate offsite?*

Response:

Fire fighting foams used on Base no longer contain PFOS and PFOA. Remediation / capping of source areas is complicated by the historical use of contaminated groundwater for irrigation on Base, creating a large area of potentially PFOS contaminated soil. Bore water is no longer used on Base.

Since being installed on Base, all fire training wastewater holding tanks have been emptied and cleaned of residual AFFF at least once a year. The water removed is treated and disposed of appropriately, in accordance with the relevant guidelines. All tanks are routinely monitored and checked for leaks on a regular basis.

Q4. *Groundwater monitoring offsite recorded exceedance PFOS and PFOA criteria set by the Minnesota Department of Health Risk Limit (HRL). Please confirm if affected users have been notified and if any other precautionary measures will be taken.*

Response:

Two community information sessions have been held - in December 2012 and December 2013 which included presentation of the extent of contaminated groundwater at the time of each of these sessions. In addition, since December 2013 a monitored community information hotline and project email address has been available to the community. Defence is committed to managing the presence of PFOS/PFOA in a way which is transparent, precautionary and based upon sound technical advice.

Q5. Are the four recommendations made in the Report being implemented? And if so what are the timeframes to which they will be completed.

Response:

Recommendation #1: Delineation of groundwater impacts in the vicinity of the site and/or groundwater contaminant fate and transport, and dilution/dispersion modelling to estimate the likely PFOS/PFOA concentrations within Oakey Creek.

- Additional sampling of landowners bores was undertaken in January 2014 to further assess the extent of the PFOS contaminated groundwater. Additional sampling is proposed in May 2014. Groundwater modelling may be undertaken as part of the next phases of investigation at the site.

Recommendation #2: Measurement of PFOS/PFOA concentrations within Oakey Creek upstream and downstream of the estimated discharge point for groundwater to the Creek.

- To be undertaken as part of the May 2014 sampling event.

Recommendation #3: Biodiversity assessment in the vicinity of the site, including Oakey Creek, to confirm the environmental values identified in the Screening ERA – this includes the presence of the Murray Cod, and other threatened flora and fauna species reported to be present in the vicinity of the site.

- likely be undertaken as part of the next phases of investigation at the site.

Recommendation #4: Further review of groundwater use in the vicinity of the site to confirm source-receptor pathways for the uptake of PFCs into the offsite ecological food chain. This will allow the CSM for ERA to be refined and any critical exposure pathways for key species identified. In the event that exposure pathways for key species are identified to be complete, a desktop study could be undertaken to determine what information is available in the scientific literature regarding benchmark doses for species similar to the identified key species.

- likely be undertaken as part of the next phases of investigation at the site.

If you require any further information, or have any other questions please contact the project team via this email defence.oakey.anz@aecom.com or telephone 1800 136 129

Regards
Sharon Suzor
Defence Oakey Project Team

From: CLEARY Amanda [mailto:Amanda.Cleary@ehp.qld.gov.au]
Sent: Tuesday, 15 April 2014 10:32 AM
To: AUBNE1 - Defence Oakey
Subject: Oakey groundwater

Good morning Jodie

I was wondering if you have received a response to the departments questions listed in my email on 12 February 2014?

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)
Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
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Australian Government
Department of Defence
Defence Support and Reform Group



Mark O'Connell
Base Support Manager Darling Downs
Department of Defence
B45 Orrs Road
Oakey, QLD 4401
☎: (07) 4577 7100
✉: mark.o'connell2@defence.gov.au

12/5/14
① Rest RB 12/5/14
② Amanda

Ms Amanda Cleary
Department of Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

8 May 2014

Date: 12/5/2014

File: 101/0007046

Item No: 2838245

Entered By: sch4-Signature

Dear Ms Cleary

Re: Project update– Army Aviation Centre Oakey (AACO) groundwater investigation

The Department of Defence is writing to update you on the progress of the ongoing investigation and assessment of the groundwater system within and adjacent to the AACO base.

It has been identified that the local groundwater may have been affected by chemicals contained in materials used in fire-fighting training undertaken on the AACO base between 1970 and 2005. These include, perfluorooctane sulphonate, known as PFOS and perfluorooctanoic acid, known as PFOA. They have also been used in a wide variety of common household and industrial products such as cleaning products, textiles and paper and packaging product for many years.

Technical consultancy firm, AECOM were engaged to undertake targeted water sampling and testing outside of the AACO base which commenced in early January 2013 to the south-west of the base. Based on preliminary testing data and what is known at this time, as a precaution landholders within the investigation area have been advised not to drink any water sourced directly from underground water bores on their property. This is the only precaution the Department of Defence has recommended at this time. No other changes to how landholders use bore water on their property, including watering gardens, irrigating crops, watering of cattle or other general household uses (apart from drinking the groundwater), have been recommended.

It is anticipated additional sites will be tested in May 2014. The outcomes of these rounds of water testing are expected to be provided to landholders in mid-2014. The project team will keep you regularly updated on the progress of the assessment.

For further information, please contact the project team on 1800 136 129 or me on [redacted]

sch4p4(6) Personal email defence.oakey.anz@aecom.com.

Yours sincerely

[redacted]
sch4-Signature

Mark O'Connell
Base Support Manager Darling Downs
Defence Support Organisation



Australian Government
Department of Defence
Defence Support and Reform Group



Mark O'Connell
Base Support Manager Darling Downs
Department of Defence
B45 Orrs Road
Oakey, QLD 4401
☎: (07) 4577 7100
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12/5/14
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Department of Environment and Heritage Protection
PO Box 731
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For further information, please contact the project team on 1800 136 129 or [sch4p4\(6\)@defence.oakey.anz@aecom.com](mailto:sch4p4(6)@defence.oakey.anz@aecom.com). (6) Personal information

Yours sincerely

sch4-Signature

Mark O'Connell
Base Support Manager Darling Downs
Defence Support Organisation



Australian Government

Department of Defence
Defence Support and Reform Group



Mark O'Connell
Base Support Manager Darling Downs
Department of Defence
B45 Orrs Road
Oakey, QLD 4401
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✉: mark.o'connell2@defence.gov.au

Mr James McKenzie
Department of Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

8 May 2014

Dear Mr McKenzie

Date: 12/5/2014
FILE: 101/229446
Item No: 2538214
Entered By: sch4-Signature

Re: Project update– Army Aviation Centre Oakey (AACO) groundwater investigation

The Department of Defence is writing to update you on the progress of the ongoing investigation and assessment of the groundwater system within and adjacent to the AACO base.

It has been identified that the local groundwater may have been affected by chemicals contained in materials used in fire-fighting training undertaken on the AACO base between 1970 and 2005. These include, perfluorooctane sulphonate, known as PFOS and perfluorooctanoic acid, known as PFOA. They have also been used in a wide variety of common household and industrial products such as cleaning products, textiles and paper and packaging product for many years.

Technical consultancy firm, AECOM, were engaged to undertake targeted water sampling and testing outside of the AACO base which commenced in early January 2013 to the south-west of the base. Based on preliminary testing data and what is known at this time, as a precaution landholders within the investigation area have been advised not to drink any water sourced directly from underground water bores on their property. This is the only precaution the Department of Defence has recommended at this time. No other changes to how landholders use bore water on their property, including watering gardens, irrigating crops, watering of cattle or other general household uses (apart from drinking the groundwater), have been recommended.

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For further information, please contact the project team on 1800 136 129 or mark.o'connell2@defence.gov.au or mark.o'connell2@defence.gov.au (6) Personal information
sch4p4(6) Personal information

Yours sincerely

sch4-Signature

Mark O'Connell
Base Support Manager Darling Downs
Defence Support Organisation

CLEARY Amanda

From: GANDER Stephen
Sent: Wednesday, 18 June 2014 12:36 PM
To: CLEARY Amanda
Cc: FORBES Johanne; GOUDIE Steve; MCKAY Adrian
Subject: AFFF @ Oakey Army Base

Hi Amanda,

I am passing on some information to regarding an enquiry from one of the Department's metering contractors.

Gierke pumps and irrigation are concerned that the levels of AFFF in the bores located on the army base may contaminate the town water supply bore that is located within close proximity to the bores in question.

John Gierke has expressed this issue to the Toowoomba Council and was surprised at their casual response at the time. He wondered if the EPA was across the issue.

Can you please give John a call on [REDACTED] to ascertain all the details of the enquiry.

Regards

Stephen Gander
Senior Project Officer
Metering & Hydrographic Support
07 4661 0234 [REDACTED] Personal information

*Department of Natural resources & Mines
Cnr Guy & Fitzroy Sts
Warwick, Qld, 4370*

CLEARY Amanda

From: CLEARY Amanda
Sent: Thursday, 19 June 2014 1:56 PM
To: GANDER Stephen
Cc: FORBES Johanne; GOUDIE Steve; MCKAY Adrian
Subject: RE: AFFF @ Oakey Army Base

Hi Stephen

Sorry it has taken me a while to get back to you but I have been trying to track down some information that would assist John Gierke and yourself.

My manager James Mackenzie attended a meeting on 10 December 2013. At this meeting there were representatives from government departments. He said there was one gentleman from Tor Street NRM. You may need to ask Steve if he knows who it was and want information they took away from the meeting.

From EHP's perspective, we have been given a copy of the preliminary investigation report that was undertaken by Parsons Brinkerhoff (PB) on behalf of Defence. I replied to Defence with a request for additional information, primarily relating to the recommendations that were made in the PB report.

Defence responded on the 8 May saying that AECOM have been engaged to undertake water sampling and testing. Their response also stated that outcome from the water testing are expected to be provided to landholders in mid 2014.

The contact details I have for them is Sharon Suzor
Defence.oakey.anz@aescom.com
1800 136 129

Hope this helps.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

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Please note I only work Tuesdays, Wednesdays and Thursdays.



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From: GANDER Stephen
Sent: Wednesday, 18 June 2014 12:36 PM
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Cc: FORBES Johanne; GOUDIE Steve; MCKAY Adrian
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Can you please give John a call on [redacted] to ascertain all the details of the enquiry.

Regards

Stephen Gander
Senior Project Officer
Metering & Hydrographic Support
07 4661 0234 [redacted] Personal information

*Department of Natural resources & Mines
Cnr Guy & Fitzroy Sts
Warwick, Qld, 4370*

RTI DL RELEASE - EHP

CLEARY Amanda

From: GOUDIE Steve
Sent: Friday, 20 June 2014 9:23 AM
To: CLEARY Amanda; GANDER Stephen
Cc: FORBES Johanne; MCKAY Adrian; CHAVASSE Jason; WELLER Jim; SANDERS Paul
Subject: RE: AFFF @ Oakey Army Base

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cheers

Steve Goudie
Manager Water Services
South Region
Dept Natural Resources and Mines
203 Tor St, Toowoomba
PO Box 318, Toowoomba Q 4350
Phone: 07 45291234
Email: steve.goudie@nr.gov.au

From: CLEARY Amanda
Sent: Thursday, 19 June 2014 1:56 PM
To: GANDER Stephen
Cc: FORBES Johanne; GOUDIE Steve; MCKAY Adrian
Subject: RE: AFFF @ Oakey Army Base

Hi Stephen

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The contact details I have for them is Sharon Suzor
Defence.oakey.anz@aescom.com
1800 136 129

Hope this helps.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.



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Please consider the environment before printing this email

From: GANDER Stephen
Sent: Wednesday, 18 June 2014 12:36 PM
To: CLEARY Amanda
Cc: FORBES Johanne; GOUDIE Steve; MCKAY Adrian
Subject: AFFF @ Oakey Army Base

Hi Amanda,

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John Gierke has expressed this issue to the Toowoomba Council and was surprised at their casual response at the time. He wondered if the EPA was across the issue.

Can you please give John a call on 444 (6) Personal information to ascertain all the details of the enquiry.

Regards

Stephen Gander

Senior Project Officer

Metering & Hydrographic Support

07 4661 0231 Section 4(6) Personal information

Department of Natural resources & Mines

Cnr Guy & Fitzroy Sts

Warwick, Qld, 4370

RTI DL RELEASE - EHP

CLEARY Amanda

From: CHAVASSE Jason
Sent: Friday, 20 June 2014 6:01 PM
To: GOUDIE Steve; CLEARY Amanda; GANDER Stephen
Cc: FORBES Johanne; MCKAY Adrian; WELLER Jim; SANDERS Paul
Subject: RE: AFFF @ Oakey Army Base

Howdy

I have been involved in these meetings with Defence regarding the contamination and from a GW management perspective. James Mckenzie was in attendance at the meeting in December from EHP.

Further work was being undertaken regarding the contamination to determine extent and movement etc.

There should be some more information from consultants mid 2014 (according to correspondence I have received) so this will provide some better information on the scope of the issue at hand.

Once there is a better understanding I think we can work on briefing and any associated management actions.

Cheers

Jason Chavasse
Principal Natural Resource Officer - GW
Department of Natural Resources and Mines

From: GOUDIE Steve
Sent: Friday, 20 June 2014 9:23 AM
To: CLEARY Amanda; GANDER Stephen
Cc: FORBES Johanne; MCKAY Adrian; CHAVASSE Jason; WELLER Jim; SANDERS Paul
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Steve Goudie

Manager Water Services

South Region

Dept Natural Resources and Mines

203 Tor St, Toowoomba

PO Box 318, Toowoomba Q 4350

Phone: 07 45291234 **Section 6 Personal information**

From: CLEARY Amanda

Sent: Thursday, 19 June 2014 1:56 PM

To: GANDER Stephen

Cc: FORBES Johanne; GOUDIE Steve; MCKAY Adrian

Subject: RE: AFFF @ Oakey Army Base

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The contact details I have for them is Sharon Suzor

Defence.oakey.anz@aescom.com

1800 136 129

Hope this helps.

Kind Regards,

Dr Amanda Cleary | Principal Environmental Officer

Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region

173 Hume Street Toowoomba

PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399

E: Amanda.Cleary@ehp.qld.gov.au

W: www.ehp.qld.gov.au

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John Gierke has expressed this issue to the Toowoomba Council and was surprised at their casual response at the time. He wondered if the EPA was across the issue.

Can you please give John a call on [redacted] to ascertain all the details of the enquiry.

Regards

Stephen Gander
Senior Project Officer
Metering & Hydrographic Support
07 4661 0234 [redacted]

*Department of Natural resources & Mines
Cnr Guy & Fitzroy Sts
Warwick, Qld, 4370*

RTI DL RELEASE - EHP

CLEARY Amanda

From: MACKENZIE James
Sent: Monday, 23 June 2014 4:01 PM
To: GOUDIE Steve
Cc: CLEARY Amanda; FORBES Johanne; MCKAY Adrian; CHAVASSE Jason; WELLER Jim; SANDERS Paul
Subject: RE: AFFF @ Oakey Army Base
Attachments: ESR Alert - Update - Groundwater Contamination - Oakey Defence Base

Hi Steve,

Further to Amanda's earlier e-mail you can find further details about the groundwater contamination at the Oakey Army Air Base at the site below;

<http://www.defence.gov.au/id/Oakey/default.asp>

AECOM are handling any queries and can be contacted at defence.oakey.anz@aecom.com or on 1800 136 129.

As Amanda has advised, I attended a community briefing in December 2103, and I am pretty certain there was also a representative from DNRM present (and I am pretty sure that TRC were represented too). AECOM ran the meeting and I am sure they would be able to furnish you with an attendance list on request.

We also escalated this issue internally and a copy of our internal ESR Alert is attached;

At this stage, AECOM are reporting that the levels of contamination are below internationally recognised thresholds for harm to humans, however there is potential for harm to aquatic life if the plume reaches Oakey creek.

As you would know, EHP has no jurisdiction over Commonwealth facilities so it is hard for us to issue them with any directions. However, at this stage, we are comfortable that Defence / AECOM are managing the situation appropriately, including management of local stakeholders who could be impacted.

AECOM is probably your best point of contact for any further / more detailed technical information, but if there is anything else we can help with please do not hesitate to contact us.

Best Regards,

James

James Mackenzie

Manager, Environmental Services & Regulation Division (ESR)

Department of Environment and Heritage Protection

Level 1 | 173 Hume Street | Toowoomba Q 4350

PO Box 731 | Toowoomba Q 4350

Telephone: 07 4615 3472 | **Facsimile:** 07 4699 4399

www.ehp.qld.gov.au





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Manager Water Services
South Region
Dept Natural Resources and Mines
203 Tor St, Toowoomba
PO Box 318, Toowoomba Q 4350
Phone: 07 45291273 **Subject: (6) Personal information**

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Defence.oakey.anz@aescom.com
1800 136 129

Hope this helps.

Kind Regards,
Jr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

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Can you please give John a call on [redacted] to ascertain all the details of the enquiry.

Regards

Stephen Gander

Senior Project Officer

Metering & Hydrographic Support

07 4661 0234 [redacted]

Department of Natural resources & Mines

Cnr Guy & Fitzroy Sts

Warwick, Qld, 4370

RTI DL RELEASE - EHP

CLEARY Amanda

From: CLEARY Amanda
Sent: Monday, 23 June 2014 10:16 AM
To: MACKENZIE James
Subject: 20140623 ESR alert update
Attachments: 20140623 ESR alert update.docx

Hi James

Please find attached the Oakey Army Base groundwater contamination ESR for your consideration.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
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23 June 2014

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring in and around the AACO base (the Base) has detected contaminants namely Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) from fire fighting foam used in training exercises between 1970 and 2005.
- A Human Health Risk Assessment undertaken on behalf of the Department of Defence (Defence) of offsite populations concluded that the levels of contaminants detected were below the tolerable threshold and exposure to offsite populations was unlikely.
- An Ecological Risk Assessment (ERA) however identified potential risks to aquatic organisms including the EPBC protected Murray Cod and birds if the groundwater migrates to the Oakey Creek located 7.2 km from the Base.
- Groundwater is used in the area primarily for irrigation. The ERA identified four threatened ecological communities and 41 species of flora/fauna that may be adversely affected by the contaminants.
- Defence has engaged a new consultant to undertake a higher level ERA which will include a detailed biodiversity assessment and confirm source-receptor pathways into the offsite ecological food chain.
- 12 February 2014 EHP provided comments on the consultant report.
- 5 May 2014 AECOM responded to EHP stating:
 - that the PFOS contaminated groundwater is not having an impact on environmental values onsite;
 - data collected to date indicates that there is no petroleum hydrocarbon contaminated groundwater migrating offsite;
 - Since December 2013 a monitored community information hotline and project email address has been available to the community;
 - Additional groundwater sampling will be undertaken in May 2014 and an update provided to the department
- The Base is a federal government site and is not listed on the Contaminated Land Register or Environmental Management Register.

