Environmental Monitoring Program

Newnes Sand & Kaolin Project
Sandham Road, Newnes Junction

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Report No: 105716
Version/Date: Final, January 2012

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Document Status

Version	Purpose of Document	Orig	Review	Review Date	Format Review	Approval	Issue Date
Draft A	Draft for Client Review	TP	RD	Dec 2011			
Final				Jan 2012			

Disclaimers

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1 Background

Development Consent 329-7-2003 for the Newnes Kaolin Sand Quarry and Kaolin Mine was approved in March 2006.

The project is located on lot 1 DP 108485 off Sandham Road, Newnes Junction, via Lithgow.

Newnes Junction is located on the Bells Line of Road approximately 10kms east of Lithgow, NSW.

This plan has been prepared in response to Schedule 5 condition 2, of the above consent, which specifies that prior to carrying out any development the Applicant shall prepare an Environmental Monitoring Program (EMoP) for the development. This EMoP must consolidate the various monitoring requirements in schedule 3 of the consent into a single document.

Schedule 3 Condition 3, of the consent, specifies that within 3 months of the completion of each Independent Environmental Audit the Applicant shall review and if necessary update the EMoP.

Refer to the Monitoring Locations plan attached in Appendix 1 of this report and a Compilation Summary table of all monitoring requirements in Appendix 2 of this report.

2 Noise Monitoring Program

Schedule 3 condition 13, of the consent, specifies that prior to undertaking the development a Noise Monitoring Program (NMP) shall be prepared and implemented.

The NMP must include a combination of attended and unattended noise monitoring and a noise monitoring protocol for evaluating compliance with the noise impact assessment in the consent.

Response: **Atkins Acoustics** have prepared an Environmental Noise Monitoring Program for the project which is listed as **Appendix 8 in the Environmental Management Strategy (EMS).**

Visual and aural inspections will be undertaken quarterly, site attended noise monitoring undertaken annually and/or to assess noise complaints received by the Newnes Kaolin Environmental Manager.

Noise measurements will be conducted at exposed property boundary or within 30 metres of any residential dwelling on that property. The measurements will be conducted with the sound level meter microphone at a height of between 1.2 and 1.5 metres above the ground.

Quarterly audits will be conducted by an Accredited Noise Consultant, Acoustic Engineer or the site Environmental manager which will conduct visual and aural inspections and evaluations of plant and equipment, installed noise controls and review the operational management procedures.

2.1 Noise Monitoring Intervals and Outcomes

Noise monitoring will be undertaken in accordance with procedures outlined in table 1 below:

Table 1

Frequency	Assessment locations	Period	Minimum outcome
Annual	*Residential properties *Site plant	* Day (0700 1800hours) - unattended - attended	* Ambient statistical noise measurements - unattended (7 days) - attended audit * La10,15min contributions for construction phase (see note below) * Laea, 15 mins contributions for plant & equipment *Prevailing weather conditions * Inspection of site noise controls * Nearfield audits of site plant and equipment * Review of noise management procedures * Compliance Statement File
Quarterly	• Residential properties • Site plant	* Day (0700 1800hours) •	• Inspection of site noise controls • Review of noise management procedures • Record findings
Complaint driven	• Residential properties • Site plant if required	* Day (0700 1800hours) - attended	* Ambient statistical noise measurements - attended audit * La10,15min contributions for construction phase (see note below) * Laea, 15 mins contributions for plant & equipment *Prevailing weather conditions * Inspection of site noise controls * Nearfield audits of site plant and equipment if required * Review of noise management procedures * Record findings Report findings to Management & complainant Follow up with additional investigations if required

Note – La10, 15min for construction noise only

3 Air Quality Monitoring Program

Schedule 3 condition 15, of the consent, specifies that prior to undertaking the development the applicant shall prepare and implement an Air Quality Monitoring Program (AQMP) which must include an air monitoring protocol for evaluating compliance with the air quality impact assessment criteria in the consent.

Response: **Pae Holmes** have prepared an Air Quality Monitoring Program for the proposal which is listed as **Appendix 7 in the EMS.**

The monitoring proposed will include:

(1) Four dust deposition gauges (DDGs) measuring nuisance dust fallout. One DDG should be located at the closest affected residential receptor to the southwest of the site with another installed beyond the northern boundary of the site to allow for upwind and downwind comparisons in dust levels. Two DDGs should be installed along the eastern boundary of the site at the border of the Blue Mountains WHA at assess amenity impacts on the WHA.

