GLADSTONE NICKEL PROJECT ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT

Updated Groundwater Investigation

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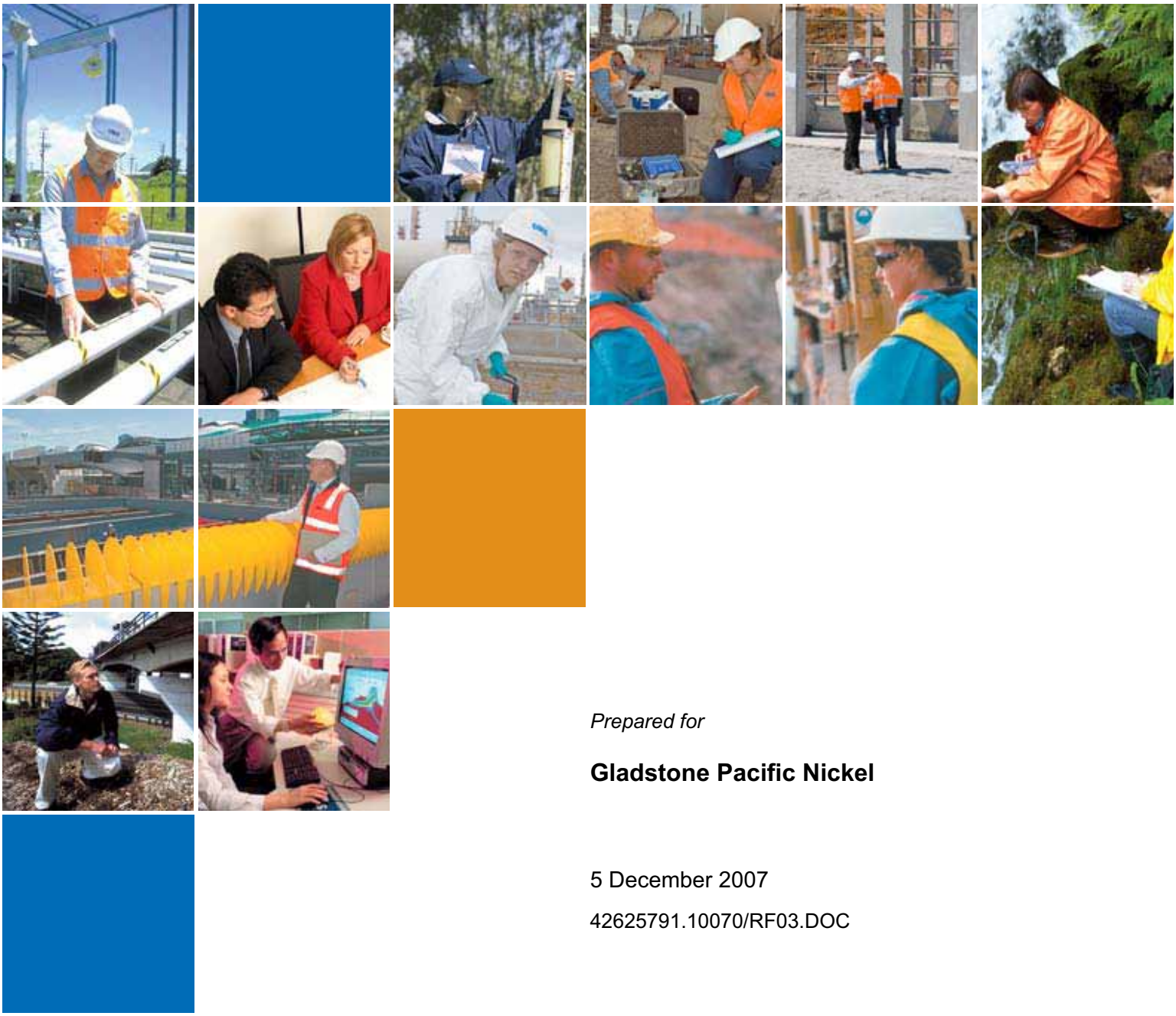
Gladstone Pacific Nickel LTD

REPORT

Supplement to EIS

Groundwater Investigations for Gladstone Pacific Nickel RSF and Plant Sites



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Section 1 Introduction

This report reviews current groundwater conditions at the Gladstone Pacific Nickel proposed Residue Storage Facility (RSF) and Plant sites, assesses the potential impacts from the proposed operations on groundwater conditions, and outlines actions that will be taken to mitigate any impacts of the proposed project. This report was prepared in response to requests for further information raised in the EIS responses from government agencies and the community

1.1 Review of Information

This groundwater assessment is based on a desk top review of available information and additional data collected on-site between April and May 2006, and between July and August 2007. The previous studies undertaken within the study area and the additional data collected have been used to provide the necessary background groundwater data.

An assessment of existing groundwater conditions for the RSF and Plant sites has been undertaken, based on the following available data sources:

- A search of the Queensland Department of Natural Resources and Water (NRW) groundwater and licensing database for registered bores located within a 3 km radius of the RSF and Plant sites.
- Previous groundwater assessments undertaken within the vicinity of the project.
- Gladstone Special 1:100,000 Geology Map (Sheet 9150 & Part 9151) March 2006 Revised Edition – Queensland Government Department of Natural Resources, Mines and Water.
- Additional groundwater and lithological data collected on-site by URS between April and May 2006, and between July and August 2007.
- A survey of unregistered groundwater bores within a 2km radius of the site.

The locations of the registered bores, unregistered bores and monitoring wells installed within the specified areas are shown on **Figure 1** and **Figure 2**. Bore cards from the NRW database, bore logs from the URS field work, and unregistered bore survey sheets are available in **Appendices A, B** and **C** respectively.

A number of previous studies have been undertaken that have assessed groundwater conditions in the vicinity of the project areas.

An EIS was prepared for the Rio Tinto Aluminium Yarwun (RTAY - previously Comalco Alumina) refinery by Dames and Moore in 1998. The RTAY refinery is located about 3 km northwest of the proposed GPN Plant site, and the RTAY Residue Management Area (RMA) is located about 3 km north of the proposed GPN RSF site. As part of the RTAY environmental conditions, RTAY is required to conduct quarterly groundwater monitoring on a network of monitoring bores.

An EIS was prepared for the proposed Wiggins Island Coal Terminal (WICT) by Connell Hatch in 2006. The study area for the WICT encompasses the area of, and an area to the northeast and southeast of, the GPN Plant site.

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2.1 Existing Hydrogeological Environment

2.1.1 Groundwater Geology and Aquifer Occurrence

Groundwater in the vicinity of the RSF site mainly occurs within fractures and pore spaces of the regional sedimentary bedrock units. The two relevant sedimentary bedrock aquifer units are the Late Devonian to Early Carboniferous Mount Alma Formation and the Rockhampton Group.

The Mount Alma Formation consists of thinly interbedded fine-grained sandstone and siltstone, and conglomerate with andesitic to dacitic volcanic clasts and siltstone rip-up clasts. This formation is found in the western portion of the project area and is separated from the Rockhampton Group in the east by the Ambrose Fault.

The Rockhampton Group is comprised of mudstone and siltstone, felsic volcaniclastic sandstone, polymictic conglomerate, oolitic and pisolitic limestone and minor skeletal limestone.

The faulted contact between the two bedrock units trends northwest-southeast through the RSF site. The contact is along a regional fault system, with a Late Permian gabbro intrusion north-west of the RSF, likely a by-product or cause of the structural deformation event. This gabbro intrusion lies between the two sedimentary bedrock units and has an associated layer of greenstone on its adjacent contact boundaries. Structural deformation in the area has produced dips in the strata of the Mount Alma Formation of between 20^{O} and 50^{O} in a north-easterly direction toward the fault and in the Rockhampton Group of 57^{O} to 82^{O} in a south-westerly direction toward the fault.

Nine groundwater monitoring bores (RSF1 to RSF9) were installed between 28 April and 1 May 2006 and 15 groundwater monitoring bores (RSF10 to RSF24) were installed between 7 and 17 August 2007. The locations of these bores are shown on **Figure 1** and **Figure 2** and the bore logs are presented in **Appendix B**.

The lithology encountered during drilling in the Mount Alma Formation and the Rockhampton Group tended to be hard fine grained sedimentary rocks (siltstone and fine grained greywacke which have been silicified), chert, and minor limestone. Due to the steep dips and complex history of structural deformation of the strata, correlation of strata between the monitoring bores cannot be undertaken. The primary permeability of the strata appears to be low due to the fine grain sizes and secondary mineralisation infilling between the grains. Fractures in the strata were observed during the investigations, some of which were infilled with silica or calcite. Hence the permeability and porosity of the Mount Alma Formation and Rockhampton Group strata is likely to be highly variable, depending on the degree of secondary mineralisation and the intensity of fracturing. Those fractures which are unfilled are likely to be the main conduits for groundwater flow through the formations. Open fractures are not pervasive throughout the area with some monitoring wells remaining dry. Recharge of these formations is generally by direct infiltration of rainfall and overland flow, and by downward leakage from overlying aquifers in unconsolidated alluvium/colluvium.

A thin layer of surficial unconsolidated alluvium/colluvium exists within the topographically low drainage lines which trend north to south within the RSF site. Along Farmers Creek they consist of 3 to 6 m of poorly sorted clay, silt, sand and gravel mixtures with occasional well sorted sand or gravel layers. Potential for groundwater exists within sandy and gravely sections of the alluvium, which represents an unconfined to semi-confined aquifer. Groundwater movement within the alluvium is predominantly via inter-granular flow. Recharge to the shallow alluvial aquifer is likely to come from two main sources - seepage from creek beds and banks during strong surface water flow or flooding; and surface infiltration of rainfall and overland flow, where alluvium is exposed and no substantial clay barriers occur in the shallow sub-surface. Due to their shallow depth and their lack of continuity and thickness, the alluvium is not considered a significant aquifer within the area of the RSF.

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2.1.2 Hydraulic Parameters

Falling head tests were conducted on the monitoring wells installed to provide details on the hydraulic conductivity of the various rock and soil materials. Analysis of the data using standard analytical methods (Hvorslev, 1951 and Bouwer and Rice, 1976) is provided in **Appendix D**. A summary of the analysis results is provided in **Table 2-1**.

Table 2-1 Hydraulic Conductivity (K) of Various Aquifer Materials

Monitoring Bore ID	Hole Depth (m)	Aquifer/ Aquitard Material	K (mean) (m/day)
Alluvium			
RSF3	4	alluvium – sandy clay	5.01×10^{-4}
RSF13	6	alluvium – sand and gravel	>10
RSF17	5	alluvium – silty sand and weathered chert	3.48×10^{-3}
Mount Alma Formation			
RSF2	9	gabbro	8.33×10^{-3}
RSF4	9	shale	1.43×10^{-4}
RSF6	15	greenstone	1.26×10^{-1}
RSF7	8	mudstone	1.72×10^{-2}
RSF9	24	mudstone	1.02×10^{-3}
RSF10	14	greywacke	9.46×10^{-1}
RSF14	36	chert	1.65×10^{-3}
Rockhampton Group			
RSF1	39	siltstone	1.92×10^{-4}
RSF5	18	shale	5.37×10^{-2}
RSF19	41.5	quartzose siltstone	9.74×10^{-3}
RSF21	36	quartzose siltstone	4.19×10^{-3}
RSF24	32	quartzose siltstone	3.84×10^{-2}

The poorly sorted alluvium at RSF3 and RSF17 has a low permeability, with a hydraulic conductivity (K) of 5.01×10^{-4} to 3.48×10^{-3} m/day. The well sorted sand and gravel at RSF13 has a high permeability, with a hydraulic conductivity of greater than 10 m/day (the rate of fall in the falling head test was too quick to determine and accurate hydraulic conductivity with the methods employed). As the alluvium is confined to the drainage lines and is not regionally extensive, groundwater extraction at high rates would not be sustainable in the long term.

The hydraulic conductivity values of the consolidated rock formations ranges from 1.43×10^{-4} to 9.46×10^{-1} m/day with an average of 1.01×10^{-1} m/day and a median of 9.04×10^{-3} m/day. Primary permeability in the consolidated rock strata is likely to be limited due to the fine grain size and secondary mineralisation of the formations. Aquifer permeability will be controlled by the spacing, aperture size and interconnectivity of the discontinuities. Where the strata is more fractured, the unit may have local zones of moderate to high hydraulic conductivity as at RSF6 and RSF10. As the consolidated rock formations are variably fractured and the extent of any high hydraulic conductivity fracture zones is not expected to be regionally extensive, groundwater extraction at high rates would not be sustainable in the long term.

2.1.3 Groundwater Levels and Flow Characteristics

The hydrogeological conditions encountered at each monitoring bore installed for the study are summarised in **Table 2-2**.

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Table 2-2 Summary of Hydrogeological Conditions Observed at Monitoring Bores

Monitoring Bore ID	Date Installed	Hole Depth (m)	Aquifer/ Aquitard Material	Screen Interval (m)	Aquifer Type	SWL (mbgl)	SWL (mAHD)*
Alluvium							
RSF3	1/5/2006	4	alluvium – sandy clay	2.5 to 4	NAP	Dry	Dry
RSF11	7/8/2007	3	alluvium – gravely clay	2-3	unconfined	2.96	36.44
RSF12	8/8/2007	3	alluvium – gravely clay	1.5-3	NAP	Dry	Dry
RSF13	8/8/2007	6	alluvium – sand and gravel	3-6	unconfined	4.51	32.49
RSF15	9/8/2007	4.5	alluvium – sandy clay	2-2.5	NAP	Dry	Dry
RSF17	11/8/2007	5	alluvium – silty sand and weathered chert	2-5	unconfined	4.25	42.46
RSF20	13/8/2007	4.5	weathered limestone	1.5-4.5	NAP	Dry	Dry
Mount Alma Formation							
RSF2	1/5/2006	9	gabbro	6 to 9	NAP	Dry	Dry
RSF4	1/5/2006	9	shale	6 to 9	NAP	Dry	Dry
RSF6	29/4/2006	15	greenstone	12 to 15	NAP	Dry	Dry
RSF7	30/4/2006	8	mudstone	2 to 8	NAP	Dry	Dry
RSF8	29/4/2006	12	shale	3 to 6	NAP	Dry	Dry
RSF9	28/4/2006	24	mudstone	21 to 24	semi-confined	17.93	66.07
RSF10	7/8/2007	14	greywacke	9.5-12.5	semi-confined	4.01	35.40
RSF14	8/8/2007	36	chert	27-36	semi-confined	14.41	37.39
RSF16	10/8/2007	50	greywacke	44-50	NAP	Dry	Dry
RSF18	12/8/2007	50.5	chert	44.5-50.5	semi-confined	48.21	65.49
Rockhampton Group							
RSF1	1/5/2006	39	siltstone	36 to 39	semi-confined	36.72	35.28
RSF5	29/4/2006	18	shale	15 to 18	NAP	Dry	Dry
RSF19	12/8/2007	41.5	quartzose siltstone	35.5-41.5	semi-confined	28.13	36.08
RSF21	13/8/2007	36	quartzose siltstone	30-36	semi-confined	23.35	31.35
RSF22	15/8/2007	50.5	quartzose siltstone	43.5-49.5	NAP	Dry	Dry
RSF23	16/8/2007	50.5	quartzose siltstone	44.5-50.5	NAP	Dry	Dry
RSF24	17/8/2007	32	quartzose siltstone	26-32	semi-confined	19.47	68.83

NAP = No aquifer present; *Based on elevation data provided by RLMS.

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Groundwater levels in alluvium were between 2.96 and 4.51 metres below ground level (mbgl), with some of the bores in alluvium being dry. Where the monitoring bores were dry the alluvium may not act as an aquifer, or the alluvial aquifers may be dry due to the extended dry conditions encountered during the field investigations. The groundwater level in the alluvium is generally above the piezometric water level in the bedrock at the same location which indicates groundwater movement may be downwards, with the alluvium recharging the bedrock aquifers. Due to the heterogeneity and discontinuity of the alluvial aquifers, the groundwater flow direction cannot be determined on a regional scale for these aquifers; however, locally groundwater flow is expected to be down gradient along the drainage lines.

Groundwater levels in the bedrock Mount Alma Formation and Rockhampton Group were between 4.01 and 48.21 mbgl, with some of the bores in these formations being dry at depths up to 50 mbgl. A contour map of groundwater levels in the bedrock units is shown in **Figure 3**. Groundwater flow within the bedrock units is primarily in fractures, and the direction of groundwater flow generally mirrors topography, flowing from topographically higher to topographically lower areas. As aquifer permeability and groundwater flow is controlled by the spacing, aperture size and interconnectivity of fractures, there may be zones of higher groundwater flow in highly fractured areas, and zones where the bedrock is unfractured and hence is not an aquifer such as at RSF16 towards the centre of the site in a topographically lower area which was dry at a depth of 50 mbgl. The effects of faults on local and regional groundwater flow patterns are not known, but could be substantial. Faults may either restrict or enhance flow, depending on the transmissivity of the fault zones, which is not possible to predict with the current level of information.

Travel time velocity estimates for the consolidated rock formations were calculated using the analytical Darcy's Law equation. An average hydraulic conductivity of 9.04×10^{-3} m/day was assumed based on the median result of the falling head tests. A drainable porosity range of 1 to 5 % was assumed for the sake of conservatism (i.e. to project the maximum potential off-site velocity). The range of hydraulic gradient on-site was 0.3 to 3 % from the water levels observed in the monitoring wells. The range of calculated groundwater flow velocities varied from 0.2 m/y to 9.9 m/year.

2.1.4 Water Quality

A summary of measured physico-chemical water quality of groundwater samples collected from monitoring bores in the project area is provided in **Table 2-3**.

Table 2-3 In situ Physico-chemical Parameters for RSF Monitoring Bores

Monitoring Bore ID	Date of Testing	SWL (mbgl)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Eh (mV)
Alluvium						
RSF13	29/08/2007	4.51	4.06	1,314	7.17	8
RSF17	30/08/2007	4.25	3.54	3,860	7.05	4
Mount Alma Formation						
RSF9	04/05/2006	17.93	2.62	1,496	7.16	207
RSF10	29/08/2007	4.01	3.97	1,687	7.19	130
RSF14	29/08/2007	14.41	0.29	5,760	7.43	-331
Rockhampton Group						
RSF1	05/05/2006	36.72	4.30	2,050	7.59	84
RSF19	28/08/2007	28.13	4.06	1,687	6.83	77
RSF21	29/08/2007	23.35	4.31	3,890	7.43	88
RSF24	30/08/2007	19.47	4.18	2,322	7.11	31

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The physico-chemical parameters measured for the samples indicate that the groundwater is relatively brackish, has a near-neutral pH and is oxidized. It should be noted that the results are likely to be influenced by the depth of the aquifer and distance from area of recharge to the sample point.

Groundwater samples were analysed at a NATA certified laboratory for major ions and select heavy metals. A summary of the analytical results is provided in **Table 2-4**, with the full laboratory reports in **Appendix E**. The environmental values of the water have been assessed according to the values identified in the Environmental Protection (Water) Policy 1997 (EPP Water 1997). The three environmental values of relevance to the groundwater at the site are:

- Biological integrity (maintaining the water quality so the plants and animals living in the waterway can survive);
- Suitability for primary industry (livestock drinking water) use; and
- Suitability for primary industry (irrigation) use.

The investigation levels (ANZECC, 2000) adopted to encompass the three defined environmental values and to provide a comparison of the groundwater analytical results include:

- The Trigger Levels for Freshwater Ecosystems – 95% protection level of species.
- The Short-term Trigger Values (STV) and Long-term Trigger Values (LTV) in Irrigation Water.
- The Livestock Drinking Water Guidelines.

According to the ANZECC (2000) guidelines, groundwater present within the monitoring wells in both the alluvium and consolidated rock formations is deemed to be suitable for livestock drinking water apart from the concentration of dissolved lead in RSF9.

Groundwater from the majority of the monitoring wells is marginal for use as irrigation water due to marginal concentrations (dependant on irrigation rates and plant types) of sodium and chloride, and to elevated concentrations of manganese for long term use at RSF13 and RSF17. However the low yield typical of the aquifers would preclude use for irrigation.

The groundwater has also been assessed against the ANZECC (2000) guidelines for the protection of 95% of species in a freshwater environment to consider the potential effect of discharge of groundwater into surface water bodies or groundwater dependant environments. The concentrations of some dissolved metals (cadmium, chromium, copper, lead and nickel) in groundwater from some bores, and the concentration of dissolved zinc in groundwater from all bores, are above the ANZECC (2000) guidelines for freshwater aquatic environments. The assessment of groundwater quality using surface water investigation levels has an inherent level of conservatism due to the assumptions made regarding the behaviour and fate of the analytes detected in groundwater along the groundwater flowpath to discharge and the subsequent effects in the surface water ecosystem.

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Table 2-4 Summary of Groundwater Quality at the RSF Site

Analyte	Units	ANZECC 2000 Environmental Values					Monitoring Bore ID								
		Freshwater - 95%	*Irrigation - LTU*	*Irrigation - STU*	Livestock - Beef	Livestock - Sheep	RSF1 6/05/06	RSF9 5/05/06	RSF 10 29/08/07	RSF 13 29/08/07	RSF 14 29/08/07	RSF 17 30/08/07	RSF 19 28/08/07	RSF 21 29/08/07	RSF 24 30/08/07
Total Dissolved Solids	mg/L	ne	***ne***	***ne***	4,000	5,000	1,312	957	1,110	1,240	1,520	1,920	896	2,350	1,430
Major Ions															
Sodium	mg/L	ne	***115-460****	***115-460****	ne	ne	***394***	***165***	***216***	***152***	***236***	***432***	***180***	***373***	***352***
Magnesium	mg/L	ne	***ne***	***ne***	ne	ne	51	47	40	37	97	96	65	224	68
Potassium	mg/L	ne	***ne***	***ne***	ne	ne	10	4	1	4	12	13	8	11	8
Calcium	mg/L	ne	***ne***	***ne***	1000	1000	32	79	84	59	102	86	103	133	71
Chloride	mg/L	ne	***175-700****	***175-700****	ne	ne	***226***	***171***	***179***	***153***	***272***	***627***	54	***839***	***338***
Sulphate	mg/L	ne	***ne***	***ne***	1000	1000	150	27	19	45	33	148	122	72	70
Bicarbonate Alkalinity as CaCO3	mg/L	ne	***ne***	***ne***	ne	ne	787	543	565	361	759	548	726	862	706
Dissolved Metals															
Arsenic	mg/L	0.013 (As^5) / 0.024 (As^3)	***0.1***	***2***	0.5	0.5	<0.001	0.002	<0.001	0.002	0.002	0.001	0.002	0.002	0.002
Barium	mg/L	ne	***ne***	***ne***	ne	ne	0.155	0.257	0.013	0.103	0.070	0.053	0.042	0.131	0.058
Beryllium	mg/L	ne	***0.1***	***0.5***	ne	ne	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0002	***0.01***	***0.05***	0.01	0.01	0.0001	<0.0001	<0.0001	0.0002	<0.0001	0.0003	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001 (Cr^4) / ne (Cr^3)	***0.1***	***1***	1	1	0.021	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002
Cobalt	mg/L	ne	***0.05***	***0.1***	1	1	<0.001	<0.001	<0.001	0.005	0.002	0.029	0.002	0.003	0.003

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Analyte	Units	ANZECC 2000 Environmental Values					Monitoring Bore ID								
		Freshwater - 95%	*Irrigation - LTU*	*Irrigation - STU*	Livestock - Beef	Livestock - Sheep	RSF1 6/05/06	RSF9 5/05/06	RSF 10 29/08/07	RSF 13 29/08/07	RSF 14 29/08/07	RSF 17 30/08/07	RSF 19 28/08/07	RSF 21 29/08/07	RSF 24 30/08/07
Copper	mg/L	0.0014	***0.2***	***5***	1	0.4	0.002	0.002	<0.001	<0.001	<0.001	0.013	<0.001	0.002	0.002
Lead	mg/L	0.0034	***2***	***5***	0.1	0.1	0.079	0.298	0.002	<0.001	0.021	0.002	0.012	0.039	0.017
Manganese	mg/L	1.9	***0.2***	***10***	ne	ne	0.022	0.055	0.091	***1.70***	0.100	***0.213***	0.172	0.175	0.092
Mercury	mg/L	0.0006	***0.002***	***0.002***	0.002	0.002	0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.011	***0.2***	***2***	1	1	0.004	<0.001	0.002	0.003	0.010	0.027	0.010	0.012	0.013
Vanadium	mg/L	ne	***0.1***	***0.5***	ne	ne	<0.05	<0.05	<0.01	<0.01	0.02	0.01	0.02	<0.01	<0.01
Zinc	mg/L	0.008	***2***	***5***	20	20	0.047	0.234	0.017	0.009	0.010	0.041	0.013	0.016	0.042

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2.1.5 Groundwater Use in Neighbouring Areas

There is no significant groundwater usage registered on the NRW groundwater database. There are only four registered groundwater bores within a 3 km radius of the RSF site. Detailed NRW bore cards are provided in **Appendix A**. Two of these bores are situated within 2 km of the western boundary (RN111019 and RN91090), and one is situated south of the RSF (RN122599). A summary of the bore details is included below:

- RN111019 is a low-yield windmill bore (0.63 L/s air lift yield) established in September 1995, that intersects the Mount Alma Formation beds. An initial standing water level of 1.5 mbgl was recorded for this bore, but no recent data has been collected for comparison with historic water levels. An initial water quality of 1600 mg/L TDS was recorded for this bore.
- RN91090 has a better recorded air lift yield (4.5 L/s) with a water quality of 1050 mg/L TDS, and an initial standing water level of 3 mbgl, measured in April 1993. This bore is screened in both the Farmer Creek alluvium and a fractured andesite (3 m thick) immediately below the alluvium.
- RN122599 is installed into the Mount Alma Formation. It had an initial water level of 4.1 mbgl, a yield of 0.95 L/s and water quality (electrical conductivity) of 1,300 µs/cm in November 2005
- RN111795 is situated approximately 2.5 km to the east of the proposed RSF. It intersects the Yarwun Beds, a separate geological unit to the Rockhampton Group and Mount Alma Formation of the project area.

A survey of properties within 2 km of the RSF was conducted by analysis of aerial photos and questionnaires sent to landowners to determine the location, construction and use of unregistered bores around the site. A number of unregistered windmill bores and solar powered pump bores were identified during this survey. These bores are dedicated stock watering facilities, with low extraction yields. The location of the unregistered bores is shown on **Figure 1**, with the survey response forms received included in **Appendix C**. The two windmills on-site were gauged during the field works in August 2007. The windmill bore in the south of the site located near RSF10 and RSF11 had a water level of 5.44 mbgl, while the water level in the windmill bore in the centre of the site west of RSF17 was 6.78 mbgl.

The RTAY RMA is situated within approximately 3 km of the north-eastern boundary of the RSF. The RMA does not use abstraction bores, but RTAY has installed a monitoring bore network for the RMA to observe spatial and temporal variations in both water quality and physical aquifer parameters.

2.2 Potential Groundwater Impacts – Construction Phase

Groundwater removal to assist in foundation excavation is not anticipated during construction. Maximum construction depths are expected to be less than 5 mbgl. Groundwater monitoring of the consolidated rock formations has shown that the water table within these units is greater than 4 mbgl, and that the thin alluvial channels are only small local aquifers and are intermittently dry. Should seasonal fluctuations cause a significant rise in groundwater levels then dewatering may be required for the sake of foundation excavation. If dewatering is required, it is not expected to be prolonged, owing to the low permeability (and therefore low groundwater recharge rates) of the various materials. Any water extracted during this time, will be utilised for dust suppression around the construction site.

Compression of the ground surface associated with the construction of the RSF will be limited and is not expected to greatly alter the permeability of strata immediately beneath for two reasons: firstly a substantial coverage of competent rock of the Mount Alma Formation and Rockhampton Group outcrop and subcrop exists beneath the proposed site; and secondly the pre-construction permeability of the weathered residual soils and the upper alluvial soils is already very low (consequently reducing the potential for pollution of the groundwater from construction activities). There will be some reduction in recharge at the location of the embankments, however the area affected is limited and as such will not have a significant impact on the recharge of the underlying alluvium or bedrock strata.

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The potential release to ground of hydrocarbons, as well as other stored chemicals, may impact on the underlying soils and aquifers down-gradient of areas of fuel and chemical storage and usage, if these areas are not managed appropriately. Workshop areas, vehicle and equipment wash-down areas and equipment and machinery repair areas all have the potential to spill fuels, lubricants, solvents or other products. Appropriate design of fuel and chemical storage areas, which includes spill containment bunding and sealing the surface area, will reduce the risk of groundwater contamination resulting from fuel and chemical spills. Bunded storage areas for fuels and dangerous goods will be provided with spill cleanup kits in accordance with the relevant Australian standards. All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas. Potential for leaks and spills from operating equipment will be reduced by ensuring that all equipment is well maintained. The low permeability of the soils and bedrock will enable isolation and remediation of potential spills. Any accidental spills will be assessed on a case-by-case basis and remediated, which may include excavation and disposal of any contaminated soil in accordance with the requirements of the EPA.

2.3 Potential Groundwater Impacts – Operations Phase

There will be no extraction of groundwater during the operation phase other than for interception of leachate if required; therefore, there will be minimal direct interference with the existing groundwater environment or direct influence on the local groundwater flow regime.

2.3.1 Seepage from RSF

During the operational phase of the project there is potential to impact groundwater by leachate from residue storage areas. Geochemical characterisation of the residue has been undertaken as part of the EIS and supplement to the EIS. The geochemical characterisation found that:

- The residue is Non-Acid Forming.
- The concentration of metals in the residue sample solids is generally within applied environmental and health based investigation guideline levels for soils. However, elevated concentrations of chromium, manganese and nickel in solids are indicated.
- Leachate derived from residue is moderately saline and approximately double the salinity (TDS) of local groundwater.
- The concentrations of metals in leachate derived from residue solid are generally low and, with the exception of manganese, are comparable to or less than metals concentrations in local groundwater. Nickel and chromium concentrations in leachate are marginally above local groundwater concentrations, but below applied guideline values.
- The concentration of soluble metals in the residue liquor is generally low and within EPA hazardous dam acceptance criteria and ANZECC (2000) livestock drinking water criteria. However, the elevated concentrations of soluble cadmium, fluoride and nickel are indicated. The concentration of soluble salts in the residue liquor solution is generally high. The soluble sulphate concentration exceeds both the applied guideline criteria. Soluble chloride also exceeds the applied hazardous dam acceptance criteria.
- The residue solid is marginally sodic, is generally cohesive and unlikely to disperse.
- The residue solid and the residue liquor contain low levels of total organic carbon, total extractable phosphorous and total nitrogen.

There is potential for seepage water to enter the deeper bedrock aquifers by direct seepage through the base of the RSF or through seepage through the alluvial aquifers where they underlie the RSF. Taking into account the maximum calculated travel time (for groundwater in the bedrock) of 9.9 m/y, a minimum distance of 5 km to the Calliope River (assuming that the aquifer flows towards the river, the aquifer is continuous, and that the Calliope River is a gaining river at this reach of its course), it would take approximately 500 years for seepage water to come into connection with the river. The role of

groundwater base flow in sustaining recharge to the Calliope River is not well understood, and in particular the role that isolated fractured bedrock aquifers play in terms of overall river base flow is unknown (DNRM&W, 2005).

Similarly, if seepage was to remain in the alluvium for the length of Farmer Creek, the travel time would be in the order of 500 years if the alluvium was consistently like that at RSF17, however if sandy and gravely alluvium such as at RSF13 was persistent, travel time would be much shorter. Semi-permanent surface water bodies in Farmer Creek and its tributaries are used for stock watering downstream of the RSF, and have the potential to be impacted by seepage into the alluvium from the RSF. However, any seepage into the alluvium would be expected to be significantly mixed and diluted by surface water flow in the creeks.

Any leachate that entered the groundwater system would be expected to increase the salinity of the groundwater locally as the salinity of the leachate is approximately double that of the groundwater below the RSF site. The concentration of dissolved metals in the leachate is expected to be low and less than the concentrations in groundwater, apart from manganese and to a lesser extent nickel and chromium. Any leachate that entered the groundwater system would also be expected to increase the concentration of these dissolved metals in the groundwater. However, any increase in the concentration of dissolved nickel or chromium is expected to remain below the livestock drinking water and irrigation guideline values. Any increase in the manganese concentration may exceed the long term irrigation guideline depending on the relative proportions of leachate and groundwater mixing, however the groundwater from RSF13 and RSF17 already contains manganese at concentrations greater than the guideline value. However, groundwater is not currently used for irrigation in the area due to elevated salinity, and is unlikely to be used for irrigation in the future.

