REPORT

Hydrogeological Assessment of the Maud Creek Gold Project

Prepared for

Terra Gold Mining Ltd

PO Box 195
Pine Creek NT 0847 Australia

5 September 2007

42213780/R001-A

URS

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Section 1 Introduction

1.1 Background

Terra Gold Mining Ltd (Terra Gold), a subsidiary of GBS Gold Pty Ltd, plans to commence underground mining operations at the Maud Creek Gold Project in 2008. The proposed mining operations will transport the mined ore to the existing Union Reefs ore processing facility.

As part of regulatory approvals, a hydrogeological assessment is required to determine the potential environmental impacts from lowering groundwater levels near the proposed mine due to underground mine dewatering. Previous hydrogeological work was undertaken for the Kilkenny Gold NL draft Environmental Impact Statement (Dames and Moore, 1998) to assess groundwater drawdown impacts as a result of dewatering for open cut mine development. This report contains the results of a revised groundwater model that incorporates additional regional hydrogeological information and the proposed underground mine development.

Additional hydrogeological drilling investigations were also undertaken to determine groundwater/surface water interaction at Maud Creek and regional groundwater flow.

1.2 Project Location and Description

The Maud Creek Project is located approximately 25 kilometres east of Katherine (Figure 1).

Terra Gold plan to commence the underground decline development in 2008, with mining activities expected to commence in late 2008 or early 2009. The underground mine development after two years is scheduled to be at 290 metres depth (-170 mRL) extending to 700 metres depth (-580 mRL) after ten years of mining.

A previously mined open cut pit is located at the site. It is approximately 200 metres long, 100 metres wide and up to 26 metres deep and is estimated to contain 300,000 kL of water. The pit will be dewatered prior to underground mine and decline development. As the decline and underground mine are below the water table, groundwater dewatering will be required.

1.3 EIS Guidelines

Based on the Northern Territory EPA guidelines for the Maud Creek Gold Project require the following hydrogeological components to be addressed:

- A description of the site and the regional groundwater systems;
- A discussion of the existing uses, beneficial uses and quality;
- A description of potential groundwater impacts associated with mining, pit dewatering and irrigation; and
- The management of groundwater and groundwater monitoring.

Section 2 Scope of Work and Proposed Approach

2.1 Scope of Work

The scope of work for this project is summarised below.

- Data Review, Model Conceptualisation and Liaison;
- Groundwater Drilling Programs;
- Groundwater Model Construction and Features;
- Groundwater Model Calibration;
- Predictive Simulations – Dewatering and Environmental Impacts, and
- EIS Groundwater Model Reporting.

2.2 Proposed Approach

The proposed approach to complete the scope of work is outlined below.

Data Review, Model Conceptualisation and Liaison

In order to update the conceptual model of the Maud Creek Gold Project and surrounding region, it will be necessary to review geological and hydrogeological data. Additional information is required for groundwater/surface water interaction at Maud Creek and regional groundwater flow direction. This additional information will be incorporated into the updated groundwater model.

Groundwater Drilling and Testing Programs

Based on our conceptual model and known geology, we will site and complete a program of groundwater drilling programs and the installation of groundwater monitoring bores to assist in determination of determine groundwater/surface water interaction at Maud Creek and regional groundwater flow. These bores will be used to measure groundwater quality down-gradient and up-gradient of the proposed mine. Previous aquifer testing at the Maud Creek Project (Dames & Moore, 1998) was sufficient for local aquifer permeability values.

Groundwater Model Construction and Features

Our proposed model will be constructed using commercially available software such as Visual MODFLOW (finite-difference). URS proposes to use MODFLOW-SURFACT with Visual MODFLOW Pro Version 4 as the pre- and post-processors. MODFLOW-SURFACT contains several flow packages which complement/supplement the widely used USGS MODFLOW by enhancing the schemes for performing unconfined simulations to rigorously model desaturation/resaturation of aquifers.

The modelled area will be discretised into different material types and layers in order to simulate the interpreted geology and hydrogeology as closely as possible. The model will take into account such features as:

- The geometry and properties of known aquifer systems;
- The geology and structural geology of the site and the impact of these structures on groundwater flow;
- The layout of the mining areas and the proposed open-pits;
- The relationship between groundwater and surface water, and
- Groundwater and surface water recharge-discharge mechanisms.

Section 2 Scope of Work and Proposed Approach

The model will be designed to incorporate additional groundwater drilling and testing information as it becomes available and this will lead to gradual model refinement as the mining operations commence. In this manner, the model can be used to refine, predict and quantify the required dewatering system for mining and also the potential environmental impacts associated with dewatering.

Groundwater Model Calibration

The calibration of the model will occur in two steps:

- Steady-State – during this calibration stage, groundwater levels generated by the model will be matched to known groundwater levels and flow directions across the mining region. This will be achieved by small variations in model parameters, especially hydraulic parameters such as permeability and storativity. A successful steady-state calibration is a necessary precursor to the next stage of model development.
- Transient – this is the most difficult and time-consuming stage of model calibration. During this work, known aquifer response to pumping by bores is matched by simulating this pumping in the model. This can be difficult to achieve. Model parameters are varied until a satisfactory drawdown response to actual pumping is achieved. The model is then ready to be used for predictive simulations to forecast available groundwater supply and assess potential environmental impacts.

Predictive Simulations – Dewatering and Environmental Impacts

The calibrated model will be used to calculate groundwater inflows to the pits. These inflows will give a preliminary indication of the amount of groundwater that has to be pumped to maintain efficient and relatively dry mining conditions, based on the proposed mining schedule.

The main groundwater-related environmental impacts resulting from the proposed mining are associated with groundwater level lowering near the underground mine. Groundwater lowering may result in vegetation stress, and have impacts on the ecological water requirements that are needed to sustain flora and fauna associated with drainages of the area.