(2) One high volume air sampler (HVAS) measuring PM10 concentrations at the closest affected residential receptor to the site, the location depending on the stage of operations and the proximity of extraction to residences to the southwest.

3.1 Dust Deposition

Dust deposition gauges will be operated in accordance with the:

- NSW DECCW “Approved methods for sampling and analysis of air pollutants in NSW” (NSW DEC 2005a)
- Australian Standard “AS/NZ 3580.10.1:2003Methods for sampling and analysis of ambient air – determination of particulate matter – deposited matter – gravimetric method.

Dust deposition will be measured and reported on a monthly basis. Exposed gauges will be replaced on a monthly basis with analysis conducted at a NATA accredited laboratory for insoluble solids and ash residue.

3.2 High Volume Air Sampler

HVAS units will be operated in accordance with the:

- NSW DECCW "Approved methods for the sampling and analysis for air pollutants in NSW" and
- Australian Standard "AS/NZ 3580.9.6:2003Methods for sampling and analysis of ambient air – determination of suspended particulate matter.

Monitoring will be conducted on a one-day-in-six run cycle for a continuous sample period of 24 hours.

The Environmental Manager will ensure that proposed dust control measures are effectively implemented and have the intended outcome, that is, no off-site nuisance or health effects due to air pollution are experienced.

4 Meteorological Monitoring

Schedule 3 condition 24, of the consent, states that prior to carrying out the development a meteorological station shall be established and maintained in the vicinity of the development.

Information is required on the prevailing wind speed and wind direction for the area.

Response: A meteorological monitoring station has been installed on the hill top, on the corner of the road, approximately 300 metres west of the proposed mine and quarry. The installation date was Friday 11th March 2011. The meteorological station has been sited in accordance with the Australian Standard. The weather station was installed and will be operated in accordance with the Manufacturers instructions.

The meteorological station will gather information on wind speed and direction.

Refer to plan showing all monitoring locations in Appendix 1 of this report.

5 Surface Water Monitoring Program

Schedule 3 condition 21, of the consent, specifies that the Surface Water Monitoring Program (SWMP) shall include;

a) detailed baseline data on surface water flows and quality in water bodies that could potentially be impacted by the development including the Wollangambe River and its tributaries.
b) surface water and stream health impact assessment criteria
c) a program to monitor surface water flows and quality
d) a program to monitor water releases from the site
e) a program to monitor bank and bed stability and
f) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water and stream health assessment criteria.

Response: **GSS Environmental** have prepared a Water Management Plan for the project which is listed as **Appendix 3 in this EMS**.

The objectives of the SWMP are to ensure that:

- dirty water is adequately being directed to and detained in sediment basins.
- No uncontrolled discharge occurs from the site during operational and rehabilitation phases of the project.
- Any discharge will only be by means of controlled flow from the water treatment plant.
- Clean water is adequately being directed away from the site by clean water diversion channels.
- The quality of the surrounding water bodies are not impacted due to site operations.

5.1 Water Quality Assessment Criteria

The relevant surface water assessment criteria are as in table 2 below;

Table 2

Pollutant	Unit of measure	100% concentration limit
Total suspended solids (TSS)	Mg/L	15
Oil & grease	Mg/L	10
Biochemical Oxygen Demand (BOD)	Mg/L	20

The recorded values of BOD, TSS and Oil and grease will be compared to these criteria. The recorded values and other parameters will be plotted to identify any trends over time.

5.2 Surface Water Monitoring Frequency and Location

Ongoing surface water monitoring will be undertaken within the ephemeral watercourses immediately down stream from the site. Refer to the monitoring locations plan.

The proposed monitoring locations will be in the immediate vicinity of the locations from where baseline water quality samples were obtained. Monitoring will be undertaken for the parameters specified in the DGRs including pH, EC, TSS, selected metals, oil and grease and BOD.

It is proposed to sample the background waters weekly during controlled discharges and monthly at other times. Samples of the water quality within the sediment control dams on site will also be taken prior to discharge.