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater potentially affecting water quality of Oakey Creek.
- Potential ecological impact on flora and fauna in and around the Base.
- Community concern about the potential impact on human health and local ecology.
- Unknown fate/management of contaminated soil at the Base.

CUSTOMER ACTIONS:

- Defence have engaged a new consultant to undertake additional groundwater monitoring and ERA of the area surrounding the Base.
- Defence offered to test individual groundwater bores at resident's request.

DEPARTMENT ACTIONS:

[HISTORICAL ACTIONS]

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue following the initial ground water monitoring in December 2012. JM advised EHP Contaminated Land unit of the potential issue.

LOCALITY DETAILS AND PHOTOGRAPHS:

- None

KEY COMMUNICATION MESSAGES:

- The department is aware of this issue and working with Defence to determine the extent of the problem.

CONTACT DETAILS:

- Name: James Mackenzie (Manager)
- Phone number: 4615 3472
- Division: ESR – Southern - West

This email is an initial alert in respect of this matter.

If further advice or action is required, it will be communicated via normal channels such as a briefing note.

END

RTI DL RELEASE - EHP

CLEARY Amanda

From: MACKENZIE James
Sent: Monday, 23 June 2014 4:22 PM
To: HILL Chris
Cc: CLEARY Amanda
Subject: FW: 20140623 ESR alert update
Attachments: 20140623 ESR alert update.docx

Chris,

Updated ESR Alert from Amanda.

There is no real change in the situation... Further groundwater monitoring occurred in May, but results have not yet been released.

Please will you review and forward to Andrew for his consideration.

Thanks,

James

James Mackenzie

Manager, Environmental Services & Regulation Division (ESR)
Department of Environment and Heritage Protection
Level 1 | 173 Hume Street | Toowoomba Q 4350
PO Box 731 | Toowoomba Q 4350
Telephone: 07 4615 3472 | **Facsimile:** 07 4699 4399
www.ehp.qld.gov.au



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Sent: Monday, 23 June 2014 10:16 AM
To: MACKENZIE James
Subject: 20140623 ESR alert update

Hi James

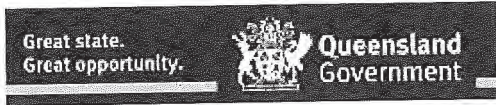
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Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

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RTI DL RELEASE - EHP

23 June 2014

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- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

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RTI DL RELEASE - EHP



Australian Government

Department of Defence
Defence Support and Reform Group

Date: 17/7/14

file: 1010009446

Item No: 3032079

Entered By: sch4-Signature

Mark O'Connell
Base Support Manager Darling Downs
Department of Defence
B45 Orrs Road
Oakey, QLD 4401
☎: (07) 4577 7100
✉: mark.o'connell2@defence.gov.au

14 July 2014

Ms Amanda Cleary
Department of Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

sch4-Signature

17/7/14
① James
17/7
② Amanda
L Fh.



Dear Ms Cleary

**Re: Army Aviation Centre Oakey (AACO) – Groundwater Investigation
Project update and community information session**

The Department of Defence is writing to update you on the progress of the ongoing investigation and assessment of the groundwater within and adjacent to the AACO.

As mentioned in previous correspondence (dated 8 May 2014), it has been identified that the local groundwater may have been affected by chemicals contained in materials used in fire-fighting training undertaken on the AACO between 1970 and 2005. These include Perfluorooctane sulphonate (PFOS) and Perfluorooctanoic acid (PFOA).

In January and May 2014, targeted water sampling and testing occurred outside of the AACO property boundary, to the west and south-west. Defence has provided results from these two rounds of testing to participating landowners.

As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property.

Please note that Defence will be holding a community information session on Tuesday 29 July 2014 between 18:00 and 19:30 at the Oakey Cultural Centre to update local residents on the progress of the investigation.

Should a meeting prior to the information session be required, Defence will be available on Tuesday 29 July 2014 to meet with you and your respective representatives in:

- Brisbane between 8:00 and 10:00, or
- Toowoomba/Oakey between 14:30 and 16:30

For more information about this ongoing, long-term investigation please see the flyer enclosed.

For further discussion, please contact me directly or alternatively contact the project team on 1800 136 129, email defence.oakey.anz@aecom.com, or visit the project website:
<http://www.defence.gov.au/id/Oakey/default.asp>.

Yours sincerely

sch4-Signature

Mark O'Connell
Base Support Manager Darling Downs
Defence Support Organisation



Army Aviation Centre Oakey – Groundwater Investigation

About the Investigation

Defence has undertaken environmental investigations and identified that groundwater beneath the Army Aviation Centre Oakey (AACO) site may have been impacted by the historical use of fire-fighting foams during training activities, held between 1970 and 2005.

These foams contained perfluorooctane sulphonate, known as PFOS, and perfluorooctanoic acid, known as PFOA.

Defence has commenced targeted water sampling to the west and south-west of the base as part of a long-term investigation into the potential human health risks to water users that may be associated with the levels of PFOS and PFOA in groundwater.

Site investigations and assessments are continuing to identify how far these impacts have travelled.

Water sampling and testing

Targeted water sampling and testing outside of the AACO site commenced in early January 2014 to the south-west of the base.

Defence also conducted additional testing in May 2014. Results from the most recent tests will be used to verify the initial groundwater data obtained during the preliminary sampling round in January 2014.

The outcomes of these rounds of water testing are expected to be provided to landholders in mid-2014.



What are we testing for?

This investigation involves testing the groundwater for PFOS and PFOA. These substances are considered likely to be present as a result of activities at the AACO.

However, these substances are also present at trace levels throughout the environment because, in addition to their inclusion in fire-fighting foams, PFOS and PFOA have been used for many years in a wide variety of common household and industrial products such as cleaning products, textiles and paper and packaging products.

Possible health impacts from long term exposure to PFOS or PFOA are not fully understood. They are what are known as “emerging contaminants” and to date, limited research has been done in Australia or overseas into the possible health impacts of these chemicals.

Using underground water

As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property.

Further assessment of potential health impacts associated with other uses of the underground water will be undertaken as part of Defence's ongoing investigations.





Previous consultation activities

Defence would like to thank the local community for its cooperation and assistance during this ongoing investigation and assessment of the local groundwater.

An initial community information session was held in December 2012.

In December 2013, a community information session was held to update key stakeholders and residents about the project.

Individual landowner meetings were undertaken in late 2013.

In January 2014 and May 2014 Defence liaised with affected landholders to undertake bore water sampling and testing. Test results are expected to be provided to these landholders in mid-2014.

Defence will continue to work cooperatively with the relevant Federal and State agencies to ensure the safety of all Defence personnel and the local community.

Invitation—community information session

A community information session about the project will be held:

Tuesday 29 July 2014

6.00—7.30pm

Oakey Cultural Centre

Corner of McDonald and Campbell Streets, Oakey

If you would like to attend, please RSVP to defence.oakey.anz@aecom.com before Monday 28 July 2014.

Contact



Community hotline: 1800 136 129



www.defence.gov.au/id/oakey



defence.oakey.anz@aecom.com



Army Aviation Centre Oakey (AACO)
Groundwater Investigation Project
C/AECOM Pty Ltd
PO Box 1307
Fortitude Valley QLD 4006

Media enquiries should be directed to Defence Media Operations on (02) 6127 1999 or mediaops@defence.gov.au



CLEARY Amanda

From: MACKENZIE James
Sent: Thursday, 17 July 2014 6:35 PM
To: CLEARY Amanda; HILL Chris
Subject: RE: Army Aviation Centre Oakey Groundwater Investigation - letter

Amanda,

Unfortunately, [redacted] on the 29th July, so will not be able to attend any of the meetings, however Chris Hill will likely be able to attend the afternoon meeting in Toowoomba. Unless we discover something new at the pre-meeting, at this stage I don't think there is any need for anyone from EHP to attend the public meeting, since based on the last public meeting they will only present information that is already in the public domain. It is mainly a forum for local landowners to ask questions, and I don't believe EHP has a role to play in this.

By way of a brief to Chris, my summary of the situation is as follows;

- The state has no jurisdiction over commonwealth land.
- As part of Defence's 'good neighbour' policy Defence voluntarily agreed to put certain lots on plan onto the EMR / CLR, but there was / is no statutory requirement for them to do so.
- EHP has an interest in any contaminants that leave the site that may cause environmental harm.
- Contam Land unit only have jurisdiction if there is a notifiable activity occurring (unlikely) or contaminated land outside the boundary of the air base (possible?).
- Contam land would also have an interest if contaminated solid was to be removed from the site that is listed on the EMR / CLR.
- ESRs interest, is I believe, limited to whether or not environmental harm has been caused, and the steps being taken to manage the risk of current / future harm.
- DNRM would be interested in the impacts to waters as defined by the acts they administer.

I believe that our primary role is to keep a watching brief on the situation, to ensure that no further harm is accused and that any current risks are adequately managed. I believe that we could use tools such as an EE or EPO, but only for the contaminants that have left the air base, and only if we had sufficient grounds (which presumably we would know after we see the results which are to be presented on the 29th.)

We can discuss next week if required, although I will need to dial in from Roma. (Tuesday afternoon would probably work best.)

Best Regards,

James

From: CLEARY Amanda
Sent: Thursday, 17 July 2014 9:20 AM
To: MACKENZIE James
Subject: FW: Army Aviation Centre Oakey Groundwater Investigation - letter

Hi James

Please find attached a letter from Defence. They would like to meet Tuesday week to discuss the groundwater. I have been in touch with Jason Chavasse (NRM), he is also interested in meeting with defence. I proposed we could meet at our office. Can you please confirm if you would like to attend A: the pre community meeting and B: the community meeting or if you want me to so I can make arrangements.

CLEARY Amanda

From: CLEARY Amanda
Sent: Thursday, 17 July 2014 9:58 AM
To: JOHNS Allen
Cc: MACKENZIE James; BRADSHAW Tony
Subject: Oakey Army Base
Attachments: 20140109 EMR CLR 2RP113524.pdf; 20140109 ESR alert.docx; 20140623 ESR alert update.docx; PB Assessment report.pdf; RE: Oakey groundwater enquiries responses; Request for further information

Morning Allen

Please find attached the documents/corro that I have on the Oakey Army Aviation groundwater contamination issue.

As discussed, what I was looking for originally in January was if the site should be on the EMR and what "tools" the department could use in the event of offsite impacts.

Defence wrote to the department on 8 May stating that AECOM have been engaged to undertake targeted water sampling off the base and they will get back to us with the details which is what this proposed meeting is for.

Any advice you can provide us would be greatly appreciated.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.



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Please consider the environment before printing this email

CLEARY Amanda

From: JOHNS Allen
Sent: Thursday, 17 July 2014 2:29 PM
To: BRADSHAW Tony; COOK David
Cc: CLEARY Amanda
Subject: FW: Oakey Army Base
Attachments: Request for Legal Advice - sch3(7) Information subject to legal professional privilege
sch3(7) Information subject to legal professional privilege

sch3(7) Information subject to legal professional privilege

Hi David and Tony,

Could you please confirm if you are able to attend the Toowoomba meeting (phone in) between 14.30 and 16.30 on 19 July 2014. I think it would be best to meet all at once.

Regards

Allen Johns

Principal Environmental Officer | Waste and Land Contamination Assessment Unit |
Environmental Services & Regulation | Department of Environment and Heritage Protection

Phone +61 (07) 3330 5694

Email: allen.johns@ehp.qld.gov.au

Level 9, 400 George Street, Brisbane, QLD 4001

GPO Box 2454, Brisbane QLD 4001

 Please consider the environment before printing this email

Great state.
Great opportunity.



Queensland
Government

From: CLEARY Amanda
Sent: Thursday, 17 July 2014 9:58 AM

To: JOHNS Allen
Cc: MACKENZIE James; BRADSHAW Tony
Subject: Oakey Army Base

Morning Allen

Please find attached the documents/corro that I have on the Oakey Army Aviation groundwater contamination issue.

As discussed, what I was looking for originally in January was if the site should be on the EMR and what "tools" the department could use in the event of offsite impacts.

Defence wrote to the department on 8 May stating that AECOM have been engaged to undertake targeted water sampling off the base and they will get back to us with the details which is what this proposed meeting is for.

Any advice you can provide us would be greatly appreciated.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
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Please note I only work Tuesdays, Wednesdays and Thursdays.



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Please consider the environment before printing this email

CLEARY Amanda

From: JOHNS Allen
Sent: Monday, 15 July 2013 11:19 AM
To: HOULT Liana
Cc: ARMSTRONG Kate
Subject: FW: EMR listing of site
Attachments: soil-disposal-permit-form-partb.pdf; form-general-details-part-a-em1124.pdf

Hi Liana,

Could I please if possible get an update on the below matter thanks Allen

Regards

Allen Johns

Principal Environmental Officer | Waste and Land Contamination Assessment Unit |
Environmental Services & Regulation | Department of Environment and Heritage Protection

Phone +61 (07) 3330 5694

Email: allen.johns@ehp.qld.gov.au

Level 9, 400 George Street, Brisbane, QLD 4001

GPO Box 2454, Brisbane QLD 4001



Please consider the environment before printing this email

From: Armstrong Kate
Sent: Wednesday, 10 July 2013 12:11 PM
To: Johns Allen
Subject: FW: EMR listing of site

Al – we will need advice on this matter. It will not be as simple as list or not list. I have called Liana Hoult in Litigation to work out if this particular site can be listed... there are different rules for different types of commonwealth sites (so I have been told to date).

As I am out this afternoon can you follow up with litigation and see if we can get any advice to assist with our decision making?

Thanks

Kate

From: Francis Karen **On Behalf Of** WLCA
Sent: Wednesday, 10 July 2013 11:48 AM
To: Armstrong Kate
Subject: FW: EMR listing of site

Kate

Please see email request below

Karen Francis
Senior Administration Officer
Permit and Licence Management
Environmental Regulatory Practice and Support,
Environmental Performance and Coordination
Telephone: 1300 130 372 (select option 4)

Facsimile: (07) 3330 5875
Email: palm@ehp.qld.gov.au

Department of Environment and Heritage Protection
400 George Street, Brisbane Q 4000
GPO Box 2454, Brisbane Q 4001
www.ehp.qld.gov.au

From: Luke, Shaun [<mailto:SLuke@pb.com.au>]
Sent: Tuesday, 9 July 2013 6:01 PM
To: WLCA
Subject: EMR listing of site

Hi,
Following up from a phone conversation Kate Armstrong had with Ivan Neralic (Parsons Brinckerhoff) this afternoon we have provided the site information (attached). If you could please reply back and inform us whether the site will need to be listed or not so a disposal permit can be processed to take soil off site, that would be appreciated. My contact details are below.

Regards

Shaun Luke
Environmental Engineer
Contaminated Land Management
Parsons Brinckerhoff
Level 4, Northbank Plaza
69 Ann Street
GPO Box 2907
Brisbane QLD 4001
AUSTRALIA

Direct: +61(0)7 3854 6732
Mobile: +61(0)7 3854 6732
Fax: +61(0)7 3854 6500
Email: sluke@pb.com.au

www.pbworld.com
www.pb.com.au

NOTICE: This communication and any attachments ("this message") may contain confidential information for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on this message is strictly prohibited. If you have received this message in error, or you are not an authorized recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your e-mail system and destroy any printed copies.

Form

Contaminated land

Part B - Application for contaminated soil disposal permit

This is the approved form for making an application to the administering authority for a disposal permit to treat or dispose of contaminated soil from land recorded in the environmental management register (EMR) or contaminated land register (CLR) under s. 424 of the Environmental Protection Act 1994 (EP Act).

This form should be completed and forwarded to the administering authority with the form Part A - General Details for all Applicants (EM1124¹).

For more information about soil disposal permits see the Guideline for Contaminated Land Professionals, available on the EHP website: <www.ehp.qld.gov.au>

1 Site information

1.1 Site location

Please provide details of site(s) the soil is proposed to be removed from

List any attachments provided.

FULL STREET ADDRESS OF SITE(S) Corner of Kehiller Street and Leak Street, Gallipoli Barracks, Enoggera	
LOT(S) 423 and 424	PLAN(S) S3127
LOCAL GOVERNMENT AREA Brisbane City Council	
ATTACHMENTS Yes, see Part A form for list of attachments.	

1.2 Site investigation

Has a site investigation report been submitted to the Department of Environment and Heritage Protection (EHP)? If yes please provide a project reference or file number.

☒ NO ☐ YES EHP project reference or file number)

1.3 Certificate of Title

Please provide a copy of the current Certificate of Title to the land

☒ Enclosed with this application ☐ Submitted previously to EHP as part of a site investigation/validation report

¹ This is the publication number, which can be used as a search term to find the latest version of the publication at <www.ehp.qld.gov.au>.

Part B - Application for contaminated soil disposal permit

1.4 Is the site currently recorded in the environmental management register or contaminated land register because the land has been used for a notifiable activity or has been contaminated by a hazardous contaminate?

- ☐ YES ☒ NO (If no, the owner or occupier of the land must submit a notification form to the administering authority, under chapter 371 of the EP Act)

2 Soil removal and disposal**2.1 Soil volume**

What is the approximate volume (in cubic metres) of soil to be removed (allowing for excavation bulking)? Over estimate the amount as a new permit will be required if the limit is reached before the disposal is complete.