Drawdown predictions from the groundwater modelling will be used to evaluate the impacts of underground mine dewatering. Thus, the groundwater/surface water modelling will allow a quantification of environmental impacts and therefore assist in planning the mitigation of such impacts. This will be an important aspect of regulatory approval for the proposed mine development.

Environmental Impact Statement Reporting

The report will describe the field program completed, the hydrogeology of the project area, the conceptual hydrogeological model, the modelling results at the EIS stage and also describe the potential environmental impacts associated with groundwater abstraction for mine dewatering.

Section 3 Groundwater Drilling and Testing Program

3.1 Groundwater Drilling Program

Six groundwater monitoring bores were installed at the Project site and surrounding areas in May 2007 by Bores NT Proprietary Limited, using a Bourne 1250 truck-mounted drilling rig using air-hammer drilling methods.

A 143 mm diameter hole was drilled at each location and the strata lithological logged. A flow measurement weir was used to measure airlift yield at regular intervals during drilling. All holes were lined with uPVC, with the annulus filled with gravel pack.

Bore construction details are summarised in Table 1 and discussed below.

Table 1 Groundwater Bores – Construction Details

Bore	Collar Co-ordinates (GDA94, Zone 53)		Collar Elevation* (m AHD)	Total Depth (m bgl+)	Screened Interval (m bgl+)	Lithology of the Screened Interval	Groundwater Depth (m bgl+)
	Easting	Northing					
MB1	224424.77	8403549.68	139.57	37.5	25.5 - 37.5	Siltstone/ Sandstone	5.64
MB2	226009.51	8402488.97	136.05	17	5.0 - 17.0	Sandstone/ Dolerite	6.91
MB3	227028.34	8401398.27	139.52	59.5	5.5 – 17.5	Basalt	2.87
MB4	225126.65	8400037.33	149.56	79	43.0 – 55.0	Sandy CLAY/ Siltstone	1.21
MB5	223429.98	8400119.90	160.57	37	25.0 – 37.0	Greywacke/ Sandstone	6.80
MB6	226656.45	8400042.82	150.15	79	49.0 – 61.0	Dolerite	3.94

+ mbgl: metres below ground level

Bore logs are provided in Appendix A, describing strata-descriptions and graphical representations of the bore construction.

3.1.1 Test Production Bores

Test production bores and aquifer testing were undertaken in 1998 (Dames and Moore, 1998) to assess open-cut dewatering rates and determine potential groundwater impacts. These tests are sufficient for local characterisation of the aquifer in the vicinity of the underground mine. Regional groundwater monitoring bores were installed to determine groundwater/surface water interaction at Maud Creek, and regional groundwater flow.

3.1.2 Groundwater Monitoring Bores

Six groundwater monitoring bores (MB1 to MB6) were drilled and lined with 50 mm nominal diameter Class 9 uPVC casing. The screened section comprised vertically slotted uPVC casing in 300 mm lengths with 2 mm aperture slots. The bore annulus was packed with a gravel filter pack up to 10 mm in diameter. Bentonite seals were placed above the gravel pack and the bore annulus was cemented to ground surface. All bores were completed with a cemented, 152 mm nominal diameter surface collar to a minimum of 5.5 m depth.

With the exception of MB2, the bores were developed by airlifting and surging techniques until clear, airlift was obtained. MB2 was developed using a bailer on the day following construction, due to bores low yield.

MB1

MB1 was drilled to 79 m below ground level and intersected weakly-cemented sandstone between 32 and 32.5 m depth. No airlift yield was measurable during drilling.

MB2

MB2 was drilled to 55 m and intersected weathered sandstone and greywacke between 4 and 14 m depth. Groundwater seepage was observed at 4.5 and 11 to 14 m depths.

MB3

MB3 was drilled to 67 m and intersected fractured quartz veining between 14 and 16 m depth. Airlift-yield was 4.3 kL/day at 18 m depth and decreased to 0.9 kL/day by 24 m depth.

MB4

MB4 was drilled to 79 m depth and intersected fractured sandstone between 22 and 23 m depth and sandy clay between 25 and 49 m depth.

MB5

MB5 was drilled to 37 m and intersected cavernous limestone between 9 and 12 m and fractured greywacke between the intervals 22 to 27 m and 29 to 32 m. A weakly cemented sandstone was intersected between 27 and 29 m.

The bore's airlift-yield was 1.6 kL/day at 9 m and increased to 518 kL/day at 29 m.

MB6

MB6 was drilled to 79 metres and intersected minor fractures at 16, 21, 26, 46, 64 and 67 m depths. A quartz band was intersected at 57 m depth.

The bore's airlift-yield was 25 kL/day at 19 m and increased to 96 kL/day at 60 m depth.

3.2 Aquifer Testing

Aquifer testing was undertaken in 1998 (Dames and Moore, 1998) to assess open-cut dewatering rates and determine potential groundwater impacts. These tests are sufficient for local characterisation and derivation of aquifer permeability values to be used in the groundwater model. Similarly, these tests were also used to assist with groundwater model calibration.

Section 4 Geology and Hydrogeology

4.1 Geology

The Maud Creek Gold Project site lies within the Pine Creek Geosyncline – an Early Proterozoic, northeast-southwest trending stratographic unit at the southern end of Edith Falls Basin and Seventeen Mile Anticline structural features. The greater project area contains mineralisation occurrences that together form the Maud Creek-Carpentaria Mineral Field.

The Project area is located in metasediments and volcanics. The Tollis Formation, Maud Dolerite, Antrim Plateau Volcanic and Kombolgie Formation are found in, and surrounding the proposed mine. The Tollis Formation consists of interbedded greywacke, siltstone, phyllite and tuff. The Maud Dolerite intrudes the Tollis Formation and outcrops as irregular bodies up to 200 metres in width. Quartz veining with associated gold mineralization has been observed within the intrusive and in the adjacent sediments.