Surface water monitoring locations, frequency & parameters will be as in table 3 below:

Table 3

Monitoring site	Monitoring frequency	Parameters
Receiving waters downstream from the development (sites SWI and SW2)	Weekly during controlled discharge and monthly at other times	As above
Dirty water dams (including main retention pond and lower retention pond)	Quarterly	As above

Surface water parameters as in table 4 below:

Table 4

Pollutant	Unit of measure	Sampling method
TSS	Mg/L	Grab sample
Oil & grease	Mg/L	Grab sample
pH	-	Grab sample
conductivity	us/cm	
Selected metals	Mg/L	
BOD	Mg/L	

Note: sampling will be undertaken in accordance with the DEC Approved Methods for Sampling and Analysis, March 2004

6 Groundwater Monitoring Program

Schedule 3 condition 22, of the consent, specifies that the Groundwater Monitoring Program (GWMP) shall include;

a) detailed baseline data on ground water levels and quality, based on statistical analysis, to benchmark the pre-mining natural variation in groundwater levels, yield and quality.
b) Groundwater impact assessment criteria
c) A program to monitor:
    1 Regional groundwater levels and quality
    2 Impacts on the groundwater supply of potentially affected landowners
    3 Impacts on base flow in downstream water bodies
    4 Impacts on groundwater dependent ecosystems and riparian vegetation and
d) A protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.

Response: **RPS Aquaterra** have prepared a **Groundwater Monitoring Program (GWP)** for the project dated October 2010 which is listed as **Appendix 2 in this EMS.**

Refer also to updated GWP by RPS Aquaterra dated November 2011.

The groundwater monitoring commenced on the proposed Newnes Kaolin mine on the 17th June 2010.

The groundwater monitoring program includes:

- Daily measurement of water levels in the existing network of piezometers (NW, NE, S and W) to be monitored through the life of the project.
- Quarterly sampling of all standpipe piezometers for analysis of electrical conductivity (EC), total dissolved solids (TDS) and pH.
- Biannual collection of water samples from all standpipe piezometers for laboratory analysis of a broader suite of parameters:

    - Physical properties (EC, TDS and pH)
    - Major cations and anions (Ca, Mg, Na, K, Cl, SO_4, HCO_3 and CO_3)
    - Nutrients
    - Dissolved metals.

- If pumping from the pit is required, record pump time to estimate the volume of the mine water pumped from the open cut mine

6.1 Mining Lease 19 Groundwater Monitoring Network

A summary of the groundwater monitoring network is as set out in table 5 below:

Table 5: M19 Monitoring Network Summary

Bore ID	Easting (WGS84)	Northing (WGS84)	Surface RL	Installed	Depth (m)	Screen Interval	Monitoring Data since
NW60 (GW1A)	244563	6293686	1037	2004	59.93	15-60	17/06/2010
NW17.5 (GW1B)				2004	17.55	14.5-17.5	17/06/2010
NE60 (GW2A)	245066	6293569	995	2004	60.35	15-60	17/06/2010
NE17.5 (GW2B)				2004	17.53	14.5-17.5	17/06/2010
S54 (GW3A)	244668	6292930	1059	2004	53.91	24-54	17/06/2010
S17.5 (GW3B)				2004	17.02	14.5-17.5	17/06/2010
W40	TBC	TBC	TBC	2010	TBC	TBC	N/A

**piezometer ('W') will be established about 550 m to the west of the proposed pit, following the DPI's approval of the Review of Environmental Factors. This piezometer will measure groundwater levels outside the zone of predicted drawdown.*

6.2 Ground water monitoring frequency:

Table 6: Groundwater Monitoring Frequency

Bore ID	Installed	Depth (m)	Screen Interval (m)	Data since	Groundwater monitoring frequency	Water quality monitoring frequency	Purpose
NW60 (GW1A)	2004	59.93	15 - 60	17/06/2010	Daily (logger)	Quarterly: TDS, EC, pH	Obtain baseline data (including possible existing groundwater influences from the Clarence Colliery to the North) and monitor drawdown/water quality impacts within the predicted zone of influence.
						Biannual: Major ions, Metals, Nutrients	
NW17.5 (GW1B)	2004	17.55	14.5-17.5	17/06/2010	Daily (logger)	Quarterly: TDS, EC, pH	
						Biannual: Major ions, Metals, Nutrients	
NE60 (GW2A)	2004	60.35	15 - 60	17/06/2010	Manual Observations	Quarterly: TDS, EC, pH	
						Biannual: Major ions, Metals, Nutrients	
NE17.	2004	17.5	14.5-	17/06/2	Daily (logger)	Quarterly: TDS,	