600 cubic metres (600 m³) of soil containing asbestos cement sheeting.

2.2 Disposal period

What are the dates between which soil is proposed to be moved to the disposal location?

FROM DATE:
09/07/2013

TO DATE:
30/08/2013

Note: In accordance with section 424(7) of the EP Act soil disposal permits only authorise the disposal of soil for the term stated on the disposal permit.

2.3 Disposal location

What is the proposed disposal location?

Note: you must provide written acceptance of local government or registered owner of the site to receive the soil. If the soil is being disposed at a non local government administered landfill you must also provide a copy of the Certificate of Title

- (a) ☐ Proposed to dispose of soil at local government administered landfill site

NAME AND ADDRESS OF LOCAL GOVERNMENT ADMINISTERED LANDFILL

- ☐ Written acceptance from the local government is enclosed

- (b) ☒ Proposed to dispose of soil at a non local government-administered landfill

LOT(S)	PLAN(S)
FULL STREET ADDRESS OF SITE(S)	

- ☒ Written acceptance from registered owner of site is enclosed with this application, stating the amount of soil and the type of contaminants present in the soil the non-government landfill has agreed to accept.

Part B - Application for contaminated soil disposal permit

- (c)
- ☐
- Proposed to remove soil to another parcel of land on the EMR or CLR

LOT(S)	PLAN(S)
FULL STREET ADDRESS OF SITE(S)	

- ☐ Accepting land is listed on the EMR or CLR
- ☐ Written acceptance from registered owner of site is enclosed with this application, stating the amount of soil and the type of contaminants present in the soil the site owner has agreed to accept.

3 Supporting information**3.1 Management options**

Disposal to landfill should only be considered where no other method of dealing with the contaminated soil is available / viable.

State reason(s) why on-site treatment or management is not proposed.

Limited room on site to remediate and dispose of soil.

3.2 Is it proposed to undertake validation sampling to confirm that all soil has been removed?

☒ NO ☐ YES

3.3 Provide a description of the contamination present in the soil to be removed

Excavated material from a road development at the Gallipoli Barracks, Enoggera. There is 600 cubic metres of material which contains fragments asbestos of bonded asbestos cement sheeting. Validation sampling of the underlying soil is not proposed, however a walkover inspection of the underlying surface will be undertaken to verify that there are no remaining fragments of bonded asbestos cement sheeting on the site surface and a clearance certificate will be provided to the client.

3.4 Please tick relevant boxes below to indicate that you have attached the following information with this application and list the relevant attachments. If a site investigation report has been or is being submitted to the administering authority, refer to the relevant sections of that report.

Required information	Attachment name / number and section
☒ Scaled plan showing soil sampling locations and contamination source(s)	Attachment D
☐ Tabulation of soil analysis results	NA
☐ Toxicity Characteristic Leaching Procedure (TCLP) results from relevant soil samples	NA
☒ Copies of all laboratory reports and sample receipt advices for all soil analysis	Attachment E

Part B - Application for contaminated soil disposal permit

☒ Explanation of location and depths of samples, how samples were collected, and how sample integrity was maintained	Attachment G
--	--------------

Declaration

Note: If you do not tell the truth in this application you may be liable for prosecution under the relevant legislation.

- I do solemnly and sincerely declare that the information provided is true and correct to the best of my knowledge. I understand that it is an offence under s480 of the *Environmental Protection Act 1994* to give to the administering authority or an authorised person a document containing information that I know to be false, misleading or incomplete in a material particular; and
- I understand that all information supplied on or with this application form may be disclosed publicly in accordance with the *Right to Information Act 2009* and the *Evidence Act 1977*.

APPLICANT'S NAME Ivan Neralic	PRINT NAME OF APPOINTED SIGNATORY (IF APPLICABLE)
----------------------------------	---

APPLICANT'S SIGNATURE/APPOINTED SIGNATORY	DATE 9 July 2013
---	---------------------

4 Applicant checklist

Required	Not Applicable	
☒	☐	Part A form completed
☒	☐	All sections of the form have been completed
☒	☐	Letter of acceptance from landfill attached (if required).
☒	☐	Application form(s) signed and dated
☒	☐	Supporting information attached
☒	☐	Completed notification of land form (if the originating site is not listed on the EMR or CLR).

Please return your completed application kit to:

Permit and Licence Management
Implementation and Support Unit
Department of Environment and Heritage Protection
GPO Box 2454
Brisbane Queensland 4001
Enquiries: **1300 130 372 (Option 4)**
Email: palm@ehp.qld.gov.au

Form

Corporate

Part A - General details for all applications

OFFICIAL USE ONLY

DATE RECEIVED

FILE REF

PROJECT REF

COMPLETE FORM

☐

ENTERED BY [SIGNATURE]

DATE

RECEIPTING DETAILS ONLY

DATE RECEIPTED

RECEIPT NUMBER

AMOUNT RECEIVED

\$

PROCESSED BY (INITIALS AND NAME)

Important information for applicants

This form asks for general applicant details and a description of the proposed project and any associated activities. The completed form must be submitted together with relevant activity specific Part B forms.

Specific details must accompany this form to enable your application to be processed. The guide provided will help you complete your application correctly. If you have any difficulties completing the form, contact Permit and Licence Management on 1300 130 372 (Option 4). Please number all attachments alphabetically (e.g. 'Attachment A').

Commercial and confidential information must be marked clearly. This information will not be disclosed, except where required by law (including the *Right to Information Act 2009*). If subsequent activities are added to the project, you will be required to resubmit this application with details of the additional activity.

Tick relevant boxes below if the applicant(s) are:

- ☐ an individual or sole trader
☐ individuals in a partnership
☐ individual(s) acting on behalf of an unincorporated organisation

→ Go to Section 1

- ☒ an incorporated company
☐ an incorporated association
☐ a statutory authority
☐ a body politic

→ Go to Section 2

Form

Part A - General details for all applications

Guide

Question 1

The applicant is the person intending to carry out the activity and in whose name the relevant permits or licences are to be issued.

The registered address is legally required for the serving of notices.

It is the address of a person and cannot be a post office box.

If more than one applicant as part of a partnership, complete the form Joint Applicant Details (EM1863) and attach to this form.

1 Individual applicant(s) details

APPLICANT'S FULL NAME	TITLE	DATE OF BIRTH
-----------------------	-------	---------------

REGISTERED ADDRESS	POST CODE
--------------------	-----------

PHONE	FAX	EMAIL
-------	-----	-------

POSTAL ADDRESS (WRITE "AS ABOVE" IF THE SAME AS REGISTERED ADDRESS)	POST CODE
---	-----------

Guardian details (if applicable)

A parent or legal guardian must complete the following details if an applicant is less than 18 years of age.

GUARDIAN'S FULL NAME	DATE OF BIRTH
----------------------	---------------

GUARDIAN'S REGISTERED ADDRESS	POST CODE
-------------------------------	-----------

GUARDIAN'S SIGNATURE	DATE
----------------------	------

→ Go to Section 3

2 Applicant details

Question 2

The applicant is the registered legal entity (not a business trading name) intending to carry out the activity and in whose name the relevant permits or licences are to be issued.

The registered address is legally required for the serving of notices. It is the registered business address of the company making the application and cannot be a post office box.

Enter the Australian Business Number (ABN); or the Australian Company Number (ACN) of the incorporated company; or the Association Number (AN) of the incorporated association; or the title and section of the legislation that gives the statutory corporation its legal status.

REGISTERED LEGAL ENTITY NAME Parsons Brinckerhoff Australia Pty Ltd
--

TRADING NAME (IF APPLICABLE) Parsons Brinckerhoff Australia Pty Ltd
--

REGISTERED ADDRESS Level 4, Northbank Plaza, 69 Ann Street, Brisbane	POST CODE 4001
---	-------------------

PHONE 07 3854 6200	FAX 07 3854 6500	E-MAIL/WEBSITE www.parosnsbrinckerhoff.com.au
-----------------------	---------------------	--

POSTAL ADDRESS (WRITE "AS ABOVE" IF THE SAME AS REGISTERED ADDRESS) Parsons Brinckerhoff, GPO Box 2907, Brisbane, QLD	POST CODE 4001
--	-------------------

ABN/ACN/AN OR TITLE AND SECTION OF LEGISLATION ABN 80 078 004 798, ACN 078 004 798

Principal contact or person in charge details

PRINCIPAL CONTACT/PERSON IN CHARGE FULL NAME Ivan Neralic	TITLE Mr
--	-------------

POSITION IN CORPORATION Principal - Contaminated Land Management

TELEPHONE 07 3854 6057	FASCIMILE 07 3854 6500	E-MAIL/WEBSITE ineralic@pb.com.au
---------------------------	---------------------------	--------------------------------------

POSTAL ADDRESS (WRITE "AS ABOVE" IF THE SAME AS REGISTERED ADDRESS) "AS ABOVE"	POST CODE
---	-----------

Part A - General details for all applications

Authorised signatory

The authorised signatory is the person authorised to sign an application on behalf of a corporation and in doing so declares that the corporation will be bound by the conditions associated with the granting of the licence or permit.

AUTHORIZED SIGNATORY FULL NAME	TITLE
Ivan Neralic	Mr

POSITION IN CORPORATION
Principal - Contaminated Land Management

3 Project details**Pre-lodgement**

Have you previously attended a pre-lodgement meeting or submitted a pre-lodgement form for this project?

☒ No

☐ Yes

PROJECT NUMBER (IF APPLICABLE)

Project description

Briefly describe the proposed activities, works, development or management.

Attach a separate sheet if there is insufficient space below.

DESCRIPTION
Parsons Brinckerhoff is submitting an application for a disposal permit to remove approximately 600 cubic metres of soil impacted with asbestos.

Form
Part A - General details for all applications

This information should at least provide enough details to allow a Department of Environment and Heritage Protection officer to locate the site of the proposal.

Give as much information as possible to accurately locate your activity, for example maps with contextual or boundary lines on plan or GPS boundary co-ordinates.

Geographical co-ordinates can include northing/easting, longitude/latitude.

Approvals required

Please list all Part B application forms you are attaching to this form.

APPLICATION FORMS

Part B - Application for contaminated soil disposal permit.

Project site

Where will the activities be conducted? Provide the street address, real property description(s) of the land(s) in which the project is located and local government area. If you require more space, attach a separate sheet.

STREET ADDRESS

Corner of Kehiller Street and Leak Street, Gallipoli Barracks, Enoggera

LOT

423 and 424

PLAN

S3127

LOCAL GOVERNMENT AREA

Brisbane City Council

If possible, provide a specific location within a protected area, a property name or an attached map with the project area clearly delineated. Also include the map name/details.

SPECIFIC LOCATION/PROPERTY NAME

See attached Figure (Attachment XX)

PROTECTED AREA

GEOGRAPHICAL CO-ORDINATES

Part A - General details for all applications

Label all attachments alphabetically
(e.g. 'Attachment A')

Attachments

List all attached documents, including maps containing information supporting this application in the space below. If there are no attachments mark "N/A."

ATTACHMENTS (LABEL ALL ATTACHMENTS ALPHABETICALLY – E.G. "ATTACHMENT A")

A - Part B Application for contaminated soil disposal permit

B - Current certificates of title

C - EMR search results

D - Figure showing site location

E - Laboratory analytical certificates (PB)

F - Landfill acceptance letter

G - Description of sampling technique

RTI DL RELEASE - EHP

Privacy statement

The Department of Environment and Heritage Protection is committed to protecting the privacy, accuracy and security of your personal information in accordance with the *Information Privacy Act 2009*. The department is collecting your personal information in accordance with the Act specified in the relevant Part B form in order to process your application. The information will only be accessed by authorised employees within the department. Some of this information may be given to another department or agency as indicated in the privacy statement on the relevant Part B form. Your information will not be given to any other person or agency unless you have given us permission or we are authorised or required by law. All information supplied on this form may be disclosed publicly in accordance with the *Right to Information Act 2009* and *Evidence Act 1977*. For queries about privacy matters email: AdminReview@ehp.qld.gov.au or telephone: (07) 3896 3705.

Further Information

The latest version of this publication can be found at <www.ehp.qld.gov.au>. Note: where available, the publication number (e.g. EM1124 for this document) can be used as a search term.

4 Applicant's certification

If you have not told the truth in this application you may be liable for prosecution under the relevant Acts or Regulations.

- I do solemnly and sincerely declare that the information provided is true and correct to the best of my knowledge.
- I understand that information supplied on or with this application form may be disclosed publicly in accordance with the *Right to Information Act 2009* and the *Evidence Act 1977*.

APPLICANT (1) SIGNATURE

Joint applicant signatures (if applicable)

APPLICANT(2) SIGNATURE

APPLICANT(3) SIGNATURE

APPLICANT(4) SIGNATURE

APPLICANT(5) SIGNATURE

DATE

Complete the following checklist.

- ☒ Application form(s) signed and completed
- ☐ Permit fees paid or enclosed (if applicable)
- ☒ Supporting information attached (e.g. maps)

Please return your completed application to:

Permit and Licence Management
Implementation Support Unit
Department of Environment and Heritage Protection
GPO Box 2454
Brisbane Queensland 4001

Enquiries: 1300 130 372 (Option 4)

Fax: (07) 3330 5875

Email: palm@ehp.qld.gov.au



Australian Government

Department of Defence

Defence Support and Reform Group

Scott Callinan
Assistant Director
Directorate of Environmental Remediation
Programs (DERP)
BP26 – 2 – B043
Environment & Engineering
Department of Defence
CANBERRA ACT 2600
Scott.Callinan1@defence.gov.au
Tel: 02 6266 8076
Fax: 02 6266 8166

14 July 2014

Mr David Cook
Department of Environment and Heritage Protection
GPO Box 2454
Brisbane Qld 4001

Dear Mr Cook

**Re: Army Aviation Centre Oakey (AACO) – Groundwater Investigation
Project update and community information session**

The Department of Defence is writing to update you on the progress of the ongoing investigation and assessment of the groundwater within and adjacent to the AACO.

As mentioned in previous correspondence with DEHP, Toowoomba (dated 8 May 2014), it has been identified that the local groundwater may have been affected by chemicals contained in materials used in fire-fighting training undertaken on the AACO between 1970 and 2005. These include Perfluorooctane sulphonate (PFOS) and Perfluorooctanoic acid (PFOA).

In January and May 2014, targeted water sampling and testing occurred outside of the AACO property boundary, to the west and south-west. Defence has provided results from these two rounds of testing to participating landowners.

As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property.

Please note that Defence will be holding a community information session on Tuesday 29 July 2014 between 18:00 and 19:30 at the Oakey Cultural Centre to update local residents on the progress of the investigation.

Should a meeting prior to the information session be required, Defence will be available on Tuesday 29 July 2014 to meet with you and your respective representatives in:

- Brisbane between 8:00 and 10:00, or
- Toowoomba/Oakey between 14:30 and 16:30

For more information about this ongoing, long-term investigation please see the flyer enclosed.

For further discussion, please contact Scott Callinan directly or alternatively contact the project team on 1800 136 129, email defence.oakey.anz@aecom.com, or visit the project website:
<http://www.defence.gov.au/id/Oakey/default.asp>.

Yours sincerely,

sch4-Signature

Scott Callinan
Assistant Director
Defence Environmental Remediation Programs
Environment and Engineering Branch



Army Aviation Centre Oakey -- Groundwater Investigation

About the Investigation

Defence has undertaken environmental investigations and identified that groundwater beneath the Army Aviation Centre Oakey (AACO) site may have been impacted by the historical use of fire-fighting foams during training activities, held between 1970 and 2005.

These foams contained perfluorooctane sulphonate, known as PFOS, and perfluorooctanoic acid, known as PFOA.

Defence has commenced targeted water sampling to the west and south-west of the base as part of a long-term investigation into the potential human health risks to water users that may be associated with the levels of PFOS and PFOA in groundwater.

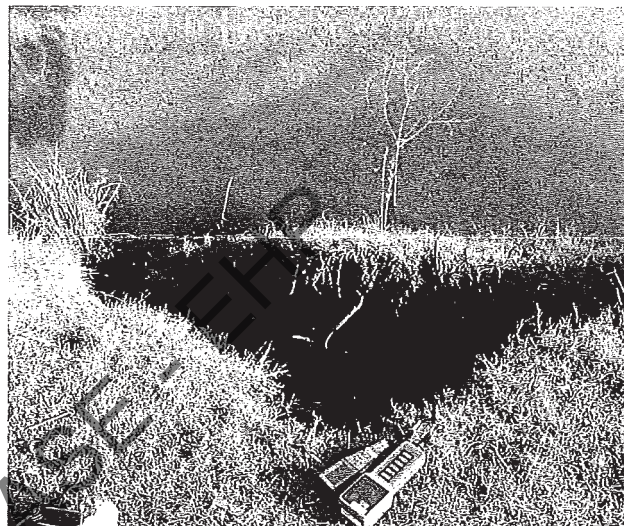
Site investigations and assessments are continuing to identify how far these impacts have travelled.

Water sampling and testing

Targeted water sampling and testing outside of the AACO site commenced in early January 2014 to the south-west of the base.

Defence also conducted additional testing in May 2014. Results from the most recent tests will be used to verify the initial groundwater data obtained during the preliminary sampling round in January 2014.

The outcomes of these rounds of water testing are expected to be provided to landholders in mid-2014.



What are we testing for?

This investigation involves testing the groundwater for PFOS and PFOA. These substances are considered likely to be present as a result of activities at the AACO.

However, these substances are also present at trace levels throughout the environment because, in addition to their inclusion in fire-fighting foams, PFOS and PFOA have been used for many years in a wide variety of common household and industrial products such as cleaning products, textiles and paper and packaging products.