The Kombolgie Formation – an arenite and conglomerate unit – overlies the Tollis Formation and the Maud Dolerite. These are in turn overlain by amygdaloidal basalt and basic volcanics of the Antrim Plateau Volcanics.

The main gold deposits were formed within a wide, steep easterly dipping zone on the contact between overlying mafic volcanics and footwall Tollis Formation sediments.

Three main zones of mineralization have been defined at the Maud Creek gold project:

1) Main Zone – On the north-striking sheared contact of mafic tuffs and sediments. The mineralisation envelope is bound by northeast trending faults, with the higher grade along the intersection of the tuff-sediment and north-east trending fault.
2) Hanging Wall Lodes – Located within dilational sites bound by northeast trending faults within the hanging wall tuffs.
3) Eastern Shear Lodes – A southerly plunging pipe-like structure including a set of mineralised lodes around the contact areole of the tuff and the Maud Creek Dolerite.

The principal portion of the deposit is 250 metres long, up to 57 metres wide, striking north and dipping moderately to the east.

The Proterozoic landscape is intersected by a complex series of fractures including the Maud Creek Lineament Zone – a 9-kilometre long northwest-trending composite feature, principally defined by the straight alignment of Maud Creek itself. Near its northern end, west-southwest-vergent thrust/reverse faults in the Kombolgie/Tollis Formations form part of the lineament zone.

The Project area's geology is simplified in Figure 2; stratigraphic units in the Project area are listed in Table 2.

Table 2 Stratigraphic Units

Group	Unit	Age
	Cainozoic	
	unconformity	
Daly River Group	Tindal Limestone	Early to Middle Cambrian
	unconformity	
Katherine River Group	McAddens Creek Volcanic Member	Middle Proterozoic
	Kombolgie Formation	
Edith River Group	Plum Tree Creek Volcanics	
	Phillips Creek Sandstone	Early Proterozoic
Postorogenic Igneous Rocks	Maud Dolerite	
El Sherana Group	Tollis Formation	

4.2 Hydrogeology

4.2.1 Groundwater Occurrence and Flow

Local and regional groundwater flow is controlled by fracturing, surface weathering and alluvial sedimentation. Groundwater within the Maud Creek Project is present in fractured, weathered and oxidised tuff, typically near the contact with the main quartz vein. The quartz breccia zone between the water table and about 100 metres depth also forms a fractured rock aquifer. Groundwater may also be present at the interface and within the upper portion of the fresh tuff.

Recharge to the aquifers is from direct infiltration of rainfall, and is likely to be highest near outcrops of quartz and quartz breccia. Gold Creek, when flowing could also be a source of recharge to local aquifers as Gold Creek near the vicinity of the mine changes flow direction abruptly, potentially controlled by a fault.

Groundwater levels in the Maud Creek area are between 1 and 6 m below ground level, depending on topography. Groundwater flow is to the northeast, towards Maud Creek (Figure 3). Seasonal variations in groundwater levels are expected to be between 2 and 4 m.

Regional groundwater yields are low, in the areas of unfractured Tollis Formation, Maud Dolerite, and Antrim Plateau Volcanics. Regional drilling indicated low airlift yields up to 100 kL/day (MB6). Yields are higher where cavernous limestone or fractured rock is intersected with yields up to 500 kL/day being reported (MB5). Locally, within the Maud Creek Deposit, groundwater yields of up to 1,200 kL/day are reported (Dames and Moore, 1998).

4.2.2 Groundwater Quality

Results of recent groundwater analysis for MB series bores is summarised in Table 3 with laboratory analysis reports in Appendix B.

Groundwater at the Project site and surrounding regions is fresh, with total dissolved solids (TDS) concentrations ranging from 320 mg/L (MB4) to 636 mg/L (MB1).

The groundwater is calcium/magnesium bicarbonate type, with a chemical composition typical of recently recharged groundwater. The pH of groundwater is slightly alkaline with pH values ranging between 7.9 (MB5) and 8.2 (MB4).

Section 4 Geology and Hydrogeology

On comparison with the Australian Drinking Water Guidelines 2004, groundwater quality exceeded aesthetic guideline values for total dissolved solids and bicarbonate, and health guideline values for selenium (WB3) and arsenic for all bores sampled except for MB2 and MB5.

Table 3 Results of Chemical Analysis

Analyte/Parameter	Units	WB3	MB1	MB2	MB3	MB4	MB5	MB6	Drinking water guideline
pH	-	-	7.90	6.95	8.11	8.19	7.87	8.01	6.5-8.5
Electrical Conductivity	µS/cm	1,086	903	728	622	564	806	850	-
Total Dissolved Solids	mg/L	515	636	502	434	320	462	528	500*
Calcium	mg/L	54	19	53	45	38	82	58	-
Potassium	mg/L	2.9	12	7	8	9	4	18	-
Magnesium	mg/L	53	16	72	66	36	60	70	-
Sodium	mg/L	13	206	29	19	32	8	28	-
Carbonate	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bicarbonate	mg/L	521	331	458	356	264	466	448	200*
Chloride	mg/L	10	134	9.3	7.4	9.7	4.7	10.0	-
Sulphate	mg/L	3.4	16	28	60	40	5	50	500/200*
Nitrate	mg/L	0.05	-	-	-	-	-	-	50
Silicon	mg/L	48	-	-	-	-	-	-	-
Iron (total)	mg/L	0.036	-	-	-	-	-	-	-
Iron (filtered)	mg/L	-	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	0.3*
Arsenic (total)	mg/L	0.018	-	-	-	-	-	-	0.007
Arsenic (filtered)	mg/L	-	0.009	0.006	0.012	0.018	0.003	0.011	0.007
Cadmium (filtered)	mg/L	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.002
Chromium (filtered)	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	0.05
Copper (filtered)	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	2
Selenium (filtered)	mg/L	0.033	-	-	-	-	-	-	0.01
Barium (filtered)	mg/L	0.25	-	-	-	-	-	-	0.7
Lead (filtered)	mg/L	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01
Nickel	mg/L	-	<0.001	0.001	0.001	<0.001	<0.001	0.002	0.02
Zinc	mg/L	-	<0.005	<0.005	0.012	<0.005	0.007	<0.005	3*