Bore ID	Installed	Depth (m)	Screen Interval (m)	Data since	Groundwater monitoring frequency	Water quality monitoring frequency	Purpose
5 (GW2B)		3	17.5	010		EC, pH Biannual: Major ions, Metals, Nutrients	
S54 (GW3A)	2004	53.91	24 - 54	17/06/2010	Daily (logger)	Quarterly: TDS, EC, pH Biannual: Major ions, Metals, Nutrients	Obtain baseline data (including possible existing groundwater influences from the Rocla Quarry to the south) and monitor drawdown/water quality impacts within the predicted zone of influence.
S17.5 (GW3B)	2004	17.02	14.5-17.5	17/06/2010	Daily (logger)	Quarterly: TDS, EC, pH Biannual: Major ions, Metals, Nutrients	
W40	TBC	TBC	TBC	TBC	Daily (logger)	Quarterly: TDS, EC, pH Biannual: Major ions, Metals, Nutrients	Obtain baseline data and monitor impacts outside the predicted zone of influence
Pit Sump					Volume (when pumped)	*Quarterly: TDS, EC, pH *Biannual: Major ions, Metals, Nutrients DS, EC, pH	Determine groundwater inflow volumes and groundwater inflow quality

7 Flora and Fauna Monitoring Program

Schedule 3 condition 30, of the consent, specifies that the Flora and Fauna Monitoring Program (FFMonP) shall include the following:

a) detailed baseline data on the flora and fauna on the site and adjacent the site including habitat present in the greater Blue Mountains WHA and along the Wollangambe River and its tributaries
b) detailed flora and fauna impact assessment criteria
c) a program to monitor flora and fauna and habitat health on and adjacent site including habitat present in the greater Blue Mountains WHA and along the Wollangambe River and its tributaries
d) a protocol for the investigation, notification and mitigation of identified non-compliances with the flora and fauna impact assessment criteria.

Response: **RPS** have prepared a **Flora & Fauna Management Plan (FFMP)** for the project which is listed as **Appendix 4 in this EMS**.

This plan includes details of the proposed FFMonP which is required to initially provide baseline data regarding the flora and fauna composition currently present within the subject site, the habitats present within the adjoining Greater Blue Mountains World Heritage Area and habitats present along the Wollangambe River and tributaries. The initial survey will provide baseline data to be used for comparison with other data gathered via regular monitoring during and subsequent to the mine operations. Baseline data will include structural and floristic vegetation descriptions, hydrological observations, occurrence and extent of weeds, presence or absence of pests or introduced fauna

The initial monitoring strategy will be to collect a comprehensive set of data to act as a baseline to enable comparison to data from subsequent surveys. Comparison of data from subsequent surveys will highlight any deviation from the baseline data and will be useful for monitoring the health, diversity and structure of the site with respect to flora and fauna.

The overall strategy will be to undertake a series of easily repeatable surveys that will gather a comprehensive set of data each time. Ideally this data gathering will follow a set of easily understood guidelines to simplify the task and to ensure that the data is collected in a similar manner each time.

A standard set of proformas will be used to gather the information.

7.1 Detailed Flora and Fauna Impact Assessment Criteria

The details of specific impact assessment criteria relating to flora and fauna, vegetation communities and habitat, are based on the selected monitoring sites for the vegetation surveys.

The monitoring of vegetation characteristic (i.e. floristic composition, habitat structure and condition) as well as hydrological regimes and other site characteristics were carried out within the NPSS. This and any monitoring of additional NSW and Australian Government listed Ecological Endangered Communities that may be identified in the compensatory sites will provide assessment data as well as inform the development and refinement of assessment criteria. These will be compared with the available scientific evidence, and in particular the profiles provided in "The Vegetation of the Western Blue Mountains including the Capertee, Coxs, Jenolan & Gurnang Areas" Volume 2: Vegetation Community Profiles (DECCW 2006).