Seepage from the RSF would also be expected to create a mound in the groundwater below the RSF. If this groundwater mound approached the surface, waterlogging of the surface soils may occur and upward mobilisation of salts may cause salinisation of the ground surface, producing dieback of vegetation in affected areas. To prevent this occurring, a seepage collection system will be installed at the RSF. This seepage collection system will limit the formation of the groundwater mound to below and close to the RSF cells and limit the potential for off-site migration of seepage.

2.4 Mitigation Strategies

2.4.1 General Groundwater Monitoring Program

A groundwater monitoring bore network will be established by installation of groundwater monitoring bores at strategic locations throughout the RSF site, including but not limited to the monitoring bores installed for the EIS studies. The monitoring program will be initiated prior to the operational phase and continued for the life of the RSF and after closure until all impacts have been mitigated. The monitoring will be conducted on a quarterly basis. An annual review of the monitoring program will be conducted to evaluate the effectiveness of each monitoring location to assess where new locations and modifications to the monitoring program may be needed, and to evaluate what impacts may be occurring. A special monitoring round will also be undertaken in the event of a significant environmental incident.

Regular monitoring of the network will continue to enable an understanding of seasonal water table fluctuations and will include groundwater depth and groundwater quality measurements. The objectives of the groundwater monitoring program are to:

- detect potential groundwater impacts early, so that effective mitigation procedures can be developed and instigated;
- determine the characteristics and trends of any contaminated groundwater flowing offsite; and
- identify whether any potential contaminants are varying in concentration or extent.

This monitoring bore network will consist of:

- Shallow monitoring bores situated within each alluvial aquifer which intersects the site and at all locations where surface drainage lines intersect the RSF boundary.
- Monitoring bores (to intersect Mount Alma Formation and Rockhampton Group aquifers) spaced appropriately around the perimeter of the RSF at varying depths.
- Monitoring bores in clusters within 100m of the toe of the embankments of the RSF to monitor groundwater at varying depths/aquifers.
- Background bores to be situated significantly up- and down- hydrogeologic gradient of the RSF (screened within the local bedrock aquifer) to enable differentiation between groundwater rises associated with natural recharge and rises associated with any mounding of the aquifer attributed to seepage from the RSF.

The monitoring program will include the following minimum water quality parameters:

- pH, electrical conductivity, TDS.
- dissolved heavy metals (National Environment Protection Measure (NEPM) 13 metal scan).
- major ions: sodium, magnesium, calcium, potassium, chloride, sulphate, fluoride and bicarbonate.
- total petroleum hydrocarbons (C6-C36 fractions) and BTEX constituents (benzene, toluene, ethylbenzene, xylene) for bores down-gradient of fuel and oil supplies/use only.

Monitoring of water levels and water quality should commence prior to construction of the RSF to obtain baseline data at each monitoring location. This data should be used to determine the natural variability in the groundwater system. Evaluation of the baseline monitoring data can be used to establish trigger levels of key parameters which can be used as a quantitative method of determining whether unexpected impacts are occurring during construction or operation. Where monitoring results indicate levels in excess of the trigger values, an investigation appropriate for the situation should be conducted to assess the need to implement management/mitigation/remedial measures.

2.4.2 Seepage from RSF

Good environmental practice requires that every reasonable effort be made to minimise the effect of seepage on the groundwater system. The factors, which will have most effect on the potential for leachate to enter the groundwater system, include:

- the residue storage method; and
- the permeability of the residue.

As discussed in the RSF Operation section of the EIS, the proposed mud-farming method reduces the potential for leachate seepage from the residue storage area because it accelerates the residue dewatering process by creating preferential surface drainage and opening up the residue to evaporation. By accelerating the dewatering process, the area required for residue operations is reduced, final residue densities are often higher, and the total volume required for residue storage is reduced. As mud-farming also accelerates the consolidation of the residue and generally produces a higher density of residue, the hydraulic conductivity of the residue is reduced, decreasing the rate of seepage through the residue.

As discussed in the Residue Characterisation section of the EIS, the residue particles are classified as silt. Consequently when it is disposed of sub-aerially in thin layers it compacts and has a very low permeability. Although cracking in dried residue can increase permeability in the surface layers, subsequent residue layers tend to seal these cracks as further residue is deposited onto already deposited layers.

The deposited residue is expected to have an extremely low permeability, in the order of 5.0×10^{-7} m/s (unconsolidated) to 5.0×10^{-12} m/s (consolidated or long term). Using the conservative permeability of 1×10^{-8} m/s used for the seepage modelling for the RSF design, and assuming a depth of water of 1 m over a

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1 m thick layer of residue, infiltration would be approximately 1 L/day/m^2. This rate would result in approximately 1000 m^3/day of leachate over a 1 km^2 storage area. These conditions would only exist in the unlikely event that the entire storage area was inundated. As the residue will be discharged in stages over only a relatively small portion of the total residue storage area and its surface will be designed to have limited ponded water, leachate rates less then those given above are likely.

The design of the RSF is to incorporate an installation of a cut-off trench within the foundation along the alignment of the containment embankments. The trench shall be at least 4 metres wide at the base and founded 200 mm into bedrock. Depth of the trench will vary depending on the thickness of alluvium. The installation of the cut-off trench through the alluvium in the embankments would effectively cut-off groundwater flow through the alluvium under the embankments. A seepage collection system was also designed to intercept seepage through the embankments and return the seepage to the RSF impoundment. The seepage collection system consists of an excavated trench (5m deep and 1m wide) fitted with a pump-back riser, lined with geotextile filter fabric, and backfilled with drainage aggregate. Drain pipe shall be placed at the bottom of the trench with a riser pipe connected to the drain pipe at the low point in the trench to convey water to a submersible pump. A submersible pump will be installed in the riser pipe to route discharge back to the RSF impoundment. It may not be practical to construct a seepage collection trench in areas where shallow, hard bedrock is encountered. In these areas, the collection trench may be replaced with extraction wells, as required.

The locations of fracture zones, which have the potential to form areas of preferential groundwater flow, are currently unknown. During construction of the containment embankments, particularly construction of the seepage cut-off trench, any fracture zones identified should be treated to reduce their permeability.

The monitoring bores installed within 100m of the toe of the embankments will be constructed to allow operation as extraction wells. If seepage is detected in the groundwater, and the seepage is shown to be causing a significant rise in groundwater levels or deterioration in groundwater quality, the monitoring wells will be able to be converted to extraction wells to allow removal of seepage impacted groundwater to the RSF. These bores installed around the circumference of the RSF should be located in areas of preferential groundwater flow. The locations of these areas of preferential groundwater flow may be defined using geophysical methods.

At closure of the RSF, a low permeability cover will be constructed across the RSF surface. The cover will comprise a three layered system to maximise the long-term sustainability and performance of the cover. The cover will include a low permeability layer, a drainage layer, and a capillary break layer. The objectives of the cover are to minimise the inflow of water into the residue and therefore reduce the amount of water available to seep into the surrounding environment; and stabilise the surface of the RSF.

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3.1 Existing Hydrogeological Environment

3.1.1 Groundwater Geology and Aquifer Occurrence

Groundwater in the vicinity of the refinery site occurs within Quaternary-age alluvial, estuarine and tidal flat deposits (sand, silt, clay and gravel), as well as deeper fractures within the low permeability sedimentary beds of the Devonian to Carboniferous-age Curtis Island Group. The distribution and connectivity of the secondary permeability fractures is relatively unknown, although NRW bore records indicate that this unit is not a significant groundwater resource. The true thickness of the Curtis Island Group is also unknown. In contrast, the Quaternary deposits typically vary in thickness between 10 m and 25 m (Department of Mines Sheet 9150) and contain significant volumes of groundwater.

The distribution of the Quaternary-age deposits is as follows:

- Underlying most of the northern and eastern areas of the refinery site are modern (Holocene-age) deposits of clay, sandy clay, clayey sand and gravel. These sediments have been derived from a variety of Port Curtis depositional environments including low-lying estuarine channels, supratidal flats and coastal grasslands.
- Underlying the central, western and southern areas of the refinery site are various alluvial deposits associated with the Calliope River floodplain. These alluvial deposits are comprised of sand, silt, clay, gravel and competent residual soil horizons. In the southern regions, the alluvium forms higher terraces, and contains characteristic soil depressions, known colloquially as 'melon holes'. These holes form as a result of drying and wetting processes influencing the high clay content (vertisol) in the soil horizon. Melon holes are typically an indicator of poor surface water infiltration capacity.

Potential for groundwater exists within the sandy and gravely sections of the alluvium, and represents an unconfined to semi-confined aquifer. Groundwater movement within the alluvium is predominantly via inter-granular flow and mirrors topography with flow from the higher topography areas in the west towards the Calliope River and Port Curtis in the east and north. Recharge to the alluvial aquifer is likely to come from two main sources - seepage from creek beds and banks during strong surface water flow or flooding; and surface infiltration of rainfall and overland flow, where alluvium is exposed and no substantial clay barriers occur in the shallow sub-surface.

Outcropping throughout the west of the refinery site (and sub-cropping beneath the Quaternary-age aquifers in the centre and east of the site) is the Doonside Formation of the Curtis Island Group. This basement rock unit is predominantly comprised of low permeability chert, lithic sandstone and mudstone. Structural deformation in the area has produced dips in the strata of the Doonside Formation of 60^{O} in a north and north-westerly direction. The Wandilla Formation of the Curtis Island Group does not outcrop on-site but subcrops at depth beneath the Quaternary deposits in the north and east of the site. The Wandilla Formation consists of low permeability mudstone, lithic sandstone, siltstone, jasper, chert, slate and schist. The primary permeability of the Doonside Formation and Wandilla Formation strata appears to be low due to the fine grain sizes, metamorphism, and secondary mineralisation infilling between the grains. Hence the permeability and porosity of the Doonside Formation and Wandilla Formation strata is likely to be highly variable, depending on the degree of secondary mineralisation and the intensity of fracturing. Those fractures which are unfilled are likely to be the main conduits for groundwater flow through the formations. Recharge of these formations is generally by direct infiltration of rainfall and overland flow in outcrop areas, and by downward leakage from overlying aquifers in the unconsolidated alluvium in subcrop areas.

Four groundwater monitoring bores (Y1 to Y4) were installed within shallow Quaternary aquifers between 1 and 2 April 2006. The locations of these bores are shown on **Figure 2** and the bore logs are presented in **Appendix B**.

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3.1.2 Hydraulic Parameters

Previous analyses of pumping tests conducted on regional Gladstone aquifers at the Rio Tinto Aluminium Yarwun (RTAY - previously Comalco Alumina) refinery (Dames & Moore, 1998) has provided a range of relevant hydraulic parameters for the alluvium and other strata (**Table 3-1**). The tertiary basal sand aquifer tested beneath the RTAY refinery site is similar to the basal sand aquifer beneath the GNP refinery site in terms of aquifer geometry, aquifer depth intervals, water levels and physical texture of the aquifer matrix. The range of hydraulic conductivity values from 0.44 to 6.34 m/day reflects the permeable nature of the basal sand aquifer, and highlights the sensitivity of the aquifer to receive and transmit potential contaminants.

Table 3-1 Hydraulic Parameters of Various Aquifer Materials

Bore ID	Aquifer	Analysis Method	K (m/d)	S
FAC1	Tertiary Basal Sand	Jacob's Method - Drawdown	5.14	6.87x10-7
FAC1	Tertiary Basal Sand	Theis' Recovery Method	3.56	-
FAC2	Tertiary Basal Sand	Theis' Recovery Method	0.44	-
FAC3	Tertiary Basal Sand	Jacob's Method - Drawdown	6.34	-
NG	Colluvium	NG	$8.64x10^{-3}$	-
NG	Mudstone / Oil Shale	NG	0.0864	-

NG= not given; K = hydraulic conductivity; T = transmissivity; S = storativity.

3.1.3 Groundwater Levels and Flow Characteristics

The hydrogeological conditions encountered at each monitoring bore installed for this study are summarised in **Table 3-2**.

Static groundwater levels within monitoring bores Y1 to Y4, measured on 6 May 2006, indicate that the potentiometric surface for the alluvial aquifer varied from 2.58 to 7.71 mbgl, which is equivalent to 0.65 to 1.69 mAHD. A contour map of groundwater levels in the alluvium is shown in **Figure 4**. Based on the contouring of these static water level measurements and other hydrogeological considerations, it is apparent that groundwater flow is to the east and northeast across the site, with discharge to Port Curtis and the Calliope River. This direction of flow appears to be influenced by the topographic relief for the site, with groundwater flowing from topographically higher to topographically lower areas. Groundwater levels in the alluvium close to the Calliope River will be maintained by, and fluctuate with, the river level.

Travel time velocity estimates for the alluvium were calculated using the analytical Darcy's Law equation. An average hydraulic conductivity range of 0.5 to 5 m/day was assumed based on the results of the falling head tests at the RTAY refinery which is consistent with a clayey sandy gravel aquifer (Freeze & Cherry, 1979). A drainable porosity range of 5 to 10 % was assumed for the sake of conservatism (i.e. to project the maximum potential off-site velocity). The range of calculated groundwater flow velocities varied from 18 to 91 m/year.

No field data on groundwater flow in the fractured rock aquifers of the Doonside and Wandilla Formations was collected for this study, however Connell Hatch (2006) reported that groundwater flow in these aquifers is from the topographically high areas west of the site to the coast, and locally to creeks as baseflow.

Table 3-2 Summary of Hydrogeological Conditions Observed at Monitoring Bores

Monitoring Bore ID	Hole Depth (m)	Aquifer Material	Screen Interval (m)	Aquifer Type	SWL (mbgl)	SWL (mAHD)*
Y1	15	Clayey sandy gravel	12 to 15	Semi-confined	2.58	1.62

Y2	12	Sandy gravel	9 to 12	Semi-confined	5.35	0.65
Y3	15	Sandy gravel	12 to 15	Semi-confined	6.43	1.57
Y4	17	Clayey sandy gravel	14 to 17	Unconfined	7.71	1.69

*Based on elevation data provided by RLMS.

3.1.4 Water Quality

A summary of the measured water quality parameters of groundwater samples collected from bores Y1 to Y4 on 6 May 2006 is provided in **Table 3-3**.

Table 3-3 In situ Physico-chemical Parameters for Refinery Site Quaternary Aquifers

Monitoring Bore ID*	Date of Testing	SWL (mbgl)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	TDS (mg/L)	pH	Eh (mV)	Temp. (˚C)
Y1	06/05/2006	2.58	3.45	15,300	9,792	6.59	+93	25.3
Y2	06/05/2006	5.35	4.27	15,940	10,202	8.35	+77	26.5
Y3	06/05/2006	6.43	3.65	13,800	8,832	6.75	+112	25.9
Y4	06/05/2006	7.71	3.60	1,059	678	6.13	+128	26.2

Bores Y1 to Y3 have a calculated total dissolved solids (TDS) range of 8,832 mg/L to 10,202 mg/L. These levels are in excess of both stock watering and fresh water aquatic ecosystem thresholds (ANZECC, 2000). Considering seawater has a TDS value of approximately 32,000 mg/L and these three bores are situated within the tidal interaction zone of the Port Curtis/Calliope River estuary, the groundwater has a distinct saline signature. However, bore Y4 which is situated further landward in a topographically higher area, contains fresh groundwater (678 mg/L). The zone between the down-gradient bores Y1 to Y3 and the up-gradient Y4, demarcates the fresh groundwater/saline groundwater interface. The range of measured values for dissolved oxygen (3.45 ppm to 4.27 ppm), pH (6.13 to 8.35), temperature (25.3 ˚C to 26.5 ˚C) and Eh (+77 mV to +128 mV) all reflect that the groundwater is of recent origin from either tidal or rainfall recharge processes.

Groundwater samples collected from Y1 to Y4 on 6 May 2006 were analysed for major ions and select heavy metals, with Y1 and Y2 also analysed for total petroleum hydrocarbons (C_6-C_{36} fractions) and BTEX (benzene, toluene, ethylene, xylene). A summary of the analytical results is provided in **Table 3-4**, with the full laboratory reports in **Appendix E**. Results of water quality analysis for groundwater samples obtained by Connell Hatch (2006) for the WICT EIS are presented in **Table 3-5**.

The environmental values of the water have been assessed according to the values identified in the Environmental Protection (Water) Policy 1997 (EPP Water 1997). The three environmental values of relevance to the groundwater at the site are:

- Biological integrity (maintaining the water quality so the plants and animals living in the waterway can survive);
- Suitability for primary industry (livestock drinking water) use; and
- Suitability for primary industry (irrigation) use.

The investigation levels (ANZECC, 2000) adopted to encompass the three defined environmental values and to provide a comparison of the groundwater analytical results include:

- The Trigger Levels for Freshwater Ecosystems – 95% protection level of species.

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- The Trigger Levels for Marine Ecosystems – 95% protection level of species.
- The Short-term Trigger Values (STV) and Long-term Trigger Values (LTV) in Irrigation Water.
- The Livestock Drinking Water Guidelines.

According to the ANZECC (2000) guidelines, groundwater present within monitoring wells Y1 to Y3 is deemed to be unsuitable for both livestock drinking water and irrigation purposes, due to the significant exceedance of TDS, chloride and sodium levels. These exceedances are attributed to the process of natural saltwater intrusion associated with tidal pressure on the alluvial aquifer. Groundwater present within monitoring wells Y1 to Y3 also exceeded the manganese limit for long term irrigation use, and Y1 and Y3 also exceeded the lead limit for livestock drinking water.

Groundwater within Y4 appears to have some potential use in terms of stock watering and irrigation, with no exceedances of the livestock guidelines and some exceedence of the sodium and chloride trigger value (depending on crop, soil type, climate and irrigation regime). However the proximity of the alluvial aquifers to the Calliope River may limit use for irrigation as excessive drawdown associated with high extraction may cause intrusion of saline water further into the alluvial aquifer.

The groundwater has also been assessed against the ANZECC (2000) guidelines for the protection of 95% of species in a freshwater and marine water environment to consider the potential effect of discharge of groundwater into surface water bodies or groundwater dependant environments (GDEs). The assessment of groundwater quality using surface water investigation levels has an inherent level of conservatism due to the assumptions made regarding the behaviour and fate of the analytes detected in groundwater along the groundwater flowpath to discharge and the subsequent effects in the surface water ecosystem. The concentrations of some dissolved metals (cadmium, chromium, copper, manganese and nickel) in groundwater from some bores, and the concentration of dissolved lead and zinc in groundwater from all bores, are above the ANZECC (2000) guidelines for freshwater and marine aquatic environments. Connell Hatch (2006) found that, based on the groundwater regime of the project area and current knowledge of groundwater discharge in the area, it is considered that there are no GDEs within the project area. It is considered that any ecosystems established in the coastal margins and along the Calliope River will be dependant on tidal and river flows and the saline water quality rather than the relatively small groundwater fluxes discharging into these environments from the alluvium and fractured rocks.

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Table 3-4 Summary of Groundwater Quality at the Plant Site

Analyte	Units	ANZECC 2000 Environmental Values						Monitoring Bore ID			
		Freshwater - 95%	Marine Water - 95%	*Irrigation - LTU*	*Irrigation - STU*	Livestock - Beef	Livestock - Sheep	Y1 6/05/06	Y2 6/05/06	Y3 6/05/06	Y4 6/05/06
Total Dissolved Solids	mg/L	ne	ne	***ne***	***ne***	4,000	5,000	9,792	10,202	8,832	678
Major Ions											
Sodium	mg/L	ne	ne	***115-460****	***115-460****	ne	ne	***2310***	***2450***	***1800***	128
Magnesium	mg/L	ne	ne	***ne***	***ne***	ne	ne	438	382	348	13
Potassium	mg/L	ne	ne	***ne***	***ne***	ne	ne	60	20	18	<1
Calcium	mg/L	ne	ne	***ne***	***ne***	1000	1000	266	344	506	8
Chloride	mg/L	ne	ne	***175-700****	***175-700****	ne	ne	***5230***	***5230***	***4470***	197
Sulphate	mg/L	ne	ne	***ne***	***ne***	1000	1000	473	534	272	18
Bicarbonate Alkalinity as CaCO3	mg/L	ne	ne	***ne***	***ne***	ne	ne	234	225	115	41
Dissolved Metals											
Arsenic	mg/L	0.013 (As^5) / 0.024 (As^3)	ne	***0.1***	***2***	0.5	0.5	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	ne	ne	***ne***	***ne***	ne	ne	0.032	0.290	0.244	0.036
Beryllium	mg/L	ne	ne	***0.1***	***0.5***	ne	ne	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0002	0.0055	***0.01***	***0.05***	0.01	0.01	0.0003	0.0002	0.0002	<0.0001
Chromium	mg/L	0.001 (Cr^4) / ne (Cr^3)	0.0044 (Cr^4) / 0.0274 (Cr^3)	***0.1***	***1***	1	1	<0.001	0.052	0.068	<0.001
Cobalt	mg/L	ne	0.001	***0.05***	***0.1***	1	1	0.012	0.087	0.050	0.003
Copper	mg/L	0.0014	0.0013	***0.2***	***5***	1	0.4	0.003	0.007	0.002	0.001
Lead	mg/L	0.0034	0.0044	***2***	***5***	0.1	0.1	0.108	0.004	0.149	0.021

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Analyte	Units	ANZECC 2000 Environmental Values						Monitoring Bore ID			
		Freshwater - 95%	Marine Water - 95%	*Irrigation - LTU*	*Irrigation - STU*	Livestock - Beef	Livestock - Sheep	Y1 6/05/06	Y2 6/05/06	Y3 6/05/06	Y4 6/05/06
Manganese	mg/L	1.9	ne	***0.2***	***10***	ne	ne	1.92	***1.21***	***1.45***	0.11
Mercury	mg/L	0.0006	0.0004	***0.002***	***0.002***	0.002	0.002	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.011	0.07	***0.2***	***2***	1	1	0.006	0.024	0.021	<0.001
Vanadium	mg/L	ne	0.1	***0.1***	***0.5***	ne	ne	<0.05	<0.05	<0.05	<0.05
Zinc	mg/L	0.008	0.015	***2***	***5***	20	20	0.080	0.056	0.125	0.060

Table 3-5 Summary of Groundwater Quality at the Plant Site Obtained by Connell Hatch (2006)

Monitoring Bore ID	pH	Electrical Conductivity (µS/cm)	Sulphate (mg/L)	Chloride (mg/L)
101	6.91	143,000	6,760	49,300
114	6.06	22,500	796	6,260

3.1.5 Groundwater Use in Neighbouring Areas

There is no significant groundwater usage registered on the NRW groundwater database. There is only one registered groundwater bore within a 3 km radius of the refinery site. Detailed NRW bore cards are provided in **Appendix A**. This bore, RN88338, intersects the Doonside Formation. The bore was drilled in 1969, and has a reported yield of 1 L/s. An initial standing water level of 11.2 mbgl was recorded for this bore, but no recent data have been measured for comparison with present day water levels. TDS concentrations of 1,043 and 982 mg/L were recorded in 1969 and 1970 respectively, but no recent data have been recorded for comparison. The current use of this bore is unknown. Considering the very low yield of this bore and its significant distance from the refinery site, there is expected to be a negligible risk of water quality degradation of the bore associated with the proposed construction and operation of the refinery.

Further bores exist outside the 3 km radius from the site but have been excluded due to the nature and variability of the hydrogeological characteristics associated with local formations. Connell Hatch (2006) identified groundwater bores in the Doonside Formation approximately 4 km west of the plant site, however these bores are located in a major zone of fracturing along the Yarrol Fault, and are expected to be in a separate hydrogeological environment. Connell Hatch (2006) also identified bores in the Wandilla Formation on the southern side of the Calliope River with yields up to 2 l/s but generally less than 1 L/s. These bores are also expected to be in a separate hydrogeological environment, with groundwater flow towards the coast and the Calliope River.

The adjacent land use is predominantly industrial and there is no groundwater extraction program or beneficial groundwater use identified for any of those sites. No unregistered bores within or adjacent to the Plant site were identified during field works. Based on this and the data available, it is believed that there are no industrial users of groundwater within the project area or surrounds. Industrial users generally have the capital required to drill and equip bores and if necessary treat the water before use. However, industry tends to require large volumes of groundwater, which as described are not available from the aquifers in the area. The RTAY refinery is situated approximately 3 km northwest of the Plant site. The RTAY refinery does not use abstraction bores, but RTAY has installed a monitoring bore network for the refinery to observe spatial and temporal variations in both water quality and physical aquifer parameters.

The NRW bore database indicates that there are no registered bores within the alluvium. This may be due in part to the clayey lithology of the alluvium (with corresponding low yields) and to the brackish to saline nature of the groundwater.

3.2 Potential Groundwater Impacts – Construction Phase

Groundwater removal to assist in foundation excavation is not anticipated during construction. Groundwater monitoring has shown that the water table within the underlying alluvial aquifer is generally greater than 5 mbgl. In the unlikely event that dewatering is required during foundation excavation, the groundwater will not be discharged to the local drainage system, but instead will be used for dust suppression or suitably captured in storage facilities. Any dewatering will include consideration of the presence of acid sulphate soils.

Compression of the ground surface associated with the construction of roads and building foundations is not expected to significantly alter the permeability of strata immediately beneath the site for two reasons:

firstly a substantial coverage of competent outcrop and subcrop exists beneath the western extent of the proposed site; and secondly the pre-construction permeability of the weathered residual soils and the upper alluvial soils is already very low (consequently reducing the potential for pollution of the groundwater from construction activities). Therefore, any minor reductions in recharge infiltration due to compaction should be negligible.

The potential release to ground of hydrocarbons, as well as other stored chemicals, may impact on the underlying soils and aquifers down-gradient of areas of fuel and chemical storage and usage, if these areas are not managed appropriately. Workshop areas, vehicle and equipment wash-down areas and equipment and machinery repair areas all have the potential to spill fuels, lubricants, solvents or other products. Appropriate design of fuel and chemical storage areas, which includes spill containment bunding and sealing the surface area, will reduce the risk of groundwater contamination resulting from fuel and chemical spills. Bunded storage areas for fuels and dangerous goods will be provided with spill cleanup kits in accordance with relevant Australian standards. All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas. Potential for leaks and spills from operating equipment will be reduced by ensuring that all equipment is well maintained. The low permeability of the soils and bedrock will enable isolation and remediation of potential spills. Any accidental spills will be assessed on a case-by-case basis and remediated, which may include excavation and disposal of any contaminated soil in accordance with the requirements of the EPA.

3.3 Potential Groundwater Impacts – Operations Phase

3.3.1 Direct Impacts

There will be no extraction of groundwater of the refinery site during the operation phase. Therefore, there will be no direct interference with the existing groundwater environment or direct influence on the local groundwater flow regime.

3.3.2 Indirect Impacts

There is the potential for low quality surface water associated with site activities to seep into the underlying groundwater. All surface water flows will be controlled by methods identified in the surface water section of the EIS, including separating water from undisturbed ('clean') areas and process areas, using bunding, and construction of water containment and flow structures with low permeability materials. The refinery process areas will be built on bunded concrete slabs, which will prevent the direct migration of any low quality water into the shallow soils and aquifers beneath the site. Stormwater and washdown water will be contained within the bunds. Sulphur and imported ore will be stored in stockpiles at the refinery. Stockpile areas, stormwater containment and settlement ponds will be provided with low permeability surfaces to minimise the risk of seepage. Stormwater containment and settlement ponds will have a low permeability base to minimise seepage into the underlying groundwater system.

The refinery will cover a significant area of the ground surface with concrete slabs, and in doing so will reduce the surface coverage of outcrop (or recharge zone) for the alluvial and bedrock aquifers. However the pre-construction permeability of the weathered residual soils and the upper alluvial soils is already very low and any reductions in recharge infiltration should be negligible compared to the total extent of the alluvial and bedrock aquifer recharge areas. Suppression of the groundwater level by the reduced infiltration in this area is expected to minimal as the groundwater levels measured are less than 2 mAHD in the alluvium and the water level will be maintained by infiltration in surrounding areas and the connection of the alluvium to the Calliope River.

The potential release to ground of hydrocarbons, as well as other stored chemicals, may impact on the underlying soils and aquifers down-gradient of areas of fuel storage and usage, and chemical storage and usage, if these areas are not managed appropriately. Workshop areas, vehicle and equipment wash down areas and equipment and machinery repair areas all have the potential to spill fuels, lubricants, solvents or other products. Appropriate design of fuel and chemical storage areas, which includes spill containment bunding and sealing the surface area, will reduce the risk of groundwater contamination resulting from fuel and chemical spills. Bunded storage areas for fuels and dangerous goods will be

provided with spill cleanup kits in accordance with the relevant Australian standards. All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas.

3.4 Mitigation Strategies

3.4.1 General Groundwater Monitoring Program

A groundwater monitoring bore network will be established by installation of groundwater monitoring bores at strategic locations throughout the refinery site, including but not limited to the monitoring bores installed for the EIS studies. The monitoring program will be initiated prior to the operational phase and continued for the life of the refinery. The monitoring will be conducted on a quarterly basis. An annual review of the monitoring program will be conducted to evaluate the effectiveness of each monitoring location to assess where new locations and modifications to the monitoring program may be needed, and to evaluate what impacts may be occurring. A special monitoring round will also be undertaken in the event of a significant environmental incident.

Regular monitoring of the network will continue to enable an understanding of seasonal water table fluctuations and will include groundwater depth and groundwater quality measurements. The objectives of the groundwater monitoring program are to:

- detect potential groundwater impacts early, so that effective mitigation procedures can be developed and instigated;
- determine the characteristics and trends of any contaminated groundwater flowing offsite; and
- identify whether any potential contaminants are varying in concentration or extent.

The monitoring program will include the following minimum water quality parameters:

- pH, electrical conductivity, TDS.
- dissolved heavy metals (National Environment Protection Measure (NEPM) 13 metal scan).
- major ions: sodium, magnesium, calcium, potassium, chloride, sulphate, fluoride and bicarbonate.
- total petroleum hydrocarbons (C6-C36 fractions) and BTEX constituents (benzene, toluene, ethylbenzene, xylene) for bores down-gradient of fuel and oil supplies/use only.

Monitoring of water levels and water quality should commence prior to construction of the refinery to obtain baseline data at each monitoring location. This data should be used to determine the natural variability in the groundwater system. Evaluation of the baseline monitoring data can be used to establish trigger levels of key parameters which can be used as a quantitative method of determining whether unexpected impacts are occurring during construction or operation. Where monitoring results indicate levels in excess of the trigger values, an investigation appropriate for the situation should be conducted to assess the need to implement management/mitigation/remedial measures.

3.4.2 Hydrocarbon and Chemical Contamination

Areas of hydrocarbon and chemical storage will have spill control measures and regular inspection regimes in order to prevent and monitor activities that could potentially lead to contamination of groundwater. Spill control measures for hydrocarbon facilities will include concrete slab bases that are bunded with oil-water separators installed on all hydrocarbon above-ground storage, refuelling and washdown areas. Bunded areas for hydrocarbon and chemicals storage will be provided with spill cleanup kits in accordance with the relevant Australian Standards. All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas.

Potential for leaks and spills from operating equipment will be reduced by ensuring that all equipment is well maintained.

Section 3 Plant Site

Installation and monitoring of the monitoring bore network on-site, including down-gradient of all potential contaminant sources, will enable early detection of any contaminated seepage.

The low permeability of the soils and bedrock will enable isolation and remediation of potential spills. Any accidental spills will be assessed on a case by case basis and remediated, which may include excavation and disposal of any contaminated soil to a licensed facility, in accordance with the requirements of the EPA.

3.4.3 Seepage from Stockpiles and Ponds

An extensive settlement and evaporation pond system to prevent discharge of surface storm water contaminants to off-site water bodies is proposed in the surface water section of the EIS. The settlement and evaporation pond system will be managed as a non release system under normal operating conditions, with discharge only expected during extreme rainfall events when significant dilution is available. Stockpiles will be contained within hardstand areas and connected via open channel drains to dedicated retention (settlement) ponds. The project pond system will be designed in accordance with best-practice engineering principles, including being lined with suitable low permeability material to prevent seepage of solutes or contaminants into underlying aquifers.