* - Aesthetic Guideline
Shaded areas indicated exceeding health or aesthetic guideline values

Section 5 Groundwater Modelling Methodology

5.1 Conceptual Hydrogeology Model

A conceptual hydrogeological model has been developed to simulate local- and regional- scale groundwater flow features. It expands on the work of Dames and Moore (1998) and includes an extended model domain (to avoid potential problems from proximal boundary conditions).

Aquifers are represented in the proposed mining area is represented by the ore zones associated with sheared contact between mafic tuffs and sediments. These zones are generally assigned the highest permeability, surrounded by lower permeability host-rock. At the near surface a moderately permeable zone represents the weathered zone. The seasonal variation in groundwater levels is simulated with seasonal rainfall-recharge and seasonal river stage heights. All creeks are assumed to provide groundwater recharge.

The detailed geology beyond the mining area is generally unknown. Therefore, the modelled geology in regional areas is based on large-scale mapping.

5.2 Model Details

5.2.1 Model Code

The model code was solved using the MODFLOW (McDonald and Harbaugh, 1988) SURFACT algorithm. MODFLOW is a three-dimensional block-centred finite-difference code developed by the United States Geological Survey (USGS) to simulate groundwater flow in the saturated subsurface. Visual MODFLOW from Waterloo Hydrogeologic Inc. is used as the pre- and post-processor.

MODFLOW SURFACT simulates unsaturated flow, and is can reduce unsaturated flow problems (for example, drying of cells near the water table).

5.2.2 Model Domain, Setup and Layering

The model domain (Figure 4) is a 15-kilometre square region centred at the Maud Creek Gold Project. The model grid contains 226 rows and 179 columns. Model-cell widths range from 400 m near the model's outer limits to 1.5 m near the prosed mine. The model domain has five layers and is described in Table 4.

The model's ground-surface elevation was assigned based on an interpolation of Digital Terrain Model (DTM) data for the Project site. This DTM data covers a region about 10 $\times$ 10 kilometre in size and is centred at the Project site. DTM data beyond this region was based on digitised data from the topographic data shown in Figure 1. As a result, potential elevation differences between accurately surveyed bores and the resultant DTM will occur.

The elevation of the base of the Tindal Limestone (the base of Layer 1) was based on stratigraphic contours presented in Dames and Moore (1996).

The elevation of the base of Layer 5 was based on the maximum-proposed mining depth.

Table 4 Model Layer-Structure

Layer	Hydrogeological Unit
1	Weathered zone/Tindal Limestone (in the model's southwest corner)
2	Fractured rock aquifer/ore zone from 110 to 90 mRL
3	Fractured rock aquifer/ore zone from 90 to 50 mRL
4	Fractured rock aquifer/ore zone from 50 to -100 mRL
5	Fractured rock aquifer/ore zone from -100 to -350 mRL

5.2.3 Distribution of Hydraulic Properties

The distribution of hydraulic properties is based on aquifer-testing and published data. Table 5 provides a summary of the aquifer-parameter data sources.

Table 5 Aquifer Parameter Data Sources

Unit	Aquifer Parameter Data Source
Other (Proterozoic)	2007 drilling results
Ore Host Rock (Tuffs)	Dames and Moore (1998)
Tindal Limestone	NRETA (2006)
Ore Zone	A re-evaluation (re-calibration) of the aquifer testing data presented in Dames and Moore (1998)
Weathered Layer	Calibration
Alluvial Sediments	Calibration

Calibration hydraulic properties are discussed in Section 5.3. Cross sections of the hydraulic property zones are provided in Figure 5.

5.2.4 Boundary Conditions

The distribution of boundary conditions is shown in Figure 4. The boundary conditions are discussed below.

Fixed Head

The model's outer boundary cells are assigned Fixed Head boundary conditions. These cells are set at a nominal head of two metres below the ground surface.

Recharge

For MODSURFACT simulations, recharge cells act as both inflow and discharge nodes, depending on the water table elevation. The Ponding Depth feature (when set to zero) allows groundwater seepage for water table elevations above the ground surface. This effectively simulates the discharge features in the Project area's groundwater flow system.

Seasonal recharge rates are simulated based on the climate data presented in. Recharge is greatly simplified as follow:

Monthly Recharge = (Monthly Rainfall - Monthly Evaporation) × Recharge Rate.

Based on calibration data the resultant monthly recharge is shown in. The total recharge is eight per cent of average annual rainfall (976 mm/year).

Drain

Groundwater abstraction due to mine development is simulated using Drain cells. The elevation of Drain cells reflect the mining schedule shown in Table 6. The Drain cells reflect the extent of the mineralisation, as defined by the hydraulic conductivity distribution of the 'ore zone' unit as presented in Figure 5.