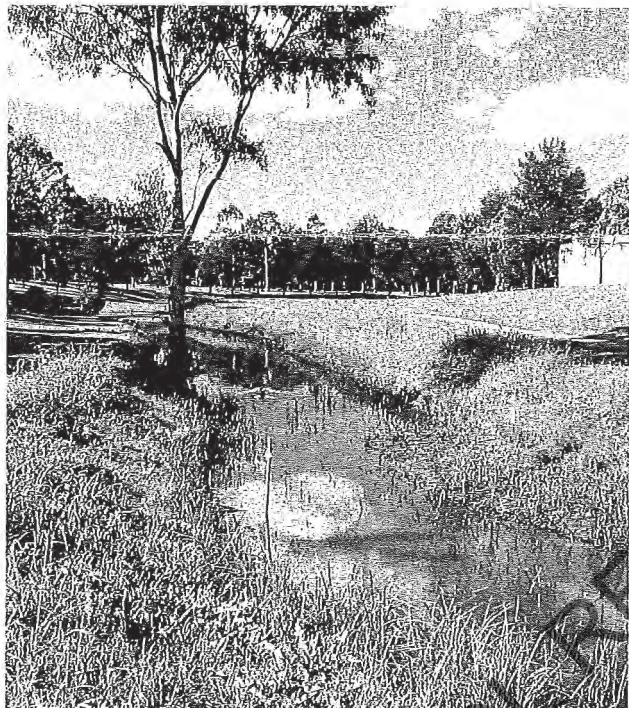
Possible health impacts from long term exposure to PFOS or PFOA are not fully understood. They are what are known as "emerging contaminants" and to date, limited research has been done in Australia or overseas into the possible health impacts of these chemicals.

Using underground water

As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property.

Further assessment of potential health impacts associated with other uses of the underground water will be undertaken as part of Defence's ongoing investigations.





Previous consultation activities

Defence would like to thank the local community for its cooperation and assistance during this ongoing investigation and assessment of the local groundwater.

An initial community information session was held in December 2012.

In December 2013, a community information session was held to update key stakeholders and residents about the project.

Individual landowner meetings were undertaken in late 2013.

In January 2014 and May 2014 Defence liaised with affected landholders to undertake bore water sampling and testing. Test results are expected to be provided to these landholders in mid-2014.

Defence will continue to work cooperatively with the relevant Federal and State agencies to ensure the safety of all Defence personnel and the local community.

Invitation—community information session

A community information session about the project will be held:

Tuesday 29 July 2014

6.00—7.30pm

Oakey Cultural Centre

Corner of McDonald and Campbell Streets, Oakey

If you would like to attend, please RSVP to defence.oakey.anz@aecom.com before Monday 28 July 2014.

Contact



Community hotline: 1800 136 129



www.defence.gov.au/id/oakey



defence.oakey.anz@aecom.com



Army Aviation Centre Oakey (AACO)
Groundwater Investigation Project
C/AECOM Pty Ltd
PO Box 1307
Fortitude Valley Qld 4006

Media enquiries should be directed to Defence
Media Operations on (02) 6127 1999 or
mediaops@defence.gov.au



CLEARY Amanda

From: COOK David
Sent: Tuesday, 22 July 2014 11:49 AM
To: CLEARY Amanda
Subject: FW: Defence AACO Stage 2b project information - EHP RFI
Attachments: Defence AACO Stage 2b environmental investigation discussion

FYI

From: Hamilton, Timothy [mailto:TiHamilton@golder.com.au]
Sent: Friday, 18 July 2014 12:31 PM
To: COOK David
Cc: Callinan, Scott MR 1; vicki.pearce1@defence.gov.au (vicki.pearce1@defence.gov.au); Wood, Lachlan
Subject: Defence AACO Stage 2b project information - EHP RFI

David,

I have since been informed via phone that staff from Defence Environmental Remediation Programs (DERP) are currently attending a business function/meetings away from their respective offices and they have kindly requested that Golder as project manager liaise with yourself on this occasion to enquire as to what further information the QLD Department of Environment and Heritage Protection (EHP) will require prior to the scheduled meeting on 29 July 2014.

Are you able to please respond to this email advising the specific information EHP are seeking?

Regards,

Timothy Hamilton (BSc (Hons) Hydrogeochemistry, MRACI CCHEM, MEIANZ) | Senior Environmental Scientist | Golder Associates Pty Ltd
147 Coronation Drive, Milton, Queensland 4064, Australia (PO Box 1734, Milton BC, QLD 4064)
T: +61 7 3721 5400 | **D:** +61 (7) 3721 5471 | **F:** +61 7 3721 5401 | **M:** [+61 7 3721 5401](tel:+61737215401) | **E:** TiHamilton@golder.com.au | www.golder.com
Attachment (6) Personal information

Winner of 22 BRW Client Choice Awards

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CLEARY Amanda

From: CLEARY Amanda
Sent: Tuesday, 22 July 2014 2:10 PM
To: HILL Chris; MACKENZIE James
Subject: FW: Army Aviation Centre Oakey - Groundwater Investigation
Attachments: 20140622_Oakey Groundwater Investigation_PowerPoint for EHP.PDF

Update and power point presentation to be given at community meeting I believe.

Two important points made in the presentation:

"As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property."

"At this time, none of the data collected and analysed by Defence indicates that landholders should stop using bore water for irrigating crops or watering livestock"

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.



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From: COOK David
Sent: Tuesday, 22 July 2014 2:04 PM
To: CLEARY Amanda; BRADSHAW Tony; JOHNS Allen
Cc: DELZOPPO Lindsay
Subject: FW: Army Aviation Centre Oakey - Groundwater Investigation

Hi All,

For your information.

Amanda, I will leave this issue for you. I am hoping that further information will be supplied, that is, a certified site investigation report.

My main concern is that Defence are recommending that the affected ground water can still be used for crops and livestock.

My view that this is a state issue and without proper scientific information the above state is a concern.

Regards
Dave

David Cook

Manager, Waste and Land Contamination Assessments and Project Support Team
Environmental Performance and Co-ordination Branch
Environmental Services & Regulation Division

T: (07) 3330 5583 || F: (07) 3330 5634
E: david.cook@ehp.qld.gov.au
A: Level 9, 400 George Street, Brisbane
M: GPO Box 2454, BRISBANE QLD 4001



From: AUBNE1 - Defence Oakey [<mailto:Defence.Oakey@aecom.com>]
Sent: Tuesday, 22 July 2014 1:47 PM
To: COOK David
Subject: Army Aviation Centre Oakey - Groundwater Investigation

Dear David,

As requested in your email to Tim Hamilton on Friday, the related reporting information about the Oakey Groundwater Investigation can be downloaded from the project website here: <http://www.defence.gov.au/id/Oakey/Documents.asp> (most of the files are too large for email).

As per our phone conversation last Wednesday, I understand you are also seeking the results from recent groundwater testing. Please find preliminary findings within the PowerPoint presentation attached (not for distribution). More detailed results are not available at this stage as the reporting process is still being finalised. Defence will keep you updated about the investigation, and will make contact when the draft report is available.

If you have any further enquiries, don't hesitate to contact the project team on 1800 136 129 or email defence.oakey.anz@aecom.com.

Regards,

Ellen
Defence Oakey project team

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Community Information Session

Army Aviation Centre Oakey

Groundwater Investigation



Tuesday 29 July 2014



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Overview

- Introductions
- Background
- About PFCs
- Water sampling and results
- Defence recommendations
- The next steps
- Questions



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Background

Army Aviation Centre Oakey

- established in 1943
- training centre for the Australian Army's aviation services
- Has hosted fire fighting training activities from the 1970s to date
- Aqueous Film Forming Foams (AFFF) are used in fire fighter training.



Image: Example of AFFF in use



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About PFCs

- AFFF contains perfluorinated chemicals (PFCs)
- PFCs are a group of chemicals used to make coatings and products that resist heat, oil, stains, grease, and water



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About PFCs

- Used for many years in a wide variety of common household and industrial products such as clothing, furniture, adhesives, food packaging, heat-resistant non-stick cooking surfaces and the insulation of electrical wire
- For example, found in Scotchgard, Teflon and Gore-Tex clothing
- People can be exposed to small quantities in daily life





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About PFCs

- Examples of PFCs:

Perfluorooctanoic Acid

PFOA

Perfluorooctane Sulfonate

PFOS

- Foams which are known to contain PFOS and PFOA are no longer used by Defence



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Defence use of AFFF

- Defence policy from 2006 to use only AFFF without PFOS / PFOA
- Defence policy is to limit the use of current AFFF products to emergency and incident requirements
- Dedicated training foams are used which are less toxic to the environment



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The Investigation

- Defence proactively undertakes regular assessments of groundwater on many of its bases, including Oakey

Groundwater is water that is located below the earth's surface. Over time, water from rain and rivers migrates through the ground and is stored in porous soils and rocks.



Image: Monitoring well

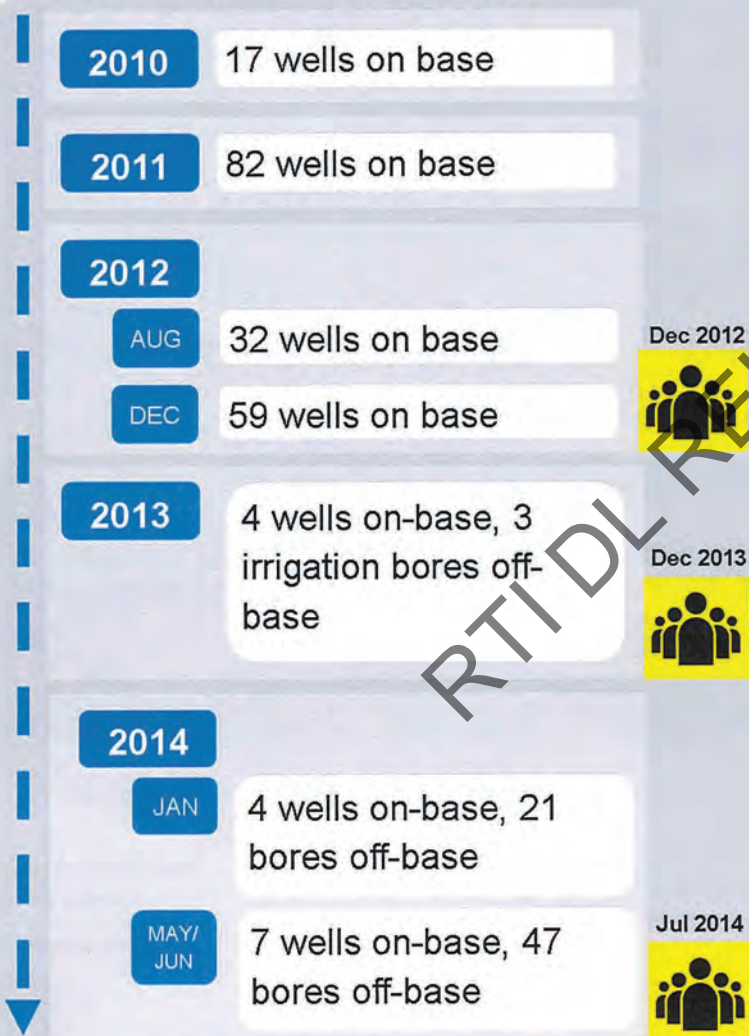


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The Investigation

Groundwater sampling



- In 2010, PFOS was detected in groundwater on the base
- Early 2013, targeted on-base sampling. Preliminary risk assessment undertaken
- Late 2013, targeted sampling west and south-west off base
- Early 2014, expanded off base sampling.



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Investigation area





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Water sampling

Bores were selected for testing based on:

- Searches of registered bores
- Consistent depth with AACO bores
- Groundwater flow direction

Small number of water samples also collected from Oakey Creek



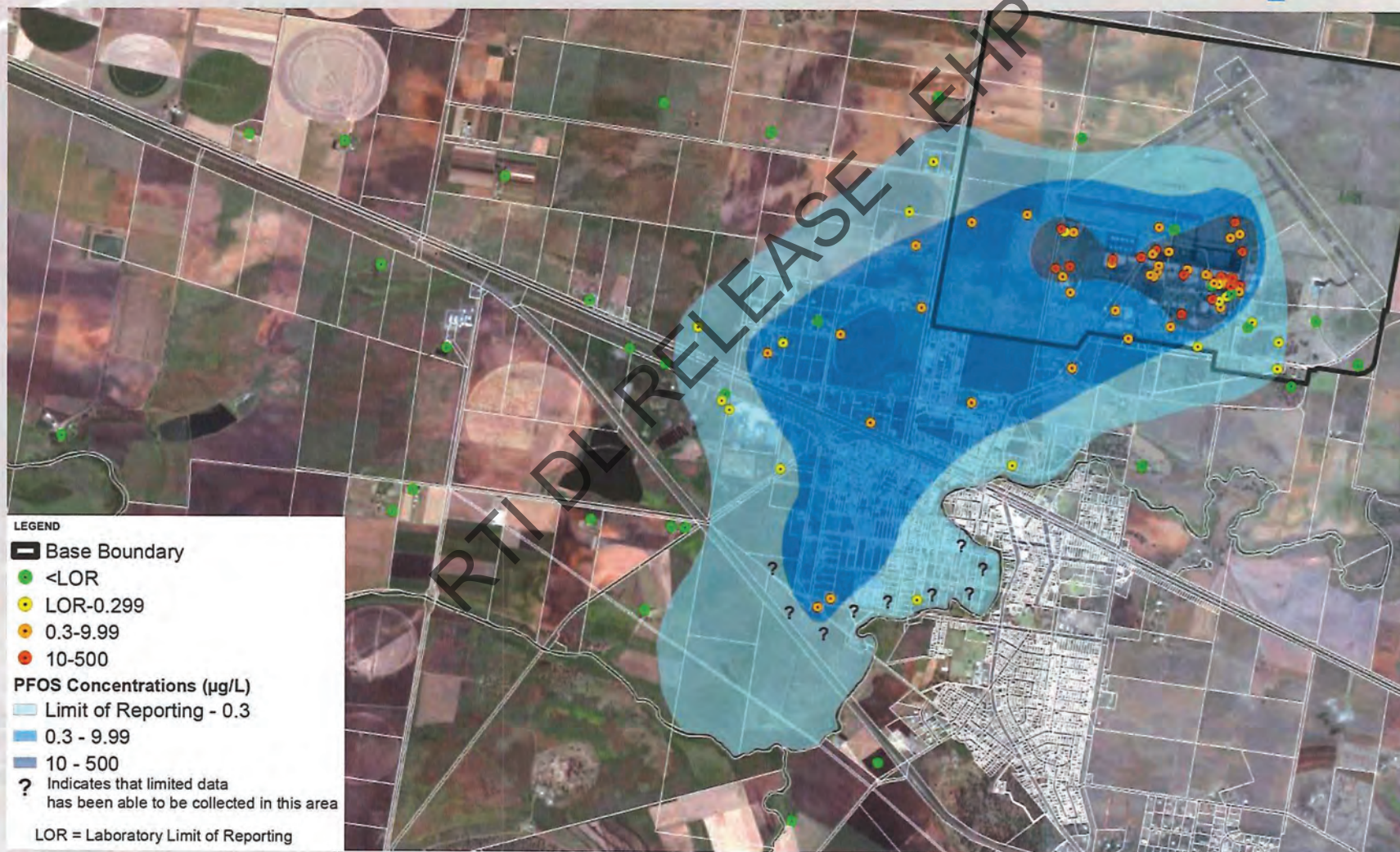
Image: Example of groundwater bore



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PFOS detections – bore water samples





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Potential Risks

- PFOS and PFOA – “Emerging contaminants”
- Limited research has been done in Australia or overseas on potential health impacts of these chemicals
- Defence is committed to undertaking further human health risk assessments to understand current exposure scenarios and associated risks.



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Using groundwater

- As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property.



Image: Example of an irrigation bore



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Using groundwater

- At this time, none of the data collected and analysed by Defence indicates that landholders should stop using bore water for irrigating crops or watering livestock
- Further investigation to occur.

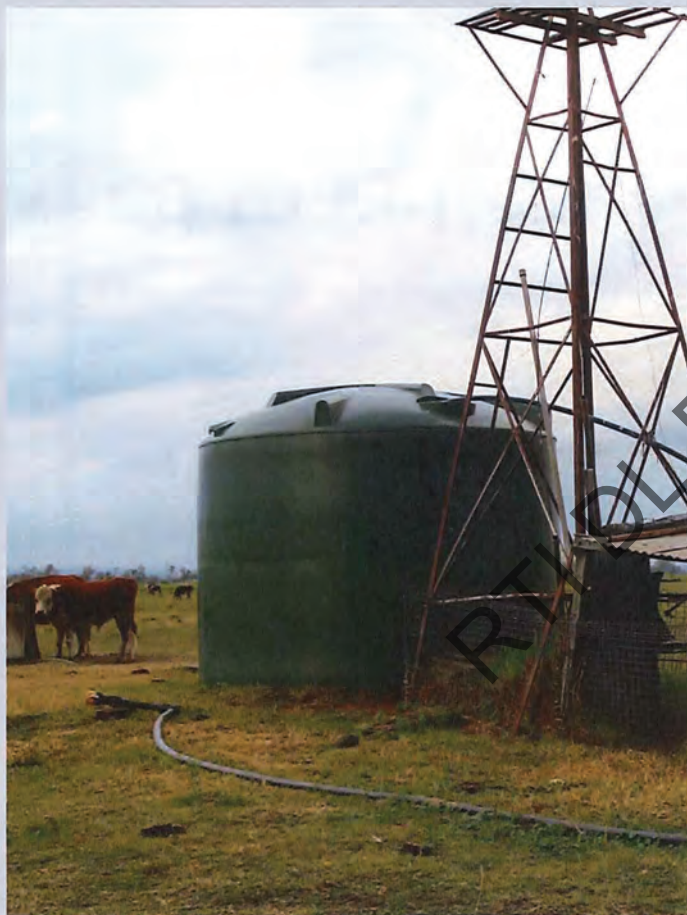


Image: Example of a stock watering bore



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Next challenges

Need to better
understand:

AFFF sources on-base

how the water is moving
through the ground

how the ground water is
being used off-base



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Next challenges

- Identifying potential risks when using water other than for drinking:
 - watering crops
 - watering cattle/ livestock
 - household use
 - industrial use
- Guideline is only for drinking water
- Impacts to Oakey Creek



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Upcoming activities

The next steps...