Early detection of seepage will enable management of any potential problems. Potential seepage from the project ponds and stockpile areas will be regularly assessed through the installation and monitoring of the monitoring bore network on-site, including down-gradient of all potential contaminant sources. This will include monitoring of water in settlement ponds for potential contaminants.

In the unlikely event of groundwater impact, mitigation strategies will include some or all of the following measures (depending on the specific requirements):

- Investigation of pond system integrity;
- Removal of contaminant source and repair/ redesign of any pond structures as required;
- Installation of and pumping from, groundwater interception wells; and
- Installation of and pumping from groundwater interception trenches.

Section 4 References

Australian and New Zealand Environment and Conservation Council, (ANZECC, 2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy.* Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No. 4, October 2000.

Bouwer, H. and R.C. Rice, (1976). *A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells*. Water Resources Research, vol. 12, no. 3, pp. 423-428.

Connell Hatch (2006). *Wiggins Island Coal Terminal Environmental Impact Statement*. Public EIS report produced by Connell Hatch, Brisbane, Queensland.

Dames & Moore, (1998). *Comalco Alumina Project Gladstone: Impact Assessment Study – Environmental Impact Statement*. Public EIS report produced by Dames & Moore (now URS Australia Pty Ltd), Brisbane, Queensland.

Department of Natural Resources, Mines & Water (2005). *Calliope River basin: draft water resource plan ecological assessment report*. Prepared by C&R Consulting.

Freeze, A.R. and Cherry, J.A. (1979). *Groundwater*, Prentice Hall, New Jersey.

Hvorslev, M.J., (1951). *Time Lag and Soil Permeability in Ground-Water Observations*, bul. no. 26, Waterways Experiment Station, Corps of Engineers, U.S. Army, Vicksburg, Mississippi

Queensland Government Department of Natural Resources, Mines and Water, (2006). *Gladstone Special 1:100,000 Geology Map* (Sheet 9150 & Part 9151) March 2006 Revised Edition.

Section 5 Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Gladstone Pacific Nickel and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Variation dated 6 August 2007.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between April 2006 and December 2007 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

This report contains information obtained by inspection, sampling, testing or other means of investigation. This information is directly relevant only to the points in the ground where they were obtained at the time of the assessment. The borehole logs indicate the inferred ground conditions only at the specific locations tested. The precision with which conditions are indicated depends largely on the frequency and method of sampling, and the uniformity of conditions as constrained by the project budget limitations. The behaviour of groundwater and some aspects of contaminants in soil and groundwater are complex. Our conclusions are based upon the analytical data presented in this report and our experience. Future advances in regard to the understanding of chemicals and their behaviour, and changes in regulations affecting their management, could impact on our conclusions and recommendations regarding their potential presence on this site.

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

Whilst to the best of our knowledge information contained in this report is accurate at the date of issue, subsurface conditions, including groundwater levels can change in a limited time. Therefore this document and the information contained herein should only be regarded as valid at the time of the investigation unless otherwise explicitly stated in this report.

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 88338

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	2	0.00		DOONSIDE FORMATION

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	17.40		GNTE	23/10/1969	-11.20	N			Y	WZ	DOONSIDE FORMATION
2	22.00	23.80	GNTE			N	COND 1880	1.00	Y	WZ	DOONSIDE FORMATION

PUMP TEST DETAILS PART 1

****** NO RECORDS FOUND ******

PUMP TEST DETAILS PART 2

****** NO RECORDS FOUND ******

BORE CONDITION

****** NO RECORDS FOUND ******

ELEVATION DETAILS

****** NO RECORDS FOUND ******

WATER ANALYSIS PART1

PIPE	DATE	RD ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	23/10/1969	1 GCL	44034	22.00	PU	GB	1880	7.6		1256.55	1042.56	486	350	1.0	4.5	
A	09/09/1970	1 GCL	46660	22.00	PU	GB	1710	7.1		1221.20	982.30	439	385	0.9	4.6	

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	23/10/1969	1	227.0		84.0	67.0		421.0		3.0	430.0	0.55		24.0				
A	09/09/1970	1	222.0		82.0	57.0		470.0			355.0	0.20		35.0				

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 88338

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

**** NO RECORDS FOUND ****

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 24/01/1992	Y 24/01/1992	Y 24/01/1992	Y 04/08/1999	Y 24/01/1992	Y 24/01/1992	Y 24/01/1992	Y 24/01/1992

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES
Y 24/01/1992		Y 24/01/1992		Y 24/01/1992			

GENERAL NOTES

**** NO RECORDS FOUND ****

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111583

REGISTRATION DETAILS

		BASIN	1320	**LATITUDE**	23-52-14	**MAP-SCALE**	503
OFFICE	Rockhampton	**SUB-AREA**		**LONGITUDE**	151-08-17	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	2100-CALLIOPE	**EASTING**	310410	**MAP-NO**	9150-3
D/O FILE NO.	520/001/7	**LOT**	40	**NORTHING**	7358844	**MAP NAME**	
R/O FILE NO.		**PLAN**	CTN157	**ZONE**	56	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**		**ACCURACY**	SKET	**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-23.87068022	**PARISH NAME**	897-CALLIOPE			**ORIGINAL BORE NO**	PURKIS
GIS LNG	151.138072885	**COUNTY**	CLINTON			**BORE LINE**	-
CHECKED	Y	**PROPERTY NAME**					
		FIELD LOCATION	CALLIOPE RIVER - TARGINIE RD VIA YARWUN			**POLYGON**	
						RN OF BORE REPLACE	
FACILITY TYPE	SF	**DATE DRILLED**	04/OCT/01			**DATA OWNER**	**DNR**
STATUS	EX	**DRILLERS NAME**	BALL W			**CONFIDENTIAL**	N
ROLES	WS	**DRILL COMPANY**	G WARD DRILLING				
		METHOD OF CONST.	ROTARY				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	04/10/2001	1	Polyvinyl Chloride	5.900	WT	140	0.00	22.50
A	04/10/2001	2	Perforated or Slotted Casing				10.50	22.50
A	04/10/2001	3	Gravel Pack	5.000	GR	165	0.00	22.50

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.00	TOP SOIL
2	1.00	17.00	CLAY & DECOMPOSED ROCK
3	17.00	22.50	BLUE GRANITE ? *

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111583

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	17.00	22.50	GNTE	04/10/2001	-16.40	N	1300 US/CM	270.00	Y	WZ	DOONSIDE FORMATION

PUMP TEST DETAILS PART 1

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

BORE CONDITION

**** NO RECORDS FOUND ****

ELEVATION DETAILS

**** NO RECORDS FOUND ****

WATER ANALYSIS PART1

**** NO RECORDS FOUND ****

WATER ANALYSIS PART 2

**** NO RECORDS FOUND ****

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	PIPE	DATE	MEASURE (m)	N/R	RMK	PIPE	DATE	MEASURE (m)	N/R	RMK
A	04/10/2001	-16.40	R											

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	METH	SOURCE
A	04/10/2001	22.50	1300						AI	GB

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111583

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 15/01/2002	Y 15/01/2002	Y 15/01/2002	Y 15/01/2002			Y 15/01/2002	Y 15/01/2002

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES

GENERAL NOTES

**** NO RECORDS FOUND ****

DISCLAIMER

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**** End of Report ****

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 91090

REGISTRATION DETAILS

		BASIN	1320	**LATITUDE**	23-55-20	**MAP-SCALE**	104
OFFICE	Rockhampton	**SUB-AREA**		**LONGITUDE**	151-02-28	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	2100-CALLIOPE	**EASTING**	300606	**MAP-NO**	9150
D/O FILE NO.	520/001(10)	**LOT**	10	**NORTHING**	7353002	**MAP NAME**	GLADSTONE
R/O FILE NO.	81-00014	**PLAN**	CL40348	**ZONE**	56	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**	L10 CL40348	**ACCURACY**	SKET	**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-23.922228591	**PARISH NAME**	3374-MT LARCOM			**ORIGINAL BORE NO**	STREETER OLO
GIS LNG	151.041035824	**COUNTY**	CLINTON			**BORE LINE**	-
CHECKED	Y	**PROPERTY NAME**					
		FIELD LOCATION				**POLYGON**	
						RN OF BORE REPLACE	
FACILITY TYPE	SF	**DATE DRILLED**	07/APR/93			**DATA OWNER**	
STATUS	EX	**DRILLERS NAME**	WEST K			**CONFIDENTIAL**	
ROLES	WS	**DRILL COMPANY**	DEPCO				
		METHOD OF CONST.	ROTARY				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	07/04/1993	1	Polyvinyl Chloride	5.900	WT	141	0.00	16.00
A	07/04/1993	2	Perforated or Slotted Casing	3.000	AP	141	10.00	16.00
A	07/04/1993	3	Gravel Pack		GR		10.00	16.00
A	07/04/1993	4	Open Hole				16.00	16.10

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION	
1	0.00	0.80	TOPSOIL	
2	0.80	3.00	CLAY	
3	3.00	5.00	CLAY & BOULDERS	
4	5.00	13.00	CLAYBOUND BOULDERS	WATER
5	13.00	16.10	FRACTURED FRESH ANDESITE	WATER

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 91090

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
901			ONE TEST HOLE
902			SWL 7/4/93 3M
903			AIRTEST 7/4/93 4.5L/S
910			DRILLERS COND 7/4/93 1640 MICROS/CM

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		CRANIA BEDS

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	10.00	16.00	TCHY	07/04/1993	-3.00	N	COND 1640	4.50	Y	FR	CRANA BEDS

PUMP TEST DETAILS PART 1

****** NO RECORDS FOUND ******

PUMP TEST DETAILS PART 2

****** NO RECORDS FOUND ******

BORE CONDITION

****** NO RECORDS FOUND ******

ELEVATION DETAILS

****** NO RECORDS FOUND ******

WATER ANALYSIS PART1

****** NO RECORDS FOUND ******

WATER ANALYSIS PART 2

****** NO RECORDS FOUND ******

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 91090

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

**** NO RECORDS FOUND ****

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 04/09/1998	Y 20/10/1993	Y 04/09/1998	Y 04/09/1998	Y 20/10/1993	Y 20/10/1993	Y 20/10/1993	Y 20/10/1993

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES
Y 20/10/1993		Y 20/10/1993		Y 20/10/1993			

GENERAL NOTES

**** NO RECORDS FOUND ****

REG NUMBER 111019

REGISTRATION DETAILS

		BASIN	1320	**LATITUDE**	23-54-00	**MAP-SCALE**	104
OFFICE	Rockhampton	**SUB-AREA**		**LONGITUDE**	151-02-41	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	2100-CALLIOPE	**EASTING**	300940	**MAP-NO**	9150
D/O FILE NO.	520/001(66)	**LOT**	24	**NORTHING**	7355463	**MAP NAME**	GLADSTONE
R/O FILE NO.		**PLAN**	CTN105	**ZONE**	56	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**		**ACCURACY**	SKET	**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-23.900053545	**PARISH NAME**	3374-MT LARCOM			**ORIGINAL BORE NO**	STREETER
GIS LNG	151.044655392	**COUNTY**	CLINTON			**BORE LINE**	-
CHECKED	Y	**PROPERTY NAME**	WOODRIDGE				
		FIELD LOCATION	BRUCE HIGHWAY VIA CALLIOPE			**POLYGON**	
						RN OF BORE REPLACE	
FACILITY TYPE	SF	**DATE DRILLED**	22/SEP/95			**DATA OWNER**	
STATUS	EX	**DRILLERS NAME**	ROBERTS N			**CONFIDENTIAL**	N
ROLES	WS	**DRILL COMPANY**	DEPCO				
		METHOD OF CONST.	ROTARY				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	22/09/1995	1	Polyvinyl Chloride	5.900	WT	140	0.00	24.40

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	5.80	TOP SOIL, CLAY & CREEK GRAVEL
2	5.80	24.40	DIORITE

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111019

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	22.30		INTR	22/09/1995	-1.50	N	COND 2500	0.63	Y	FR	MOUNT HOLLY BEDS

PUMP TEST DETAILS PART 1

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

BORE CONDITION

**** NO RECORDS FOUND ****

ELEVATION DETAILS

**** NO RECORDS FOUND ****

WATER ANALYSIS PART1

**** NO RECORDS FOUND ****

WATER ANALYSIS PART 2

**** NO RECORDS FOUND ****

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	PIPE	DATE	MEASURE (m)	N/R	RMK	PIPE	DATE	MEASURE (m)	N/R	RMK
A	22/09/1995	-1.50	R											

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	METH	SOURCE
A	22/09/1995	24.40	2500						AI	GB

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111019

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 04/01/1999	Y 04/01/1999	Y 04/01/1999	Y 04/01/1999			Y 04/01/1999	Y 04/01/1999

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES

GENERAL NOTES

**** NO RECORDS FOUND ****

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111795

REGISTRATION DETAILS

		BASIN	1320	**LATITUDE**	23-53-30	**MAP-SCALE**	253
OFFICE	Rockhampton	**SUB-AREA**		**LONGITUDE**	151-06-17	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	2100-CALLIOPE	**EASTING**	307048	**MAP-NO**	9150-33
D/O FILE NO.	520/001(7)	**LOT**	89	**NORTHING**	7356474	**MAP NAME**	
R/O FILE NO.		**PLAN**	CTN248	**ZONE**	56	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**		**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-23.891664071	**PARISH NAME**	897-CALLIOPE			**ORIGINAL BORE NO**	
GIS LNG	151.104761513	**COUNTY**	CLINTON			**BORE LINE**	-
CHECKED	Y	**PROPERTY NAME**	JOHN HENDRY 'ROSS' BOYLE				
		FIELD LOCATION	BOYLES ROAD, CALLIOPE			**POLYGON**	
						RN OF BORE REPLACE	
FACILITY TYPE	SF	**DATE DRILLED**	20/SEP/02			**DATA OWNER**	
STATUS	EX	**DRILLERS NAME**	M CROWSON			**CONFIDENTIAL**	
ROLES	WS	**DRILL COMPANY**	GLADSTONE DRILLING				
		METHOD OF CONST.	ROTARY				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	20/09/2002	1	Polyvinyl Chloride	5.900	WT	140	0.00	20.00
A	20/09/2002	2	Perforated or Slotted Casing	1.500	AP	140	16.00	20.00
X	20/09/2002	3	Grout			205	0.00	2.00

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	3.00	DARK BROWN CLAY
2	3.00	5.00	BROKEN ROCK
3	5.00	16.00	LIGHT BROWN CLAY
4	16.00	20.00	BROKEN BROWN ROCK

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111795

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	16.00	20.00	MDST	20/09/2002	-10.00	N	COND 3500	2.52	Y	FR	CRANA BEDS

PUMP TEST DETAILS PART 1

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

BORE CONDITION

**** NO RECORDS FOUND ****

ELEVATION DETAILS

**** NO RECORDS FOUND ****

WATER ANALYSIS PART1

**** NO RECORDS FOUND ****

WATER ANALYSIS PART 2

**** NO RECORDS FOUND ****

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	METH	SOURCE
A	20/09/2002	16.00	3500						AI	GB

SPECIAL WATER ANALYSIS

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 111795

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 29/07/2003	Y 29/07/2003	Y 29/07/2003	Y 29/07/2003				

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES

GENERAL NOTES

**** NO RECORDS FOUND ****

DISCLAIMER

YOU MUST INCLUDE THIS NOTICE ON ANY COPIES OF THE LICENSED DATA HOWEVER ALTERED, REFORMATTED OR REDISPLAYED:

YOU MUST INCLUDE THIS NOTICE ON ANY CREATED PRODUCTS OR IMAGES:

IF YOU DO NOT ACCEPT THE ABOVE CONDITIONS PLEASE DO NOT USE THE DATA AND RETURN SAME FORTHWITH. YOUR USE OF THE DATA CONSTITUTES ACCEPTANCE OF THE ABOVE CONDITIONS.

**** End of Report ****

Appendix B

Geological and Monitoring Well Construction Logs

URS Australia Pty Ltd

Monitoring Well RSF 1

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

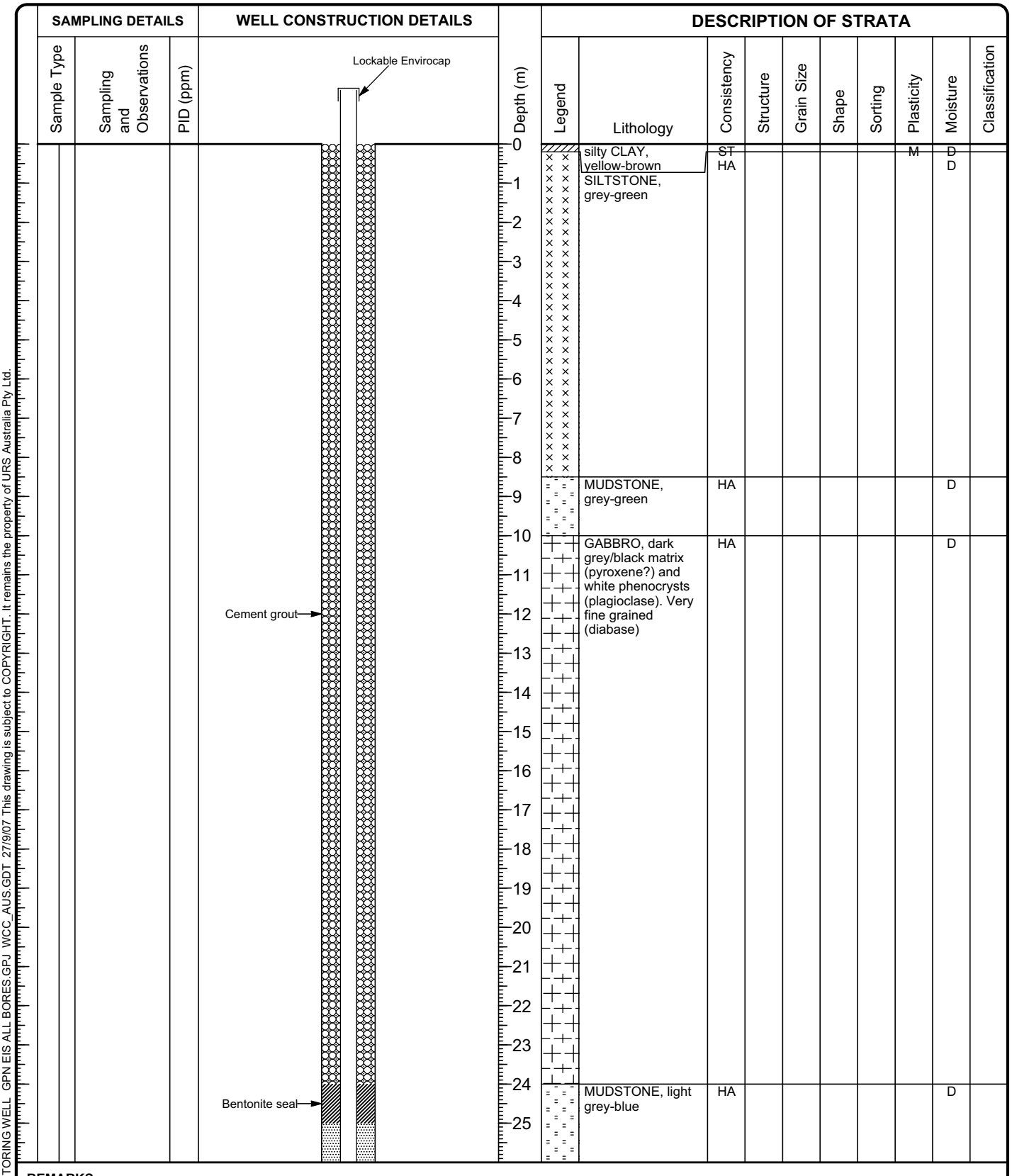
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **1-5-06**
Date Finished: **1-5-06**

Relative Level: mAHD
Coordinates: 300123 mE
7358473 mN
Permit No:

Client: **Gladstone Pacific Nickel**



REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 1

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **1-5-06**
Date Finished: **1-5-06**

Relative Level: mAHD
Coordinates: 300123 mE
7358473 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS	Depth (m)	DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)			Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Class 18 uPVC 50mm casing	26										
				27										
				28										
				29										
				30										
				31		SILTSTONE, light grey-blue	HA						SM	
				32										
				33										
				34										
				35										
				36										
			Class 18 uPVC 50mm slotted screen in sand annulus	37										
				38										
			Endcap	39										
				40										
				41										
				42										
				43										
				44										
				45										
				46										
				47										
				48										
				49										
				50										
				51										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 10

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

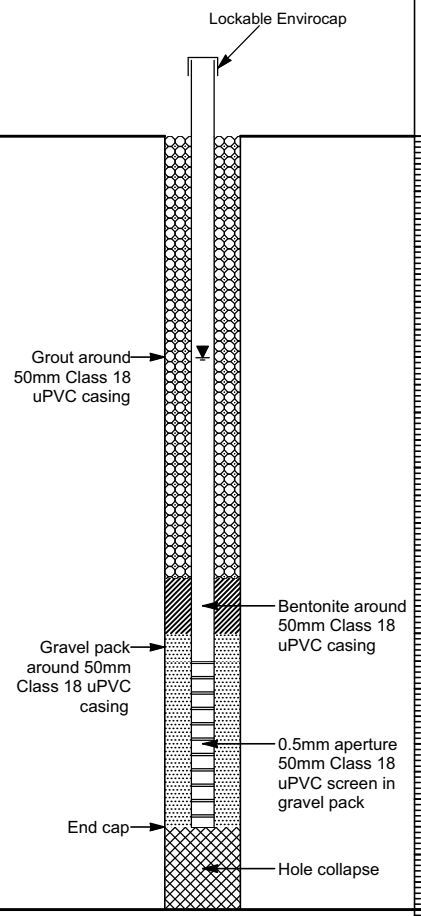
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **7-8-07**
Date Finished: **7-8-07**

Relative Level: 39.4 mAHD
Coordinates: 302504 mE
7352307 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0–2		Dark grey CLAY						L	D	
2–3		Light brown, beige, CLAYEY GRAVEL			F-M	SA-SR	M			
3–4		Light brown, beige, orange GRAVELLY CLAY and quartz rich dark rock clasts			F-M					
4–5		Orange, light brown CLAY and grey, blue, green quartz rich rock clasts						L		
5–6		Beige, light grey, CLAY and greywacke clasts						L	SM	
6–7		Light brown, light grey GREYWACKE								
7–8		Light grey, light blue, light brown GREYWACKE								
8–9		Light brown, light grey, blue GREYWACKE								
9–10		Light brown, light grey GREYWACKE								
10–13		Light brown, light grey, blue GREYWACKE								

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 11

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **7-8-07**
Date Finished: **7-8-07**

Relative Level: 39.4 mAHD
Coordinates: 302504 mE
7352312 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap; Grout around 50mm Class 18 uPVC casing; Bentonite around 50mm Class 18 uPVC casing; 0.5mm aperture 50mm Class 18 uPVC screen in gravel pack; End cap	0		Dark grey CLAY						L		
				1		Dark grey CLAY and light brown, beige CLAYEY GRAVEL			F-M	SA-SR	M			
				2		Light brown, dark brown GRAVELLY CLAY			F-M					
				3										
				4										
				5										
				6										
				7										
				8										
				9										
				10										
				11										
				12										
				13										
				14										
				15										
				16										
				17										
				18										
				19										
				20										
				21										
				22										
				23										
				24										
				25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 12

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

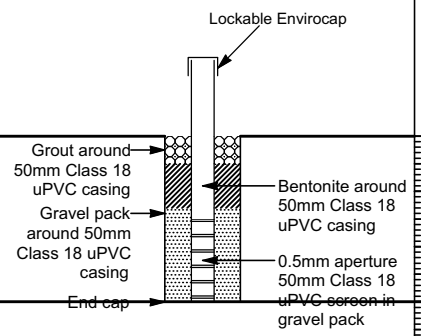
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **8-8-07**
Date Finished: **8-8-07**

Relative Level: 38.1 mAHD
Coordinates: 302124 mE
7352327 mN
Permit No:

Client: **Gladstone Pacific Nickel**



SAMPLING DETAILS			WELL CONSTRUCTION DETAILS	Depth (m)	DESCRIPTION OF STRATA								
Sample Type	Sampling and Observations	PID (ppm)			Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
				0		Light brown, dark brown, grey, SILTY GRAVEL and COBBLES			F-C	SA-SR	W			
				1		Dark brown, dark grey CLAYEY GRAVEL			F-C	SA-R	W			
				2		Dark grey, dark brown CLAYEY GRAVEL			F-C	SA-R	W			
				3										
				4										
				5										
				6										
				7										
				8										
				9										
				10										
				11										
				12										
				13										
				14										
				15										
				16										
				17										
				18										
				19										
				20										
				21										
				22										
				23										
				24										
				25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 13

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

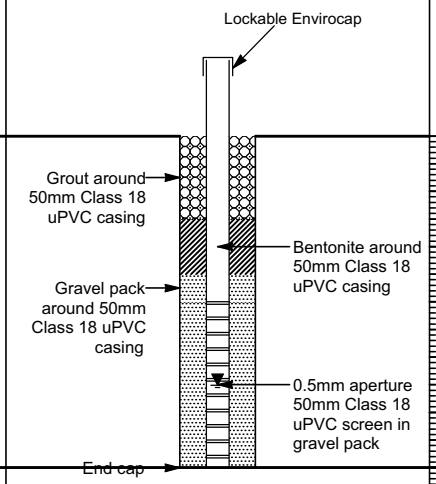
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **8-8-07**
Date Finished: **8-8-07**

Relative Level: 37 mAHD
Coordinates: 302015 mE
7352065 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		Dark grey, brown, CLAYEY GRAVEL and COBBLES			F-C	A-SR	M			
1		Light brown, beige, SILTY CLAYEY GRAVEL			F-C	A-SR	M			
2										
3		Dark brown CLAYEY GRAVEL			F-C	A-SR	M			
4		Dark brown GRAVEL and medium COBBLES			F-C	A-SR	W			
5		Dark brown, red coarse SAND to coarse GRAVEL			CS-CG	A-SR	M			
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 14

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

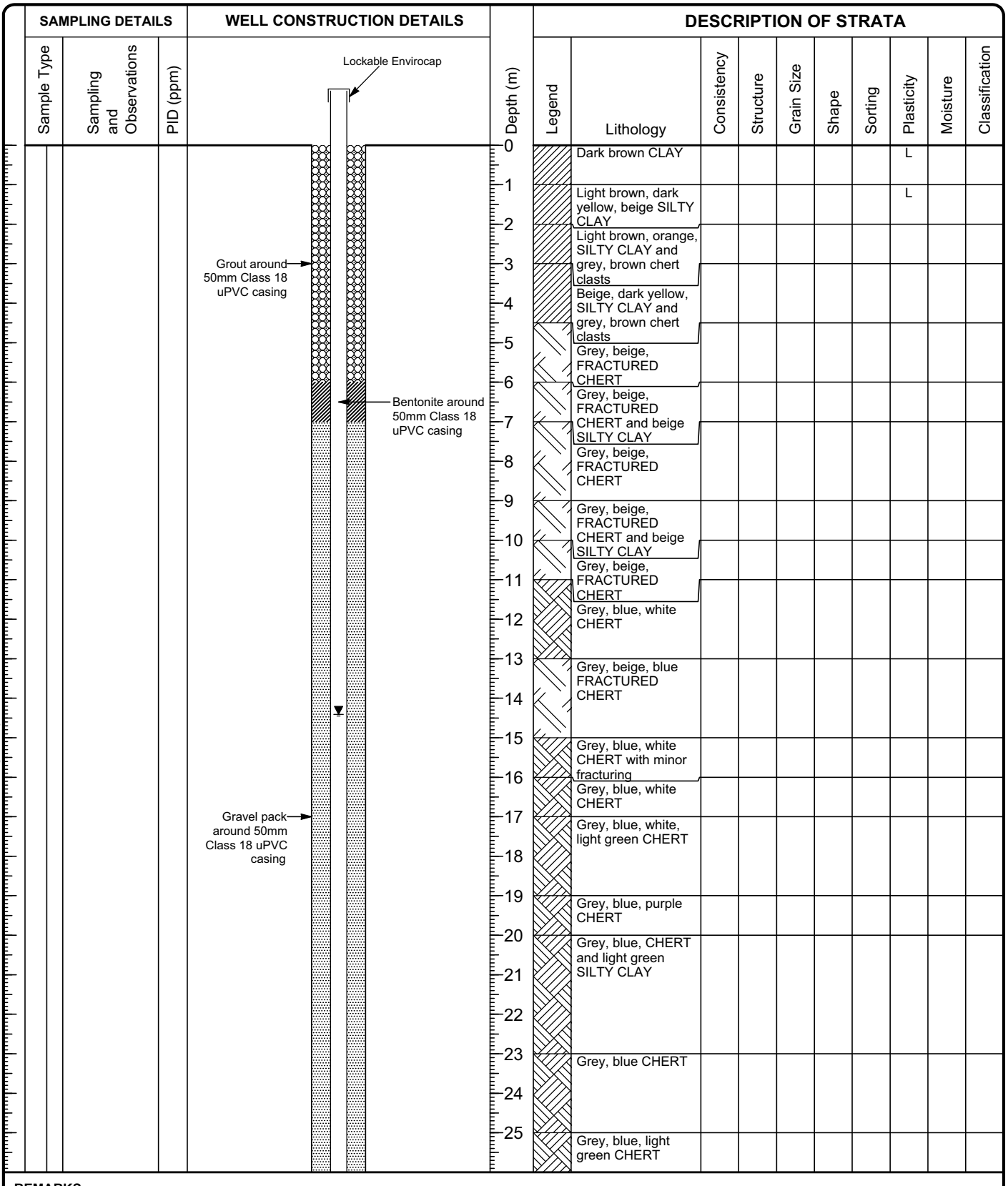
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **8-8-07**
Date Finished: **8-8-07**

Relative Level: 51.8 mAHD
Coordinates: 301768 mE
7352763 mN
Permit No:

Client: **Gladstone Pacific Nickel**



REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 14

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **8-8-07**
Date Finished: **8-8-07**

Relative Level: 51.8 mAHD
Coordinates: 301768 mE
7352763 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
				26										
				27		Grey, blue, light green CHERT								
				28										
				29										
				30		Grey, blue, green CHERT								
				31		Grey, blue, brown, green CHERT								
			0.5mm aperture 50mm Class 18 uPVC screen in gravel pack	32		Grey, blue, green CHERT								
				33										
				34										
				35										
			End cap	36										
				37										
				38										
				39										
				40										
				41										
				42										
				43										
				44										
				45										
				46										
				47										
				48										
				49										
				50										
				51										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 15

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

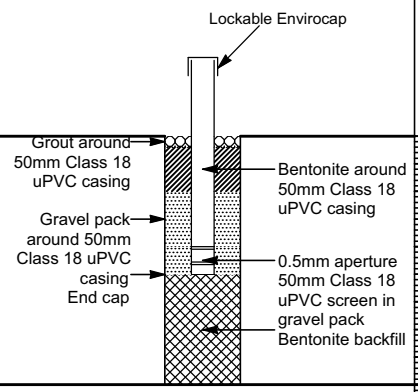
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **9-8-07**
Date Finished: **9-8-07**

Relative Level: 44.7 mAHD
Coordinates: 303176 mE
7353210 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		Dark grey CLAY						L	SM	
1		Light brown, grey SILTY CLAY						L		
2		Light brown, orange SANDY CLAY and CLAYEY SAND								
3		Emerald green, white, grey CLAY - WEATHERED BEDROCK								
4		Light green, white, SILTY CLAY - WEATHERED BEDROCK								
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
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19										
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21										
22										
23										
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 16

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **9-8-07**
Date Finished: **10-8-07**

Relative Level: 57.7 mAHD
Coordinates: 302575 mE
7353166 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap	0		Brown SILTY CLAY						L		
				1		Orange, light brown CLAY and clasts of WEATHERED GREYWACKE						L		
				2					F					
			Grout around 50mm Class 18 uPVC casing	3		Light green, dark green, orange, brown WEATHERED GREYWACKE								
				4										
				5										
				6		Light green, brown, orange WEATHERED GREYWACKE			F					
				7										
				8		Dark grey, dark blue fine SANDSTONE			F					
				9										
				10										
				11		Light green, dark green GREYWACKE			F					
				12		Aqua, green, grey GREYWACKE			F					
				13										
				14										
				15		Green, aqua, grey GREYWACKE			F					
				16										
				17		Light green, dark green, grey FRACTURED GREYWACKE with white quartz veins			F					
				18										
				19		Light green, dark green, grey GREYWACKE with qhite quartz veins			F					
				20										
				21										
				22										
				23										
				24										
			Backfill with cuttings around 50mm Class 18 uPVC casing	25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 16