Table 6 Mining Schedule

Date	RL	Day	Date	RL	Day	Date	RL	Day
01-Mar-08	120.11	0	01-Mar-12	-270.32	1461	01-Mar-16	-476.73	2922
01-Apr-08	90.67	31	01-Apr-12	-274.62	1492	01-Apr-16	-481.03	2953
01-May-08	77.27	61	01-May-12	-278.92	1522	01-May-16	-485.34	2983
01-Jun-08	60.68	92	01-Jun-12	-283.22	1553	01-Jun-16	-489.64	3014
01-Jul-08	53.15	122	01-Jul-12	-287.52	1583	01-Jul-16	-493.94	3044
01-Aug-08	33.84	153	01-Aug-12	-291.82	1614	01-Aug-16	-498.24	3075
01-Sep-08	19.88	184	01-Sep-12	-296.11	1645	01-Sep-16	-502.55	3106
01-Oct-08	6.15	214	01-Oct-12	-300.41	1675	01-Oct-16	-506.85	3136
01-Nov-08	4.18	245	01-Nov-12	-304.71	1706	01-Nov-16	-511.15	3167
01-Dec-08	-8.83	275	01-Dec-12	-309.01	1736	01-Dec-16	-515.46	3197
01-Jan-09	-22.68	306	01-Jan-13	-313.31	1767	01-Jan-17	-519.76	3228
01-Feb-09	-32.03	337	01-Feb-13	-317.61	1798	01-Feb-17	-524.06	3259
01-Mar-09	-45.89	365	01-Mar-13	-321.91	1826	01-Mar-17	-528.36	3287
01-Apr-09	-60.20	396	01-Apr-13	-326.21	1857	01-Apr-17	-532.67	3318
01-May-09	-78.68	426	01-May-13	-330.50	1887	01-May-17	-536.97	3348
01-Jun-09	-80.73	457	01-Jun-13	-334.80	1918	01-Jun-17	-541.27	3379
01-Jul-09	-94.59	487	01-Jul-13	-339.10	1948	01-Jul-17	-545.58	3409
01-Aug-09	-108.03	518	01-Aug-13	-343.40	1979	01-Aug-17	-549.88	3440
01-Sep-09	-108.03	549	01-Sep-13	-347.70	2010	01-Sep-17	-554.18	3471
01-Oct-09	-131.78	579	01-Oct-13	-352.00	2040	01-Oct-17	-558.48	3501
01-Nov-09	-131.78	610	01-Nov-13	-356.30	2071	01-Nov-17	-562.79	3532
01-Dec-09	-145.61	640	01-Dec-13	-360.60	2101	01-Dec-17	-567.09	3562
01-Jan-10	-158.60	671	01-Jan-14	-364.90	2132	01-Jan-18	-571.39	3593
01-Feb-10	-162.89	702	01-Feb-14	-369.20	2163	01-Feb-18	-575.70	3624
01-Mar-10	-167.19	730	01-Mar-14	-373.50	2191	01-Mar-18	-580.00	3652
01-Apr-10	-171.49	761	01-Apr-14	-377.80	2222			
01-May-10	-175.78	791	01-May-14	-382.10	2252			
01-Jun-10	-180.08	822	01-Jun-14	-386.40	2283			
01-Jul-10	-184.38	852	01-Jul-14	-390.70	2313			
01-Aug-10	-188.67	883	01-Aug-14	-395.00	2344			
01-Sep-10	-192.97	914	01-Sep-14	-399.30	2375			
01-Oct-10	-197.27	944	01-Oct-14	-403.60	2405			
01-Nov-10	-201.57	975	01-Nov-14	-407.91	2436			
01-Dec-10	-205.86	1005	01-Dec-14	-412.21	2466			
01-Jan-11	-210.16	1036	01-Jan-15	-416.51	2497			
01-Feb-11	-214.46	1067	01-Feb-15	-420.81	2528			
01-Mar-11	-218.75	1095	01-Mar-15	-425.11	2556			
01-Apr-11	-223.05	1126	01-Apr-15	-429.41	2587			
01-May-11	-227.35	1156	01-May-15	-433.71	2617			
01-Jun-11	-231.65	1187	01-Jun-15	-438.01	2648			
01-Jul-11	-235.94	1217	01-Jul-15	-442.32	2678			
01-Aug-11	-240.24	1248	01-Aug-15	-446.62	2709			
01-Sep-11	-244.54	1279	01-Sep-15	-450.92	2740			
01-Oct-11	-248.84	1309	01-Oct-15	-455.22	2770			
01-Nov-11	-253.13	1340	01-Nov-15	-459.52	2801			
01-Dec-11	-257.43	1370	01-Dec-15	-463.83	2831			
01-Jan-12	-261.73	1401	01-Jan-16	-468.13	2862			
01-Feb-12	-266.03	1432	01-Feb-16	-472.43	2893			

River

River cells have been utilised to simulate groundwater recharge and discharge along Maud Creek and Gold Creek. The stage height of River cells has been based on DTM data and seasonal rainfall data.

The riverbed conductance has been set at 0.2 × 1/day × area (m^2). This is equivalent to the following nominal river parameters:

- One metre riverbed thickness;
- Ten metre river width; and
- A riverbed Conductance of 2 m/day.

The simulated River stage height varied seasonally, based on the simulated recharge.

5.2.5 Simplifying Assumptions and Limitations for Modelling

The developed groundwater flow model has limitations. These limitations result from generalisations, interpretations and assumptions made in attempting to simulate the interpreted hydrogeology. The model limitations include:

- The surface elevation of the groundwater model is dependent on the digital terrain model (DTM) data. DTM gridding algorithms have an averaging effect on elevation data, and local minima, subject to the coarseness of the data used. These approximations are likely to contribute to inaccuracy of simulated groundwater levels when compared to surveyed groundwater levels.
- An approximation has been used to simulate seasonal rainfall recharge; actual recharge is a complex function of rainfall timing, duration, and soil and vegetation characteristics.
- MODFLOW is a fully saturated groundwater flow model code, which can lead to an overestimation of the dewatered areas;
- The area occurs within a fractured rock environment, where the only major aquifers in the bedrock are secondary structures, such as faults and shear zones in the weathered zones. The models only represent the major secondary structures (faults and shear zones) in the area; and
- The limited data surrounding the deposits and the complexities of the hydrogeological regime mean that this model should only be used as a guide to determine impact areas and the likely groundwater abstraction rates required for dewatering. The interpretation of predictive simulations should be based on the assumptions made.