2014

- Detailed hydrogeological review
- Desktop ecological study
- Additional site history study
- Data gaps analysis
- Additional human health risk assessment
- Ecological risk assessment

2015

- Sampling of groundwater, soil & sediment to support risk assessment
- Update and refine risk assessment

Ongoing
community
consultation



Image: Drainage channel near base



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Contact us

Defence want to keep you informed

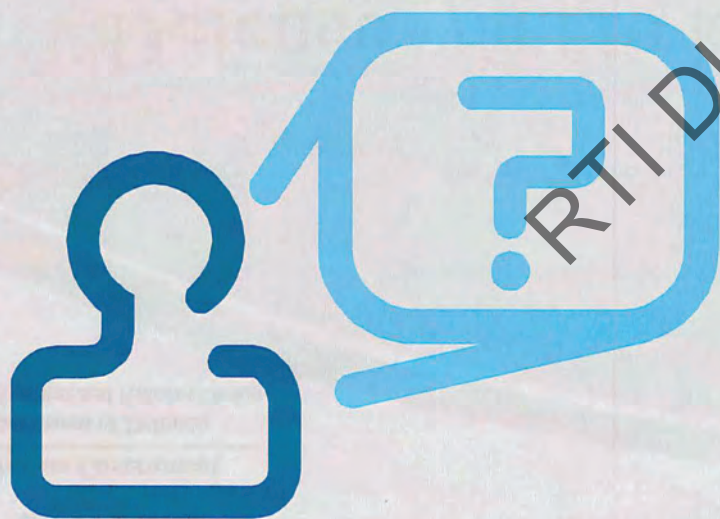
- Phone: 1800 136 129 (Monday to Friday, 8.30am to 5pm)
- Email: defence.oakey.anz@aecom.com
- Website: www.defence.gov.au/id/oakey



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Questions



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Thank you

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Defence Infrastructure Division - Oakey - Army Aviation Centre - Groundwater Investigation Project

(/)

[Home \(/id/Default.asp\)](#)
[ID Introduction \(/id/ID_Introduction.asp\)](#)
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Oakey - Army Aviation Centre - Groundwater Investigation

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[Community
Consultation
\(CommunityConsultation.asp\)](#)
[Media Coverage
\(MediaCoverage.asp\)](#)
[Contacts
\(Contacts.asp\)](#)
[Feedback \(mailto:
defence.oakey.anz@aeecom.com\)](#)

Documents

Community Hotline Number 1800 136 129

Reports relevant to this project:

These
reports are
on file
101/000.9446
which can
be
downloaded
from below
website.

- [Final Report Stage 1 and Stage 2 Environmental Investigation at Army Aviation Centre, Oakey, Queensland, URS \(.../Master/docs/oakey/AACOakeyEnviroInvest1EnviroInvest2-October2010Report.pdf\)](#) (14 October 2010)
- [Stage 2 \(Part 2\) Environmental Investigation Army Aviation Centre Oakey, Coffey \(.../Master/docs/oakey/AACOakeyEnviroInvest2Part2September2011Report.pdf\)](#) (9 September 2011)
- [Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey - Groundwater Monitoring Event, December 2012, Parsons Brinckerhoff \(.../Master/docs/oakey/AACOakeyStage3RiskAssessmentRemediationDesignGMEDecember2012F\)](#) (February, 2013)
- [February 2013 Addendum to Stage 3 Risk Assessment and Remediation Design and Army Aviation Centre Oakey Groundwater Monitoring Event, Parsons Brinckerhoff](#)

CLEARY Amanda

From: BRADSHAW Tony
Sent: Wednesday, 23 July 2014 11:40 AM
To: COOK David; CLEARY Amanda; JOHNS Allen
Cc: DELZOPPO Lindsay; HOLMES Nigel
Subject: RE: Army Aviation Centre Oakey - Groundwater Investigation

Hi Dave, some preliminary comments on the slides about Oakey groundwater investigations

Issue 1 - Assessment appears focussed only on PFOS and PFOA rather than total fluorinated compounds

The assessment appears to focus on PFOS and PFOA. These are a subset contaminants of potential concern. For example, the EHP published model operating conditions for landfills and the draft EHP policy on management of fire-fighting foams both require monitoring and assessment of total fluorinated compounds., not just PFOA and PFOS. The policy has the following definitions:

Fluorinated organic compounds

All organic compounds that contain the elements fluorine and carbon where the fluorine has replaced some or all of the hydrogen in the straight or branched organic carbon chain including perfluorinated or polyfluorinated compounds. This commonly includes, but is not limited to, PFOS, PFOA, fluorotelomers, fluorosurfactants and their breakdown products.

Fluorinated organics analyses

For the purposes of assessing the environmental risks of fluorinated organics in soil, water or concentrate samples analyses shall be done for at least PFOS, PFOA, 6:2FtS and 8:2FtS (6:2 and 8:2 fluorotelomer sulphonates) content whether in derivatised or free form (i.e. total content) and total fluorinated organics.

<http://www.ehp.qld.gov.au/era/prescribed/model-operating-conditions-era60-em1211.pdf>

<http://www.amerex-aust.com.au/sites/default/files/web/Solberg/Policy-QLDFirefightingFoamsV3-0.pdf>

To assess contaminants of potential concern, a broader analysis suite would need to be undertaken/reported. This should be informed by the nature of the fluorinated foams used by the RAAF at Oakey.

Issue 2 - The Assessment does not take into account the possibility of contamination via stormwater discharges

The fluorinated contaminants were applied to the mock planes/ the land surface in fire fighting exercises. They have filtered to groundwater. However, it is highly likely that they have also discharged from the site via stormwater drainage. There is no relevant sampling presented e.g. of sediments to assess releases into the environment via this pathway, nor potential impacts. For example, in western Queensland, it is common to build earthen storages across drainage channels to retain water for various uses. This is also a more direct pathways to local creeks.

Issue 3 - The Parson and Brinkerhoff Risk Assessment did not assess potential impacts on crops or cattle from use of contaminated groundwater for irrigation and stock watering.

Overseas studies have shown uptake of fluorinated organics occurs in cattle and crops on pastures on which sewage bio-solids containing these compounds has taken place. EHP has not been provided with information assessing health risks to cattle, crops and human consumers of such irrigation. The latest presentation advises affected persons that continued use of contaminated groundwater for irrigation and stock watering is safe. The basis of this assessment is unknown.

Issue 4 - Environmental Impacts on surface waters are unknown

The fluorinated compound involved are persistent organic pollutants. These have potential to affect the aquatic ecosystem, as well as human uses of surface waters e.g. stock watering. These impacts are unknown.

Issue 5 - Fate of any contaminated soil

EHP has standards for landfill acceptance of soil contaminated with these substances. It is not known if any contaminated soil or tarmac has been disposed from the site and if so, whether it met leachate standards and went to a properly lined facility.

We should raise these issues with defence when we meet them.

Cheers Tony

From: COOK David
Sent: Tuesday, 22 July 2014 2:04 PM
To: CLEARY Amanda; BRADSHAW Tony; JOHNS Allen
Cc: DELZOPPO Lindsay
Subject: FW: Army Aviation Centre Oakey - Groundwater Investigation

Hi All,

For your information.

Amanda, I will leave this issue for you. I am hoping that further information will be supplied, that is, a certified site investigation report.

My main concern is that Defence are recommending that the affected ground water can still be used for crops and livestock.

My view that this is a state issue and without proper scientific information the above state is a concern.

Regards
Dave

David Cook

Manager, Waste and Land Contamination Assessments and Project Support Team
Environmental Performance and Co-ordination Branch
Environmental Services & Regulation Division

T: (07) 3330 5583 || F: (07) 3330 5634

E: david.cook@ehp.qld.gov.au

A: Level 9, 400 George Street, Brisbane

M: GPO Box 2454, BRISBANE QLD 4001

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From: AUBNE1 - Defence Oakey [<mailto:Defence.Oakey@aecom.com>]
Sent: Tuesday, 22 July 2014 1:47 PM
To: COOK David
Subject: Army Aviation Centre Oakey - Groundwater Investigation

Dear David,

As requested in your email to Tim Hamilton on Friday, the related reporting information about the Oakey Groundwater Investigation can be downloaded from the project website here: <http://www.defence.gov.au/id/Oakey/Documents.asp> (most of the files are too large for email).

As per our phone conversation last Wednesday, I understand you are also seeking the results from recent groundwater testing. Please find preliminary findings within the PowerPoint presentation attached (not for distribution). More detailed

results are not available at this stage as the reporting process is still being finalised. Defence will keep you updated about the investigation, and will make contact when the draft report is available.

If you have any further enquiries, don't hesitate to contact the project team on 1800 136 129 or email defence.oakey.anz@aecom.com.

Regards,

Ellen
Defence Oakey project team

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CLEARY Amanda

From: CLEARY Amanda
Sent: Tuesday, 22 July 2014 3:04 PM
To: BRADSHAW Tony; MACKENZIE James; HILL Chris
Subject: Oakey base

Afternoon

Just a quick email with a map showing where there has been groundwater samples that exceeded investigation levels reported in the May 2013 Defence Report.

Where there a pins showing PFOS these are groundwater bores where PFOS was detected. No groundwater concentrations exceeded the investigation level for PFOA according to the Report. It should be noted that these sites are located on Commonwealth land. There is no reported data as yet for off site.

RTI DL RELEASE - EHP



CLEARY Amanda

From: DELZOPPO Lindsay
Sent: Friday, 25 July 2014 11:40 AM
To: MCMAIN Lisa
Cc: HILL Chris; MACKENZIE James; CLEARY Amanda; BROWN Glen; COOK David; BRADSHAW Tony
Subject: FW: Oakey Army Base
Attachments: defence letter.pdf; 20140109 ESR alert.docx; Oakey.pdf

Importance: High

Hi Lisa,

Recent media coverage attached about groundwater contamination at and adjacent to the Army Aviation Centre 3 km from Oakey.

An ESR alert from Jan 2014 is also attached. As discussed, it might be good to ask Chris Hill's people to update the art.

We, with Toowoomba staff, have reviewed the contamination reports supplied by Defence and made recommendations for further investigations.

We expect Defence to table further information when we meet with them to discuss the contamination and what action might be taken under the contaminated land provisions and other sections of the EP Act, on Tuesday 29/7/14.

<http://www.brisbanetimes.com.au/queensland/defence-warns-oakey-residents-not-to-drink-bore-water-20140725-zwnp0.html>

<http://www.thechronicle.com.au/news/dont-drink-the-bore-water/2328622/>

Kind Regards,

Lindsay Delzoppo
Director Statewide Environmental Assessments
Department of Environment & Heritage Protection

Level 9, 400 George Street, Brisbane
GPO Box 2454, Brisbane Qld 4001
Phone: 07 3330 5630
Mobile: 04 (6) Personal information
Email: lindsay.delzoppo@ehp.qld.gov.au



From: COOK David
Sent: Thursday, 17 July 2014 3:22 PM
To: DELZOPPO Lindsay
Subject: Oakey Army Base

Hi Lindsay,

Below is the email trail and I have attached the information received from Defence.

It is proposed that defence will meet with EHP on Tuesday 29/7/14 between 8am and 10am. They will be a further meeting with affected property owners at Toowoomba/Oakey between 2.30pm and 4.30pm.

We have also received the report from Parsons Brinkerhoff which indicates that there may be some concerns. Tony and Allen will provide further comments.

Regards
Dave

From: JOHNS Allen
Sent: Thursday, 17 July 2014 2:29 PM
To: BRADSHAW Tony; COOK David
Cc: CLEARY Amanda
Subject: FW: Oakey Army Base

sch3(7) Information subject to legal professional privilege

Hi David and Tony,

Could you please confirm if you are able to attend the Toowoomba meeting (phone in) between 14.30 and 16.30 on 29 July 2014. I think it would be best to meet all at once.

Regards
Allen Johns
Principal Environmental Officer | Waste and Land Contamination Assessment Unit |
Environmental Services & Regulation | Department of Environment and Heritage Protection
Phone +61 (07) 3330 5694
Email: allen.johns@ehp.qld.gov.au
Level 9, 400 George Street, Brisbane, QLD 4001
GPO Box 2454, Brisbane QLD 4001
 Please consider the environment before printing this email

From: CLEARY Amanda
Sent: Thursday, 17 July 2014 9:58 AM
To: JOHNS Allen
Cc: MACKENZIE James; BRADSHAW Tony
Subject: Oakey Army Base

Morning Allen

Please find attached the documents/corro that I have on the Oakey Army Aviation groundwater contamination issue.

As discussed, what I was looking for originally in January was if the site should be on the EMR and what "tools" the department could use in the event of offsite impacts.

Defence wrote to the department on 8 May stating that AECOM have been engaged to undertake targeted water sampling off the base and they will get back to us with the details which is what this proposed meeting is for.

Any advice you can provide us would be greatly appreciated.

Kind Regards,
Dr Amanda Cleary | Principal Environmental Officer
Department of Environment and Heritage Protection (EHP)

Environmental Services & Regulation Division (ESR) Southern Region
173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350

T: 07 4699 4371 F: 07 4699 4399
E: Amanda.Cleary@ehp.qld.gov.au
W: www.ehp.qld.gov.au

Please note I only work Tuesdays, Wednesdays and Thursdays.

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Australian Government

Department of Defence
Defence Support and Reform Group

Mark O'Connell
Base Support Manager Darling Downs
Department of Defence
B45 Orrs Road
Oakey, QLD 4401
☎: (07) 4577 7100
✉: mark.o'connell2@defence.gov.au

14 July 2014

Ms Amanda Cleary
Department of Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

Dear Ms Cleary

**Re: Army Aviation Centre Oakey (AACO) – Groundwater Investigation
Project update and community information session**

The Department of Defence is writing to update you on the progress of the ongoing investigation and assessment of the groundwater within and adjacent to the AACO.

As mentioned in previous correspondence (dated 8 May 2014), it has been identified that the local groundwater may have been affected by chemicals contained in materials used in fire-fighting training undertaken on the AACO between 1970 and 2005. These include Perfluorooctane sulphonate (PFOS) and Perfluorooctanoic acid (PFOA).

In January and May 2014, targeted water sampling and testing occurred outside of the AACO property boundary, to the west and south-west. Defence has provided results from these two rounds of testing to participating landowners.

As a precaution, Defence is recommending that landholders within the investigation area do not drink any water sourced from underground water bores on their property.

Please note that Defence will be holding a community information session on Tuesday 29 July 2014 between 18:00 and 19:30 at the Oakey Cultural Centre to update local residents on the progress of the investigation.

Should a meeting prior to the information session be required, Defence will be available on Tuesday 29 July 2014 to meet with you and your respective representatives in:

- Brisbane between 8:00 and 10:00, or
- Toowoomba/Oakey between 14:30 and 16:30

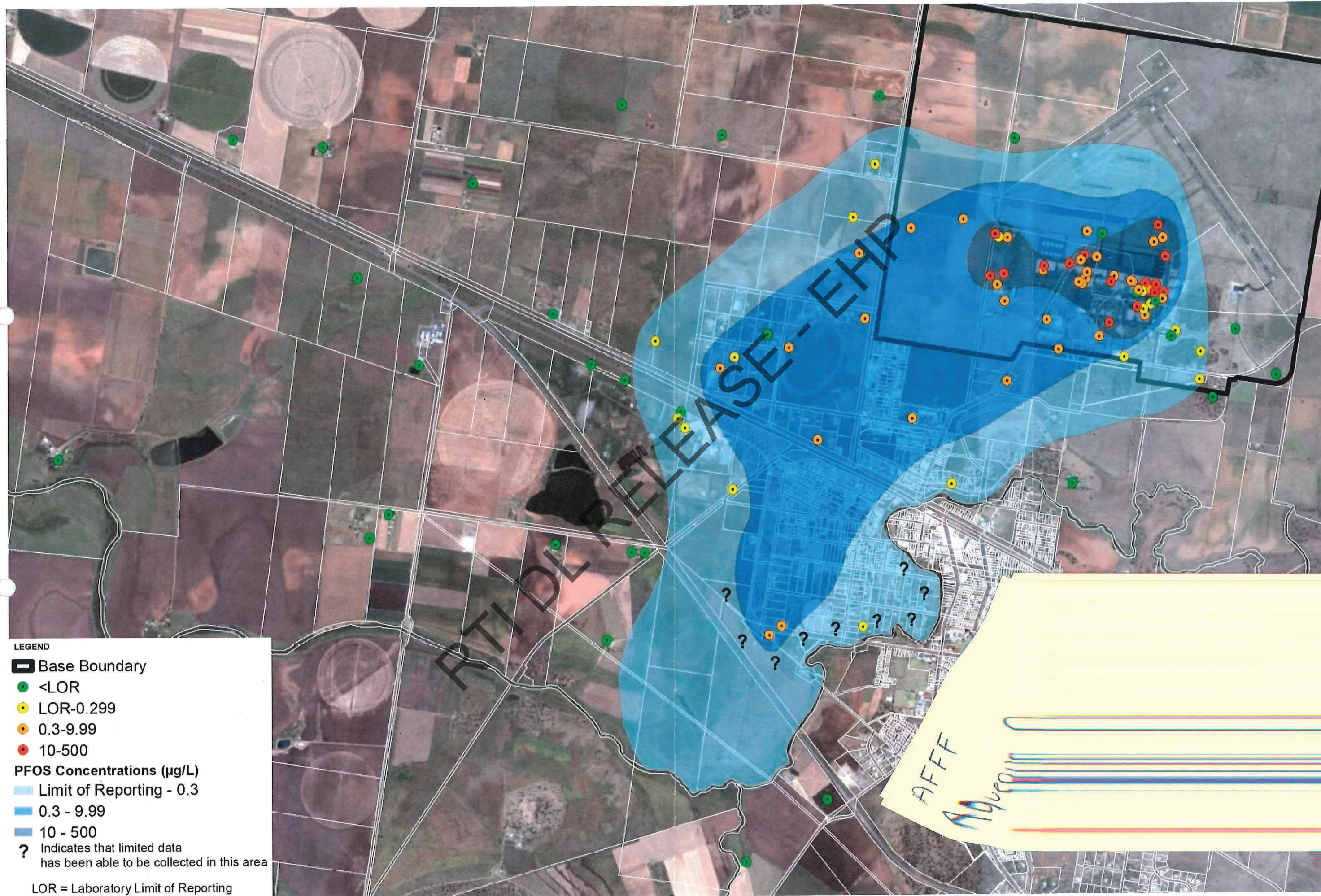
For more information about this ongoing, long-term investigation please see the flyer enclosed.