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

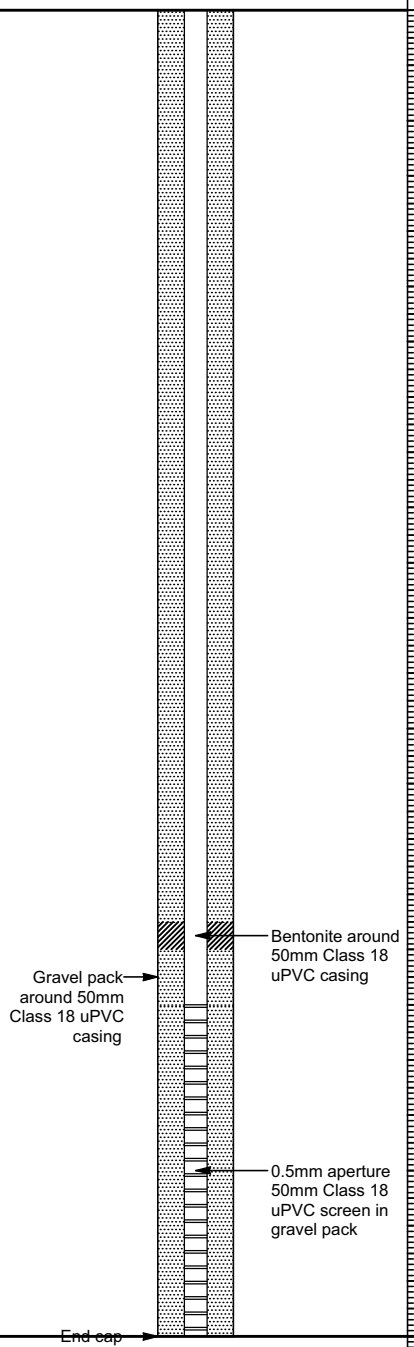
Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **9-8-07**
Date Finished: **10-8-07**

Relative Level: 57.7 mAHD
Coordinates: 302575 mE
7353166 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS	Depth (m)	DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)			Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification



REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 17

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

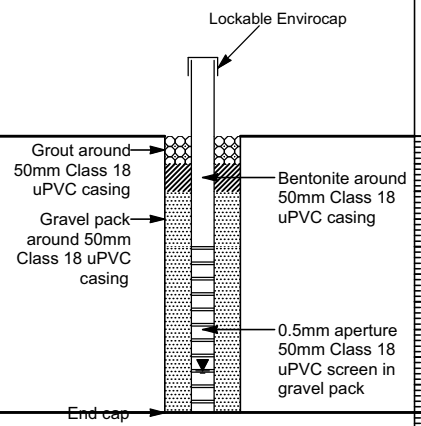
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **11-8-07**
Date Finished: **11-8-07**

Relative Level: 46.7 mAHD
Coordinates: 303163 mE
7353611 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		Dark, brown, light grey CLAY						L-M	SM	
1		Brown, grey GRAVELLY CLAY			F-C	A-SR				
2		Light brown, orange, CLAYEY SANDY GRAVEL			F-C	A-SR	W			
3		Beige, brown, light grey SILTY SAND and minor grey coarse rock clasts - WEATHERED CHERT			F-C	A-SR				
4					F-C	A-SR				
5		Beige, light grey, SILTY SAND and F-C grey rock clasts - WEATHERED CHERT								
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 18

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **11-8-07**
Date Finished: **12-8-07**

Relative Level: 113.7 mAHD
Coordinates: 301192 mE
7354179 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap	0		Brown SILTY SANDY CLAY and brown, dark grey CHERT								
				1		Dark green, orange, white CHERT								
			Grout around 50mm Class 18 uPVC casing	3		Dark green, light green, white CHERT								
				4		Light green, dark green, orange, white CHERT								
				6		Dark green, white CHERT								
				10		Light green, orange, white CHERT								
				19		Light green, white, dark green CHERT								
			Backfill with cuttings around 50mm Class 18 uPVC casing	25										

REMARKS:

URS Australia Pty Ltd

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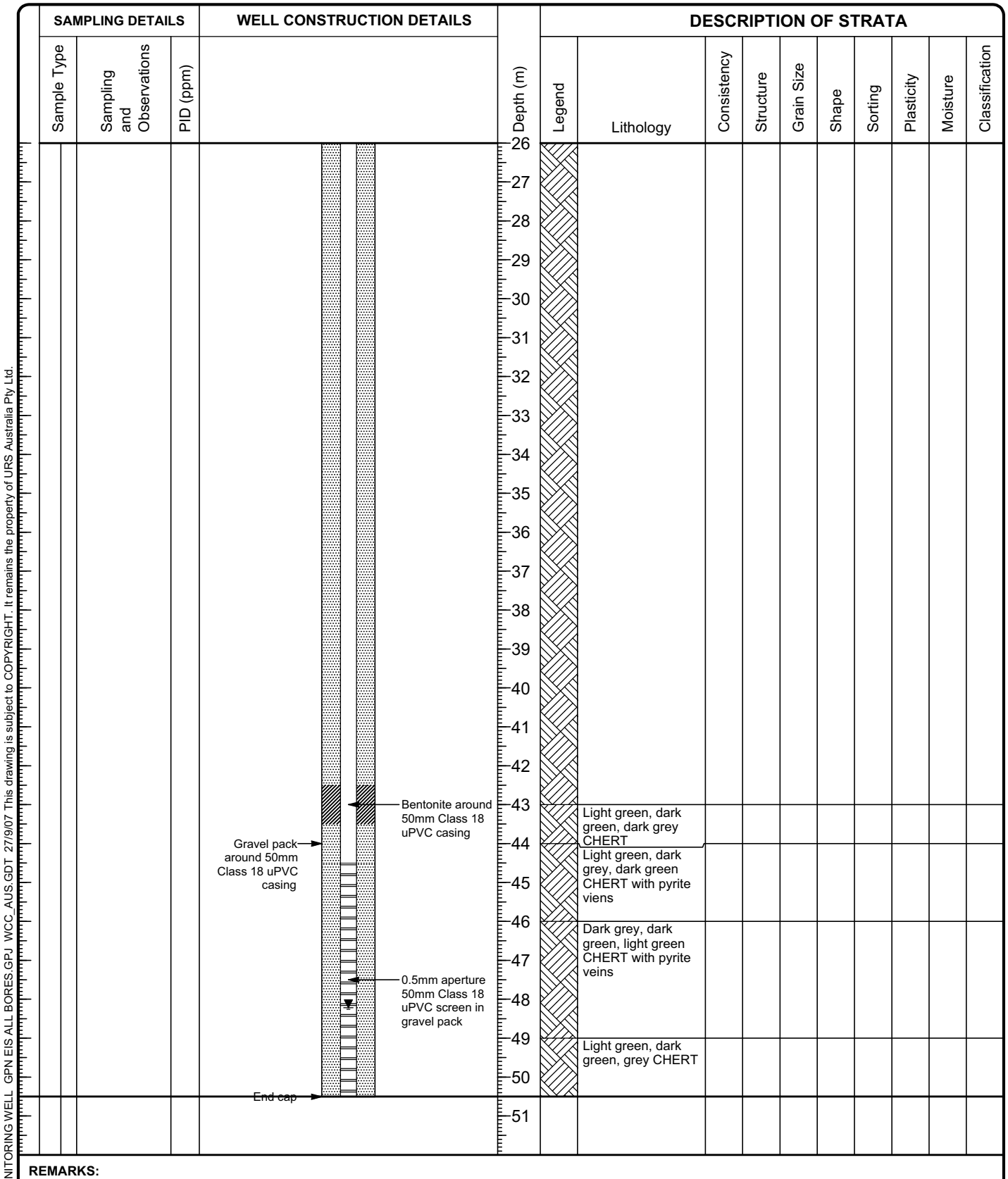
Date Finished: **12-8-07**

Relative Level: 113.7 mAHD
Coordinates: 301192 mE
7354179 mN
Permit No:

Client: **Gladstone Pacific Nickel**



REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 19

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

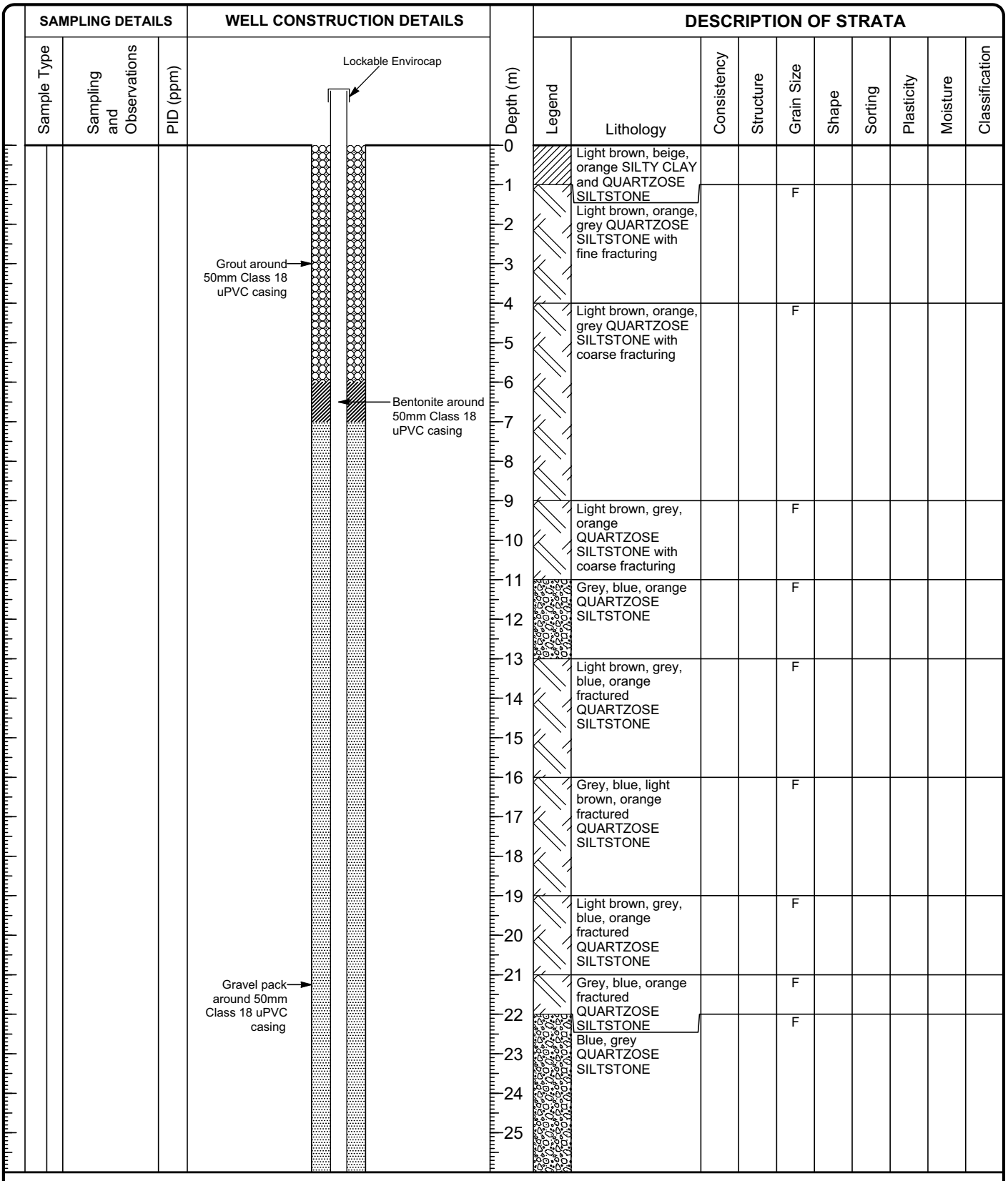
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **12-8-07**
Date Finished: **12-8-07**

Relative Level: 64.2 mAHD
Coordinates: 305206 mE
7352190 mN
Permit No:

Client: **Gladstone Pacific Nickel**



REMARKS:

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Monitoring Well RSF 19

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Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

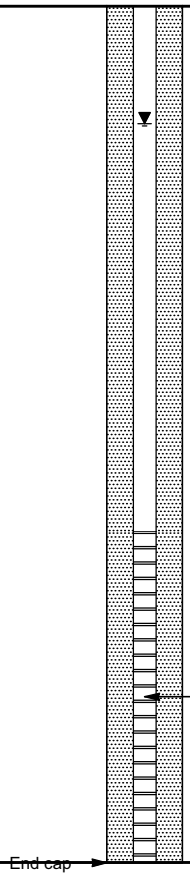
Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **12-8-07**
Date Finished: **12-8-07**

Relative Level: 64.2 mAHD
Coordinates: 305206 mE
7352190 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS	Depth (m)	DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)			Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification



26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

REMARKS:

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Monitoring Well RSF 2

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
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Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

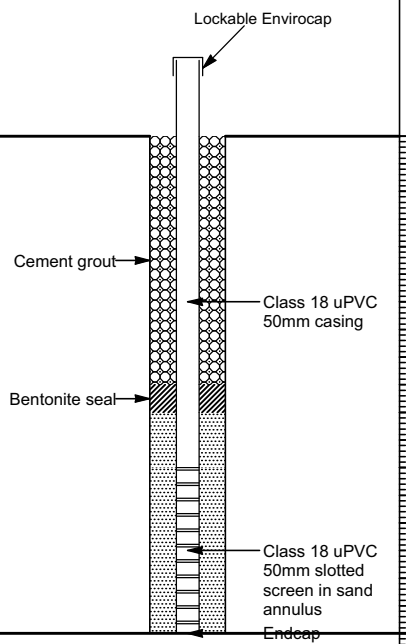
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **1-5-06**
Date Finished: **1-5-06**

Relative Level: mAHD
Coordinates: 301384 mE
7357739 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		CLAYEY SAND, yellow-brown	FI	G	F	SA	P		D	
1		MUDSTONE, brown-grey	HA						D	
2		GABBRO, dark grey/black matrix (pyroxene?) and white phenocrysts (plagioclase). Very fine grained (diabase)	HA						D	
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 20

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **13-8-07**
Date Finished: **13-8-07**

Relative Level: 39.3 mAHD
Coordinates: 304478 mE
7352227 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap; Grout around 50mm Class 18 uPVC casing; Bentonite around 50mm Class 18 uPVC casing; Gravel pack around 50mm Class 18 uPVC casing; 0.5mm aperture 50mm Class 18 uPVC screen in gravel pack; End cap	0		Dark brown CLAY						L	D	
				1		Light brown, light grey, white CLAY and WEATHERED LIMESTONE						L	D	
				2									D	
				3		Light grey, white, dark grey, orange WEATHERED LIMESTONE								
				4		Light brown, light grey, white WEATHERED LIMESTONE							D	
				5										
				6										
				7										
				8										
				9										
				10										
				11										
				12										
				13										
				14										
				15										
				16										
				17										
				18										
				19										
				20										
				21										
				22										
				23										
				24										
				25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 21

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

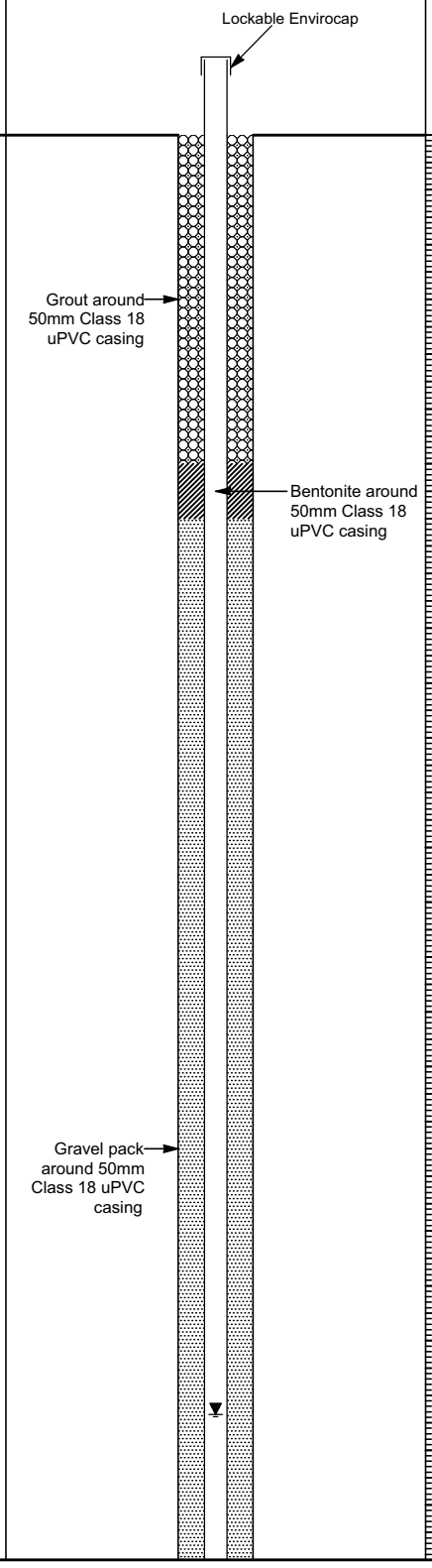
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **13-8-07**
Date Finished: **13-8-07**

Relative Level: 54.7 mAHD
Coordinates: 304149 mE
7352221 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0–1		Beige SILTY CLAY and orange beige WEATHERED QUARTZOSE SILTSTONE			F			L		
1–2		Light brown, orange, beige QUARTZOSE SILTSTONE and beige SILTY CLAY			F					
2–3		Light brown, grey, orange fractured QUARTZOSE SILTSTONE			F					
3–4		Light brown, orange, grey fractured QUARTZOSE SILTSTONE			F					
4–5		Light brown, grey, orange fractured QUARTZOSE SILTSTONE			F					
5–6										
6–7										
7–8										
8–9										
9–10		Grey, light brown, orange fractured QUARTZOSE SILTSTONE			F					
10–11										
11–12		Grey, blue, orange QUARTZOSE SILTSTONE			F					
12–13										
13–14		Grey, light brown, orange, white fractured QUARTZOSE SILTSTONE			F					
14–15										
15–16										
16–17		Grey, blue, orange, brown fractured QUARTZOSE SILTSTONE			F					
17–18										
18–19										
19–20										
20–21		Grey, blue, orange fractured QUARTZOSE SILTSTONE			F					
21–22										
22–23		Beige, grey, orange QUARTZOSE SILTSTONE			F					
23–24										
24–25										
25		Beige, grey, white QUARTZOSE			F					

REMARKS:

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Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **13-8-07**
Date Finished: **13-8-07**

Relative Level: 54.7 mAHD
Coordinates: 304149 mE
7352221 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS	Depth (m)	DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)			Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			0.5mm aperture 50mm Class 18 uPVC screen in gravel pack End cap	26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51		SILTSTONE Dark grey, blue QUARTZOSE SILTSTONE Dark grey, light grey QUARTZOSE SILTSTONE Grey, blue QUARTZOSE SILTSTONE Grey, blue, white QUARTZOSE SILTSTONE			F F F F					

REMARKS:

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Monitoring Well RSF 22

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Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **15-8-07**
Date Finished: **15-8-07**

Relative Level: 88.3 mAHD
Coordinates: 304713 mE
7353570 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap	0		Light brown, orange WEATHERED QUARTZOSE SILTSTONE and dark brown SILTY CLAY			F					
				1										
				2		Orange, beige, WEATHERED QUARTZOSE SILTSTONE			F					
			Grout around 50mm Class 18 uPVC casing	3										
				4		Light brown, orange WEATHERED QUARTZOSE SILTSTONE								
				5										
				6										
			Bentonite around 50mm Class 18 uPVC casing	7										
				8		Light brown, blue, orange WEATHERED QUARTZOSE SILTSTONE			F					
				9										
				10										
				11										
				12										
				13		Brown, blue, grey QUARTZOSE SILTSTONE			F					
				14		Blue, light grey, light brown QUARTZOSE SILTSTONE			F					
				15										
				16										
				17										
				18		Blue, light grey, orange QUARTZOSE SILTSTONE			F					
				19		Dark grey, blue, light grey QUARTZOSE SILTSTONE			F					
				20		Blue, light grey, light brown QUARTZOSE SILTSTONE			F					
				21		Dark grey, blue, light grey QUARTZOSE SILTSTONE with pyrite veins			F					
				22										
				23		Light grey, blue, orange QUARTZOSE SILTSTONE			F					
				24		Dark grey, light grey, white QUARTZOSE SILTSTONE with quartz veins			F					
			Gravel pack around 50mm	25										

REMARKS:

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Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **15-8-07**
Date Finished: **15-8-07**

Relative Level: 88.3 mAHD
Coordinates: 304713 mE
7353570 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Class 18 uPVC casing	26		Light grey, blue, white QUARTZOSE SILTSTONE with white quartz veins			F					
				27										
				28		Dark grey, blue, light grey QUARTZOSE SILTSTONE			F					
				29										
				30										
				31		Light grey, blue, green QUARTZOSE SILTSTONE with calcite veins and minor pyrite			F					
				32										
				33										
				34										
				35										
				36										
				37										
				38										
				39										
				40										
				41										
				42										
				43		Light grey, green QUARTZOSE SILTSTONE with calcite veins			F					
				44		Dark grey, light grey, green QUARTZOSE SILTSTONE with pyrite and calcite veins			F					
			0.5mm aperture 50mm Class 18 uPVC screen in gravel pack	45										
				46		Light grey, blue, green QUARTZOSE SILTSTONE with minor calcite and pyrite veins			F					
				47										
				48		Light grey, dark grey QUARTZOSE SILTSTONE with calcite and pyrite veins			F					
				49										
			End cap	50										
			Hole collapse	51										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 23

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **16-8-07**
Date Finished: **16-8-07**

Relative Level: 100.6 mAHD
Coordinates: 303802 mE
7354937 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap	0		Light brown, beige, grey WEATHERED QUARTZOSE SILTSTONE			F					
				1					F					
			Grout around 50mm Class 18 uPVC casing	2		Beige, orange WEATHERED QUARTZOSE SILTSTONE and SAND								
				3					F					
				4		Dark grey, dark green, light brown QUARTZOSE SILTSTONE			F					
			Bentonite around 50mm Class 18 uPVC casing	5		Dark grey, dark green, orange QUARTZOSE SILTSTONE								
				6										
				7										
				8										
				9										
				10		Dark green, dark grey QUARTZOSE SILTSTONE with white calcite veins			F					
				11										
				12		Dark green, dark grey, light brown QUARTZOSE SILTSTONE with white calcite veins			F					
				13										
				14		Dark green, dark grey QUARTZOSE SILTSTONE with white calcite veins			F					
				15										
				16										
				17										
				18										
				19		Dark green, dark grey QUARTZOSE SILTSTONE with white calcite veins			F					
				20					F					
				21		Dark green, dark grey QUARTZOSE SILTSTONE with white and orange calcite veins			F					
				22										
				23		Dark green QUARTZOSE SILTSTONE			F					
				24		Dark green, dark grey QUARTZOSE SILTSTONE with minor white calcite veins								
			Gravel pack around 50mm Class 18 uPVC casing	25										

REMARKS:

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Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **16-8-07**
Date Finished: **16-8-07**

Relative Level: 100.6 mAHD
Coordinates: 303802 mE
7354937 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS	Depth (m)	DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)			Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
				26										
				27										
				28										
				29										
				30										
				31										
				32										
				33										
				34										
				35										
				36										
				37		Dark green, light grey QUARTZOSE SILTSTONE			F					
				38		Dark green, light green, dark grey QUARTZOSE SILTSTONE with white calcite veins			F					
				39					F					
				40		Dark green, dark grey QUARTZOSE SILTSTONE with minor white calcite veins								
				41					F					
				42		Light green, light grey QUARTZOSE SILTSTONE with minor white calcite veins								
				43										
				44										
				45										
				46										
				47										
			0.5mm aperture 50mm Class 18 uPVC screen in gravel pack	48										
				49										
				50					F					
			End cap	51		Dark green, dark grey QUARTZOSE SILTSTONE with white calcite veins								

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 24

URS Australia Pty. Ltd.
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Phone +61732432111
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Project No.: **42625791**

Project Reference: **GPN EIS Bores**

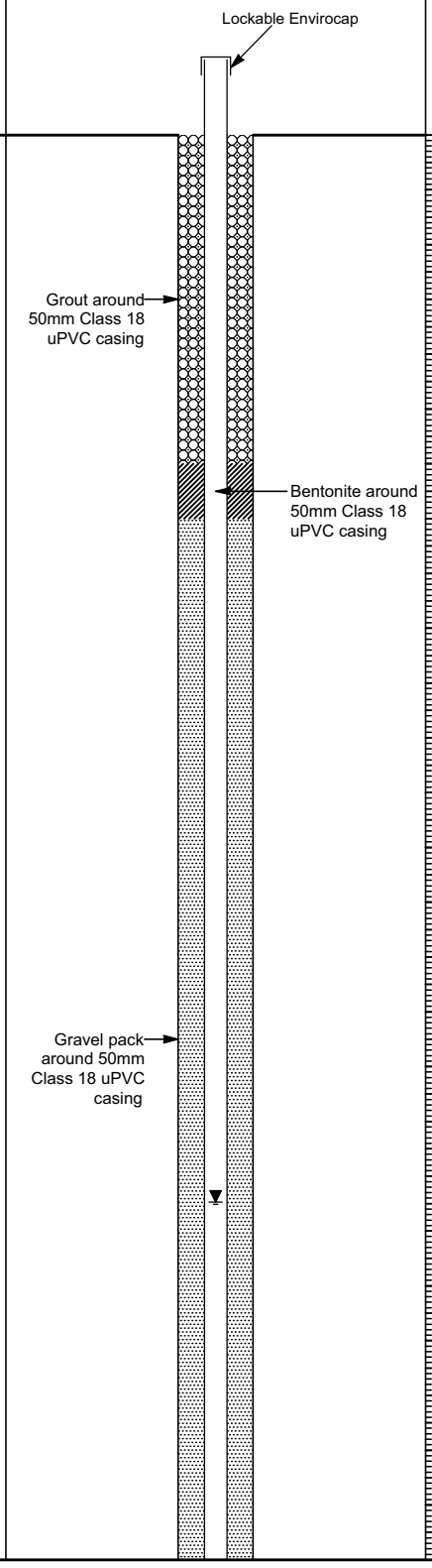
Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **17-8-07**
Date Finished: **17-8-07**

Relative Level: 88.3 mAHD
Coordinates: 302756 mE
7356385 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0–3		Dark brown SILTY CLAY								
0–3		Dark yellow, beige SILTY CLAY and orange, light brown WEATHERED QUARTZOSE SILTSTONE								
3–5		Orange, light brown, WEATHERED QUARTZOSE SILTSTONE			F					
5–7		Dark grey, dark brown, fractured QUARTZOSE SILTSTONE			F					
7–8		Dark brown, dark grey, fractured QUARTZOSE SILTSTONE with orange staining			F					
8–12		Dark grey, dark brown, fractured QUARTZOSE SILTSTONE with orange staining and calcite veins			F					
12–13		Dark grey, dark brown, fractured QUARTZOSE SILTSTONE with orange staining and calcite veins			F					
13–16		Dark grey, dark brown, fractured QUARTZOSE SILTSTONE with orange staining and calcite veins			F					
16–17		Dark grey, dark green, dark brown, fractured QUARTZOSE SILTSTONE with orange staining and minor calcite veins			F					
17–19		Dark green, dark grey QUARTZOSE SILTSTONE			F					
19–21		Dark green QUARTZOSE SILTSTONE with calcite veins			F				M	
21–23		Dark green, dark grey, black QUARTZOSE SILTSTONE with calcite veins			F					
23–25		Light grey, dark grey, dark green QUARTZOSE SILTSTONE with calcite veins			F					
25		Light grey QUARTZOSE			F					

REMARKS:

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Monitoring Well RSF 24

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Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Wizard Drilling**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **AW**
Checked By: **SD**
Date Started: **17-8-07**
Date Finished: **17-8-07**

Relative Level: 88.3 mAHD
Coordinates: 302756 mE
7356385 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			0.5mm aperture 50mm Class 18 uPVC screen in gravel pack	26		SILTSTONE with calcite veins								
				27		Dark green, light green QUARTZOSE SILTSTONE with calcite veins			F					
				28		Dark green QUARTZOSE SILTSTONE with calcite veins			F					
				29		Dark green, dark grey QUARTZOSE SILTSTONE with calcite veins			F					
				30		Dark grey, black, dark green QUARTZOSE SILTSTONE with calcite veins			F				M	
			End cap	31		Dark grey, dark green, light green QUARTZOSE SILTSTONE with calcite veins			F				M	
				32		Dark grey, light grey, light green QUARTZOSE SILTSTONE with calcite veins								
				33		Dark grey, light grey, light green, white QUARTZOSE SILTSTONE with calcite veins								
				34										
				35										
				36										
				37										
				38										
				39										
				40										
				41										
				42										
				43										
				44										
				45										
				46										
				47										
				48										
				49										
				50										
				51										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 3

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **1-5-06**
Date Finished: **1-5-06**

Relative Level: mAHD
Coordinates: 300955 mE
7358691 mN
Permit No:

Client: **Gladstone Pacific Nickel**

SAMPLING DETAILS			WELL CONSTRUCTION DETAILS		DESCRIPTION OF STRATA									
Sample Type	Sampling and Observations	PID (ppm)		Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
			Lockable Envirocap; Cement grout; Bentonite seal; Class 18 uPVC 50mm casing; Class 18 uPVC 50mm slotted screen in sand annulus; Endcap	0		SANDY CLAY, dark to medium brown	FI	G	F	SA	P	L	D	
				4		SILTSTONE, light grey-blue	HA						SM	

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 4

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

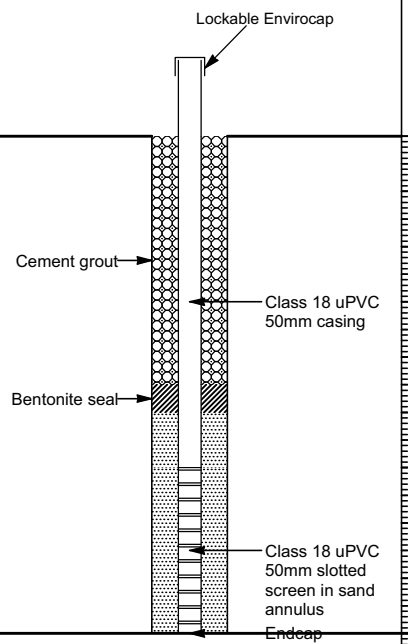
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **1-5-06**
Date Finished: **1-5-06**

Relative Level: mAHD
Coordinates: 301179 mE
7359012 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		silty CLAY, yellow-brown	ST					M	D	
1		MUDSTONE, light grey	HA						D	
2		SHALE, light grey-blue, very hard	HA						D	

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 5

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

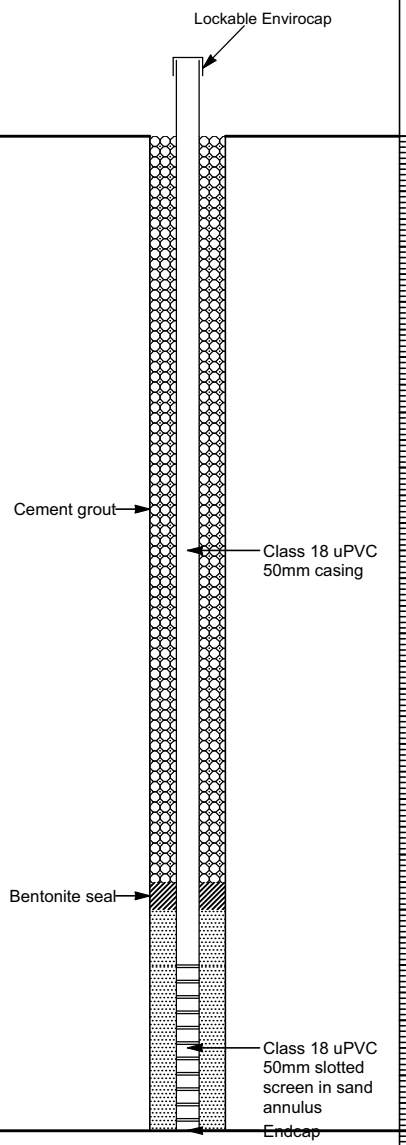
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **29-4-06**
Date Finished: **29-4-06**