5.3 Model Calibration

Model calibration is a process of altering model parameters – within a defined range of values – to best match the available groundwater-level data. Steady-state calibration was followed by transient calibration, the results of which were then re-evaluated in steady state.

Model calibration was carried out by trial-and-error adjustment of the hydraulic conductivity input data, to enable simulations broadly compatible with groundwater observations. MODFLOW's parameter estimation module (PEST) has also been utilised to help assess appropriate hydraulic and recharge parameters.

5.3.1 Steady State Calibration

Simulated steady-state results are most sensitive to:

- the hydraulic conductivity of the ore host rock;
- the hydraulic conductivity of the weathered layer and

Section 5 Groundwater Modelling Methodology

- applied recharge.

The MOFLOW parameter estimation tool 'PEST' was used to enhance model-calibration for these parameters; the adopted values are listed in Table 6.

The calibration normalised root mean square (NRMS) was 12 per cent, with a correlation coefficient of 0.94. These data show that the model generally matches the observed groundwater levels.

Steady-state groundwater heads are shown in Figure 6.

5.3.2 Transient Calibration

Transient calibration included two components: calibration with the pump test data presented in Dames and Moore (1998), and calibration with the seasonally-varying monitoring bore data.

Pumping-Test Calibration

Pumping-test data presented in Dames and Moore (1998) was re-evaluated based on the new model configuration. These pumping tests were used to verify the revised model calibration.

The PEST parameter estimation program was then used to alter the hydraulic conductivity and storage parameters for the ore zone, the ore host rock and the weathered layer, to best simulate the observed groundwater-drawdown data.

5.3.3 Derived Hydraulic Parameters

Based on the hydrogeological conditions described in Section 4.2 and the hydraulic parameters listed in Table 6 have been adopted. For comparison, Table 6 also includes the previously-adopted aquifer parameters from Dames and Moore (1998).

Table 6 Aquifer Parameters

Unit	**Present Model**				**Domahidy (1998)**			
	K_{XY}	**K_Z**	**Ss**	**Sy**	**K_{XY}**	**K_Z**	**Ss**	**Sy**
Other (Proterozoic)	0.0001	0.0001	0.001	5.0E-06	-	-	-	-
Ore Host Rock (Tuffs)	0.002	0.002	0.001	5.0E-06	0.002	0.002	0.0005	1.0E-06
Tindal Limestone	10	10	0.2	2.0E-06	-	-	-	-
Ore Zone	2	2	0.001	1.5E-04	0.1 - 3	0.1 - 2	0.001 - 0.1	1.0E-06
Weathered Layer	0.06	0.06	0.025	5.0E-06	1	1	0.2	1.0E-06
Alluvial Sediments	0.5	0.5	0.2	5.0E-06	-	-	-	-

K_{XY} Horizontal Hydraulic Conductivity (m/day)
K_Z Vertical Hydraulic Conductivity (m/day)
Ss Specific Storage (dimensionless)
Sy Specific Yield (dimensionless)

Section 6 Groundwater Modelling Results

6.1 Estimated Dewatering Rates

Estimated dewatering rates for the first year of mining is approximately 3,400 kL/day, with groundwater inflows progressively decreasing to 1,700 kL/day after ten years of mining. Groundwater inflows could be reduced in the first year of mining if dewatering commences prior to decline development.

Underground mine inflows during the wet season could be significantly higher through direct infiltration through existing mineral exploration holes and/or fractured rock that is hydraulically connected with the surface creeks or bedrock. Gold Creek, in the vicinity of the underground mine may have hydraulic connection between surface water to groundwater that may provide water ingress into the underground mine workings, particularly during the wet season.

6.2 Estimated Drawdown from Underground Mine Dewatering

Figures 7 and 8 show the predicted water table elevations after 2 and 10 years of underground mine dewatering.

Figure 7 show the predicted groundwater level drawdown at the end of the dry season after 2 years of underground mine dewatering. The cone of depression is deepest at the mine, and the extent of the 1 m drawdown is observed up to 1.1 km from the mine.

Figure 8 show the predicted groundwater level drawdown at the end of the dry season, after 10 years of underground mine dewatering. The cone of depression is greatest at the mine and the extent of the 1 m drawdown is observed up to 1.8 km from the mine.

As shown in Figures 7 and 8, the drawdown effects are quite localised, even at the end of the expected 10 year mine life. At the completion of mining, and cessation of dewatering, groundwater levels are expected to recover quickly outside of the immediate underground mine area.

6.3 Potential Impacts from Underground Mine Dewatering

Drawdown caused by underground dewatering has the potential to lower groundwater levels near Gold Creek within the first two years of mining and potentially Maud Creek in the longer term. As a result, in areas where hydraulic connection exists between the creeks and underlying aquifers, there is a potential for reduced creek flows during the shoulder stream flow periods in November – December and April – May due to groundwater drawdown.

However, during these periods, the flow in Gold Creek will rely more on groundwater discharge from the predominantly limestone aquifers in the upper part of the Gold Creek catchment rather than the local aquifer system at the mine. Groundwater levels in other areas of Gold Creek are generally below ground surface during the dry season, and provide insignificant “seepage” flow in the creek.