For further discussion, please contact me directly or alternatively contact the project team on 1800 136 129, email defence.oakey.anz@aecom.com, or visit the project website:
<http://www.defence.gov.au/id/Oakey/default.asp>.

Yours sincerely

sch4p4(6) Signature

Mark O'Connell
Base Support Manager Darling Downs
Defence Support Organisation



CLEARY Amanda

Subject: Defence AACO Stage 2b environmental investigation discussion
Location: Level 9, 400 George Street Brisbane, QLD 4000 - (Meeting room TBA)
Start: Tue 29/07/2014 9:30 AM
End: Tue 29/07/2014 10:30 AM
Recurrence: (none)
Organizer: Hamilton, Timothy

Invitation sent on behalf of DERP:

Good morning,

Please advise availability/acceptance to attend a meeting to discuss the Defence AACO Stage 2b Environmental Investigation program.

The details provided below:

Location: Level 9, 400 George Street Brisbane, QLD 4000 - (Meeting room TBA – EHP to advise meeting room availability/location)

Time: Between 9/9:30 through to 10:30.

Contact EHP office: David Cook P: 07 3330 5583

Defence are progressing precursory information relating to the project as a lead up to this meeting and will endeavour to send this through next week.

Regards,

Golder Associates – Consulting Project Manager – Defence AACO Stage 2b Environmental Investigation program



Timothy Hamilton (BSc (Hons) Hydrogeochemistry, MRACI CCHEM, MEIANZ) | Senior Environmental Scientist | Golder Associates Pty Ltd
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CLEARY Amanda

Subject: Defence AACO Stage 2b environmental investigation
Location: 203 Tor Street, Toowoomba QLD 4350 - 'Clapham' conference room (reception - contact Jason Chavasse)
Start: Tue 29/07/2014 2:30 PM
End: Tue 29/07/2014 3:30 PM
Recurrence: (none)
Meeting Status: Accepted
Organizer: Hamilton, Timothy

Venue location change due to Defence operational requirements

Located at 203 Tor Street, Toowoomba in the government complex. Enter the front gate, customer service centre on right with car park, check in/pass issue then call Jason.

Invitation sent on behalf of DERP -

Good morning,

Please advise availability/acceptance to attend a meeting to discuss the Defence AACO Stage 2b Environmental Investigation program.

The details for location have been provided below:

Location: DNRM Toowoomba offices - 203 Tor Street Toowoomba QLD 4350

Time: Between 14:30 and 15:30

Office Contact: Jason Chavasse (6) Personal information (07) 4529 1233 Jason.chavasse@dnrm.qld.gov.au

Regards,



Timothy Hamilton (BSc (Hons) Hydrogeochemistry, MRACI CCHEM, MEIANZ) | Senior Environmental Scientist | Golder Associates Pty Ltd
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File Note

File Reference: 101-0009446

Print and file when complete.

Date: 29 July 2014

File Name: Oakey Army Aviation Centre (OAAC)

Subject (Detail): groundwater contamination.

Meeting 1

Location: EHP Office - Level 9, 400 George Street, Brisbane

Attendees:

SB Sarah Brown - DERP
 SC Scott Callinan - DERP
 VP Vicki Pearce - DERP
 PM Paul McCabe - AECOM
 FL Frances Lee - AECOM
 AC Amanda Cleary - EHP - phone
 RC Ray Clarke - BSOM, AACO
 MO Mark O'connell - BSM, AACO
 CH Chris Hill - EHP
 TB Tony Bradshaw - EHP (contaminated land)
 DC David Cook - EHP (contaminated land)
 LD Lindsay Delzoppo - EHP
 AJ Allen Johns - EHP (contaminated land)

- This meeting was primarily to update the contaminated land unit on the recent findings of groundwater analysis.
- PM gave a presentation on the information that would be provided at the community meeting scheduled for that night at Oakey.
- PM said whilst they have a better idea of the size of the plume there is very little guidance on the impact the PFOS and PFOA will have long term, how it can be remediated. PM also confirmed that they had not looked at stormwater runoff from the sites, contaminated sediments potentially leaving the site and that this will be part of the ongoing investigation.
- DC said that the site should be listed on the EMR so that contaminated soil can be removed on site. Defence have a different translation of the legislation and believe they don't need to be listed on the EMR. AECOM will work with the contaminated land group to resolve this issue.
- PM said whilst they have the data from recent modelling and have mapped the potential plume, the final report has not been completed, but should be given to the department by end of August.
- PM said that people in the investigation area have been notified in writing and results have been given to them out of courtesy. They will also be telling the community that if they have concerns they can contact the Defence and monitoring may be undertaken but will be done on a case by case basis.
- PM stressed that AECOM has only done a preliminary assessment of the extent of the impact.
- PM said that there is limited to no information on the long term impact of exposure to the contaminants.
- TB said that EHP would be interested in seeing the entire characterisation of the groundwater, not just PFOA and PFOS.

Meeting 2

Location: NRM Office - 203 Tor Street, Toowoomba

Attendees:

SB Sarah Brown - DERP
SC Scott Callinan – DERP
VP Vicki Pearce – DERP
PM Paul McCabe - AECOM
FL Frances Lee - AECOM
JC Jason Chavasse - DNRM
AC Amanda Cleary – EHP
SG Steve Goudie - DNRM
RC Ray Clarke – BSOM, AACO
MO Mark O'connell – BSM, AACO
JM John Mills – TRC
AK Alan Kleinschmidt - TRC

Chair: Scott Callinan DERP

- This meeting was primarily to update the contaminated land unit on the recent findings of groundwater analysis for local government and NRM officers. EHP was also invited. Items discussed were the same as the mornings meeting.
- NRM raised concerns about the extent of the plume and impact on bore users. According to PM it is approximately 3.7 km from the base. NRM also raised concerns about the interconnectivity between the aquifers as there are two and question PM at what depth the samples were taken and from what aquifer. PM said he could not say definitively but that they sampled water approximately 13.5 m down.
- Toowoomba Regional Council representatives JM and AK were very concerned about the lack of information provided to Council prior to the information being made public. AK also had concerns that two of the TRC bores that have the capability to provide bore water to the RO plant were contaminated and what impact that would have on the community if they need to access water from the RO plant.
- AC raised concerns about surrounding industries, particularly the nearby abattoir licensed by TRC and the Oakey abattoir. PM said that this would all form part of the ongoing investigations and that if businesses had concerns they could contact Defence.
- TRC requested that Defence have more active engagement with Department of Health and Department of Energy and Water supply.

Date: 30 July 2014

sch4p4(6) Personal information

Author: Amanda Cleary

Position: Principal Environmental Officer

CLEARY Amanda

From: GOUDIE Steve
Sent: Wednesday, 30 July 2014 11:21 AM
To: CLEARY Amanda
Subject: FW: Oakey Groundwater investigation meeting agenda

Amanda

A brief outline I sent last night after the meeting

Might give you a call shortly – I might grab Jason

cheers

Steve Goudie

Manager Water Services
South Region
Dept Natural Resources and Mines
203 Tor St, Toowoomba
PO Box 318, Toowoomba Q 4350
Phone: 07 45291279
[Redacted] (6) Personal information

From: KEARNAN Wally
Sent: Wednesday, 30 July 2014 10:37 AM
To: MCKAY Adrian
Cc: GOUDIE Steve; SANDERS Paul; WELLER Jim; CHAVASSE Jason; KREBS Ross
Subject: Re: Oakey Groundwater investigation meeting agenda

Ok let's get ourselves sorted. No jurisdiction impediments.

Where do we go with this?

Paul - can you coordinate and get ready for media.

Cheers

Wally Kearnan
Executive Director-South Region
Service Delivery

Please note that this short message has been sent from my iPad.

On 30/07/2014, at 9:36 AM, "MCKAY Adrian" <Adrian.Mckay@dnrm.qld.gov.au> wrote:

Steve,

Just to clarify the minor depression gw depression I was referring to is localised within Sub Area 3 of the OCGMA, not the CCAGMA. This is the area downstream of the Oakey – Cooyar Rd you drive across when heading to Dalby. Most of the bigger users and the TWS bores are in this area.

Melissa has transposed the plume map from the Chronicle article onto a map of entitlements. It's a rough interpretation of the plume area just to give you a feel relative to the OCGMA and entitlements

Adrian

From: GOUDIE Steve
Sent: Tuesday, 29 July 2014 9:52 PM
To: SANDERS Paul
Cc: WELLER Jim; KEARNAN Wally; CHAVASSE Jason; MCKAY Adrian; KREBS Ross
Subject: Re: Oakey Groundwater investigation meeting agenda

Paul

I attended this evenings public meeting in Oakey.

The defence departments environmental remediation division were in attendance but the main presentation was delivered by their consultants AECOM.

The presentation was clear in terms of the history of use of PFCs (PFOS and PFOA) the key chemicals at the heart of this issue.

This material has properties that made it very good for fire fighting foam. These properties of course meaning the product is easily mixed with water, thus it is very good at seeping into groundwater systems. These PFCs being banned world wide since 2006. And therefore have not been used by the ADF since then. Therefore this is a legacy issue for its use since between the mid 70's to 2006.

The issue has been monitored since 2006 but was all contained within the Army Base, not until further work done between 2010 and 2011 that they realised this might be needing further monitoring.

Which is where they are now at – they have only really started in earnest in the last 12 months trying to determine the extent of the spread. They were shocked themselves when they started sampling around the base that the spread to the south west was clearly far more extensive than they had thought. Thus the information presented is a very simple display of levels of contamination that has been sampled from private bores in the

area. They simply kept heading further from the base until there tests came up with no trace.

The map was quite confronting to the audience. Questions of what is the long term affects, we have been using this water to drink, bath, boil vegies etc What do we do tomorrow? What is the impact on our land values. Can stock drink this. Can we eat the stock afterwards.

An issue that was not highlighted was the Oakey Meatworks (all Jap export) is in the middle of the plume- they use both alluvium and GAB water). I hate to think what would the Japanese reaction might be to such chemicals being found in meat products from this factory. This is one of the major employers in Oakey and is one of the largest export sheds in the nation.

Most responses to questions was quite simply we don't know! This product has almost no guidelines throughout the world in terms of its impacts. Only a drinking water guideline from the US is available and this suggests levels above (I think around 15ppb) is a problem for drinking water. The levels south west of the base (underneath 1/3 of Oakey are between 30 to 300ppb).

The defence force have provided a 1800 number so that people can deal with them on a case by case basis. Ie to see what can be done to find alternative supplies or treat existing supplies. It would seem that likely course of action will be to treat water at the end point – there appears little likelihood of fixing problem at the source.

They explained that this is the start of process and they will ensure community is kept better informed- they will be conducting a very comprehensive assessment of the full implications such as what is the geological impacts ie forecasting spread, what remediation can occur, what are other management actions. It was clear though that they have not seen something as bad as this on any defence force site - suggesting that they have over 2000 pieces of land across the nation.

There is no means of dispersing this chemical, it bioaccumulates (which I think is latin for it builds up and doesn't disappear very easily).

This plume is very likely to continue to head west following the Oakey Creek alluvium, Adrian McKay this afternoon suggesting that this could be exacerbated (maybe travel quicker) as the hydraulic gradient increase towards the central Condamine alluvium where there is a large cone of depression. This was a something that AECOM were not aware of yet but understood that they will need to consider in their investigations.

AECOM explained during the meeting that they would need to work with DNRM to understand the groundwater system better.

The meeting itself was well managed as there was a fair bit of anger in many questions. Shine lawyers were on hand representing some of the constituents. Council reps were also in attendance but didn't ask any questions during the meeting. Their town bores are affected by this plume.

WIN TV, ABC radio and Toowoomba Chronicle attended the entire meeting. There would have good footage including the map that provided the outline of the plume. They interviewed a number of people after the meeting. I expect that this will be in media from tomorrow morning onwards.

This will clearly become a major issue for a long term. EHP Qld Health and Council likely the main players. We have role with ensuring appropriate information for the investigations which by the sound of it will be a major activity.

Will keep you posted on anything else that pops up

Cheers

Steve

Sent from my iPhone

On 29 Jul 2014, at 5:57 pm, "SANDERS Paul" <Paul.Sanders@dnrm.qld.gov.au> wrote:

Thanks Steve. Don't be afraid to walk out if it gets too hostile.

On 29 Jul 2014, at 5:55 pm, "GOUDIE Steve" <Steve.Goudie@dnrm.qld.gov.au> wrote:

Paul

About to head to the public meeting now. Sounds like EHP won't be there tonight they have been instructed from up high not to attend

The information we saw today was a bit shocking. In terms of extent of spread/plume. Big issue is no real understanding of health effects. The pfoa and pfos don't break down so this is here for a long term. Council is ropable (they attended this meeting) as they were unaware of the extent of issue. All town bores might be affected. There is no info related to secondary impacts eg eating animals that drink the water. The japaneses export meat works at oakey is in the effected area.

I expect this to become a highly contentious issue and will ballon from this evening on. I anticipate this meeting tonight to be very hostile

Best head to it and I will give you a call afterwards

Cheers

Steve

Sent from my iPhone

On 29 Jul 2014, at 12:02 pm, "SANDERS Paul" <Paul.Sanders@dnrm.qld.gov.au> wrote:

Thanks Steve.

I'm in meeting all afternoon, hence if someone could email me regarding the outcome of the meeting this afternoon, it would be appreciated. Also, if you could give me a quick call after the meeting tonight it would be appreciated (any time up to 10:30pm).

Thanks

Paul

Paul Sanders
Regional Manager

Water Services
South Region
Department of Natural Resources and Mines
Telephone: 07 3330 4465 **Facsimile:**
07 3406 2581 **Mobile:** [redacted] (6) Personal information
Email: paul.sanders@dnrm.qld.gov.au
Landcentre
Cnr Main and Vulture Streets, Woolloongabba
Q
GPO Box 2771, Brisbane Qld 4000

From: GOUDIE Steve
Sent: Tuesday, 29 July 2014 8:53 AM
To: SANDERS Paul
Cc: WELLER Jim
Subject: FW: Oakey Groundwater investigation meeting agenda

Paul

FYI

This is the agenda for todays meeting with defence.

I will also head to tonights community meeting.

Steve Goudie
Manager Water Services
South Region
Dept Natural Resources and Mines
203 Tor St, Toowoomba
PO Box 318, Toowoomba Q 4350
Phone: 07 45291279 [redacted] (6) Personal information

From: AUBNE1 - Defence Oakey
[mailto:Defence.Oakey@aecom.com]
Sent: Monday, 28 July 2014 5:15 PM
To: CHAVASSE Jason; CLEARY Amanda; GOUDIE Steve; Adrian.mckae@dnrm.qld.gov.au; john.mills@toowoombarc.qld.gov.au
Subject: Oakey Groundwater investigation meeting agenda

Good afternoon

For your assistance, please see attached the agenda for tomorrow's meeting about the Oakey Groundwater Investigation.

Regards

Defence Oakey Project Team

P: 1800 136 129
E: Defence.Oakey@aecom.com
W: www.defence.gov.au/id/Oakey

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<Oakey Creek Well Interference by Volume showing Defence PFO.PDF>

<20140730 The Chronicle PFOS Investigation.pdf>

CLEARY Amanda

From: HILL Chris
Sent: Wednesday, 30 July 2014 3:09 PM
To: CLEARY Amanda
Cc: MACKENZIE James
Subject: FW: updated alert of Oakey Army Base
Attachments: 20140730 ESR alert update final.docx

Amanda

This is the alert that went up – includes some additional info from Lindsay Delzoppo

Chris Hill

Regional Manager, Southern Region (West)
Environmental Services & Regulation
Department of Environment and Heritage Protection
173 Hume St, Toowoomba, Qld 4350
Tel 07 46994360 **Mobile** 07 46994360 (6) Personal information
www.ehp.gov.au



From: HILL Chris
Sent: Wednesday, 30 July 2014 2:04 PM
To: CONNOR Andrew
Cc: Corro EHP ESR Southern; DELZOPPO Lindsay; COOK David; MACKENZIE James
Subject: updated alert of Oakey Army Base

Hi Andrew

Updated alert attached which has been edited/reviewed by Lindsay and Dave Cook in addition to regional input.