Relative Level: 112 mAHD
Coordinates: 302836 mE
7356962 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		CLAYEY SAND, grey-brown	LO	G	F	SA	P		D	
1		MUDSTONE, yellow-brown	HA						D	
2										
3		SHALE, light grey-blue, very hard	HA						D	
4										
5										
6										
7		MUDSTONE, grey-brown	HA						D	
8										
9		SHALE, light grey-blue, very hard	HA						D	
10										
11										
12										
13		MUDSTONE, yellow-brown	HA						D	
14		SHALE, light grey-blue, very hard	HA						D	
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 6

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

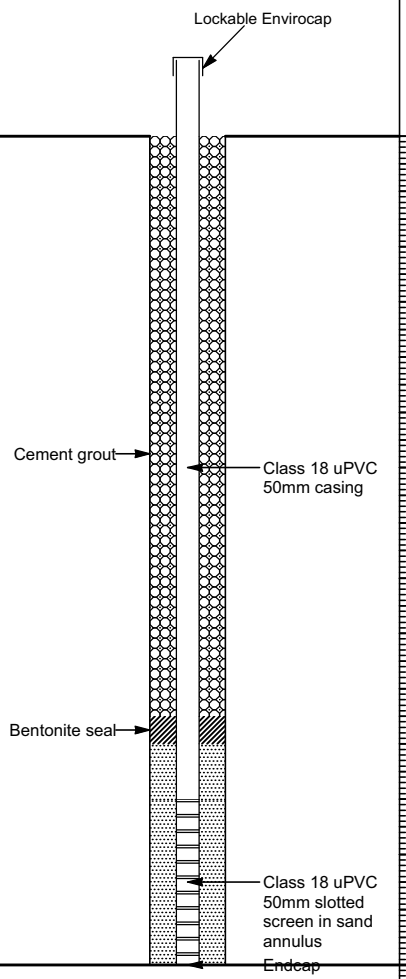
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **28-4-06**
Date Finished: **29-4-06**

Relative Level: 106.2 mAHD
Coordinates: 302309 mE
7356521 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		ROCKY SOIL, dark brown	LO	G	C	SA	P		D	
1		GREENSTONE, very hard (metamorphic product of gabbro), green-grey	HA						D	
3		SILTSTONE, yellow-brown	HA						SM	
8		GREENSTONE, very hard (metamorphic product of gabbro), green-grey	HA						D	

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 7

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

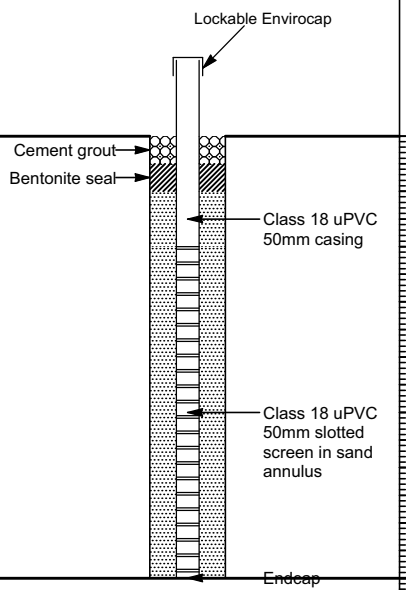
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **29-4-06**
Date Finished: **30-4-06**

Relative Level: 59.1 mAHD
Coordinates: 303114 mE
7354563 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0–1		silty CLAY, medium grey	ST					M	D	
1–4		CLAYEY SAND, orange-brown	LO	G	M	SA	P		D	
4–6		CLAYSTONE, moderately hard, yellow-brown	HA						D	
6–8		MUDSTONE, yellow-brown	HA						D	

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 8

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

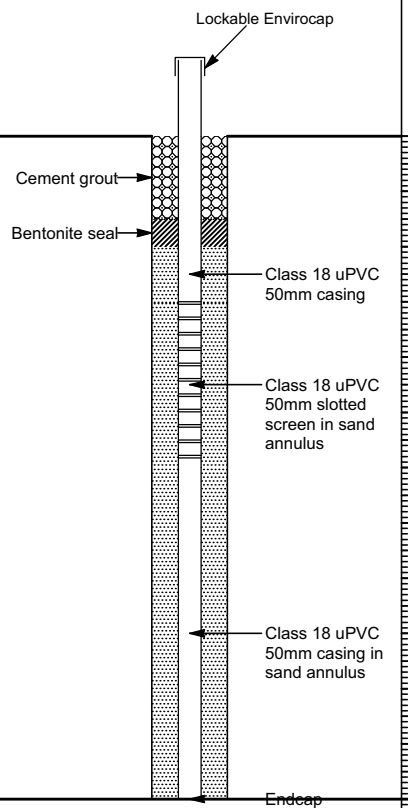
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **29-4-06**
Date Finished: **29-4-06**

Relative Level: 72.3 mAHD
Coordinates: 302656 mE
7355871 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		CLAYEY SAND, yellow-brown	LO	G	M	SA	P		D	
1		silty CLAY, yellow-brown to grey	ST					M	D	
2										
3										
4										
5		MUDSTONE, yellow-brown	HA						D	
6										
7		SHALE, light grey-blue, very hard	HA						D	
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well RSF 9

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

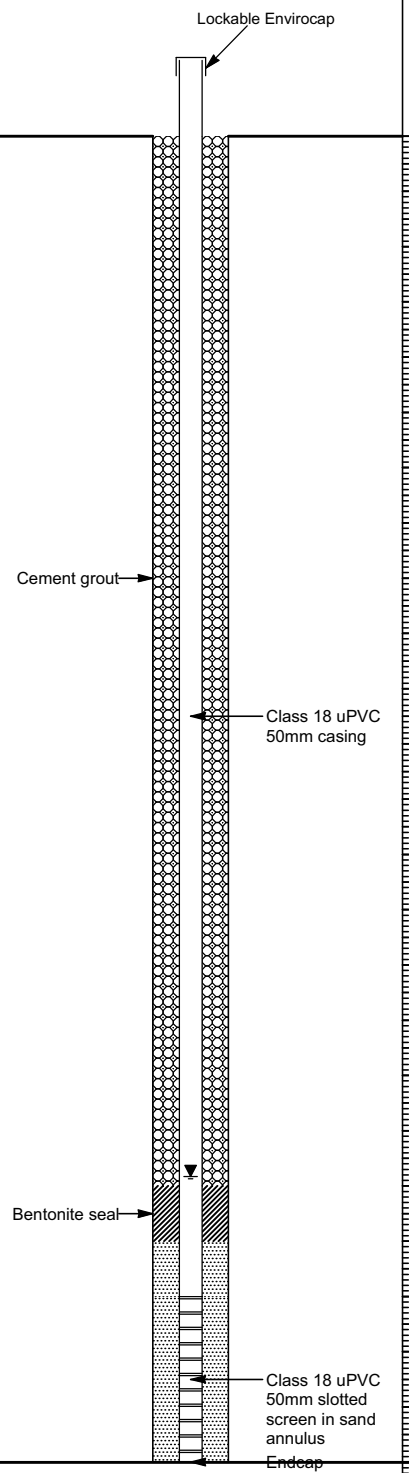
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **28-4-06**
Date Finished: **28-4-06**

Relative Level: 87 mAHD
Coordinates: 302316 mE
7355824 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		ORGANIC SOIL, brown	LO	G	M	SA	P		D	
1		SHALE, light grey-blue, very hard	HA						D	
2		MUDSTONE, yellow-brown	HA						D	
5		KAOLINITE MUDSTONE, white-yellow	ST					M	D	
6		SILTSTONE, yellow-brown	HA						SM	
11		SHALE, light grey-blue, very hard	HA						D	
12		SILTSTONE, yellow-brown	HA						SM	
16		MUDSTONE, yellow-brown	HA						D	
24										
25										

REMARKS:

URS Australia Pty Ltd

Monitoring Well Y 1

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

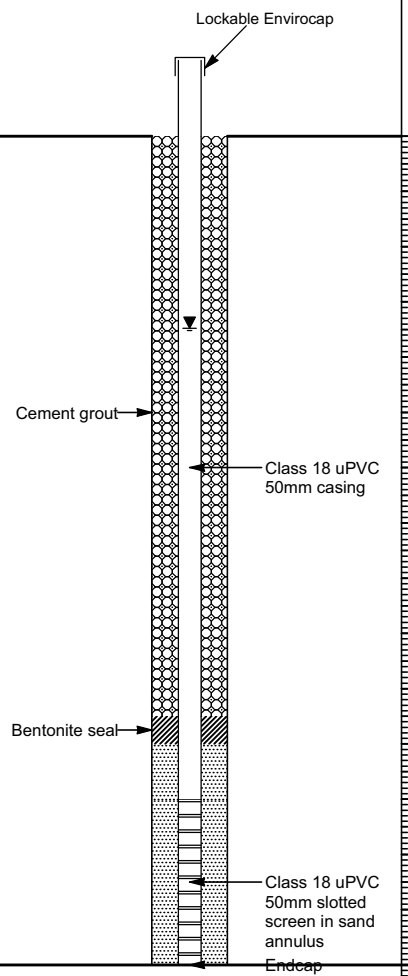
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **2-5-06**
Date Finished: **2-5-06**

Relative Level: mAHD
Coordinates: 314416 mE
7361234 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		silty CLAY, light grey	LO	G	F	SA	P		D	
1		GRAVEL, moderately cemented hardpan	VS	G	C	A	P		D	
2		CLAY, grey to light brown	HA					H	D	
12		CLAYEY SANDY GRAVEL, water bearing unit	LO	G	C	A	P		S	
15										

REMARKS:

URS Australia Pty Ltd

Monitoring Well Y 2

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

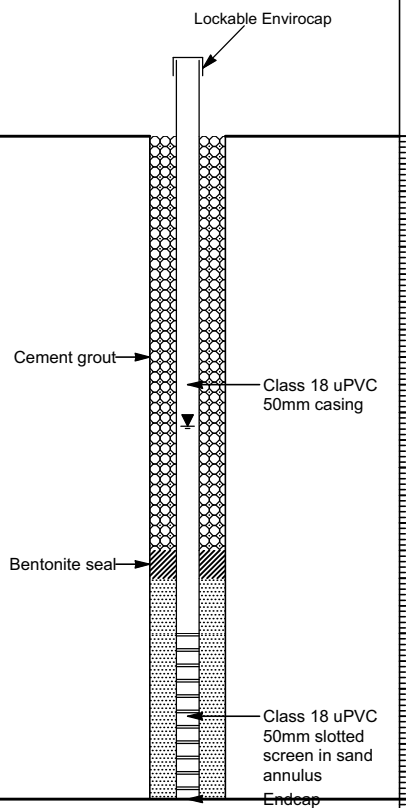
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **2-5-06**
Date Finished: **2-5-06**

Relative Level: mAHD
Coordinates: 314172 mE
7361603 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification	Sample Type	Sampling and Observations	PID (ppm)
0		SANDY GRAVEL, yellow-brown	LO	G	C	A	P		D				
4		CLAY, grey to yellow-brown	ST					M	D				
9		SANDY GRAVEL, water bearing unit	LO	G	C	A	P		S				

REMARKS:

URS Australia Pty Ltd

Monitoring Well Y 3

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

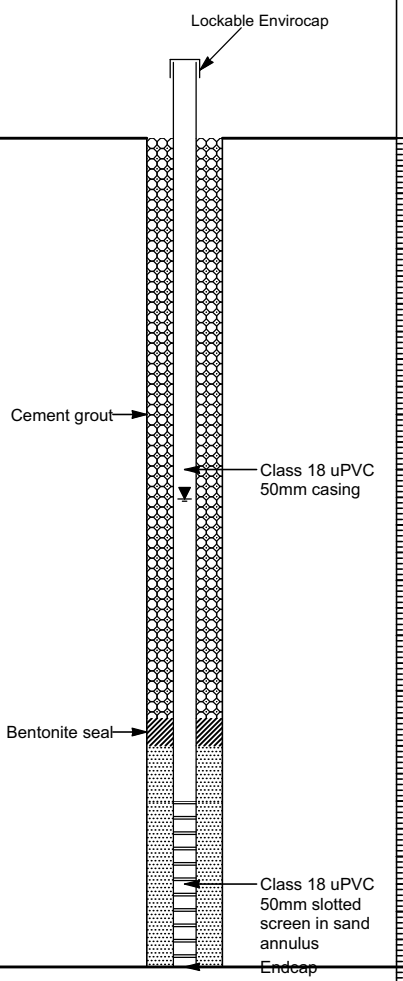
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **2-5-06**
Date Finished: **2-5-06**

Relative Level: mAHD
Coordinates: 314117 mE
7361439 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification	Sample Type	Sampling and Observations	PID (ppm)
0		SANDY GRAVEL, yellow-brown	LO	G	C	A	P		D				
3		CLAY, grey to yellow-brown	ST					M	D				
10		SANDY GRAVEL, water bearing unit	LO	G	C	A	P		S				

REMARKS:

URS Australia Pty Ltd

Monitoring Well Y 4

URS Australia Pty. Ltd.
Level 14, 240 Queen Street, Brisbane, QLD, 4001
Phone +61732432111
Fax +61732432199

Project No.: **42625791**

Project Reference: **GPN EIS Bores**

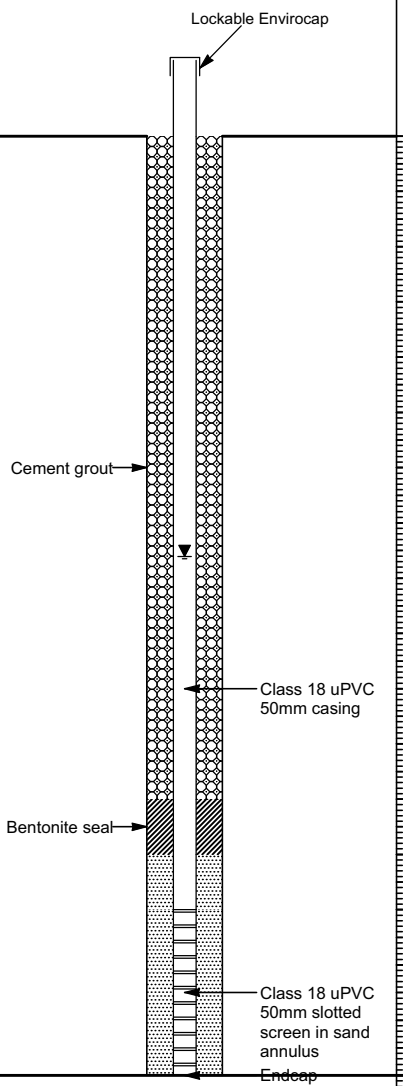
Drilling Contractor: **Geoprobe**

Drilling Method: **Down Hole Hammer (DHH)**

Logged By: **TE**
Checked By: **TE**
Date Started: **2-5-06**
Date Finished: **2-5-06**

Relative Level: mAHD
Coordinates: 313863 mE
7361476 mN
Permit No:

Client: **Gladstone Pacific Nickel**



Depth (m)	Legend	Lithology	Consistency	Structure	Grain Size	Shape	Sorting	Plasticity	Moisture	Classification
0		SANDY GRAVEL, yellow-brown	LO	G	C	A	P		D	
6		CLAYEY SANDY GRAVEL, water bearing unit	LO	G	C	A	P		S	

REMARKS:

Appendix C

Responses to Unregistered Bores Survey

W1

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Highway
Via Calliope

Contact Name: Claude Streeter

Contact Telephone: Home: 49751375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 18 yrs
4. How deep is the bore? 60 ft
5. Is the bore cased or open hole? ☑ Cased ☐ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☐ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stockwater -

7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Jos Hayter

Contact Telephone:

Business Address: "GSDA" Gladstone.

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

W2

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Highway
Via Calliope

Contact Name: Claude Streeter.

Contact Telephone: Home: 49751375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 40 +
4. How deep is the bore? 30 ft
5. Is the bore cased or open hole? ☑ Cased ☐ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☐ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stockwater.

7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Des Haylor

Contact Telephone:

Business Address: "GSDA" Gladstone.

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

W3

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Highway. Via Calliope.

Contact Name: Claude Streeter

Contact Telephone: Home: W9751375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 18 yrs
4. How deep is the bore? 60 ft
5. Is the bore cased or open hole? ☑ Cased ☐ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☐ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stockwater.

7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Des Haylor

Contact Telephone:

Business Address: "GSDA" Gladstone.

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

W 4

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Highway
Via Calliope.

Contact Name: Claude Streeter

Contact Telephone: Home: 49751 375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 16 yrs
4. How deep is the bore? 50 Ft.
5. Is the bore cased or open hole? ☑ Cased ☐ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☑ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stock water
7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Jos Hayter

Contact Telephone:

Business Address: "GSDA" Gladstone.

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

W5

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Hyw Via Calliope.

Contact Name: Claude Streeter.

Contact Telephone: Home: 49751 375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 40+ yrs.
4. How deep is the bore? 30 ft.
5. Is the bore cased or open hole? ☑ Cased ☐ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☐ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stock water
7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Jas Hayter

Contact Telephone:

Business Address: "GSTA" Gladstone -

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

W7-

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Highway Via Calliope.

Contact Name: Claude Streeter

Contact Telephone: Home: 49751375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 40+ yrs.
4. How deep is the bore? 30 ft (Old well)
5. Is the bore cased or open hole? ☐ Cased ☑ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☐ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stockwater
7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Des Hayter

Contact Telephone:

Business Address: "GSDA" Gladstone

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

W 8

PRIVATE GROUNDWATER BORE INFORMATION – ENVIRONMENTAL SURVEY FORM

Please take a moment to complete this form and return it as soon as possible in the attached envelope. Postage is free.

Property Address: "Woodridge" Bruce Highway
Via Calliope.

Contact Name: Claude Streeter

Contact Telephone: Home: 49751375 Work:

Mobile:

1. Is there a groundwater bore located at the above property? ☑ Yes ☐ No
   If **YES** please complete questions 3 to 7 and return this form to us.
   If **NO** please complete question 2 and return this form to us.
2. Are you planning to install a groundwater bore at the above property? ☐ Yes ☑ No
3. Approximately how old is the bore? 18yrs
4. How deep is the bore? 60ft
5. Is the bore cased or open hole? ☑ Cased ☐ Open hole
6. Is the bore currently in use? ☑ Yes ☐ No

   If yes, then what is the bore used for?
   - ☐ Irrigation of garden (eg grass, trees, shrubs)
   - ☐ Irrigation of vegetables or fruits
   - ☐ Drinking
   - ☐ Washing clothes or bathing
   - ☑ Other (please specify) Stockwater.

7. How often is the bore used? ☑ Daily ☐ Monthly ☐ Other (please specify)

If you are not the owner of the property, please still supply your address above and provide the details of the owner/real estate agent below:

Contact Name: Jes Haylor

Contact Telephone:

Business Address: "GSDA" Gladstone.

THANK YOU FOR YOUR ASSISTANCE

For further information please contact Willy Van Vaerenbergh
URS Australia
Level 14, 240 Queen Street, Brisbane Qld. 4000
Telephone: 07 3243 2111 • Facsimile: 07 3243 2199

URS

From: Ann Coward (ann.coward@yahoo.com.au)
To: JamesM@gladstonepacific.com.au
Date: Thursday, 15 November, 2007 11:40:52 AM
Subject: Bore information?

Good morning James

Following is the information you requested on the two bores at Fairview.

Bore on Lot 18 RP CL40367 (Bullock Paddock)
Longitude 151 degrees 00.867
Latitude 23 degrees 55.318
Water struck at 9 metres water rising to 5 metres
Yeilding 1800 GPH approx
Quality - Brackish
Solar pumped daily for stock watering purposes

Bore on Lot 19 RP CL40367 (Newhaven Paddock)
Longitude 151 degrees 02.115
Latitude 23 degrees 55.655
Water struck at 9 metres waterrising to 5 metres
Yeilding 2000 gH approx
Quality - Potable
Solar pumped daily for stock watering purposes

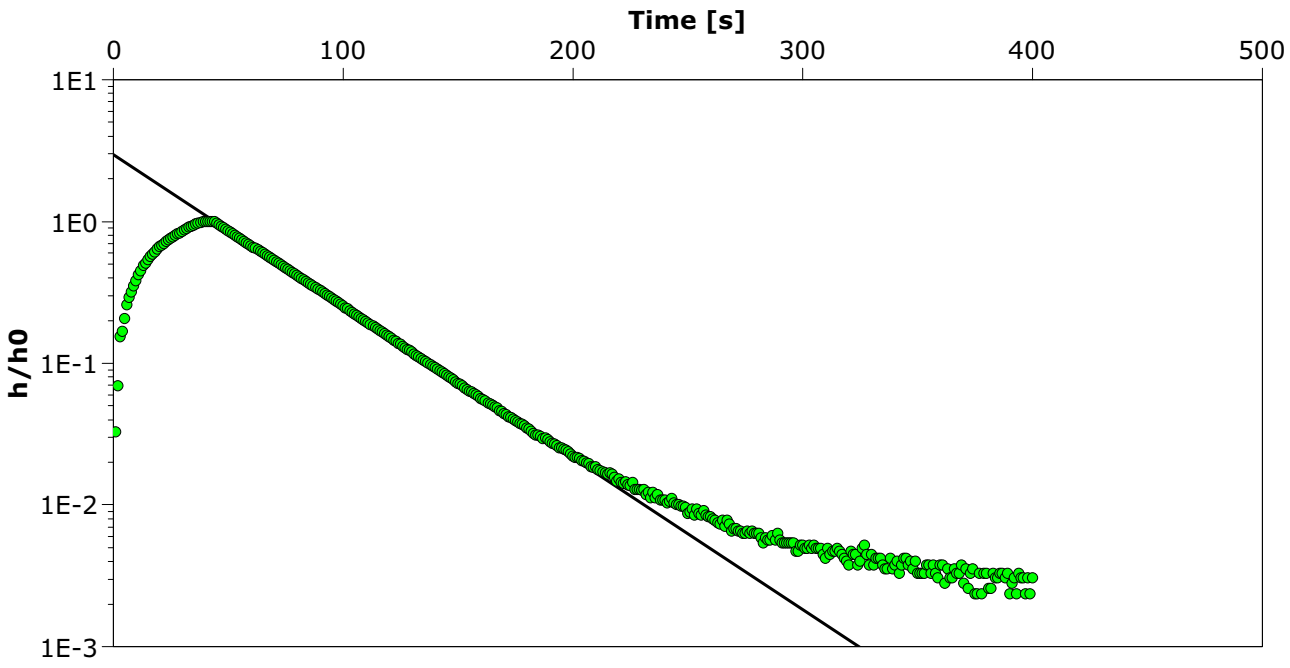
I hope this is of some assistance to you.

Ann Coward

Appendix D Falling Head Test Analyses

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF10	Test Well: RSF10
Test conducted by: A Wilson		Test date: 30/08/2007
Analysis performed by: S Denner	Hvorslev	Date: 13/09/2007
Aquifer Thickness: 3.50 m		

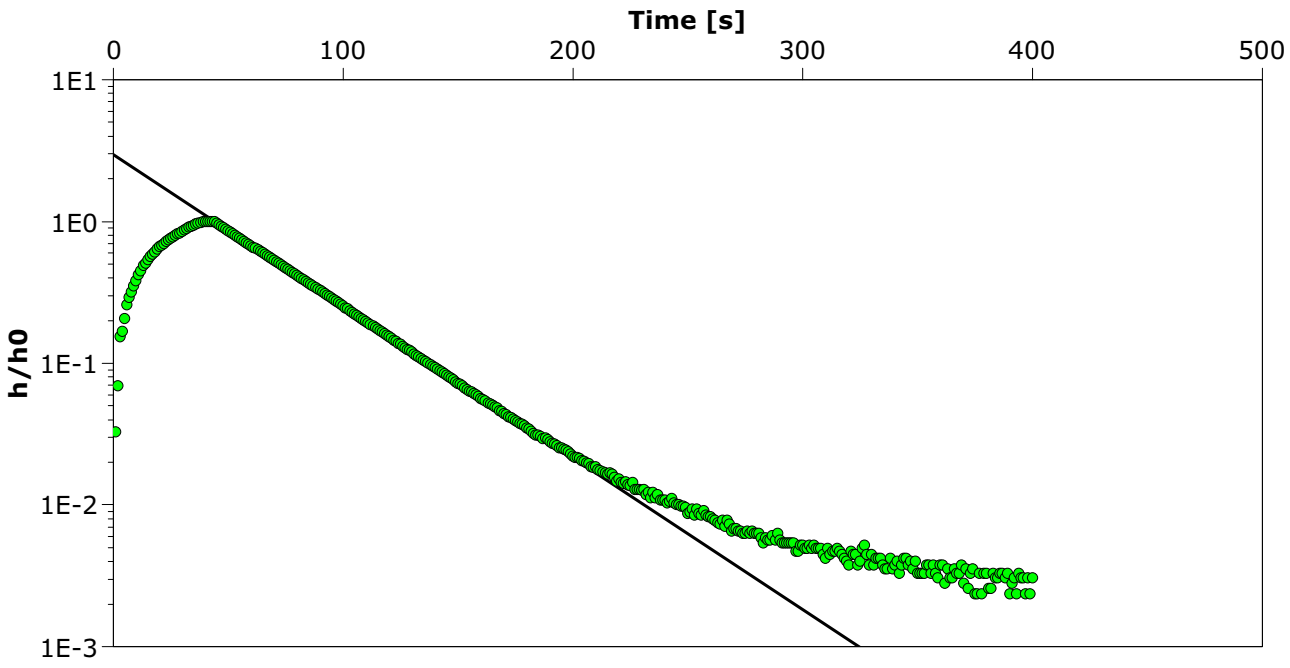


Calculation after Hvorslev

Observation well	K [m/d]	
RSF10	1.07×10^{0}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF10	Test Well: RSF10
Test conducted by: A Wilson		Test date: 30/08/2007
Analysis performed by: S Denner	Bouwer & Rice	Date: 13/09/2007
Aquifer Thickness: 3.50 m		

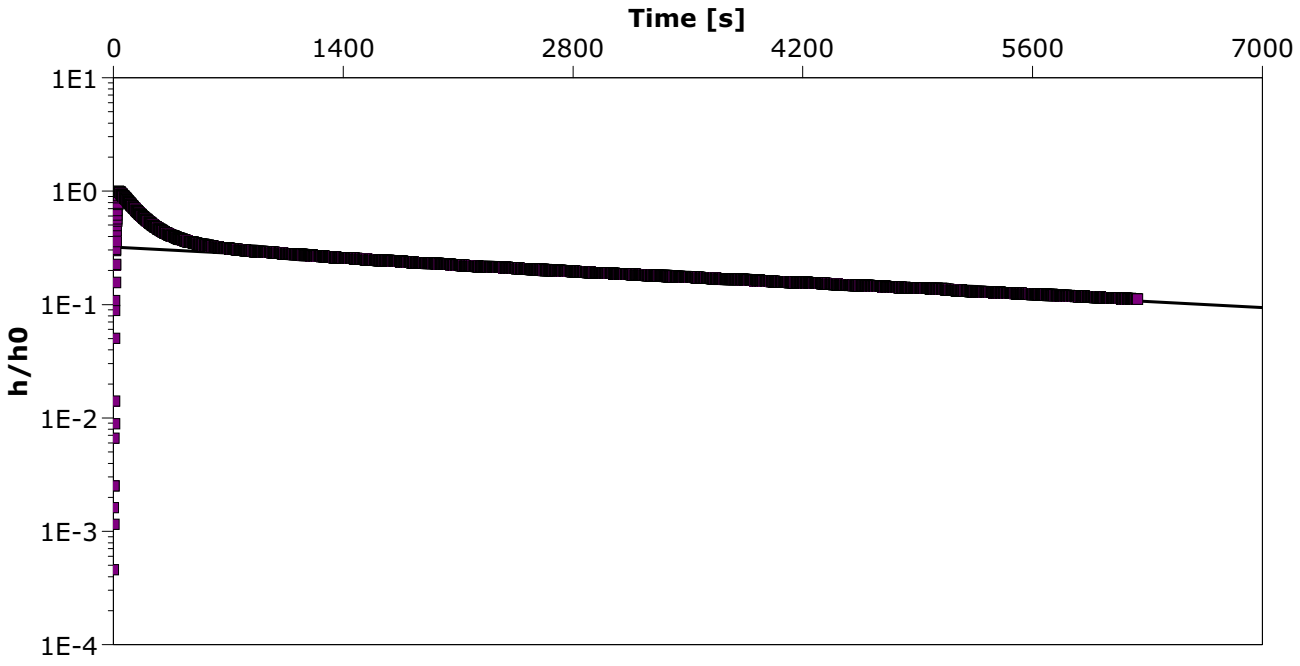


Calculation after Bouwer && Rice

Observation well	K [m/d]	
RSF10	8.25×10^{-1}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF14	Test Well: RSF14
Test conducted by: A Wilson		Test date: 30/08/2007
Analysis performed by: S Denner	Hvorslev LT	Date: 13/09/2007
Aquifer Thickness: 21.00 m		

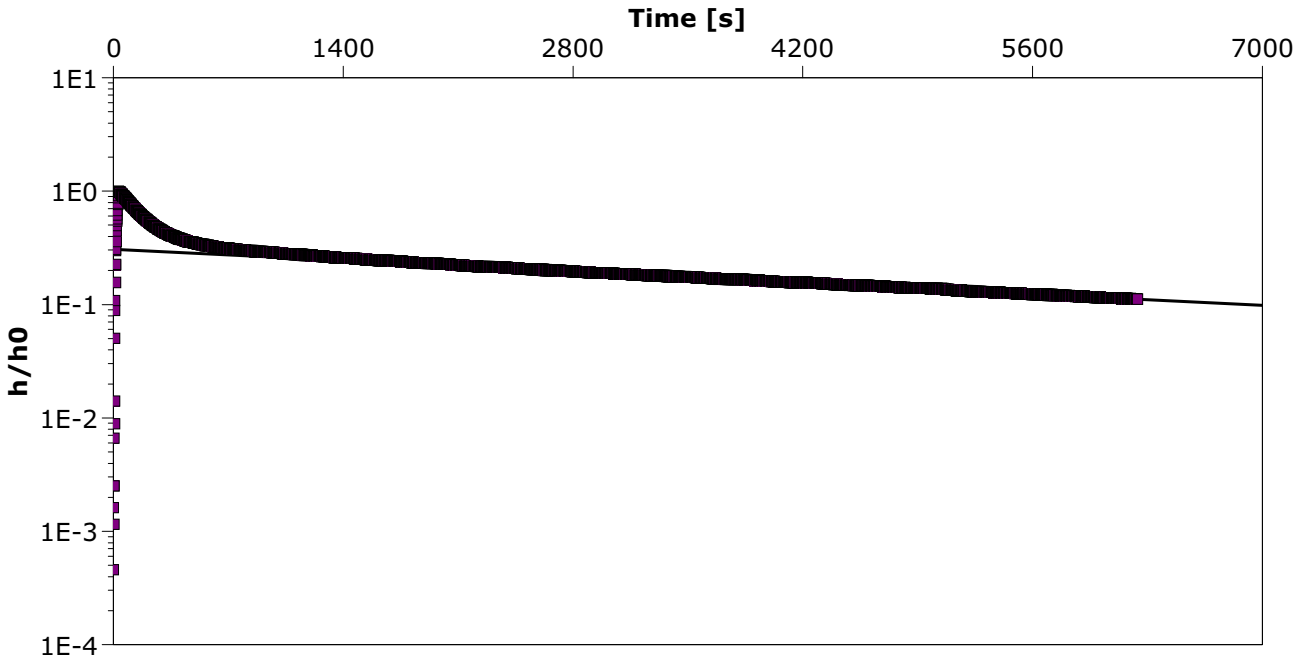


Calculation after Hvorslev

Observation well	K [m/d]	
RSF14	1.95×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF14	Test Well: RSF14
Test conducted by: A Wilson		Test date: 30/08/2007
Analysis performed by: S Denner	Bouwer & Rice LT	Date: 13/09/2007
Aquifer Thickness: 21.00 m		