Flow in Maud Creek is also seasonal, with low or no flow during the dry season. Flows are reported to be from upstream discharges and parts of the creek do not flow during the dry season. Similarly, for Maud Creek there is a potential for reduced creek flows during the shoulder stream flow periods in November – December and April – May due to groundwater drawdown at Maud Creek mine.

The groundwater level at the confluence of Gold and Maud Creek (MB2) is approximately 6.9 m below ground level (approximately 4 m below the creek bed) in the dry season. Maud Creek is underlain here by a thin alluvial section, clayey sand, sandstone, greywacke and dolerite. Groundwater yield from this bore was very low at 1.7 kL/day, indicated very low permeable strata. Since groundwater levels are below the base of Maud Creek and the strata is likely to be of very low permeability, lowering of the groundwater table is unlikely to cause significant changes in creek flow.

Groundwater drawdown has the potential to reduce the availability of water to support woodland vegetation when groundwater levels are naturally within 5 m of the ground surface. As groundwater levels are generally between 1 and 6 m below ground surface, it is likely that some vegetation may be affected by a reduction in available water within the drawdown cone of the mine dewatering system. However, due to the laterally confined nature of the mine aquifer, and the short mine life, the impact will be very limited in space and time.

No beneficial use of groundwater for agriculture or domestic supply has been identified within the predicted drawdown extent. Neither are there any permanent pools or soaks within the predicted drawdown extent that would have beneficial uses for the environment.

Section 7 Conclusions & Recommendations

Based on the results of the drilling and testing programmes and groundwater modelling, the following conclusions and recommendations are summarised below.

7.1 Conclusions

- Drilling programmes were undertaken near the Maud Creek Project to assist with regional groundwater flow and predict groundwater drawdown associated with underground mine dewatering, through the use of a groundwater flow model.
- The hydrogeology away from the mining areas is generally unknown. The regional hydrogeology is based on regional geological maps and structures, but the groundwater model does not take all of these into account.
- The modelled areas occur in a fractured rock environment. As such, the occurrence of aquifers is structurally controlled and quite complex. We feel that the main aquifer comprise of a north-striking sheared contact of mafic tuffs and sediments in both the weathered and fresh bedrock zones. Away from the central shears we believe that only minor aquifers occur and these are mainly located in the weathered zone.
- Groundwater models are approximate, but can be used to assess order of magnitude variations in groundwater level as a result of mine dewatering and the required abstraction rates to meet dewatering requirements. Calibration of the model is based on 48 hour pumping tests.
- No wetlands or swamps are present in the vicinity the drawdown predicted by the modelling.
- Drawdown caused by underground dewatering has the potential to lower groundwater levels near Gold Creek and potentially Maud Creek in the longer term, however the flow in Gold Creek relies more on groundwater discharge from the predominantly limestone aquifers in the upper part of the Gold Creek catchment rather than the local aquifer system at the mine.
- Groundwater levels near the confluence of Maud and Gold Creeks underlain by low permeable strata and groundwater levels are approximately 4 m below the creek bed in the dry season. Any lowering of the groundwater table is unlikely to cause significant changes in creek flow.
- As groundwater levels are generally between 1 and 6 m below ground surface, it is likely that some vegetation may be affected by a reduction in available water within the drawdown cone of the mine dewatering system. Due to the laterally confined nature of the mine aquifer, and the short mine life, the impact will be limited to the extent of the drawdown, primarily located with the granted tenement area.

7.2 Recommendations

- Incorporate the existing monitoring and production bores at the project site into a groundwater monitoring programme and monitor throughout the life of the mining.
- As part of licensing requirements, it will probably be necessary to regularly monitor the performance of the dewatering systems (abstraction rates, groundwater levels) and the groundwater monitoring network for environmental reasons. This monitoring is recommended because it will also be advantageous to maintain relatively dry and efficient mining conditions by optimising dewatering system performance.
- At this stage, the design of the dewatering systems is preliminary. As mining schedules and mine designs become more definitive, it is recommended that the dewatering designs are refined.

Section 8 References

Dames and Moore. (1996), Maud Creek Gold Project Dewatering and Groundwater Supply Assessment. Unpublished Report, Dames & Moore Pty. Ltd., Ref: 28885-004-373, 2 September 1996.

Dames and Moore (1998), Appendix I; Preliminary Dewatering Investigation Phase II Maud Creek Project. Draft Environmental Impact Statement; Maud Creek Gold Project (Appendices). Dames & Moore, Ref: 38127-004-073, September, 1998.

Natural Resources, Environment and the Arts (NRETA) (2006), Regional Groundwater Modelling of the Cambrian Limestone Aquifer System of the Wiso Basin, Georgina Basin and Daly Basin. A report prepared by the Department of Natural Resources, Environment & The Arts (NRETA), 2006.

National Health and Medical Research Council/Natural Resource Management Ministerial Council, (2004), Australian and New Zealand Guidelines for Fresh and Marine Water, Australian Water Association.

Section 9 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 Terra Gold Mining Ltd 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 Proposal dated 21 May 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 19 July and 17 August 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.