The regular systematic monitoring of these sites over the life of the project and in accordance with the protocols outlined in this FFMP will determine if these community types, and by inference to similar vegetation types nearby, have been impacted by the activities of the project.

Similarly, the monitoring of fauna species and habitat characteristic at these sites and elsewhere in the area - in accordance with the protocols herein - will determine if fauna species have been impacted by the activities of the project.

Monitoring of the composition and degree of existing weed infestation in accordance with the Pest and Weed Management Plan has provided a baseline for the assessment of any weed invasion of the subject sites and helped inform the selection of criteria for the assessment of flora and fauna communities.

7.2 Vegetation Mapping

Flora surveys on site and vegetation mapping were carried out and included the following procedures:

- Review of the vegetation mapping (Benson and Keith 1990, DECCW 2006) for the study locality;
- Aerial Photograph Interpretation (API) to map the community(s) extent into definable map units;
- Confirmation of the community type(s) present (dominant species) via the undertaking of detailed field flora surveys and identification; and
- Mapping of the type and general extent of the community(s) present into definable map units where appropriate.

7.3 General Flora Survey

General flora surveys were carried out across the subject site to determine species diversity and abundance and vegetation structure (the flora quadrat proforma in Appendix 1 of the FFMP outlines the information that was recorded during surveys). This consisted of ten 20 m x 20 m quadrats and random meanders throughout each quadrat as described by Cropper (1993). A map showing the study site with the location of each quadrat is shown in Figure 6-1 of the FFMP.

All species recorded were identified as far as practicable to species and subspecies (where relevant) level. When a plant could not be identified accurately in the field, a single sample was collected, together with notes on habitat, form, percent coverage and height. These samples were identified in the office (according to nomenclature in Harden [1992 – 2002]) or sent to the Royal Botanical Gardens for identification.

Fauna habitat assessments were conducted at each quadrat to determine the possible composition of faunal assemblages at each site if species were not observed during the survey.

An example of flora and fauna data sheets is supplied in Appendix 2 of the FFMP.
Weed identification and monitoring (as required under Schedule 3 Condition 29(c) of the consent) was undertaken in association with these works.

7.4 Monitoring site locations and project commitments

Flora and fauna monitoring was carried out within the 100m buffer and within the adjoining GBMWHA and alongside the Wollangambe River and tributaries, totalling ten monitoring plots in the survey area. The location of these survey locations is shown in Figure 6-1 of the FFMP.

- The program of monitoring within the GBMWHA and alongside the Wollangambe River and tributaries is similar to that for the subject site and compensatory sites.
- Assessment of the potential for the identified vegetation communities to constitute EEC's as listed within the *TSC Act* and the *EPBC Act* was undertaken within each monitoring quadrat. Vegetation communities that are listed during the life of the project will be further assessed and additional surveys undertaken if this is found to be necessary. Floristic composition, geo-morphological characters and geographic distribution will be considered when determining whether a vegetation community comprises an EEC or not.

Weed and pest monitoring also occurred in these areas in accordance with schedule 3 Condition 29(c) of the consent.

7.4.1 Program of monitoring within the 100m buffer

Two monitoring sites using the methods outlined previously were located within the buffer were surveyed.

7.4.2 Program of monitoring within the adjoining Greater Blue Mountains WHA

Four monitoring sites using the methods outlined previously were located within 200m of the common project / GBMWHA boundary to ensure that the project does not impact upon the biodiversity of the GBMWHA.

7.4.3 Program of Monitoring along the Wollangambe River and tributaries

Two monitoring sites using the methods outlined previously were located along the main tributaries to the Wollangambe River, with an additional two monitoring sites along the Wollangambe River itself to ensure that the project does not impact upon the ecology of the Wollangambe River and its tributaries.

7.4.4 Program of monitoring within the Dargans Creek Reserve and Shrub Swamp habitats on the Newnes Plateau

It is expected that the start-up and annual funding directed to the HNCMA for these areas will also effectively fund annual monitoring activities showing an improvement in rehabilitated areas, though this is outside the scope of the site-specific Flora and Fauna Monitoring Program.

7.4.5 Program of monitoring within the minimum 25ha offset area

The land tenure and location of the minimum 25ha offset area has informed monitoring requirements. It may be that land may be purchased and granted to NPWS, depending on its location, which would be likely to not require annual monitoring. The proponent will fully consult with OEH (NPWS) and SEWPAC to determine any monitoring requirements and this FFMP will need to be updated at that time.