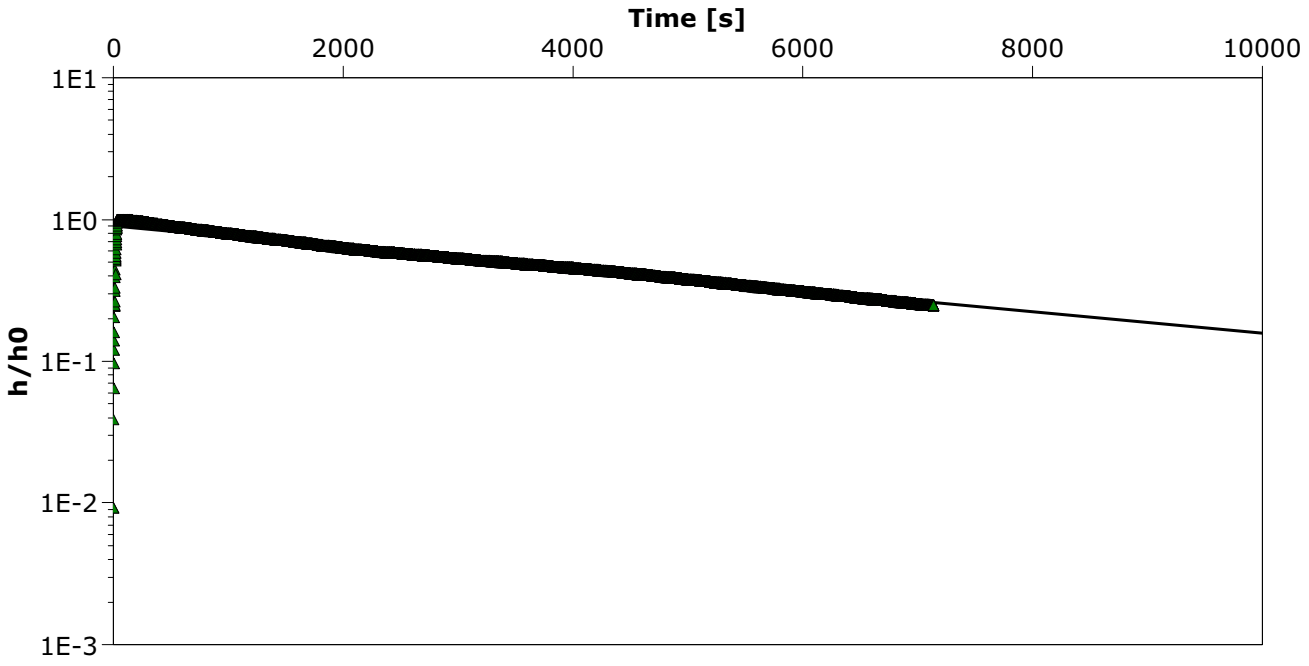


Calculation after Bouwer && Rice

Observation well	K [m/d]	
RSF14	1.35×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF17	Test Well: RSF17
Test conducted by: A Wilson		Test date: 31/08/2007
Analysis performed by: S Denner	Hvorslev LT	Date: 13/09/2007
Aquifer Thickness: 0.80 m		

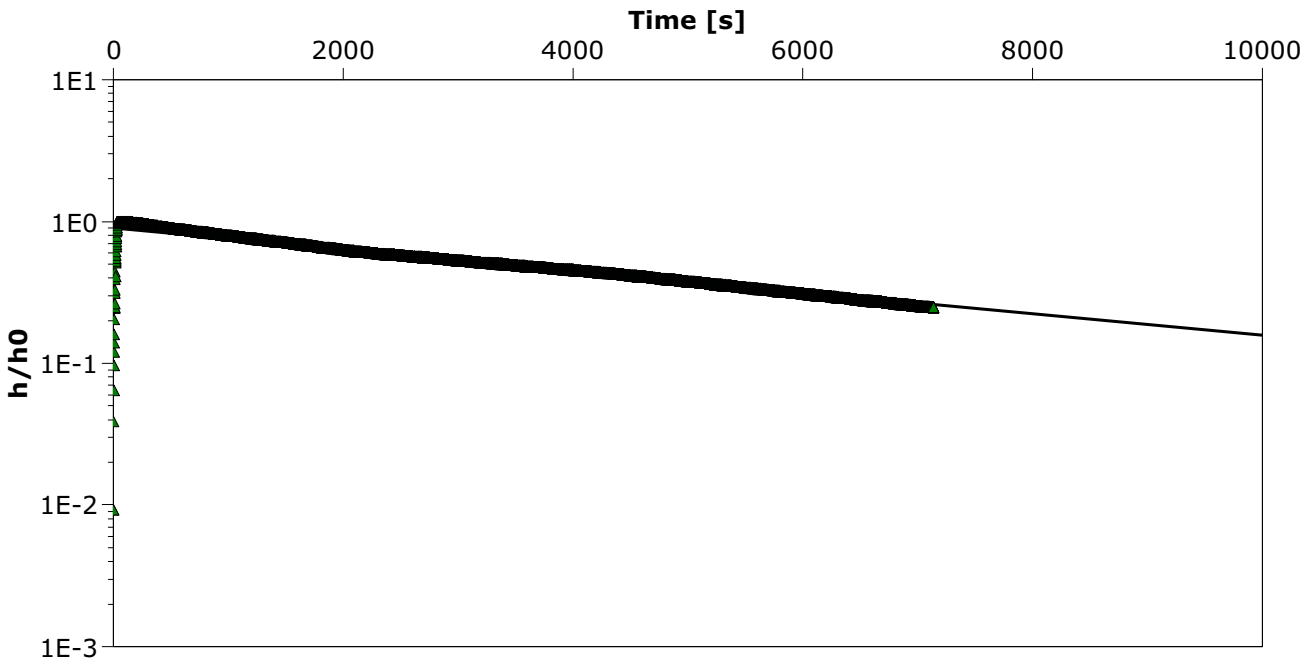


Calculation after Hvorslev

Observation well	K [m/d]	
RSF17	4.00×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF17	Test Well: RSF17
Test conducted by: A Wilson		Test date: 31/08/2007
Analysis performed by: S Denner	Bouwer & Rice LT	Date: 13/09/2007
Aquifer Thickness: 0.80 m		

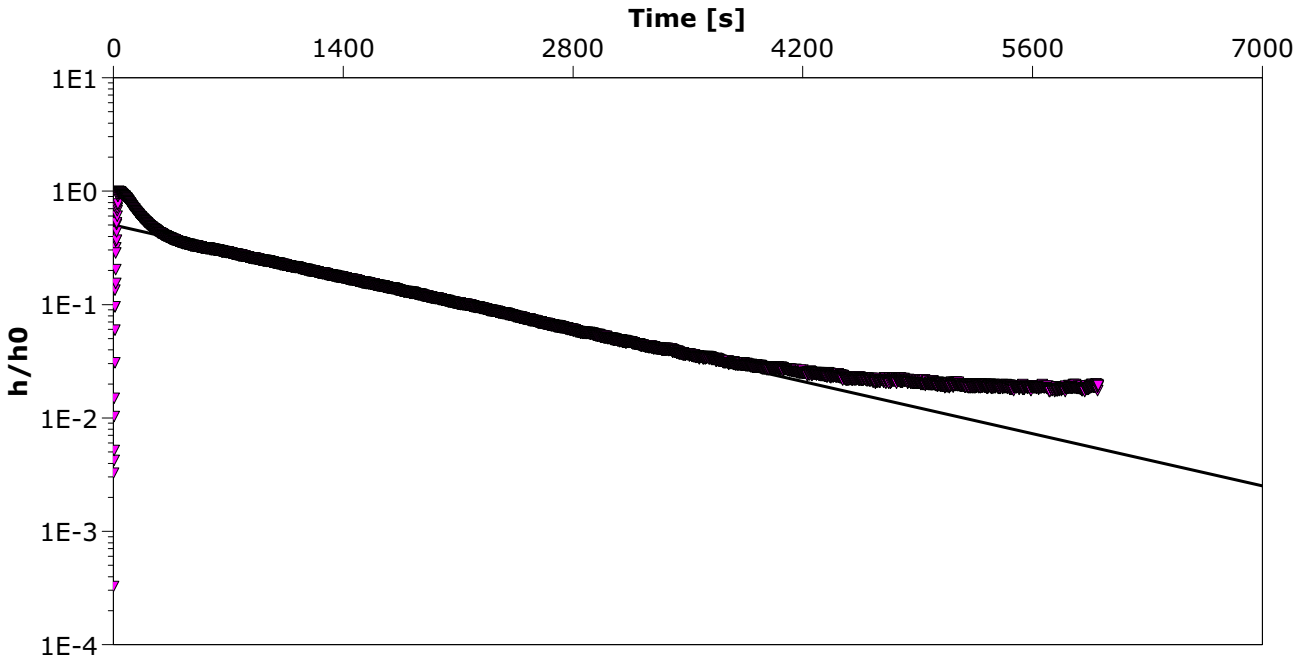


Calculation after Bouwer && Rice

Observation well	K [m/d]	
RSF17	2.96×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF19	Test Well: RSF19
Test conducted by: A Wilson		Test date: 29/08/2007
Analysis performed by: S Denner	Hvorlsev LT	Date: 13/09/2007
Aquifer Thickness: 12.50 m		

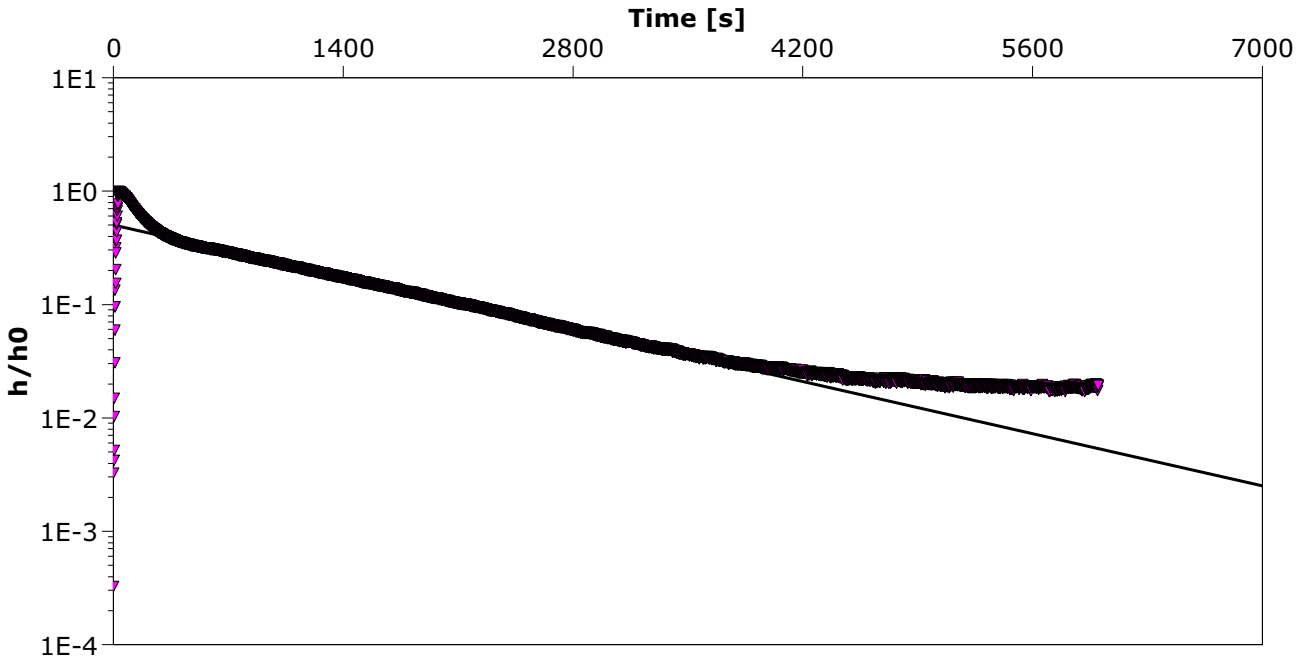


Calculation after Hvorslev

Observation well	K [m/d]	
RSF19	1.11×10^{-2}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF19	Test Well: RSF19
Test conducted by: A Wilson		Test date: 29/08/2007
Analysis performed by: S Denner	Bouwer & Rice LT	Date: 13/09/2007
Aquifer Thickness: 12.50 m		

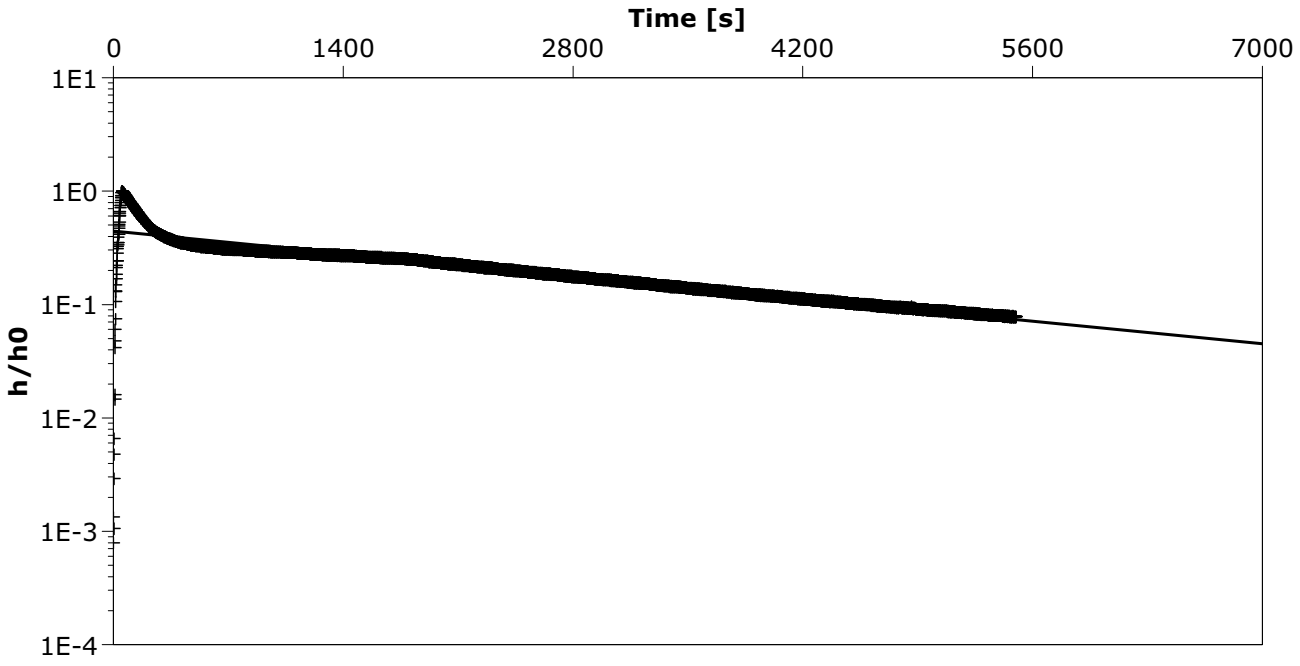


Calculation after Bouwer && Rice

Observation well	K [m/d]	
RSF19	8.38×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF21	Test Well: RSF21
Test conducted by: A Wilson		Test date: 27/08/2007
Analysis performed by: S Denner	Hvorslev LT	Date: 13/09/2007
Aquifer Thickness: 13.00 m		

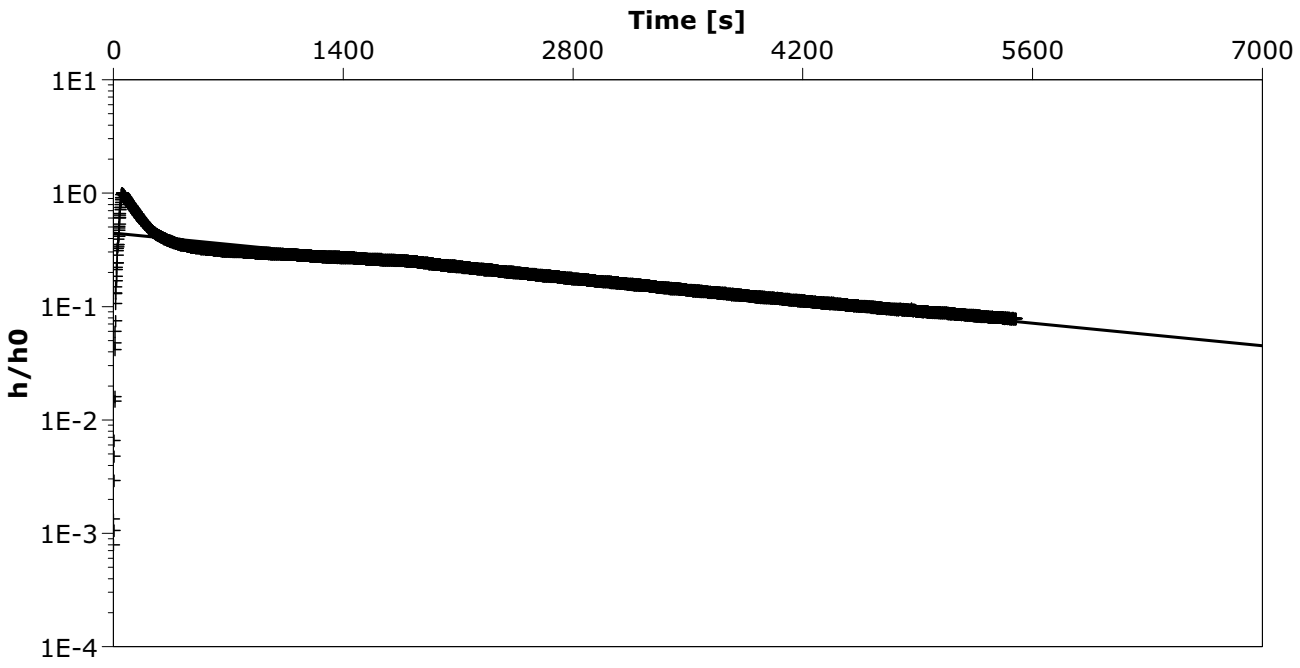


Calculation after Hvorslev

Observation well	K [m/d]	
RSF21	4.77×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF21	Test Well: RSF21
Test conducted by: A Wilson		Test date: 27/08/2007
Analysis performed by: S Denner	Bouwer & Rice LT	Date: 13/09/2007
Aquifer Thickness: 13.00 m		

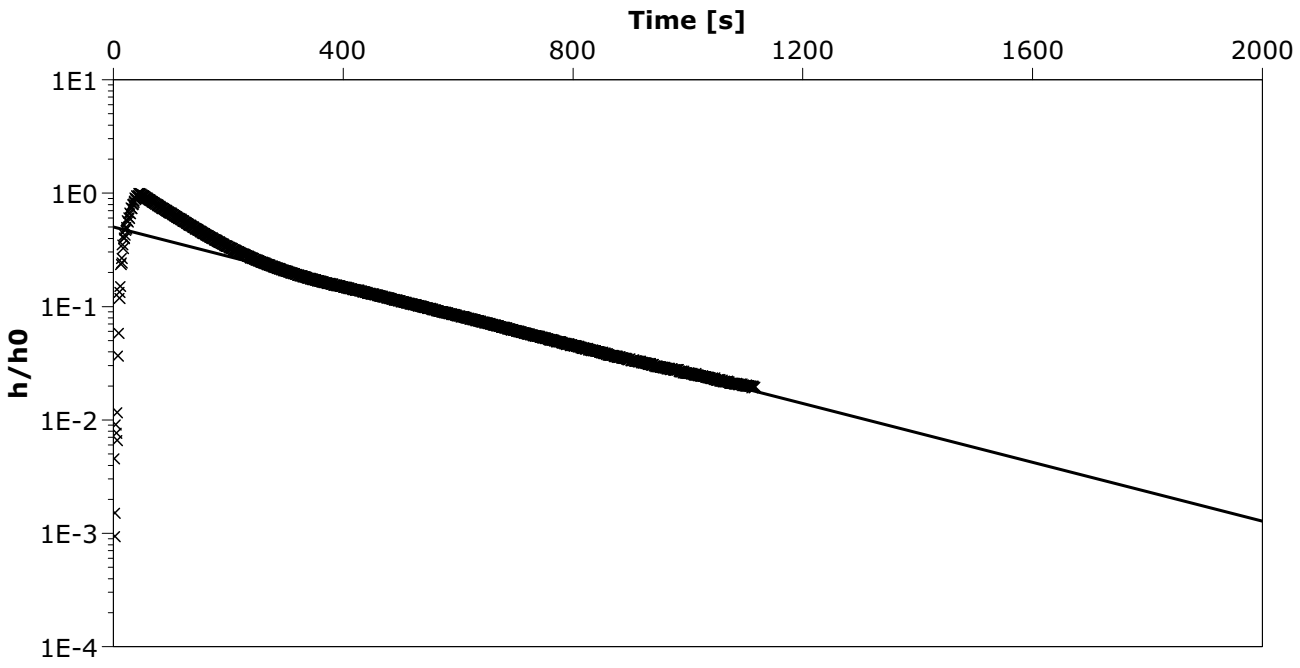


Calculation after Bouwer && Rice

Observation well	K [m/d]	
RSF21	3.61×10^{-3}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF24	Test Well: RSF24
Test conducted by: A Wilson		Test date: 30/08/2007
Analysis performed by: S Denner	Hvorslev LT	Date: 13/09/2007
Aquifer Thickness: 12.50 m		

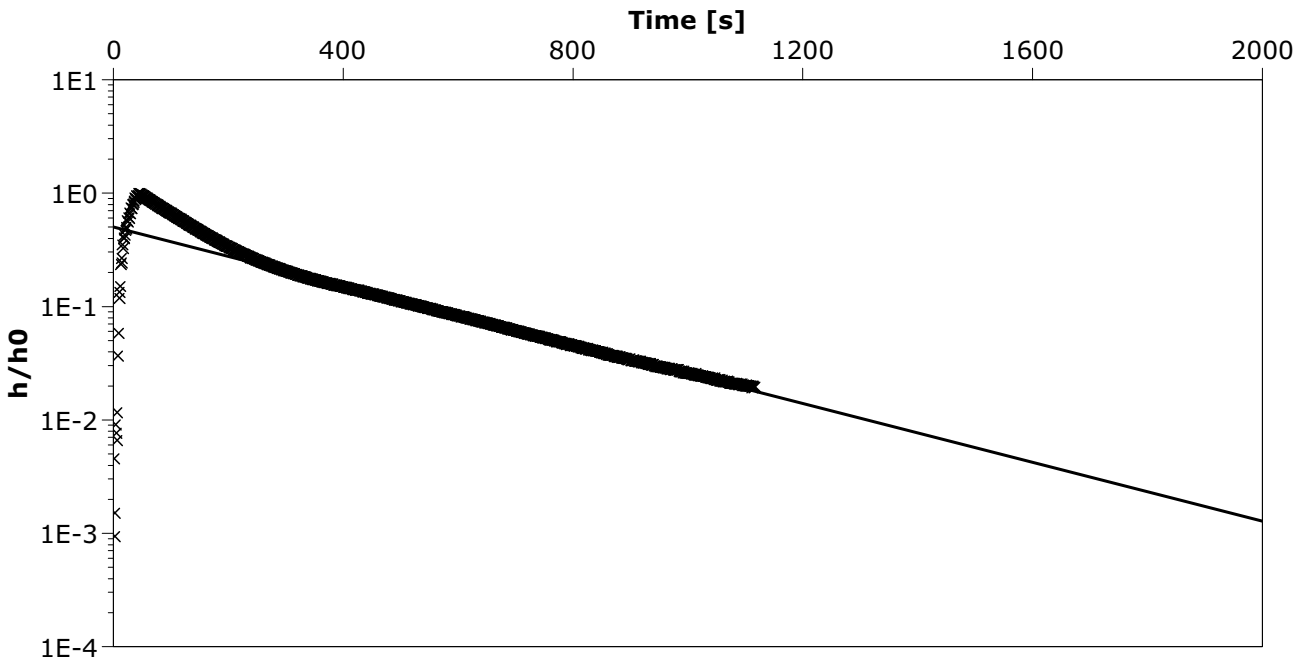


Calculation after Hvorslev

Observation well	K [m/d]	
RSF24	4.37×10^{-2}	

URS Australia Pty Ltd Level 14 240 Queen Street Brisbane QLD 4000	**Slug Test Analysis Report**
	Project: GPN EIS
	Number: 42625791
	Client: Gladstone Pacific Nickel

Location: Residue Storage Facility	Slug Test: RSF24	Test Well: RSF24
Test conducted by: A Wilson		Test date: 30/08/2007
Analysis performed by: S Denner	Bouwer & Rice LT	Date: 13/09/2007
Aquifer Thickness: 12.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
RSF24	3.31×10^{-2}	

Appendix E Groundwater Laboratory Analytical Results

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: **GLADSTONE PACIFIC NICKEL**

ADDRESS / OFFICE:

PROJECT MANAGER (PM): **Dr Tim Ezzy**

PROJECT ID: 42625833

SITE: **GPN Plant/RSF sites** P.O. NO.: 16031

RESULTS REQUIRED (**Date**): ASAP QUOTE NO.:

SAMPLER: TRE

MOBILE: 0437 800 643

PHONE 07 3243 2124

EMAIL REPORT TO: tim_ezzy@urscorp.com (underscore between tim and ezzy)

EMAIL INVOICE TO: (if different to report)

Austra[redacted]rices Pty Ltd

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	13 metals (NEPM SUITE) - W3	Cations: Major (Ca, Mg, Na, K)	Anions: Major (Cl, SO4, alkalin	TPH(C6-C36)/BTEX - W-4	Notes: e.g. Highly contaminated samples e.g. "High PAHs expected". Extra volume for QC or trace LORs etc.
1	RSF9	Water	5/5/06			3	X	X	X		
2	RSF1	"	6/5/06			3	X	X	X		
3	Y1	"	6/5/06			6	X	X	X	X	Cond. 15 mS/cm
4	Y2	"	6/5/06			6	X	X	X	X	Cond 16 mS/cm
5	Y3	"	6/5/06			3	X	X	X		Cond 14 mS/cm
6	Y4	"	6/5/06			3	X	X	X		
7	Y5	"	6/5/06			6	X	X	X	X	Cond 16 mS/cm
8	Rinsate	"	6/5/06			5	X	X	X	X	
9	~~Field~~ Trip Blank	"	6/5/06			2				X	

ALS Environmental
Brisbane
Work Order
EB0604401

Report Version: WOLabel 1.01

Telephone : 61-7-32437222

RELINQUISHED BY:

Name: Tim Ezzy	Date: 8/5/06	Name: Gle Arthurs	Date: 8/5/06
Of: URS	Time: 9:55	Of: ALS	Time: 0955
Name:	Date:	Name:	Date:
Of:	Time:	Of:	Time:

RECEIVED BY

METHOD OF SHIPMENT

Con' Note No:

Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

AUSTRALIAN LABORATORY SERVICES P/L

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: **URS AUSTRALIA PTY LTD (QLD)**	*Laboratory*	: **ALS Environmental Brisbane**	*Page*	: **1 of 7**
Contact	: **MR TIM EZZY**	*Contact*	: **Michael Heery**	*Work Order*	: **EB0604401**
Address	: **GPO BOX 302 BRISBANE QLD AUSTRALIA 4001**	*Address*	: **32 Shand Street Stafford QLD Australia 4053**		
E-mail	: **tim_ezzy@urscorp.com**	*E-mail*	: **Michael.Heery@alsenviro.com**		
Telephone	: **07 3243 2111**	*Telephone*	: **61-7-32437222**		
Facsimile	: **07 3243 2199**	*Facsimile*	: **61-7-32437259**		
Project	: **42625833**	*Quote number*	: **EN/001/05**	*Date received*	: **8 May 2006**
Order number	: **16031**			*Date issued*	: **18 May 2006**
C-O-C number	: **- Not provided -**			*No. of samples*	- *Received* : **9**
Site	: **GPN Plant/RSF sites**				*Analysed* : **9**

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	*Position*	*Department*
Carsten Emrich	**Senior Organic Chemist**	**Organics - NATA 825 (818 - Brisbane)**
Stephen Hislop	**Laboratory Diagnostician**	**Inorganics - NATA 825 (818 - Brisbane)**

ALS Environmental

Comments

This report for the ALSE reference EB0604401 supersedes any previous reports with this reference. Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- **Analytical results for samples submitted**

When moisture determination has been performed, results are reported on a dry weight basis. When a reported 'less than' result is higher than the LOR, this may be due to primary sample extracts/digestion dilution and/or insuffient sample amount for analysis. Surrogate Recovery Limits are static and based on USEPA SW846 or ALS-QWI/EN38 (in the absence of specified USEPA limits). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **Surrogate control limits**

The analytical procedures used by ALS Environmental are based on established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house procedure are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported herein. Reference methods from which ALSE methods are based are provided in parenthesis.