Chris

Chris Hill

Regional Manager, Southern Region (West)
Environmental Services & Regulation
Department of Environment and Heritage Protection
173 Hume St, Toowoomba, Qld 4350
Tel 07 46994360 **Mobile** 07 46994360 (6) Personal information
www.ehp.gov.au



30 July 2014

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring in and around the AACO base (the Base) has detected contaminants namely Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) from fire fighting foam used in training exercises between 1970 and 2005.
- The plume of potentially contaminated groundwater is approximately 5 km long and extends under the township of Oakey.
- PFOS and PFOA are listed on the Stockholm Convention as Persistent Organic Pollutants.
- A 2013 Human Health Risk Assessment undertaken on behalf of the Department of Defence (Defence) of offsite populations concluded that the levels of contaminants detected were below the tolerable threshold and exposure to offsite populations was unlikely.
- An Ecological Risk Assessment (ERA) however identified potential risks to aquatic organisms including the EPBC protected Murray Cod and birds if the groundwater migrates to the Oakey Creek located 7.2 km from the Base.
- Groundwater is used in the area primarily for irrigation. The ERA identified four threatened ecological communities and 41 species of flora/fauna that may be adversely affected by the contaminants.
- Defence has engaged a new consultant to undertake a higher level ERA which will include a detailed biodiversity assessment and confirm source-receptor pathways into the offsite ecological food chain.
- 12 February 2014 EHP provided comments on the consultant report.
- 5 May 2014 AECOM responded to EHP stating:
 - that the PFOS contaminated groundwater is not having an impact on environmental values onsite;
 - data collected to date indicates that there is no petroleum hydrocarbon contaminated groundwater migrating offsite;
 - Since December 2013 a monitored community information hotline and project email address has been available to the community;
 - Additional groundwater sampling will be undertaken in May 2014 and an update provided to the department.
- 14 July 2014 Defence invited the department to a briefing to be held on 29 July 2014 and also provided a community information flyer and community PowerPoint presentation.
- The Base is a federal government site and is not listed on the Contaminated Land Register or Environmental Management Register.
- Defence and their contractor AECOM met with EHP, local government and NRM staff on 30 July 2014 to provide a brief on data that has been obtained in the latest groundwater analysis and what would be discussed in the Community meeting that night.
- Local government raised concerns in this meeting that two of their bores which are used (not currently) in their Reverse Osmosis town water treatment plant recorded PFOS contamination.
- Issues raised at the community meeting included impact on health, support for those who don't have access to town water and impacts on property values.
- Qld Health is providing Defence with acceptability criteria for PFOS and PFOA concentrations in water used for drinking.
-

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater affecting local stock watering, irrigation bores.
- Potential impact on water quality of Oakey Creek.

- Potential ecological impact on flora and fauna in and around the Base.
- Community concern about the potential impact on human health and local ecology.
- Unknown fate/management of contaminated soil at the Base [and stormwater released off site.](#)
- [Long term impact of PFOS and PFOA as it bio accumulates and doesn't biodegrade.](#)

CUSTOMER ACTIONS:

- Defence have engaged AECOM to undertake additional groundwater monitoring and ERA of the area surrounding the Base.
- Defence offered to test individual groundwater bores at resident's request.
- DNRM were also been informed of the situation by Defence in late 2013.
- Defence [held](#) state government agency and community briefings on 29 July 2014.
- Defence have set up a community hotline, e-mail and website to handle any enquiries relating to this issue.

DEPARTMENT ACTIONS:

[HISTORICAL ACTIONS]

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue in late 2013, and attended a public meeting in December 2013.
- The issue was briefed up following the public meeting.
- JM advised EHP Contaminated Land unit of the potential issue.
- Environmental Services officers have been liaising with AECOM in order to better understand the extent and likely risks of environmental harm.
- [Defence will provide the detailed investigation report to EHP for review. It is anticipated that the report will be finalised in 4-6 weeks.](#)
- [EHP will decide whether it should and can list the Oakey Defence base on the environmental management register or contaminated land register as soon as it has reviewed the report.](#)

KEY COMMUNICATION MESSAGES:

- Defence are managing this issue and are taking appropriate action to identify the extent and impact of the contamination.
- Defence are managing local stakeholders and are the primary contact for any enquiries. Ref : www.defence.gov.au/id/oakey
- Defence have kept the department informed regarding the environmental aspects of this matter.

CONTACT DETAILS:

- Name: Chris Hill (Regional Manager)
- Phone number: 4699 4360
- Division: ESR – Southern - West

END



back



NO ANSWERS: Oakey residents still floundering in murky waters

Researchers remain baffled

Chris Calcino

chris.calcino@thechronicle.com.au

GROUNDWATER contamination from decades of chemical use at the Oakey Army Aviation Centre could become an environmental and health disaster.

Or, it could be nothing.

There were no answers as the Department of Defence called an emergency meeting to keep Oakey residents informed last night.

Firefighting foam containing perfluorooctane sulphonate and perfluorooctanoic acid were used for training purposes at the base for 35 years until 2005, when their safety came into question.

AECOM land contamination specialist Paul McCabe told the crowd groundwater tests within the base's immediate vicinity started in 2012 and have continued, gradually widening, until now.

The contamination spread further than Defence ever imagined. The chemicals have even found in Oakey Creek.

"How much do we know about the inter-connectivity, the nature and extent of the aquifer, the relationship with the existing bores? Very little to nothing, at the moment," Mr McCabe said.

The science is so new researchers can not be sure the chemicals pose any threat to humans, though early tests have revealed a link to tumour growth in the livers of rats.

It remains to be seen whether the entire food chain has been compromised by poisoned fish or agricultural use and whether even bathing in the tainted bore water can have adverse effects.

The chemicals do not look like going anywhere — they are notoriously durable and could take decades or longer to break down.

Again, no one really knows.

It is of most concern to residents

who have no access to town water, which has been cleared of the pollutants.

Real estate agent Craig Commens said his family only used rainwater and bore water.

"It's black and white. I don't use town water now. If the army's stuff-up is causing us to have to use the town water, they should pay," he said.

Defence spokeswoman Sarah Brown said that was an option.

Another card on the table is the installation of tap filtration systems, but no research can yet verify if they would work.

When the issue of plummeting land values came up, the response was similarly vague.

"I can't tell you what the impact is now, and I can't say in five years time it will be back to normal. I don't know," Mr McCabe said.

Testing of bores all over Oakey will continue until the full scope of the contamination is revealed.



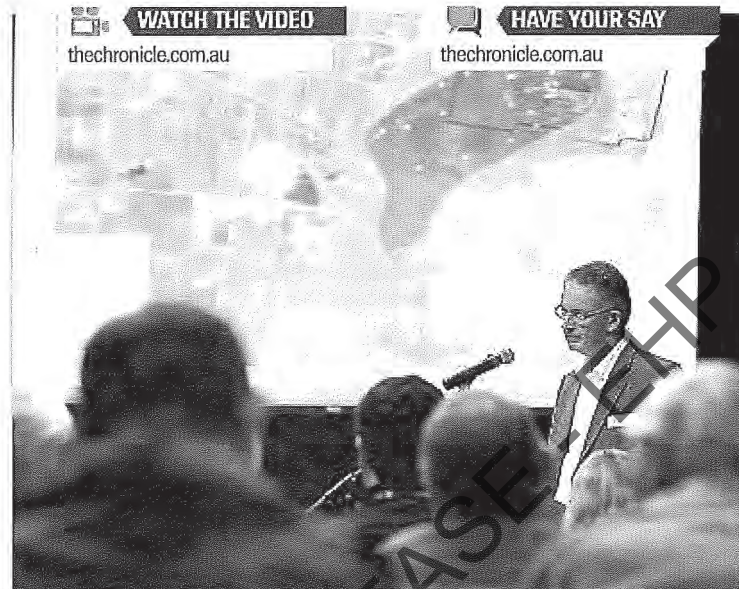
MORE QUESTIONS:
Oakey resident Brad Hudson asks why it took so long for the Department of Defence to alert residents of the contamination.



Toowoomba Chronicle, Toowoomba QLD
30 Jul 2014, by Chris Calcino

General News, page 5 - 334.00 cm²
Regional - circulation 17,392 (MTWTFS-)

ID 291312083



GROUNDWATER POISON: AECOM contaminated land specialist Paul McCabe shows the crowd initial data on the spread of the chemicals at last night's information session in Oakey. PHOTO: KEVIN FARMER

CLEARY Amanda

From: BRADSHAW Tony
Sent: Thursday, 31 July 2014 8:34 AM
To: HOLMES Nigel
Cc: COOK David; DELZOPPO Lindsay; HILL Chris; CLEARY Amanda; KANE Gary
Subject: RE: latest Oakey media

Thanks Nigel,

No worries. It was mainly a run through by defence's consultant of the presentation they were going to give the residents and acknowledgement that this is just the start of a large investigation in which they seek to be open and responsive.

We explained to Defence at the meeting that in terms of characterising on site contamination and its impacts, EHP is concerned about all fluorinated compounds, particularly PFOS or PFOA precursors such as flouroteleomers.

In response to a question as to whether shaded maps they were showing to the community represented any totals such as PFOS + PFOA or sum fluorinated etc, they advised maps are only PFOS. We advised that some drinking water standards e.g. German are based on such sums.

We haven't seen their latest report as it is still being produced but I get the impression it may only focus on PFOS & PFOA.

We will obviously keep you and Gary engaged on this project

Cheers Tony

Tony Bradshaw
Senior Principal Environmental Officer
Project Support

Environmental Services & Regulation
Department of Environment & Heritage Protection
Level 9, 400 George Street, Brisbane Qld 4000
Telephone 07 3330 5704
Fax (07) 3330 5875

Email tony.bradshaw@ehp.qld.gov.au
Website www.ehp.qld.gov.au

Please consider the environment before printing this email



From: HOLMES Nigel
Sent: Wednesday, 30 July 2014 4:32 PM
To: BRADSHAW Tony
Subject: RE: latest Oakey media

Tony

That sounds good, sorry I didn't get to the teleconference, an earlier meeting ran well over time. I noticed in the article that Defence referred to foams used "between 1970 and 2005". This suggest that they were not releasing compounds of concern after 2005.

After 2005 the AFFF very probably in use would have been an Ansul foam which was not a lot better with compounds of concern in it including:

26 mg/L	4:2FtTAoS (fluorotelomer thioetheramido sulfonate)
6,100 mg/L	6:2FtTAoS "
1,100 mg/L	8:2FtTAoS "

The 8:2 compounds are also of particular concern as they are toxic in themselves as well as partially breaking down to PFOA as the end-product. Undegraded 8:2 Ft compounds would not show in the PFOA analyses. 6:2Ft compounds are also known to be persistent in groundwater with elevated levels still present 10 years after use stopped in some examples and the groundwater still able to foam.

Air Services Australia were told in 2002 when they stopped using 3M Lightwater (PFOS) that Ansulite AFFF did not have any fluorinated compounds in it, this is a complete fallacy, I wonder if Defence were told/think the same.

We met with Air Services Australia today regarding Cairns airport wastewater disposal for PFOS leaching out of the training area concrete, small bickies compared to Oakey but they are going to do some chronic toxicity testing that has not been done before that may help us with other sites.

Regards

Nigel Holmes
Principal Advisor Incident Management
Central Queensland
Incident Response Unit
Environmental Services & Regulation
Queensland Department of Environment & Heritage Protection

PO Box 3130 Rockhampton QLD 4701
61 Yeppoon Road, North Rockhampton QLD 4702
Phone: 07 4936 0503
Mobile: [REDACTED] 4(6) Personal information
Satellite: [REDACTED] 4(6) Personal information

Pollution Hotline: 1300 130 372
<mailto:nigel.holmes@ehp.qld.gov.au>



From: BRADSHAW Tony
Sent: Wednesday, 30 July 2014 3:02 PM
To: KANE Gary; HOLMES Nigel
Subject: RE: latest Oakey media

Hi Gary, we are awaiting provision of the report and results from defence, apparently coming in the next few weeks. Defence have intimated a willingness to work cooperatively with this Department and the Health Department to address the issues. Cheers Tony

Tony Bradshaw
Senior Principal Environmental Officer
Project Support

Environmental Services & Regulation
Department of Environment & Heritage Protection
Level 9, 400 George Street, Brisbane Qld 4000
Telephone 07 3330 5704
Fax (07) 3330 5875

Email tony.bradshaw@ehp.qld.gov.au
Website www.ehp.qld.gov.au

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From: KANE Gary
Sent: Wednesday, 30 July 2014 11:40 AM
To: BRADSHAW Tony; HOLMES Nigel
Subject: latest Oakey media

Dear Nigel and Tony

Do we know if the local EHP office is working on this? Looks like a classic EE and/or TEP job.

Regards. Gary.

Gary Kane, Principal Advisor
Incident Response Unit, Environmental Services & Regulation Division
Department of Environment & Heritage Protection
Telephone (07) 3330 5711; **Mobile** 04 (6) Personal info 24-hour emergency 1300 130 372
Email gary.kane@ehp.qld.gov.au; **Website** www.ehp.qld.gov.au
L7 / 400 George Street, Brisbane QLD 4000; GPO Box 2454, Brisbane QLD 4001

CLEARY Amanda

From: BRADSHAW Tony
Sent: Friday, 1 August 2014 3:50 PM
To: WATTS Richard J
Cc: DELZOPPO Lindsay; HILL Chris; COOK David; CLEARY Amanda
Subject: Earlier Report - Oakey Army Base
Attachments: PB Assessment report.pdf

Hi Richard, please find attached an earlier risk assessment on the groundwater near the army base, focussed on swimming and incidental exposure to irrigation water. This was based on groundwater from well on base and close to, prior to the recent finding announced this week.

Cheers Tony

Tony Bradshaw
Senior Principal Environmental Officer
Project Support

Environmental Services & Regulation
Department of Environment & Heritage Protection
Level 9, 400 George Street, Brisbane Qld 4000
Telephone 07 3330 5704
Fax (07) 3330 5875

Email tony.bradshaw@ehp.qld.gov.au

Website www.ehp.qld.gov.au

RTI DL RELEASE - EHP

CLEARY Amanda

From: BRADSHAW Tony
Sent: Friday, 1 August 2014 3:44 PM
To: CLEARY Amanda; HILL Chris
Subject: FW: Oakey Army Base PFOS/PFOA presentation
Attachments: 20140622_Oakey Groundwater Investigation_PowerPoint for EHP (3).PDF

Sorry Amanda and Chris, hit send before including yourselves, cheers Tony

From: BRADSHAW Tony
Sent: Friday, 1 August 2014 3:42 PM
To: WATTS Richard J
Cc: DELZOPPO Lindsay; COOK David
Subject: Oakey Army Base PFOS/PFOA presentation

Hi Richard, please find attached copy of presentation given to our Department this week.

The involvement of Biosecurity Queensland in responding to this issue would be appreciated.

Regards, Tony

Tony Bradshaw
Senior Principal Environmental Officer
Project Support

Environmental Services & Regulation
Department of Environment & Heritage Protection
Level 9, 400 George Street, Brisbane Qld 4000
Telephone 07 3330 5704
Fax (07) 3330 5875

Email tony.bradshaw@ehp.qld.gov.au

Website www.ehp.qld.gov.au



Australian Government

Department of Defence
Defence Support and Reform Group

Scott Callinan
Assistant Director
Directorate of Environmental Remediation
Programs (DERP)
BP26 – 2 – B043
Environment & Engineering
Department of Defence
CANBERRA ACT 2600
Scott.Callinan1@defence.gov.au
Tel: 02 6266 8076
Fax: 02 6266 8166

8 August 2014

RECEIVED
11 AUG 2014
TOOWOOMBA

sch4p4(6) Signature

Date: 11/8/14
File: 10100094446
Item No: 3075196
Entered By: sch4p4(6) Signature

Dr Amanda Cleary
Project Manager
Department Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

Dear Amanda

Re: Army Aviation Centre Oakey (AACO) – Groundwater Investigation Project

The Department of Defence is writing to thank you and your, DEHP colleagues for meeting with us on Tuesday 29 July 2014, about the Oakey Groundwater Investigation.

For your assistance, please see the enclosed DVD which contains copies of the previously prepared technical reports on this investigation, including:

- Stage 2 (Part 2) Environmental Investigation – Army Aviation Centre Oakey (Coffey)
- Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey – Groundwater Monitoring Event, December 2012 (Parsons Brinckerhoff – Feb 2013)
- Offsite Risk Assessment, PFOS and PFOA in Groundwater: Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey (Parsons Brinckerhoff – May 2013)
- Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey Remediation Action Plan – Petroleum Hydrocarbons in Areas SQ0335 and SQ0117 (Parsons Brinckerhoff – June 2013)
- Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey Remediation Action Plan – Perfluorocarbons in Groundwater (Parsons Brinckerhoff – June 2013)
- February 2013 Addendum to Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey – Groundwater Monitoring Event (Parsons Brinckerhoff – May 2013)
- Stage 3 Risk Assessment and Remediation Design at Army Aviation Centre Oakey – Remediation Options Feasibility Study (Parsons Brinckerhoff – May 2013)
- Onsite Risk Assessment, PFOS and PFOA in Groundwater: Stage 3 Risk Assessment and Remediation Design, Army Aviation Centre Oakey (Parsons Brinckerhoff – May 2013)
- Final Report – Stage 1 and Stage 2 Environmental Investigation at Army Aviation Centre Oakey, Queensland (URS – October 2010)
- Letter: Enclosure 1 to Offsite Human Health Risk Assessment, PFOS and PFOA in Groundwater, Army Aviation Centre Oakey (AACO), May 2013 (Parsons Brinckerhoff – 4 June 2013)
- Letter: Indicative Human Health Risk Assessment, PFOS/PFOA in AACO swimming pool – Army Aviation Centre Oakey (Parsons Brinckerhoff – 29 November 2012)

Defence is committed to keeping you informed and working cooperatively with DEHP over the course of this long-term investigation.

Please be advised, a Water Use Survey has recently been distributed to landholders within the investigation area. Please see enclosed a copy of this survey for your information.

If you require further information or would like to arrange a further meeting, please contact me directly or alternatively, contact the project team on 1800 136 129 or defence.oakey.anz@aeacom.com. The project website will be updated as the investigation progresses. Please visit: <http://www.defence.gov.au/id/Oakey>.

Thank you for your assistance to date.

Yours sincerely

sch4p4(6) Signature

Scott Callinan

Assistant Director

Defence Environmental Remediation Programs

Environment and Engineering Branch

RTI DL RELEASE - EHP

Army Aviation Centre Oakey - Groundwater Investigation

Water Use Survey

Your property is within the current investigation area.

The purpose of this survey is to obtain more information about your water source and use.

For more information go to: www.defence.gov.au/id/Oakey.