8 Aboriginal Cultural Heritage Monitoring Program

Schedule 3 condition 38 specifies that prior to undertaking the development an Aboriginal Cultural Heritage Monitoring Program (ACHMP) shall be prepared and implemented.

The ACHMP shall include:

a) a program to monitor for the presence of Aboriginal relics during pre-clearing, clearing and excavation stages of the development with the involvement of the Bathurst Local Aboriginal Land Council;
b) detailed methodology for conducting the monitoring program and
c) procedures for managing any Aboriginal relics discovered during the development.

Response: **RPS** has prepared an **Aboriginal Cultural Heritage Management Plan** (ACHMP) for the project, which includes a monitoring program, and which is listed as **Appendix 6 in this EMS**.

This monitoring program should be implemented when the following works or activities are proposed within the project area: pre-clearing, clearing, initial excavation. This monitoring program includes key personnel; land manager, on-site personnel, heritage consultant and Aboriginal stakeholders with their roles and responsibilities outlines in the ACHMP.

At the outset, relevant on-site personnel and land manager should have read and understood this document and a copy of this document should be kept on-site for ease of reference. Before the commencement of works the land manager in liaison with on-site personnel should identify whether the following activities are proposed within the project area: pre-clearing, clearing, initial excavation. The location/s of such activities should be identified, as well as the intended start date. The heritage consultant (RPS) should be contacted at least one month prior to the commencement of works so that the location/area can be inspected and monitored in consultation with the Aboriginal stakeholders (Bathurst Local Aboriginal Land Council).

If Aboriginal sites or objects are identified during monitoring, appropriate mitigation strategies should be developed in accordance with the monitoring program methodology in the ACHMP. Such strategies should be implemented and signed off by the heritage consultant and Aboriginal stakeholders. The Land manager should fill out the Aboriginal Cultural Heritage Monitoring Log and append information supplied by the heritage consultant to the back of this document. The activity in the designated area which has been monitored can then proceed. If no Aboriginal sites or objects are identified during monitoring, then the land manager should fill out the Aboriginal Cultural Heritage Log and the activity can proceed in the area which has been monitored. If other areas require monitoring then the monitoring program should be implemented as appropriate, until such time that all land to be impacted has been monitored for pre-clearing, clearing and initial excavation activities. Once the monitoring program is complete for all activity areas this document can be finalised and closed; a copy should be forwarded to the Aboriginal stakeholders.

Appendix 1

Monitoring Location plan

Appendix 2

Compilation summary table of all monitoring requirements

Environ-mental issue	Monitoring locations	Frequency	Parameters
Noise	• Residential properties nearby • Site plant	Annual, Quarterly and Complaint driven	• Comparison with baseline data • Ambient statistical noise measurements • Prevailing weather conditions
Air quality	• North east corner of site • South east corner of site • South west hill top • (incl HVAS)	Monthly	• Comparison with baseline data • Dust deposition • Insoluble solids • Ash residue
Meteoro-logical	Southwest Hill top 300m west of site	Daily	Permanent weather station installed which measures; * wind speed * wind direction
Surface water	• North east corner of site on creek line • South east corner of site on creek line	Weekly and quarterly	• Comparison with baseline data • Total suspended solids • Oil and grease • Biochemical oxygen demand
Groundwater	• North east corner of site – GW2A GW2B • North west corner of site – GW1A GW1B • South of site GW3A GW3B • West of site	Daily logger and Quarterly sampling and Biannual sampling for lab analysis	• Comparison with baseline data • Physical properties • Major cations and anions • Nutrients • Dissolved metals
Flora and Fauna	• North east corner of site within 100 m buffer	Prior to vegetation removal,	* Comparison with baseline data, * hydrological observations,

	• South east corner of site within 100m buffer • Eight sites within WHA & close to Wollangambe Rv • Overall site	During quarry operations Subsequent to quarry operations	* occurrence and extent of weeds * presence or absence of pests or introduced fauna and flora
Aboriginal Cultural Heritage	Overall site	Prior to commencement of works, prior to vegetation removal/earth works	Presence or absence of Aboriginal sites or objects