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: RSF9	RSF1	Y1	Y2	Y3
Sample Matrix Type / Description:				LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Sample Date / Time:				5 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00
Laboratory Sample ID:				EB0604401-001	EB0604401-002	EB0604401-003	EB0604401-004	EB0604401-005
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	543	787	234	225	115
Total Alkalinity as CaCO3		1	mg/L	543	787	234	225	115
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	27	150	473	534	272
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	171	226	5230	5230	4470
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	79	32	266	344	506
Magnesium	7439-95-4	1	mg/L	47	51	438	382	348
Sodium	7440-23-5	1	mg/L	165	394	2310	2450	1800
Potassium	7440-09-7	1	mg/L	4	10	60	20	18
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	0.257	0.155	0.032	0.290	0.244
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.0003	0.0002	0.0002
Chromium	7440-47-3	0.001	mg/L	<0.001	0.021	<0.001	0.052	0.068
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.012	0.087	0.050
Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.003	0.007	0.002
Lead	7439-92-1	0.001	mg/L	0.298	0.079	0.108	0.004	0.149
Manganese	7439-96-5	0.001	mg/L	0.055	0.022	1.92	1.21	1.45
Nickel	7440-02-0	0.001	mg/L	<0.001	0.004	0.006	0.024	0.021
Vanadium	7440-62-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc	7440-66-6	0.005	mg/L	0.234	0.047	0.080	0.056	0.125
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	0.0002	0.0001	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance								
Total Anions		0.01	meq/L	16.2	25.2	162	163	134
Total Cations		0.01	meq/L	15.1	23.2	151	156	133
Ionic Balance		0.01	%	3.77	4.30	3.43	2.31	0.40
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction		20	µg/L	----	----	<20	<20	----
C10 - C14 Fraction		50	µg/L	----	----	<50	<50	----
C15 - C28 Fraction		100	µg/L	----	----	200	<100	----
C29 - C36 Fraction		50	µg/L	----	----	<50	<50	----

ALS Environmental

Analytical Results

	Client Sample ID :	RSF9	RSF1	Y1	Y2	Y3
	Sample Matrix Type / Description :	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
	Sample Date / Time :	5 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00
	Laboratory Sample ID :	EB0604401-001	EB0604401-002	EB0604401-003	EB0604401-004	EB0604401-005

Analyte	CAS number	LOR	Units					
EP080: BTEX								
Benzene	71-43-2	1	µg/L	----	----	<1	<1	----
Toluene	108-88-3	2	µg/L	----	----	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	----	----	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	----	----	<2	<2	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	----	----	100	95.6	----
Toluene-D8	2037-26-5	0.1	%	----	----	94.0	93.8	----
4-Bromofluorobenzene	460-00-4	0.1	%	----	----	91.6	93.5	----

ALS Environmental

Analytical Results

				Client Sample ID :	Y4	Y5	Rinsate	Trip Blank	
				Sample Matrix Type / Description :	LIQUID	LIQUID	LIQUID	LIQUID	
				Sample Date / Time :	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	
				Laboratory Sample ID :	EB0604401-006	EB0604401-007	EB0604401-008	EB0604401-009	
Analyte	*CAS number*	*LOR*	*Units*						
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		41	241	5	----	
Total Alkalinity as CaCO3		1	mg/L		41	241	5	----	
ED040F: Dissolved Major Anions									
Sulphate as SO4 2-	14808-79-8	1	mg/L		18	532	<1	----	
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		197	5130	5	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		8	362	<1	----	
Magnesium	7439-95-4	1	mg/L		13	375	<1	----	
Sodium	7440-23-5	1	mg/L		128	2540	2	----	
Potassium	7440-09-7	1	mg/L		<1	23	<1	----	
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	
Barium	7440-39-3	0.001	mg/L		0.036	0.338	<0.001	----	
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	0.0002	<0.0001	----	
Chromium	7440-47-3	0.001	mg/L		<0.001	0.056	<0.001	----	
Cobalt	7440-48-4	0.001	mg/L		0.003	0.085	<0.001	----	
Copper	7440-50-8	0.001	mg/L		0.001	0.007	<0.001	----	
Lead	7439-92-1	0.001	mg/L		0.021	0.003	<0.001	----	
Manganese	7439-96-5	0.001	mg/L		0.110	1.20	<0.001	----	
Nickel	7440-02-0	0.001	mg/L		<0.001	0.023	<0.001	----	
Vanadium	7440-62-2	0.05	mg/L		<0.05	<0.05	<0.05	----	
Zinc	7440-66-6	0.005	mg/L		0.060	0.027	<0.005	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	
EN055: Ionic Balance									
Total Anions		0.01	meq/L		6.97	161	0.24	----	
Total Cations		0.01	meq/L		7.07	160	0.08	----	
Ionic Balance		0.01	%		0.56	0.23	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction		20	µg/L		----	<20	<20	<20	
C10 - C14 Fraction		50	µg/L		----	<50	<50	----	
C15 - C28 Fraction		100	µg/L		----	<100	<100	----	
C29 - C36 Fraction		50	µg/L		----	<50	<50	----	

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Analytical Results

	Client Sample ID :	Y4	Y5	Rinsate	Trip Blank	
	Sample Matrix Type / Description :	LIQUID	LIQUID	LIQUID	LIQUID	
	Sample Date / Time :	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	6 May 2006 15:00	
	Laboratory Sample ID :	EB0604401-006	EB0604401-007	EB0604401-008	EB0604401-009	
Analyte	CAS number / LOR / Units					
EP080: BTEX						
Benzene	71-43-2 / 1 / µg/L	----	<1	<1	<1	
Toluene	108-88-3 / 2 / µg/L	----	<2	<2	<2	
Ethylbenzene	100-41-4 / 2 / µg/L	----	<2	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3 / 2 / µg/L	----	<2	<2	<2	
ortho-Xylene	95-47-6 / 2 / µg/L	----	<2	<2	<2	
EP080S: TPH(V)/BTEX Surrogates						
1.2-Dichloroethane-D4	17060-07-0 / 0.1 / %	----	93.7	89.0	102	
Toluene-D8	2037-26-5 / 0.1 / %	----	91.8	90.3	95.2	
4-Bromofluorobenzene	460-00-4 / 0.1 / %	----	91.2	89.2	96.7	

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Surrogate Control Limits

Matrix Type: WATER - Surrogate Control Limits ***Surrogate Control Limits***

Method name	*Analyte name*	*Lower Limit*	*Upper Limit*
EP080: TPH Volatiles/BTEX			
EP080S: TPH(V)/BTEX Surrogates	1,2-Dichloroethane-D4	80	120
	Toluene-D8	88	110
	4-Bromofluorobenzene	86	115

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**URS AUSTRALIA PTY LTD (QLD)**	**Laboratory**	:	ALS Environmental Brisbane	**Page**	: **1 of 11**
Contact	:	MR TIM EZZY	**Contact**	:	Michael Heery		
Address	:	GPO BOX 302 BRISBANE QLD AUSTRALIA 4001	**Address**	:	32 Shand Street Stafford QLD Australia 4053	**Work order**	: **EB0604401**
						Amendment No.	:
Project	:	42625833	**Quote number**	:	EN/001/05	**Date received**	: 7 May 2006
Order number	:	16031				**Date issued**	: 18 May 2006
C-O-C number	:	- Not provided -					
Site	:	GPN Plant/RSF sites					
E-mail	:	tim_ezzy@urscorp.com	**E-mail**	:	Michael.Heery@alsenviro.com	**No. of samples**	
Telephone	:	07 3243 2111	**Telephone**	:	61-7-32437222	**Received**	: 9
Facsimile	:	07 3243 2199	**Facsimile**	:	61-7-32437259	**Analysed**	: 9

This final report for the ALSE work order reference EB0604401 supersedes any previous reports with this reference.

Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- Laboratory Duplicates (DUP); Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Samples (LCS); Recovery and Acceptance Limits
- Matrix Spikes (MS); Recovery and Acceptance Limits

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Accredited for compliance with ISO/IED 17025

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Department
Carsten Emrich	Organics - NATA 825 (818 - Brisbane)
Stephen Hislop	Inorganics - NATA 825 (818 - Brisbane)

Quality Control Report - Laboratory Duplicates (DUP)

The quality control term **Laboratory Duplicate** refers to an intralaboratory split sample randomly selected from the sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity.
- Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. *Abbreviations:* ***LOR*** = *Limit of Reporting,* ***RPD*** = *Relative Percent Difference.*
* Indicates failed QC. The permitted ranges for the RPD of Laboratory Duplicates (relative percent deviation) are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting:- Result < 10 times LOR, no limit - Result between 10 and 20 times LOR, 0% - 50% - Result > 20 times LOR, 0% - 20%

Matrix Type: WATER ***Laboratory Duplicates (DUP) Report***

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
ED037P: Alkalinity by PC Titrator						
ED037P: Alkalinity by PC Titrator - (QC Lot: 213363)				**mg/L**	**mg/L**	**%**
EB0604332-001	Anonymous	Hydroxide Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Carbonate Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Bicarbonate Alkalinity as CaCO3	1 mg/L	10	8	22.2
		Total Alkalinity as CaCO3	1 mg/L	10	8	22.2
EB0604401-006	Y4	Hydroxide Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Carbonate Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Bicarbonate Alkalinity as CaCO3	1 mg/L	41	42	2.4
		Total Alkalinity as CaCO3	1 mg/L	41	42	2.4
ED040F: Dissolved Major Anions						
ED040F: Dissolved Major Anions - (QC Lot: 210874)				**mg/L**	**mg/L**	**%**
EB0604287-021	Anonymous	Sulphate as SO4 2-	1 mg/L	755	771	2.0
EB0604305-003	Anonymous	Sulphate as SO4 2-	1 mg/L	5	5	0.0
ED040F: Dissolved Major Anions - (QC Lot: 210875)				**mg/L**	**mg/L**	**%**
EB0604401-003	Y1	Sulphate as SO4 2-	1 mg/L	473	488	3.3
EB0604477-001	Anonymous	Sulphate as SO4 2-	1 mg/L	135	133	1.3
ED045P: Chloride by PC Titrator						
ED045P: Chloride by PC Titrator - (QC Lot: 213368)				**mg/L**	**mg/L**	**%**
EB0604401-001	RSF9	Chloride	1 mg/L	171	171	0.0
ED093F: Dissolved Major Cations						
ED093F: Dissolved Major Cations - (QC Lot: 210873)				**mg/L**	**mg/L**	**%**
EB0604287-021	Anonymous	Calcium	1 mg/L	208	210	0.8
		Magnesium	1 mg/L	83	84	1.4
		Sodium	1 mg/L	187	188	0.0
		Potassium	1 mg/L	10	10	0.0
EB0604305-003	Anonymous	Calcium	1 mg/L	12	13	0.0

Matrix Type: WATER

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
ED093F: Dissolved Major Cations - continued						
ED093F: Dissolved Major Cations - (QC Lot: 210873) - continued				mg/L	mg/L	%
EB0604305-003	Anonymous	Magnesium	1 mg/L	7	8	0.0
		Sodium	1 mg/L	57	59	3.6
		Potassium	1 mg/L	3	3	0.0
ED093F: Dissolved Major Cations - (QC Lot: 210876)				mg/L	mg/L	%
EB0604401-003	Y1	Calcium	1 mg/L	266	270	1.4
		Magnesium	1 mg/L	438	446	1.8
		Sodium	1 mg/L	2310	2360	2.2
		Potassium	1 mg/L	60	60	0.0
EB0604477-001	Anonymous	Calcium	1 mg/L	308	310	0.4
		Magnesium	1 mg/L	1040	1040	0.6
		Sodium	1 mg/L	3440	3400	1.2
		Potassium	1 mg/L	4	3	0.0
EG020F: Dissolved Metals by ICP-MS						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 210882)				mg/L	mg/L	%
EB0604287-022	Anonymous	Arsenic	0.001 mg/L	0.002	0.002	0.0
		Beryllium	0.001 mg/L	<0.001	<0.001	0.0
		Barium	0.001 mg/L	0.046	0.044	4.5
		Cadmium	0.0001 mg/L	0.0009	0.0005	47.6
		Chromium	0.001 mg/L	<0.001	<0.001	0.0
		Cobalt	0.001 mg/L	0.112	0.110	2.2
		Copper	0.001 mg/L	0.116	0.115	0.0
		Lead	0.001 mg/L	<0.001	<0.001	0.0
		Manganese	0.001 mg/L	3.87	3.80	1.9
		Nickel	0.001 mg/L	0.008	0.007	0.0
		Vanadium	0.01 mg/L	<0.01	<0.01	0.0
		Zinc	0.005 mg/L	0.012	0.011	8.8
EB0604312-004	Anonymous	Arsenic	0.001 mg/L	0.007	0.006	0.0
		Beryllium	0.001 mg/L	<0.001	<0.001	0.0
		Barium	0.001 mg/L	0.126	0.125	0.0

Matrix Type: WATER

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EG020F: Dissolved Metals by ICP-MS - continued						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 210882) - continued				mg/L	mg/L	%
EB0604312-004	Anonymous	Cadmium	0.0001 mg/L	<0.0001	<0.0001	0.0
		Chromium	0.001 mg/L	0.032	0.031	0.0
		Cobalt	0.001 mg/L	<0.001	<0.001	0.0
		Copper	0.001 mg/L	0.006	0.005	0.0
		Lead	0.001 mg/L	<0.001	<0.001	0.0
		Manganese	0.001 mg/L	0.002	0.001	0.0
		Nickel	0.001 mg/L	0.001	0.001	0.0
		Vanadium	0.01 mg/L	<0.01	<0.01	0.0
		Zinc	0.005 mg/L	0.007	<0.005	35.5
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 211396)				mg/L	mg/L	%
EB0604105-051	Anonymous	Arsenic	0.001 mg/L	<0.001	<0.001	0.0
		Beryllium	0.001 mg/L	<0.001	<0.001	0.0
		Barium	0.001 mg/L	<0.001	<0.001	0.0
		Cadmium	0.0001 mg/L	0.0001	<0.0001	0.0
		Chromium	0.001 mg/L	<0.001	<0.001	0.0
		Cobalt	0.001 mg/L	<0.001	<0.001	0.0
		Copper	0.001 mg/L	0.003	0.002	0.0
		Lead	0.001 mg/L	<0.001	<0.001	0.0
		Manganese	0.001 mg/L	<0.001	<0.001	0.0
		Nickel	0.001 mg/L	<0.001	<0.001	0.0
		Vanadium	0.01 mg/L	<0.01	<0.01	0.0
		Zinc	0.005 mg/L	<0.005	<0.005	0.0
EB0604401-007	Y5	Arsenic	0.001 mg/L	<0.001	0.002	85.1
		Beryllium	0.001 mg/L	<0.001	<0.001	0.0
		Barium	0.001 mg/L	0.338	0.345	1.9
		Cadmium	0.0001 mg/L	0.0002	0.0002	0.0
		Chromium	0.001 mg/L	0.056	0.060	7.1
		Cobalt	0.001 mg/L	0.085	0.089	4.3
		Copper	0.001 mg/L	0.007	0.007	0.0

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Matrix Type: WATER

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EG020F: Dissolved Metals by ICP-MS - continued						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 211396) - continued				mg/L	mg/L	%
EB0604401-007	Y5	Lead	0.001 mg/L	0.003	0.003	0.0
		Manganese	0.001 mg/L	1.20	1.24	3.7
		Nickel	0.001 mg/L	0.023	0.023	0.0
		Vanadium	0.05 mg/L	<0.05	<0.05	0.0
		Zinc	0.005 mg/L	0.027	0.029	8.1
EG035F: Dissolved Mercury by FIMS						
EG035F: Dissolved Mercury by FIMS - (QC Lot: 211699)				mg/L	mg/L	%
EB0604309-002	Anonymous	Mercury	0.0001 mg/L	0.0003	0.0003	0.0
EB0604376-003	Anonymous	Mercury	0.0001 mg/L	<0.0001	<0.0001	0.0
EG035F: Dissolved Mercury by FIMS - (QC Lot: 211700)				mg/L	mg/L	%
EB0604401-003	Y1	Mercury	0.0001 mg/L	<0.0001	<0.0001	0.0
EB0604430-023	Anonymous	Mercury	0.0001 mg/L	<0.0001	<0.0001	0.0
EP080/071: Total Petroleum Hydrocarbons						
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 212808)				µg/L	µg/L	%
EB0604313-001	Anonymous	C6 - C9 Fraction	20 µg/L	<20	<20	0.0
EB0604401-009	Trip Blank	C6 - C9 Fraction	20 µg/L	<20	<20	0.0
EP080: BTEX						
EP080: BTEX - (QC Lot: 212808)				µg/L	µg/L	%
EB0604313-001	Anonymous	Benzene	1 µg/L	<1	<1	0.0
		Toluene	2 µg/L	<2	<2	0.0
		Ethylbenzene	2 µg/L	<2	<2	0.0
		meta- & para-Xylene	2 µg/L	<2	<2	0.0
		ortho-Xylene	2 µg/L	<2	<2	0.0
EB0604401-009	Trip Blank	Benzene	1 µg/L	<1	<1	0.0
		Toluene	2 µg/L	<2	<2	0.0
		Ethylbenzene	2 µg/L	<2	<2	0.0
		meta- & para-Xylene	2 µg/L	<2	<2	0.0
		ortho-Xylene	2 µg/L	<2	<2	0.0

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Quality Control Report - Method Blank (MB) and Laboratory Control Samples (LCS)

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

Matrix Type: WATER

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
ED037P: Alkalinity by PC Titrator						
ED037P: Alkalinity by PC Titrator - (QC Lot: 213363)		mg/L	mg/L	%	%	%
Total Alkalinity as CaCO3	1 mg/L	----	200	100	70	130
ED040F: Dissolved Major Anions						
ED040F: Dissolved Major Anions - (QC Lot: 210874)		mg/L	mg/L	%	%	%
Sulphate as SO4 2-	1 mg/L	<1	1	----	----	----
ED040F: Dissolved Major Anions - (QC Lot: 210875)		mg/L	mg/L	%	%	%
Sulphate as SO4 2-	1 mg/L	<1	1	----	----	----
ED045P: Chloride by PC Titrator						
ED045P: Chloride by PC Titrator - (QC Lot: 213368)		mg/L	mg/L	%	%	%
Chloride	1 mg/L	----	1000	96.0	70	130
	1 mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations						
ED093F: Dissolved Major Cations - (QC Lot: 210873)		mg/L	mg/L	%	%	%
Calcium	1 mg/L	<1	----	----	----	----
Magnesium	1 mg/L	<1	----	----	----	----
Potassium	1 mg/L	<1	----	----	----	----
Sodium	1 mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations - (QC Lot: 210876)		mg/L	mg/L	%	%	%
Calcium	1 mg/L	<1	----	----	----	----
Magnesium	1 mg/L	<1	----	----	----	----
Potassium	1 mg/L	<1	----	----	----	----
Sodium	1 mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 210882)		mg/L	mg/L	%	%	%

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Matrix Type: WATER

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

Analyte name	LOR	Method blank result	Actual Results: Spike concentration	Actual Results: Spike Recovery LCS	Recovery Limits: Dynamic Recovery Limits Low	Recovery Limits: Dynamic Recovery Limits High
EG020F: Dissolved Metals by ICP-MS - continued						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 210882) - continued		mg/L	mg/L	%	%	%
Arsenic	0.001 mg/L	----	0.1000	98.5	70	130
	0.001 mg/L	<0.001	----	----	----	----
Barium	0.001 mg/L	<0.001	----	----	----	----
Beryllium	0.001 mg/L	----	0.010	95.3	70	130
	0.001 mg/L	<0.001	----	----	----	----
Cadmium	0.0001 mg/L	----	0.1000	96.1	70	130
	0.0001 mg/L	<0.0001	----	----	----	----
Chromium	0.001 mg/L	----	0.1000	95.9	70	130
	0.001 mg/L	<0.001	----	----	----	----
Cobalt	0.001 mg/L	----	0.1000	94.4	70	130
	0.001 mg/L	<0.001	----	----	----	----
Copper	0.001 mg/L	----	0.1000	100	70	130
	0.001 mg/L	<0.001	----	----	----	----
Lead	0.001 mg/L	----	0.1000	104	70	130
	0.001 mg/L	<0.001	----	----	----	----
Manganese	0.001 mg/L	----	0.1000	92.7	70	130
	0.001 mg/L	<0.001	----	----	----	----
Nickel	0.001 mg/L	----	0.1000	97.3	70	130
	0.001 mg/L	<0.001	----	----	----	----
Vanadium	0.01 mg/L	----	0.1000	99.0	70	130
	0.01 mg/L	<0.01	----	----	----	----
Zinc	0.005 mg/L	----	0.1000	108	70	130
	0.005 mg/L	<0.005	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 211396)		mg/L	mg/L	%	%	%
Arsenic	0.001 mg/L	----	0.1000	100	70	130
	0.001 mg/L	<0.001	----	----	----	----
Barium	0.001 mg/L	<0.001	----	----	----	----
Beryllium	0.001 mg/L	----	0.010	90.9	70	130
	0.001 mg/L	<0.001	----	----	----	----

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Matrix Type: WATER

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

Analyte name	LOR	Method blank result	Actual Results: Spike concentration	Actual Results: Spike Recovery LCS	Recovery Limits: Dynamic Recovery Limits Low	Recovery Limits: Dynamic Recovery Limits High
EG020F: Dissolved Metals by ICP-MS - continued						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 211396) - continued		mg/L	mg/L	%	%	%
Cadmium	0.0001 mg/L	----	0.1000	97.4	70	130
	0.0001 mg/L	<0.0001	----	----	----	----
Chromium	0.001 mg/L	----	0.1000	95.1	70	130
	0.001 mg/L	<0.001	----	----	----	----
Cobalt	0.001 mg/L	----	0.1000	98.0	70	130
	0.001 mg/L	<0.001	----	----	----	----
Copper	0.001 mg/L	----	0.1000	99.9	70	130
	0.001 mg/L	<0.001	----	----	----	----
Lead	0.001 mg/L	----	0.1000	103	70	130
	0.001 mg/L	<0.001	----	----	----	----
Manganese	0.001 mg/L	----	0.1000	97.8	70	130
	0.001 mg/L	<0.001	----	----	----	----
Nickel	0.001 mg/L	----	0.1000	98.6	70	130
	0.001 mg/L	<0.001	----	----	----	----
Vanadium	0.01 mg/L	----	0.1000	94.6	70	130
	0.01 mg/L	<0.01	----	----	----	----
Zinc	0.005 mg/L	----	0.1000	109	70	130
	0.005 mg/L	<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS						
EG035F: Dissolved Mercury by FIMS - (QC Lot: 211699)		mg/L	mg/L	%	%	%
Mercury	0.0001 mg/L	----	0.010	84.3	70	130
	0.0001 mg/L	<0.0001	----	----	----	----
EG035F: Dissolved Mercury by FIMS - (QC Lot: 211700)		mg/L	mg/L	%	%	%
Mercury	0.0001 mg/L	----	0.010	78.4	70	130
	0.0001 mg/L	<0.0001	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons						
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 211122)		µg/L	µg/L	%	%	%
C10 - C14 Fraction	50 µg/L	----	524	64.4	64	112
	50 µg/L	<50		----		

Matrix Type: WATER

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

Analyte name	*LOR*	*Method blank result*	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
				LCS	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons - continued						
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 211122) - continued		µg/L	µg/L	%	%	%
C15 - C28 Fraction	100 µg/L	----	840	71.3	66	130
	100 µg/L	<100		----	----	----
C29 - C36 Fraction	50 µg/L	<50		----	----	----
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 212808)		µg/L	µg/L	%	%	%
C6 - C9 Fraction	20 µg/L	----	260	102	72	123
	20 µg/L	<20	----	----	----	----
EP080: BTEX						
EP080: BTEX - (QC Lot: 212808)		µg/L	µg/L	%	%	%
Benzene	1 µg/L	----	10	95.2	68	125
	1 µg/L	<1	----	----	----	----
Ethylbenzene	2 µg/L	----	10	99.9	72	120
	2 µg/L	<2	----	----	----	----
meta- & para-Xylene	2 µg/L	----	10	102	69	121
	2 µg/L	<2	----	----	----	----
ortho-Xylene	2 µg/L	----	10	98.4	74	117
	2 µg/L	<2	----	----	----	----
Toluene	2 µg/L	----	10	102	72	119
	2 µg/L	<2	----	----	----	----

Quality Control Report - Matrix Spikes (MS)

The quality control term **Matrix Spike (MS)** refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC type is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQO's). 'Ideal' recovery ranges stated may be waived in the event of sample matrix interferences. - Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. *Abbreviations:* ***LOR*** *= Limit of Reporting,* ***RPD*** *= Relative Percent Difference.*

* Indicates failed QC

Matrix Type: WATER

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
ED045P: Chloride by PC Titrator								
ED045P: Chloride by PC Titrator - (QC Lot: 213368)				mg/L	mg/L	%	%	%
Chloride	EB0604401-002	RSF1	1 mg/L	100	226	104	70	130
EG020F: Dissolved Metals by ICP-MS								
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 210882)				mg/L	mg/L	%	%	%
Arsenic	EB0604287-023	Anonymous	0.001 mg/L	0.100	0.015	125	70	130
Barium			0.001 mg/L	0.100	0.044	121	70	130
Cadmium			0.0001 mg/L	0.100	0.0002	120	70	130
Chromium			0.001 mg/L	0.100	<0.001	123	70	130
Cobalt			0.001 mg/L	0.100	0.557	* Not Determined	70	130
Copper			0.001 mg/L	0.100	0.113	123	70	130
Lead			0.001 mg/L	0.100	<0.001	122	70	130
Manganese			0.001 mg/L	0.100	0.170	119	70	130
Nickel			0.001 mg/L	0.100	0.002	127	70	130
Zinc			0.005 mg/L	0.100	0.105	129	70	130
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 211396)				mg/L	mg/L	%	%	%
Arsenic	EB0604105-052	Anonymous	0.001 mg/L	0.100	<0.001	98.3	70	130
Beryllium			0.001 mg/L	0.100	<0.001	93.5	70	130
Barium			0.001 mg/L	0.100	<0.001	94.5	70	130
Cadmium			0.0001 mg/L	0.100	<0.0001	101	70	130
Chromium			0.001 mg/L	0.100	<0.001	96.9	70	130
Cobalt			0.001 mg/L	0.100	<0.001	105	70	130
Copper			0.001 mg/L	0.100	0.002	103	70	130
Lead			0.001 mg/L	0.100	<0.001	105	70	130
Manganese			0.001 mg/L	0.100	<0.001	102	70	130
Nickel			0.001 mg/L	0.100	<0.001	102	70	130
Vanadium			0.01 mg/L	0.100	<0.01	97.3	70	130

ALS Environmental

Matrix Type: WATER

Matrix Spike (MS) Report

					Actual Results		Recovery Limits	
					Sample Result	Spike Recovery	Static Limits	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS - continued								
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 211396) - continued				mg/L	mg/L	%	%	%
Zinc	EB0604105-052	Anonymous	0.005 mg/L	0.100	<0.005	106	70	130
EG035F: Dissolved Mercury by FIMS								
EG035F: Dissolved Mercury by FIMS - (QC Lot: 211699)				mg/L	mg/L	%	%	%
Mercury	EB0604309-002	Anonymous	0.0001 mg/L	0.01	0.0003	80.0	70	130
EG035F: Dissolved Mercury by FIMS - (QC Lot: 211700)				mg/L	mg/L	%	%	%
Mercury	EB0604401-003	Y1	0.0001 mg/L	0.01	<0.0001	76.4	70	130
EP080/071: Total Petroleum Hydrocarbons								
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 212808)				µg/L	µg/L	%	%	%
C6 - C9 Fraction	EB0604313-003	Anonymous	20 µg/L	140	<20	101	70	130
EP080: BTEX								
EP080: BTEX - (QC Lot: 212808)				µg/L	µg/L	%	%	%
Benzene	EB0604313-003	Anonymous	1 µg/L	10	<1	99.8	70	130
Toluene			2 µg/L	10	<2	99.3	70	130

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: **GLADSTONE PACIFIC NICKEL**	SAMPLER: AW
ADDRESS / OFFICE:	MOBILE: 0448 853 004
PROJECT MANAGER (PM): SD	PHONE 07 3243 2146
PROJECT ID: 42625791	EMAIL REPORT TO: stephen_denner@urscorp.co (underscore between stephen and denner)
SITE: P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (**Date**): QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

Australian Laboratory Services Pty Ltd

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: (Yes) No N/A
SAMPLE TEMPERATURE
CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		13 metals (NEPM SUITE) - W3	Cations: Major (Ca, Mg, Na, K)	Anions: Major (Cl, SO4, alkalinit	TDS	Lab pH and EC
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles					
1	RSF 19	Water	28/8		P	2	✓	✓	✓	✓	✓
2	QC01		28/8				✓	✓	✓	✓	✓
3	RSF 21		29/8				✓	✓	✓	✓	✓
4	RSF 13		29/8				✓	✓	✓	✓	✓
5	RSF 14		29/8				✓	✓	✓	✓	✓
6	RSF 10		29/8				✓	✓	✓	✓	✓
7	QC02		29/8				✓	✓	✓	✓	✓
8	QC03		29/8				✓	✓	✓	✓	✓
9	RSF 17		30/8				✓	✓	✓	✓	✓
10	RSF 24		30/8				✓	✓	✓	✓	✓
11	QC04		30/8				✓	✓	✓	✓	✓
12	RINSATE WATER	↓	29/8		↓	↓	✓	✓	✓	✓	✓

Environmental Division
Brisbane
Work Order
EB0709888

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ANDREW WILSON	Date: 31/8/07	Name: [signature]	Date: 3/9/07	Con' Note No: 350X0130
Of: URS	Time: 10:00	Of: ALS	Time: 1335	
Name:	Date:	Name:	Date:	Transport Co: TNT
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EB0709888**	Page	: 1 of 8
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42625791 GLADSTONE PACIFIC NICKEL	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-SEP-2007
Sampler	: AW	Issue Date	: 12-SEP-2007
Site	: ----		
		No. of samples received	: 12
Quote number	: EN/001/07	No. of samples analysed	: 12

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes.

Key : CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting
^ = Result(s) reported is calculated using analyte detections at or above the LOR. (eg. <5 + 5 + 7 = 12).

- **Ionic balances are within acceptable limits as detailed in the 20th Ed. APHA "Standard Methods for the Examination of Water and Wastewater".**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RSF 19	QC01	RSF 21	RSF 13	RSF 14
				Client sampling date / time: 28-AUG-2007 15:00	28-AUG-2007 15:00	29-AUG-2007 15:00	29-AUG-2007 15:00	29-AUG-2007 15:00
				EB0709888-001	EB0709888-002	EB0709888-003	EB0709888-004	EB0709888-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.71**	**6.81**	**7.49**	**7.59**	**7.72**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1550**	**7**	**4030**	**1290**	**1980**
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**896**	**7**	**2350**	**1240**	**1520**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**726**	**8**	**862**	**361**	**759**
Total Alkalinity as CaCO3	----	1	mg/L	**726**	**8**	**862**	**361**	**759**
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**122**	<1	**72**	**45**	**33**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**54**	**1**	**839**	**153**	**272**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**103**	<1	**133**	**59**	**102**
Magnesium	7439-95-4	1	mg/L	**65**	<1	**224**	**37**	**97**
Sodium	7440-23-5	1	mg/L	**180**	**1**	**373**	**152**	**236**
Potassium	7440-09-7	1	mg/L	**8**	<1	**11**	**4**	**12**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.002**	----	**0.002**	**0.002**	**0.002**
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	**0.042**	----	**0.131**	**0.103**	**0.070**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	<0.0001	**0.0002**	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	**0.002**	----	**0.003**	**0.005**	**0.002**
Copper	7440-50-8	0.001	mg/L	<0.001	----	**0.002**	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	**0.012**	----	**0.039**	<0.001	**0.021**
Manganese	7439-96-5	0.001	mg/L	**0.172**	----	**0.175**	**1.70**	**0.100**
Nickel	7440-02-0	0.001	mg/L	**0.010**	----	**0.012**	**0.003**	**0.010**
Vanadium	7440-62-2	0.01	mg/L	**0.02**	----	<0.01	<0.01	**0.02**
Zinc	7440-66-6	0.005	mg/L	**0.013**	----	**0.016**	**0.009**	**0.010**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	----	<0.001	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RSF 19	QC01	RSF 21	RSF 13	RSF 14
				Client sampling date / time: 28-AUG-2007 15:00	28-AUG-2007 15:00	29-AUG-2007 15:00	29-AUG-2007 15:00	29-AUG-2007 15:00
				EB0709888-001	EB0709888-002	EB0709888-003	EB0709888-004	EB0709888-005
EG020T: Total Metals by ICP-MS								
Barium	7440-39-3	0.001	mg/L	----	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	----	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	----	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	----	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	----	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	----	<0.001	----	----	----
Vanadium	7440-62-2	0.01	mg/L	----	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	----	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	<0.0001	<0.0001	<0.0001
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	<0.0001	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**18.6**	**0.18**	**42.4**	**12.4**	**23.5**
^ Total Cations	----	0.01	meq/L	**18.5**	**0.06**	**41.6**	**12.6**	**23.6**
^ Ionic Balance	----	0.01	%	**0.16**	----	**0.96**	**0.76**	**0.17**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RSF 10	QC02	QC03	RSF 17	RSF 24
				Client sampling date / time: 29-AUG-2007 15:00	29-AUG-2007 15:00	29-AUG-2007 15:00	30-AUG-2007 15:00	30-AUG-2007 15:00
				EB0709888-006	EB0709888-007	EB0709888-008	EB0709888-009	EB0709888-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.89**	**7.88**	**6.67**	**7.90**	**7.88**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1630**	**1550**	**5**	**3150**	**2380**
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**1110**	**1160**	**8**	**1920**	**1430**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**565**	**564**	**6**	**548**	**706**
Total Alkalinity as CaCO3	----	1	mg/L	**565**	**564**	**6**	**548**	**706**
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**19**	**19**	<1	**148**	**70**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**179**	**183**	**3**	**627**	**338**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**84**	**84**	<1	**86**	**71**
Magnesium	7439-95-4	1	mg/L	**40**	**40**	<1	**96**	**68**
Sodium	7440-23-5	1	mg/L	**216**	**216**	**1**	**432**	**352**
Potassium	7440-09-7	1	mg/L	**1**	**1**	<1	**13**	**8**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	**0.001**	**0.002**
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	**0.013**	**0.013**	----	**0.053**	**0.058**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	**0.0003**	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	**0.001**	**0.002**
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	**0.029**	**0.003**
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	**0.013**	**0.002**
Lead	7439-92-1	0.001	mg/L	**0.002**	**0.002**	----	**0.002**	**0.017**
Manganese	7439-96-5	0.001	mg/L	**0.091**	**0.098**	----	**0.213**	**0.092**
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.002**	----	**0.027**	**0.013**
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	**0.01**	<0.01
Zinc	7440-66-6	0.005	mg/L	**0.017**	**0.016**	----	**0.041**	**0.042**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	----	----	<0.001	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RSF 10	QC02	QC03	RSF 17	RSF 24
				Client sampling date / time: 29-AUG-2007 15:00	29-AUG-2007 15:00	29-AUG-2007 15:00	30-AUG-2007 15:00	30-AUG-2007 15:00
				EB0709888-006	EB0709888-007	EB0709888-008	EB0709888-009	EB0709888-010
EG020T: Total Metals by ICP-MS								
Barium	7440-39-3	0.001	mg/L	----	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L	----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	----	----	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	<0.001	----	----
Vanadium	7440-62-2	0.01	mg/L	----	----	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	<0.005	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	<0.0001	<0.0001
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	<0.0001	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**16.7**	**16.8**	**0.20**	**31.7**	**25.1**
^ Total Cations	----	0.01	meq/L	**16.9**	**16.9**	**0.06**	**31.4**	**24.7**
^ Ionic Balance	----	0.01	%	**0.50**	**0.24**	----	**0.58**	**0.89**