1. Please provide your contact details:

Name:	<input type="text"/>
Phone:	<input type="text"/>
Email:	<input type="text"/>
Property address:	<input type="text"/>

2. How is water supplied to your property? (multiple response)

- ☐ Town water
- ☐ Tank/ Rain water
- ☐ Bore water

3. Is there an existing town water connection or water meter at your property?

- ☐ Yes - currently in use
- ☐ Yes - not in use
- ☐ No
- ☐ Unsure

4. How many rainwater tanks do you have and what is the overall capacity?

If you are using bore water or have done so in the past, please proceed to Q5.

No further information required if there is no bore present on your property.

Army Aviation Centre Oakey - Groundwater Investigation

11. Please provide further details on your bore.

How long have you
resided at this property?

What is/are the depth(s)
of your bore(s)?

What was the date of
installation of your bore
(s)?

What volume of water are
you permitted to extract
on your licence?

What is your average
annual volume of
extraction?

Do you extract and store
water on-site (in dams,
tanks etc.)?

Do you extract water for
aquaculture (private or
commercial ventures)?

12. Please provide any further comments in the box below.

Thank you for your assistance

If you have any questions about this survey, please contact the project team:

P: 1800 136 129

E: defence.oakey.anz@aecom.com



Investigation and detection areas

The map (right) shows the current investigation and detection areas.

The 'detection area' (indicated in shades of blue) shows the current understanding of the area, in which concentrations of PFOS have been reported in the groundwater. This is inferred from bore sample results and may change over time as more samples are tested.

The 'investigation area' (indicated by the black dotted line) is the broader area beyond the detection area, which is being studied as part of assessing the extent of the contaminated groundwater.

This may also change as more information becomes available.

Contact



1800 136 129 freecall (business hours)



www.defence.gov.au/id/oakey

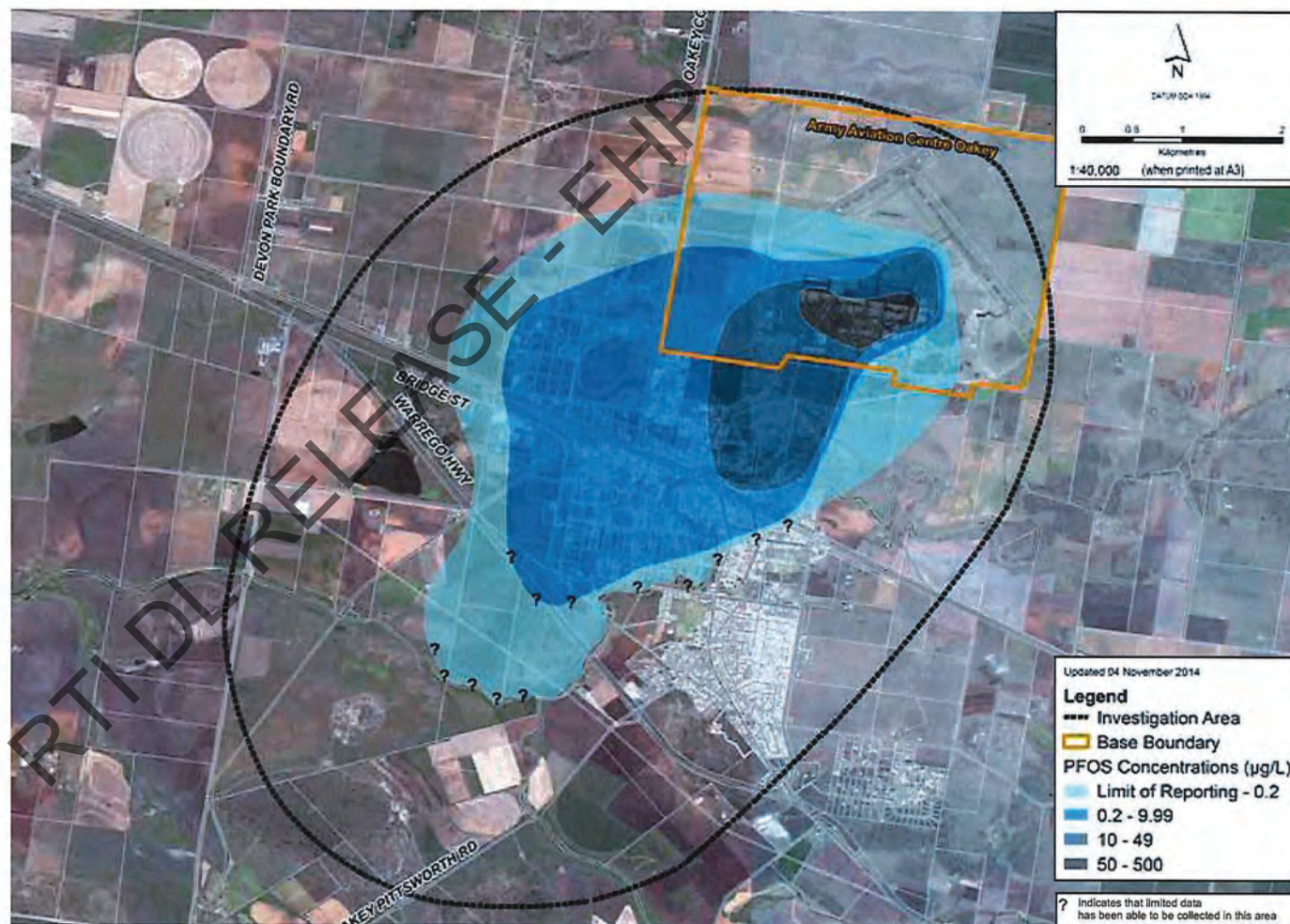


defence.oakey.anz@aecom.com



Army Aviation Centre Oakey (AACO)
Groundwater Investigation Project
C/AECOM Pty Ltd
PO Box 1307
Fortitude Valley Qld 4006

Media enquiries should be directed to
Defence Media Operations on [02] 6127 1999 or
mediaops@defence.gov.au





Army Aviation Centre Oakey – Groundwater Investigation

About the Investigation

The Department of Defence (Defence) is undertaking a long-term environmental investigation and assessment of the groundwater beneath the Army Aviation Centre Oakey (AACO) base and surrounds.

The initial investigation has involved targeted sampling and testing of local water bores to the west and south-west of the base and desktop studies.

It is anticipated the investigation may take several years to complete. The purpose of the investigation is to understand how groundwater may have been impacted by fire-fighting foams, used as part of training activities on the AACO between 1970 and 2005. These foams contained perfluorooctane sulphonate (PFOS) and perfluorooctanoic acid (PFOA).

The information collected will assist Defence to understand the groundwater impacts and contribute to developing appropriate management strategies in relation to any potential human health and ecological risks.

Using groundwater for drinking

As a precaution, Defence recommends not drinking water from any underground sources within the investigation area (see map over page) or using bore water to re-fill rainwater tanks that supply drinking water, until further notice.

Landholders and residents within the investigation area, who use groundwater for drinking water or household use, should contact Defence in order to discuss possible management strategies. Each household's drinking water requirements will be assessed on a case-by-case basis to select the most appropriate assistance that Defence may be able to provide.



Invitation - community information session

Defence will provide an update about the project on:

Tuesday 2 December 2014

6.00 – 7.30pm

Oakey RSL, 76 Campbell Street, Oakey

If you would like to attend, please RSVP to 1800 136 129 or defence.oakey.anz@daecom.com before 5pm. Monday 1 December 2014.



About PFOS and PFOA

PFOS and PFOA have been used for many years in a wide variety of common household and industrial products such as cleaning products, textiles and paper and packaging products and are present at trace concentrations throughout the environment.

PFOS and PFOA are 'emerging contaminants' and to date, limited research has been completed in Australia or overseas into the possible health impacts of these chemicals. Research in Australia and overseas continues to be undertaken and Defence is actively engaged with industry professionals to review the information from these studies and its applicability to the site conditions.

Keeping the community informed

Defence is committed to regularly updating the community throughout the investigation.

The project website will be updated as the investigation progresses. Community information sessions, direct mail and information sheets will occur as required.

Enquiries or requests relating to individual properties will be assessed on a case-by-case basis.





Australian Government

Department of Defence
Defence Support and Reform Group

Mark O'Connell
Base Support Manager Darling Downs
Department of Defence
B45 Orr Road
Oakey, QLD 4401
☎: (07) 4577 7100
✉: mark.oconnell2@defence.gov.au

26 November 2014

Dr Amanda Cleary
Principal Environmental Officer
Department of Environment and Heritage Protection
PO Box 731
Toowoomba Qld 4350

Dear Dr Cleary

**Re: Army Aviation Centre Oakey – Groundwater Investigation
Invitation to stakeholder roundtable**

The Department of Defence is writing to invite you to attend a stakeholder roundtable meeting about the Army Aviation Centre Oakey (AACO) Groundwater Investigation.

For your assistance, please find the latest project update enclosed.

This meeting is to provide key government agency representatives other key stakeholders with an update about the investigation's progress.

The details for this meeting are as follows:

Date: Tuesday 2 December 2014
Time: 3 – 4.30pm
Location: Oakey RSL
76 Campbell Street, Oakey
RSVP: RSVP before 5pm, Monday 1 December 2014 to 1800 136 129 or
defence.oakey.anz@aecom.com.

Questions can be submitted in advance by emailing defence.oakey.anz@aecom.com. This will enable Defence to gather necessary information so a response can be provided at the roundtable meeting. There will be also opportunity for participants to ask questions at the meeting.

Please be advised that this meeting is for invited participants only. If you are not the appropriate representative for the organisation listed above, please contact the project team to advise.

A public community information session about the project will be held in the evening of Tuesday 2 December, 6 – 7.30pm, at Oakey RSL. If you also wish to attend this event, please RSVP before 5pm, Monday 1 December 2014.

For further information, please contact the project team on 1800 136 129 or email defence.oakey.anz@aecom.com.

Yours sincerely

sch4p4(6) Signature

Mark O'Connell
Base Support Manager Darling Downs
Defence Support Organisation

CLEARY Amanda

From: HORTON Sarah
Sent: Wednesday, 3 December 2014 2:10 PM
To: BLANCHARD Scott
Cc: CLEARY Amanda
Subject: FW: 20141203 ESR alert update
Attachments: 20141203 ESR alert update.docx

Hi Scott

Please find attached ESR alert for your review and forwarding to Andrew.

Thanks
Sarah

From: CLEARY Amanda
Sent: Wednesday, 3 December 2014 12:26 PM
To: HORTON Sarah
Subject: 20141203 ESR alert update

Hi Sarah

Please find and updated ESR for the ongoing Oakey Army Aviation groundwater contamination issue for your consideration.

Kind Regards,
Dr Amanda Cleary

Principal Environmental Officer (Compliance), South Queensland Compliance | Toowoomba
Environmental Services & Regulation
Department of Environment and Heritage Protection

173 Hume Street Toowoomba
PO Box 731, Toowoomba QLD 4350
T: 07 4699 4371
www.ehp.qld.gov.au

Please note I don't work Monday's

Please report all pollution incident/breaches to EHP's pollution line on 137468.



Customers first | Ideas into action | Unleash potential | Be courageous | Empower people

Please consider the environment before printing this email

3 December 2014

ALERT CATEGORY:

- Environmental incident

ALERT NAME:

- Groundwater Contamination – Oakey Defence Base

CUSTOMER DETAILS:

- Department of Defence (Defence)
- Army Aviation Centre, Oakey (AACO)

SUMMARY OF ISSUE/S:

- Groundwater monitoring in and around the AACO base (the Base) has detected contaminants namely Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) from fire fighting foam used in training exercises between 1970 and 2005.
- The plume of potentially contaminated groundwater is approximately 5 km long and extends under the township of Oakey.
- PFOS and PFOA are listed on the Stockholm Convention as Persistent Organic Pollutants.
- A 2013 Human Health Risk Assessment undertaken on behalf of the Department of Defence (Defence) of offsite populations concluded that the levels of contaminants detected were below the tolerable threshold and exposure to offsite populations was unlikely.
- An Ecological Risk Assessment (ERA) however identified potential risks to aquatic organisms including the EPBC protected Murray Cod and birds if the groundwater migrates to the Oakey Creek located 7.2 km from the Base.
- Groundwater is used in the area primarily for irrigation. The ERA identified four threatened ecological communities and 41 species of flora/fauna that may be adversely affected by the contaminants.
- Defence has engaged a new consultant to undertake a higher level ERA which will include a detailed biodiversity assessment and confirm source-receptor pathways into the offsite ecological food chain.
- The Base is a federal government site and is not listed on the Contaminated Land Register or Environmental Management Register.
- 2 December 2014 EHP attended a stakeholder meeting hosted by Defence. The purpose of the meeting was to provide key stakeholders with an update of the investigations process prior to the community meeting held that night.
- Defence confirmed that the investigation is still looking at the extent of the groundwater contamination. To date 64 bores have been tested on Base and 49 recorded exceedences, and 31 of the 97 bores tested off site recorded exceedences.
- Alternative drinking water has been provided to 11 landowners. Health screening will also commence on a small number of selected landholders.
- Some surface water sampling has been undertaken recently of the Oakey Creek however Defence stated the data is yet to be available for review.
- Stakeholders in attendance included representatives from Shine Lawyers, who questioned if the sites where bore water contamination had been recorded should be listed on the Environmental Management Register (EMR). Defence has previously had meetings with EHP (contaminated land unit) regarding this matter. Defence and EHP did not comment during the meeting. Post meeting, EHP advised Shine Lawyers to put their questions in writing to EHP.

POTENTIAL IMPACTS / RISKS:

- Contaminated groundwater affecting local stock watering, irrigation bores.
- Potential impact on water quality of Oakey Creek.
- Potential ecological impact on flora and fauna in and around the Base.
- Community concern about the potential impact on human health and local ecology.
- Unknown fate/management of contaminated soil at the Base and stormwater released off site.
- Long term impact of PFOS and PFOA as it bio accumulates and doesn't biodegrade.

CUSTOMER ACTIONS:

- Defence have engaged AECOM to undertake additional groundwater monitoring and ERA of the area surrounding the Base.
- Defence offered to test individual groundwater bores at resident's request.
- DNRM were also been informed of the situation by Defence in late 2013.
- Defence have set up a community hotline, e-mail and website to handle any enquiries relating to this issue.

DEPARTMENT ACTIONS:**[HISTORICAL ACTIONS]**

- EHP manager, James Mackenzie (JM) was informed by Defence of a potential contamination issue in late 2013, and attended a public meeting in December 2013.
- The issue was briefed up following the public meeting.
- JM advised EHP Contaminated Land unit of the potential issue.
- Environmental Services officers have been liaising with AECOM in order to better understand the extent and likely risks of environmental harm.
- Defence will provide the detailed investigation report to EHP for review.

KEY COMMUNICATION MESSAGES:

- Defence are managing this issue and are taking appropriate action to identify the extent and impact of the contamination.
- Defence are managing local stakeholders and are the primary contact for any enquiries. Ref : www.defence.gov.au/id/oakey
- Defence have kept the department informed regarding the environmental aspects of this matter.

CONTACT DETAILS:

- Name: Sarah Horton (Compliance Delivery Manager)
- Phone number: (07) 4615 3474
- Division: Industry and Development

END

From: Mackenzie Judy [Judy.Mackenzie@ehp.qld.gov.au]

Sent: Wednesday, 12 December 2012 8:28 AM

To: Mackenzie James

Subject: Pls call Mark O'Connell - Manager Oakey Army Base on 4577 7100 re: groundwater. Thanks, Judy

Judy Mackenzie | Senior Environmental Support Officer
Environmental Services & Regulation, Department of Environment & Heritage Protection
173 Hume Street Toowoomba QLD 4350

PO Box 731 Toowoomba QLD 4350

T: 07 4699 4370 F: 07 4699 4388

E: General - southwest.es@ehp.qld.gov.au

E: Direct - Judy.Mackenzie@ehp.qld.gov.au

RTI DL RELEASE - EHP

From: Mackenzie James [James.Mackenzie@ehp.qld.gov.au]
Sent: Friday, 14 December 2012 3:50 PM
To: Coleman Kylie
Subject: Contaminated Land at Oakey Air Force Base

Kylie,

We have been informally advised by the Department of Defence that they have identified some contaminated land (and potentially contaminated groundwater) at the Oakey Air Force Base. The contaminants are PFOS residues from Aqueous Fire Fighting foams and also fuel (AvGas).

At this stage, DoD have engaged Parsons Brinkerhoff to establish the extent of the contamination, whether it is contained on DoD property and whether there is any risk of the contaminants moving off DoD property. They have also contacted neighbouring landowners and held a public meeting (last night) to advise neighbours of the potential contamination of their land.

I understand that normally the landowner would be required to formally notify the department under section 317 of the EP Act, but I seek your advise on how this applies to Commonwealth land.

DoD have indicated that they will supply us with a copy of the report from Parsons Brinkerhoff and appear willing to cooperate with us.

Please could you advise what you think the process should be from here.

Thanks & Best Regards,

James

James Mackenzie
A/ Regional Manager, Southern Region (West)
Environmental Services & Regulation
Department of Environment and Heritage Protection
Ph: (07) 4615 3472

RTI DL RELEASE - EHP

From: Johns Allen [Allen.Johns@ehp.qld.gov.au]
Sent: Wednesday, 19 December 2012 4:51 PM
To: Mackenzie James
Subject: RE: Oakey Airforce Base

Hi James, Lot 2 is listed for the below and Lot 1 is not listed ta Allen

RTI DL RELEASE - EHP

Lot 1 on SP208379 is not listed ta Allen

From: Mackenzie James
Sent: Wednesday, 19 December 2012 4:47 PM
To: Johns Allen
Subject: Oakey Airforce Base

Allen,

The two main lots are;

2/RP113524
1/SP208379

14-414
Please could you advise if either of these are on the EMR.

Thanks,

File A

416 of 417

Release

James

James Mackenzie

A/ Regional Manager, Southern Region (West)

Environmental Services & Regulation

Department of Environment and Heritage Protection

Ph: (07) 4615 3472

RTI DL RELEASE - EHP