Analytical Results

Sub-Matrix: WATER			Client sample ID :	QC04	RINSATE WATER			
			Client sampling date / time :	30-AUG-2007 15:00	28-AUG-2007 15:00			
Compound	CAS Number	LOR	Unit	EB0709888-011	EB0709888-012			
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.34**	**6.50**			
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**7**	**6**			
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**6**	**6**			
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1			
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1			
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**6**	**6**			
Total Alkalinity as CaCO3	----	1	mg/L	**6**	**6**			
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	<1	<1			
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	<1	**1**			
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1			
Magnesium	7439-95-4	1	mg/L	<1	<1			
Sodium	7440-23-5	1	mg/L	**2**	**1**			
Potassium	7440-09-7	1	mg/L	<1	<1			
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001			
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001			
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001			
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001			
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001			
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001			
Copper	7440-50-8	0.001	mg/L	<0.001	**0.001**			
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001			
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001			
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001			
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01			
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005			
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001			

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC04	RINSATE WATER			
				Client sampling date / time: 30-AUG-2007 15:00	28-AUG-2007 15:00			
				EB0709888-011	EB0709888-012			
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**0.11**	**0.15**			
^ Total Cations	----	0.01	meq/L	**0.06**	**0.06**			

QUALITY CONTROL REPORT

Work Order	: **EB0709888**	Page	: 1 of 8
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42625791 GLADSTONE PACIFIC NICKEL	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 03-SEP-2007
Sampler	: AW	Issue Date	: 12-SEP-2007
Order number	: ----		
		No. of samples received	: 12
Quote number	: EN/001/07	No. of samples analysed	: 12

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 488286)									
EB0709888-001	RSF 19	EA005-P: pH Value	----	0.01	pH Unit	7.71	7.60	1.4	0% - 20%
EB0709888-010	RSF 24	EA005-P: pH Value	----	0.01	pH Unit	7.88	7.87	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 488285)									
EB0709888-001	RSF 19	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1550	1560	0.9	0% - 20%
EB0709888-010	RSF 24	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2380	2380	0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 485474)									
EB0709709-010	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	51900	53900	3.8	0% - 20%
EB0709827-021	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	252	280	10.5	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 485476)									
EB0709804-003	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	36000	34800	3.2	0% - 20%
EB0709847-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	256	296	14.5	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 486279)									
EB0709822-002	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	136000	134000	1.0	0% - 20%
EB0709888-011	QC04	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	76	72	5.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 488283)									
EB0709709-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	----
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	----
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	265	266	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	265	266	0.0	0% - 20%
EB0709888-001	RSF 19	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	----
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	----
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	726	719	1.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	726	719	1.0	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 487457)									
EB0709888-001	RSF 19	ED040F: Sulphate as SO4 2-	14808-79-8	1	mg/L	122	121	1.4	0% - 20%
EB0709888-010	RSF 24	ED040F: Sulphate as SO4 2-	14808-79-8	1	mg/L	70	70	0.0	0% - 20%
ED045P: Chloride by PC Titrator (QC Lot: 488284)									
EB0709709-005	Anonymous	ED045-P: Chloride	16887-00-6	1	mg/L	19200	19100	0.5	0% - 20%
EB0709888-005	RSF 14	ED045-P: Chloride	16887-00-6	1	mg/L	272	268	1.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 487458)									
EB0709888-001	RSF 19	ED093F: Calcium	7440-70-2	1	mg/L	103	102	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	65	65	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	180	180	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 487458) - continued									
EB0709888-010	RSF 24	ED093F: Calcium	7440-70-2	1	mg/L	71	71	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	68	69	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	352	358	1.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 487642)									
EB0709888-001	RSF 19	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.042	0.040	6.0	0% - 20%
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	----
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.012	0.012	0.0	0% - 50%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.172	0.168	2.1	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.010	0.010	0.0	0% - 50%
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	0.02	0.01	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	0.012	10.1	No Limit
EB0709918-032	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.022	0.021	5.8	0% - 20%
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	----
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.01	0.985	2.3	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.003	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	----
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.005	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 486424)									
EB0709885-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	0.0	----
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.004	0.006	28.7	No Limit
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0164	0.0168	2.1	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.058	0.066	14.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	----

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 486424) - continued									
EB0709885-001	Anonymous	EG020A-T: Vanadium	7440-62-2	0.01	mg/L	0.05	0.05	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	----
EB0709916-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.050	0.050	0.0	0% - 20%
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	----
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	----
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.108	0.107	1.2	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.012	0.013	0.0	0% - 50%
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	----
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.060	0.057	5.0	0% - 50%
EG035F: Dissolved Mercury by FIMS (QC Lot: 489442)									
EB0709882-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	----
EB0709950-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	----
EG035T: Total Mercury by FIMS (QC Lot: 484954)									
EB0709840-012	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.0001	<0.0001	0.0	----
EB0709900-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	----

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

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

Sub-Matrix: **WATER**

		Method Blank (MB) Report			Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 488286)								
EA005-P: pH Value	----	0.01	pH Unit	----	7 pH Unit	99.7	80.8	118
EA010P: Conductivity by PC Titrator (QCLot: 488285)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1413 µS/cm	100	87.8	110
EA015: Total Dissolved Solids (QCLot: 485474)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	2000 mg/L	94.8	88.2	107
EA015: Total Dissolved Solids (QCLot: 485476)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	2000 mg/L	94.0	88.2	107
EA015: Total Dissolved Solids (QCLot: 486279)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	2000 mg/L	98.0	88.2	107
ED037P: Alkalinity by PC Titrator (QCLot: 488283)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	99.8	74.2	117
ED040F: Dissolved Major Anions (QCLot: 487457)								
ED040F: Sulphate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED045P: Chloride by PC Titrator (QCLot: 488284)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	98.4	90	110
ED093F: Dissolved Major Cations (QCLot: 487458)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 487642)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1000 mg/L	96.5	72.6	121
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	98.0	72.6	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1000 mg/L	104	85	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1000 mg/L	92.8	81.8	128
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1000 mg/L	97.4	84.6	115
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	95.6	85.2	117
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1000 mg/L	99.6	86.7	112
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1000 mg/L	104	77.3	122
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1000 mg/L	93.7	84.4	116
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1000 mg/L	93.4	72.9	121
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	102	81.3	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
		LOR	Unit	Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 486424)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1000 mg/L	83.8	70	121
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	90.0	71.6	130
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1000 mg/L	92.4	82	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1000 mg/L	90.1	77.6	130
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1000 mg/L	91.7	81.1	119
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	93.4	83.1	119
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1000 mg/L	89.6	83.3	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1000 mg/L	111	71.2	127
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1000 mg/L	91.8	81.1	119
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1000 mg/L	90.4	70	124
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	92.5	80.1	126
EG035F: Dissolved Mercury by FIMS (QCLot: 489442)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	100	70	130
EG035T: Total Mercury by FIMS (QCLot: 484954)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0100 mg/L	101	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045P: Chloride by PC Titrator (QCLot: 488284)							
EB0709709-006	Anonymous	ED045-P: Chloride	16887-00-6	4000 mg/L	94.0	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 487642)							
EB0709888-003	RSF 21	EG020A-F: Arsenic	7440-38-2	0.100 mg/L	106	70	130
		EG020A-F: Beryllium	7440-41-7	0.100 mg/L	109	70	130
		EG020A-F: Barium	7440-39-3	0.100 mg/L	96.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.100 mg/L	96.4	70	130
		EG020A-F: Chromium	7440-47-3	0.100 mg/L	87.5	70	130
		EG020A-F: Cobalt	7440-48-4	0.100 mg/L	102	70	130
		EG020A-F: Copper	7440-50-8	0.100 mg/L	97.9	70	130
		EG020A-F: Lead	7439-92-1	0.100 mg/L	92.2	70	130
		EG020A-F: Manganese	7439-96-5	0.100 mg/L	92.6	70	130
		EG020A-F: Nickel	7440-02-0	0.100 mg/L	98.2	70	130
		EG020A-F: Vanadium	7440-62-2	0.100 mg/L	105	70	130
		EG020A-F: Zinc	7440-66-6	0.100 mg/L	104	70	130
EG020T: Total Metals by ICP-MS (QCLot: 486424)							
EB0709900-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1.000 mg/L	96.2	70	130
		EG020A-T: Beryllium	7440-41-7	0.100 mg/L	97.0	70	130
		EG020A-T: Barium	7440-39-3	1.000 mg/L	96.3	70	130
		EG020A-T: Cadmium	7440-43-9	0.500 mg/L	94.2	70	130
		EG020A-T: Chromium	7440-47-3	1.000 mg/L	93.6	70	130
		EG020A-T: Cobalt	7440-48-4	1.000 mg/L	97.2	70	130
		EG020A-T: Copper	7440-50-8	1.000 mg/L	99.0	70	130
		EG020A-T: Lead	7439-92-1	1.000 mg/L	93.2	70	130
		EG020A-T: Manganese	7439-96-5	1.000 mg/L	115	70	130
		EG020A-T: Nickel	7440-02-0	1.000 mg/L	96.4	70	130
		EG020A-T: Vanadium	7440-62-2	1.000 mg/L	96.1	70	130
		EG020A-T: Zinc	7440-66-6	1.000 mg/L	98.4	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 489442)							
EB0709882-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	86.2	70	130
EG035T: Total Mercury by FIMS (QCLot: 484954)							
EB0709840-012	Anonymous	EG035T: Mercury	7439-97-6	0.0100 mg/L	103	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB0709888**	Page	: 1 of 10
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42625791 GLADSTONE PACIFIC NICKEL	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 03-SEP-2007
Sampler	: AW	Issue Date	: 12-SEP-2007
Order number	: ----		
		No. of samples received	: 12
Quote number	: EN/001/07	No. of samples analysed	: 12

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

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

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural								
RSF 19, RINSATE WATER	QC01,	**28-AUG-2007**	**---**	---	----	**10-SEP-2007**	28-AUG-2007	×
Clear Plastic Bottle - Natural								
RSF 21, RSF 14, QC02,	RSF 13, RSF 10, QC03	**29-AUG-2007**	**---**	---	----	**10-SEP-2007**	29-AUG-2007	×
Clear Plastic Bottle - Natural								
RSF 17, QC04	RSF 24,	**30-AUG-2007**	**---**	---	----	**10-SEP-2007**	30-AUG-2007	×
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural								
RSF 19, RINSATE WATER	QC01,	**28-AUG-2007**	**---**	---	----	**10-SEP-2007**	25-SEP-2007	✓
Clear Plastic Bottle - Natural								
RSF 21, RSF 14, QC02,	RSF 13, RSF 10, QC03	**29-AUG-2007**	**---**	---	----	**10-SEP-2007**	26-SEP-2007	✓
Clear Plastic Bottle - Natural								
RSF 17, QC04	RSF 24,	**30-AUG-2007**	**---**	---	----	**10-SEP-2007**	27-SEP-2007	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural								
RSF 19, RINSATE WATER	QC01,	**28-AUG-2007**	**----**	----	----	**05-SEP-2007**	04-SEP-2007	×
Clear Plastic Bottle - Natural								
RSF 21, RSF 14, QC02,	RSF 13, RSF 10, QC03	**29-AUG-2007**	**----**	----	----	**05-SEP-2007**	05-SEP-2007	✓
Clear Plastic Bottle - Natural								
RSF 17, QC04	RSF 24,	**30-AUG-2007**	**----**	----	----	**06-SEP-2007**	06-SEP-2007	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural RSF 19, QC01, RINSATE WATER	**28-AUG-2007**	---	---	----	**10-SEP-2007**	11-SEP-2007	✓
Clear Plastic Bottle - Natural RSF 21, RSF 13, RSF 14, RSF 10, QC02, QC03	**29-AUG-2007**	---	---	----	**10-SEP-2007**	12-SEP-2007	✓
Clear Plastic Bottle - Natural RSF 17, RSF 24, QC04	**30-AUG-2007**	---	---	----	**10-SEP-2007**	13-SEP-2007	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural RSF 19, QC01, RINSATE WATER	**28-AUG-2007**	---	---	----	**07-SEP-2007**	25-SEP-2007	✓
Clear Plastic Bottle - Natural RSF 21, RSF 13, RSF 14, RSF 10, QC02, QC03	**29-AUG-2007**	---	---	----	**07-SEP-2007**	26-SEP-2007	✓
Clear Plastic Bottle - Natural RSF 17, RSF 24, QC04	**30-AUG-2007**	---	---	----	**07-SEP-2007**	27-SEP-2007	✓
ED045P: Chloride by PC Titrator							
Clear Plastic Bottle - Natural RSF 19, QC01, RINSATE WATER	**28-AUG-2007**	---	---	----	**10-SEP-2007**	25-SEP-2007	✓
Clear Plastic Bottle - Natural RSF 21, RSF 13, RSF 14, RSF 10, QC02, QC03	**29-AUG-2007**	---	---	----	**10-SEP-2007**	26-SEP-2007	✓
Clear Plastic Bottle - Natural RSF 17, RSF 24, QC04	**30-AUG-2007**	---	---	----	**10-SEP-2007**	27-SEP-2007	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
RSF 19,	QC01,	**28-AUG-2007**	**---**	---	----	**07-SEP-2007**	25-SEP-2007	✓
RINSATE WATER								
Clear Plastic Bottle - Natural								
RSF 21,	RSF 13,	**29-AUG-2007**	**---**	---	----	**07-SEP-2007**	26-SEP-2007	✓
RSF 14,	RSF 10,							
QC02,	QC03							
Clear Plastic Bottle - Natural								
RSF 17,	RSF 24,	**30-AUG-2007**	**---**	---	----	**07-SEP-2007**	27-SEP-2007	✓
QC04								
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified								
RSF 19		**28-AUG-2007**	**---**	---	----	**07-SEP-2007**	24-FEB-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified								
RSF 21,	RSF 13,	**29-AUG-2007**	**---**	---	----	**07-SEP-2007**	25-FEB-2008	✓
RSF 14,	RSF 10,							
QC02								
Clear Plastic Bottle - Filtered; Lab-acidified								
RSF 17,	RSF 24	**30-AUG-2007**	**---**	---	----	**07-SEP-2007**	26-FEB-2008	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC01,	RINSATE WATER	**28-AUG-2007**	**06-SEP-2007**	24-FEB-2008	✓	**06-SEP-2007**	24-FEB-2008	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC03		**29-AUG-2007**	**06-SEP-2007**	25-FEB-2008	✓	**06-SEP-2007**	25-FEB-2008	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC04		**30-AUG-2007**	**06-SEP-2007**	26-FEB-2008	✓	**06-SEP-2007**	26-FEB-2008	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified								
RSF 19		**28-AUG-2007**	**----**	----	----	**11-SEP-2007**	25-SEP-2007	✓
Clear Plastic Bottle - Filtered; Lab-acidified								
RSF 21,	RSF 13,	**29-AUG-2007**	**----**	----	----	**11-SEP-2007**	26-SEP-2007	✓
RSF 14,	RSF 10,							
QC02								
Clear Plastic Bottle - Filtered; Lab-acidified								
RSF 17,	RSF 24	**30-AUG-2007**	**----**	----	----	**11-SEP-2007**	27-SEP-2007	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified							
QC01, RINSATE WATER	**28-AUG-2007**	**----**	----	----	**04-SEP-2007**	25-SEP-2007	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified							
QC03	**29-AUG-2007**	**----**	----	----	**04-SEP-2007**	26-SEP-2007	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified							
QC04	**30-AUG-2007**	**----**	----	----	**04-SEP-2007**	27-SEP-2007	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	6	60	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	3	60	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by PC Titrator	ED045-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	3	60	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by PC Titrator	ED045-P	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Mercury by FIMS	EG035T	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulphur and/or Silcon content is determined by ICP/AES and reported as Sulphate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 Cl - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Mercury by FIMS	EG035T	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance	EN055	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). "Anonymous" Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
RSF 19, RINSATE WATER	QC01,	----	----	----	10-SEP-2007	28-AUG-2007	**13**
Clear Plastic Bottle - Natural							
RSF 21, RSF 14, QC02,	RSF 13, RSF 10, QC03	----	----	----	10-SEP-2007	29-AUG-2007	**12**
Clear Plastic Bottle - Natural							
RSF 17, QC04	RSF 24,	----	----	----	10-SEP-2007	30-AUG-2007	**11**
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
RSF 19, RINSATE WATER	QC01,	----	----	----	05-SEP-2007	04-SEP-2007	**1**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control data available for this section.**

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Brisbane, QLD 4000 Australia
GPO Box 302, Queensland 4001
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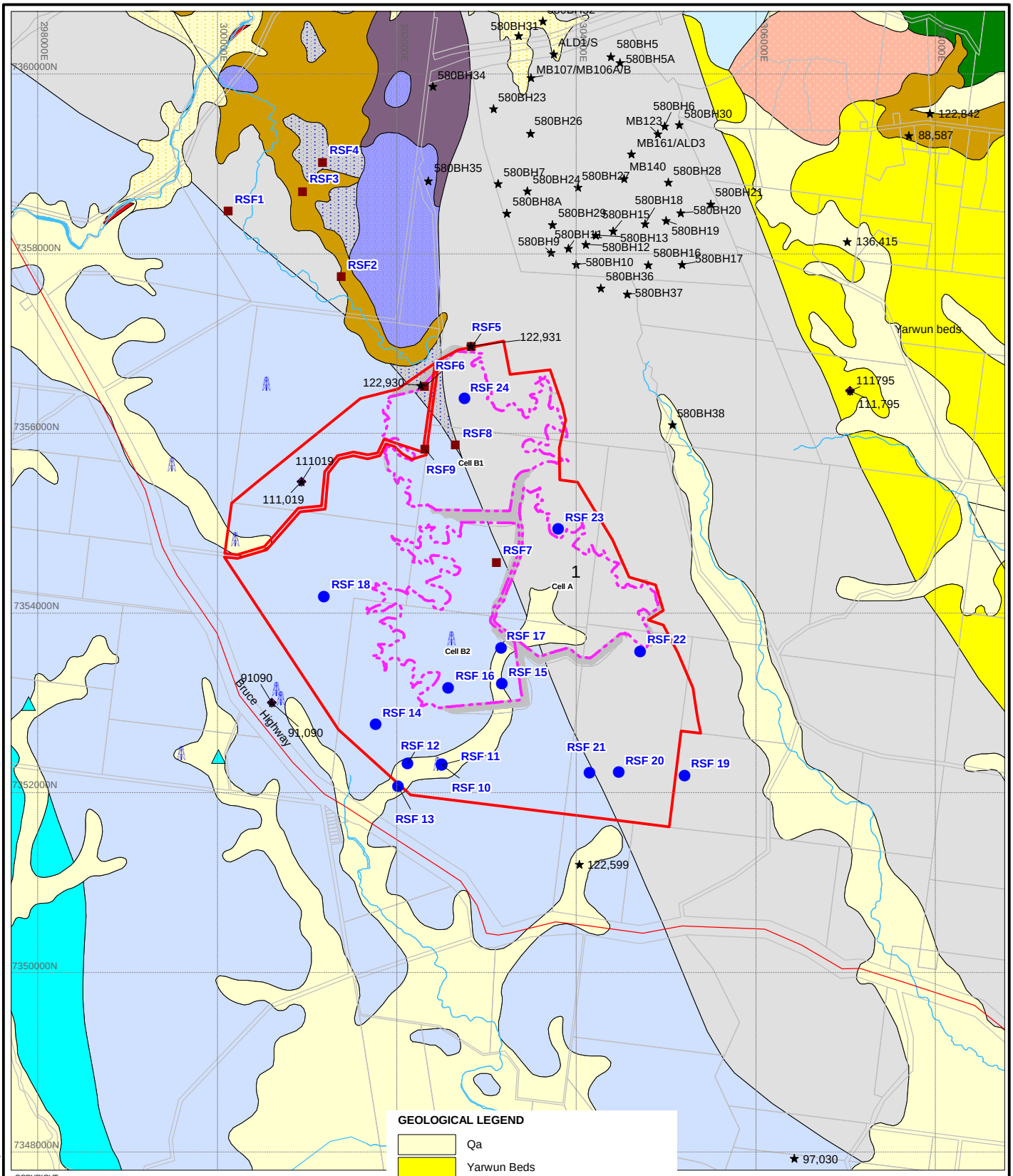
Figures



GEOLOGICAL LEGEND

- Qa
- Yarwun Beds
- TQa
- TQr
- Targinie Quartz Monzonite
- PRg/b
- Chalmers Formation
- Rockhampton Group, Berserker Group
- Rockhampton Group
- Mount Alma Formation

- URS Groundwater Bore (2007)
- URS Groundwater Bore (2006)
- Comalco Groundwater Bore
- DNRW Registered Bore
- Unregistered Bores
- Unregistered Bores - Fairfield
- RSF Site Boundary - Lot 4
- Cell Footprints

0 750 1500m
Scale 1:60 000 (A4)
MGA Z56, GDA94

Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT
SUPPLEMENT
GROUNDWATER REPORT

Title: **GROUNDWATER BORES, TERRAIN UNITS AND GEOLOGICAL REGIMES - RESIDUE STORAGE FACILITY**

Drawn: VH	Approved: CMP	Date: 05-12-2007	Figure: **1**	Rev: A
Job No: **4262 5791**	File No: 42625791-g-263.wor			**A4**

0 750 1500m

Scale 1:45 000 (A4)

MGA Z56, GDA94

Qhm — Geological Boundary and Regime

Groundwater Monitoring Bore - URS

Groundwater Bore - Hatch, Nov2006

DNRW Registered Bore

Proposed Development Footprint

Refinery Site Boundary

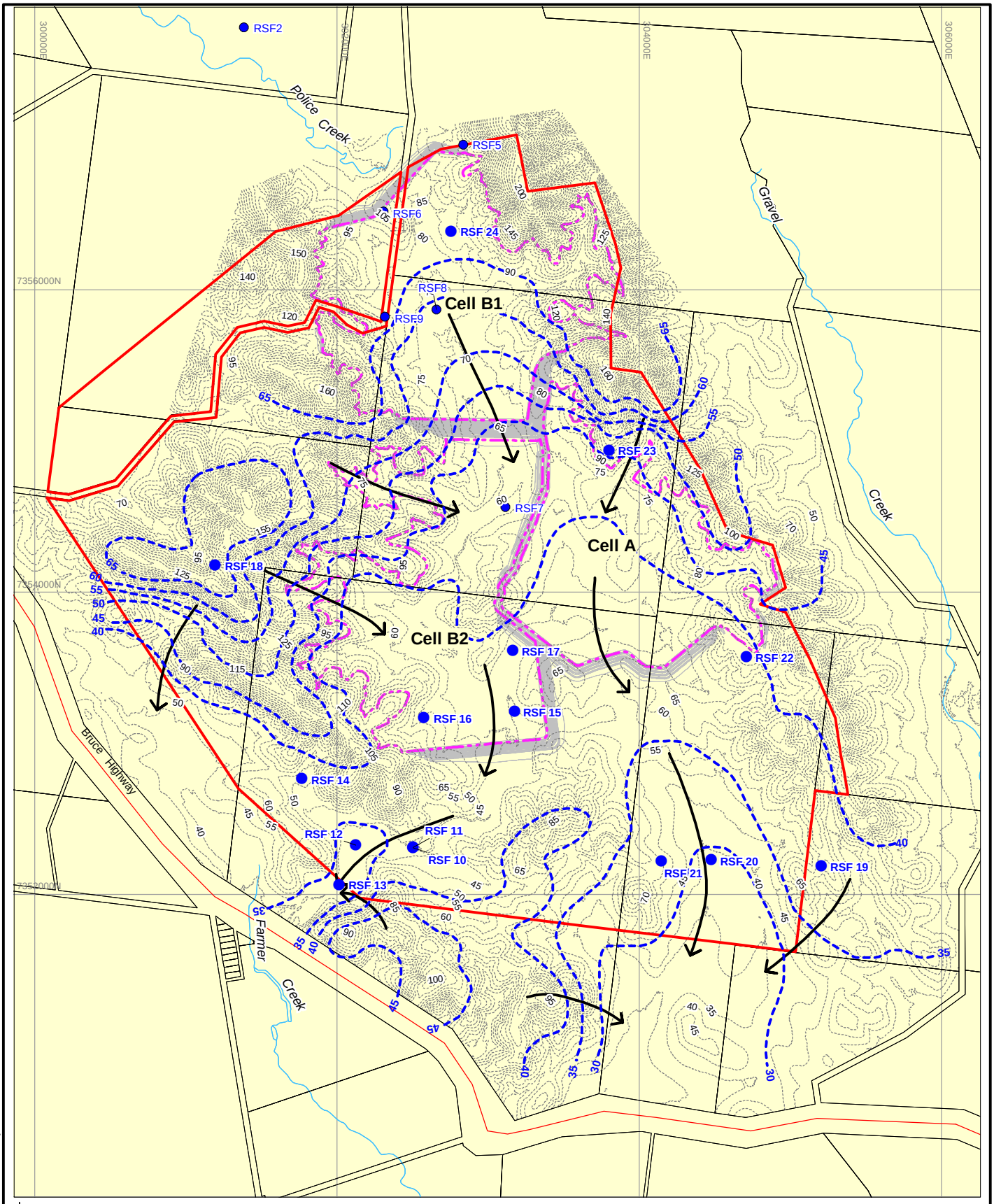
Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT
SUPPLEMENT
GROUNDWATER REPORT

Title: **REFINERY SITE GROUNDWATER BORES**

Drawn: VH	Approved: CMP	Date: 05-12-2007	Figure: **2**	Rev: A
Job No: **4262 5791**	File No: 42625791-g-229.wor			**A4**



Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT
SUPPLEMENT
GROUNDWATER REPORT

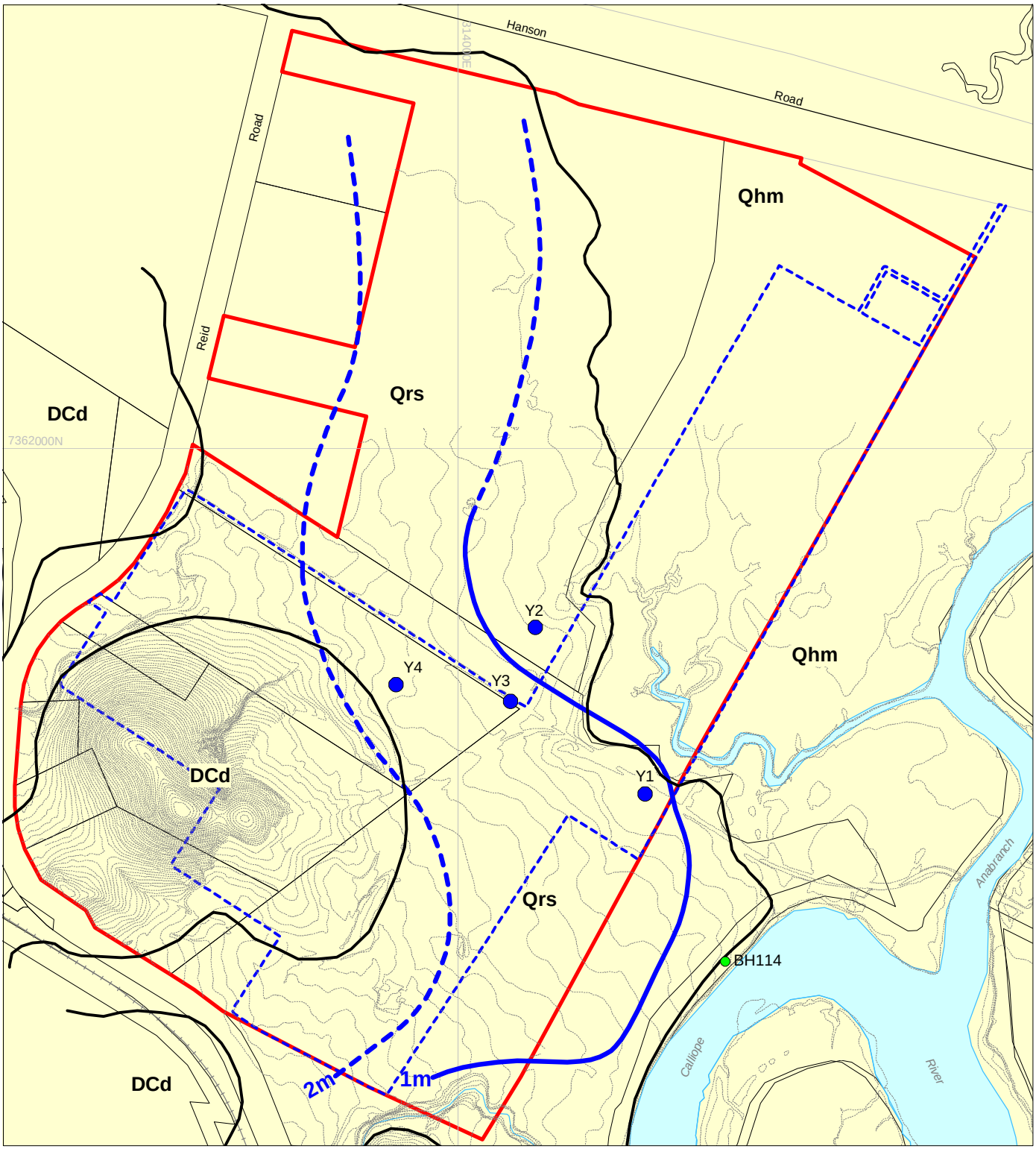
Title: **INFERRED GROUNDWATER CONTOURS AND INFERRED GROUNDWATER FLOW - RESIDUE STORAGE FACILITY**

Drawn: VH	Approved: CMP	Date: 05-12-2007
Job No: **4262 5791**	File No: 42625791-g-264.wor	

Figure: **3**

Rev: A

A4



0 200 400m

Scale 1:12,500 (A4)

MGA Z56, GDA94

1m — Groundwater Contour and Value

2m - - - Inferred Groundwater Contour and Value

Qhm — Geological Boundary and Regime

Inferred Groundwater Flow

Groundwater Monitoring Bore - URS

Groundwater Bore - Hatch, Nov 2006

Proposed Development Footprint

Refinery Site Boundary

Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT
SUPPLEMENT
GROUNDWATER REPORT

Title: **REFINERY SITE GROUNDWATER CONTOURS**

Drawn: VH	Approved: CMP	Date: 05-12-2007	Figure: **4**	Rev: A
Job No: **4262 5791**	File No: 42625791-g-231.wor			**A4**

Appendix A Bore Cards from NRW Groundwater Database

GROUNDWATER DATABASE

DATE 30/01/2006

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 88338

REGISTRATION DETAILS

		BASIN	1320	**LATITUDE**	23-49-51	**MAP-SCALE**	104
OFFICE	Rockhampton	**SUB-AREA**		**LONGITUDE**	151-09-31	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	2100-CALLIOPE	**EASTING**	312438	**MAP-NO**	9150
D/O FILE NO.	515/030/0282	**LOT**	1	**NORTHING**	7363279	**MAP NAME**	GLADSTONE
R/O FILE NO.	30-0282	**PLAN**	RP612126	**ZONE**	56	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**	P108	**ACCURACY**	SKET	**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-23.830876784	**PARISH NAME**	897-CALLIOPE			**ORIGINAL BORE NO**	OFFICE LICENCE ONLY
GIS LNG	151.158551632	**COUNTY**	CLINTON			**BORE LINE**	-
CHECKED	Y	**PROPERTY NAME**					
		FIELD LOCATION				**POLYGON**	
						RN OF BORE REPLACE	
FACILITY TYPE	SF	**DATE DRILLED**				**DATA OWNER**	
STATUS	EX	**DRILLERS NAME**				**CONFIDENTIAL**	
ROLES	WS	**DRILL COMPANY**					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	01/10/1969	1	Steel Casing (unspecified)	4.760	WT	152	0.00	23.80
A	01/10/1969	2	Perforated or Slotted Casing		AP	152	21.90	23.80

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	12.80	SOIL & GRITTY CLAY
2	12.80	23.77	MED TO HARD GRANITE(????) SOFT BANDS
902			SWL 23/10/69 - 11.2 M
903			BAILER TEST - 1.0 L/S
910			WRC COND 10/69 - 1880 MICROS/CM

STRATIGRAPHY DETAILS

DNR	1	0.00	DOONSIDE FORMATION