Appendix A Bore Construction Logs

URS

MONITORING WELL MB1

URS Australia Pty Ltd
Level 3, 93 Mitchell Street, Darwin 0800
Phone: 08 8980 2900
Fax: 08 8941 3920

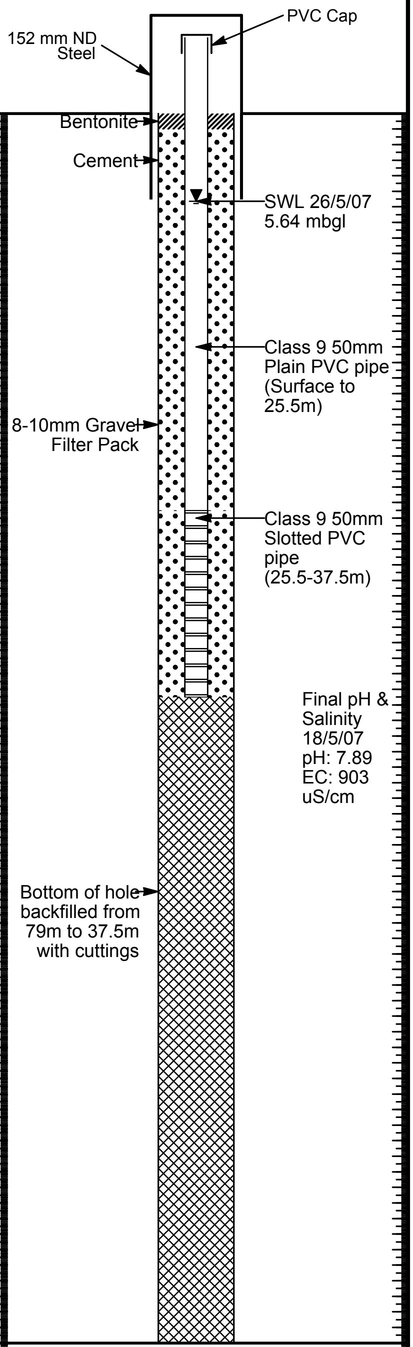
Project Reference:	**Maud Creek Hydro Studies**	Client:	**Terra Gold Mining Limited**
Drilling Contractor:	**Bores NT**	Location:	**Maud Creek**
Project No.:	**42213780**		
Logged By:	**C.Schenker**	Bore Size:	**143 mm**
Checked By:	**C.MacHunter**	Total Depth:	**79.00 m**
Date Started:	**16-5-07**	Casing Size:	**50 mm**
Date Finished:	**17-5-07**		
Relative Level:	**139.57**	Drill Type:	**Air Hammer**
Coordinates:	**8403549.68 mN** / **224424.77 mE**	Drill Model:	**Bourne 1250**
Permit No:	**BCPK106**	Drill Fluid:	**None**

USC DESCRIPTION OF STRATA

Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations

Depth (m)	USC Description of Strata
0	SAND: Fine to medium grained, light brown/grey, 5% subangular gravels 1-2mm in size
	SILTSTONE: Weathered, orange/brown with ironstone fragments and some fine to medium grained sand
	SANDSTONE: Weathered, fine to medium grained, grey/brown with weathered siltstone fragments, purple/red
	SILTSTONE: Slightly weathered, purple/red
	GREYWACKE: Fresh, massive, grey with some green colour, medium to coarse grained, minor ironstone banding
	SILTSTONE: Slightly weathered, purple/red with some quartz banding, moist
	SANDSTONE: Weakly cemented, medium to coarse grained, grey, minor groundwater seepage
	GREYWACKE: Fresh, massive, grey/green, medium to coarse grained
	SILTSTONE: Fresh, purple/brown
	GREYWACKE: Fresh, massive, grey/green, medium to coarse grained
79	End of Hole @ 79m - Extent of Investigation

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL MB2

URS Australia Pty Ltd
Level 3, 93 Mitchell Street, Darwin 0800
Phone: 08 8980 2900
Fax: 08 8941 3920

Project Reference:	Maud Creek Hydro Studies	Client:	Terra Gold Mining Limited
Drilling Contractor:	Bores NT	Location:	Maud Creek
Project No.:	42213780		
Logged By:	C.Schenker	Bore Size:	143 mm
Checked By:	C.MacHunter	Total Depth:	55.00 m
Date Started:	20-5-07	Casing Size:	50 mm
Date Finished:	22-5-07		
Relative Level:	136.05	Drill Type:	Air Hammer
Coordinates:	8402488.97 mN 226009.51 mE	Drill Model:	Bourne 1250
Permit No:	BCPK106	Drill Fluid:	Water & Foam

Depth (m) | Legend

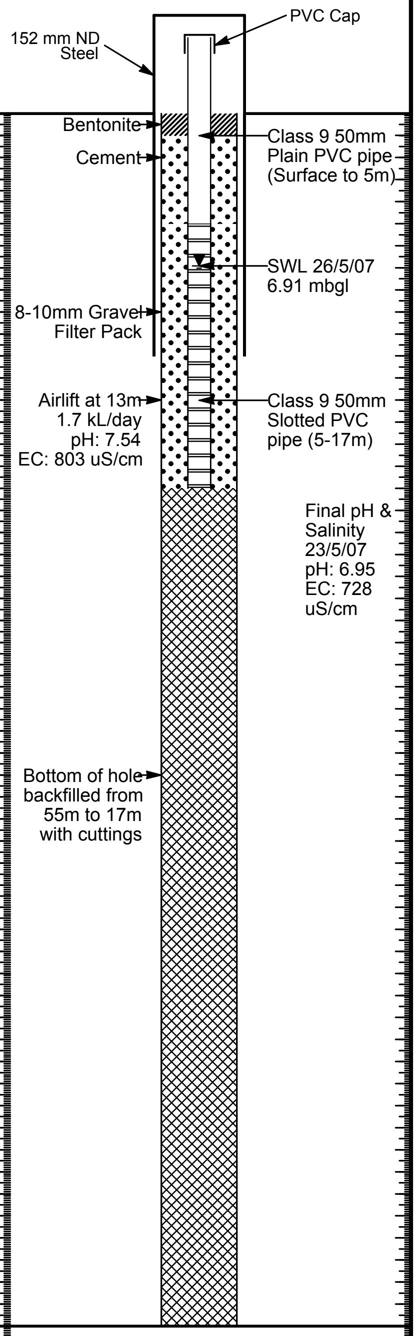
USC DESCRIPTION OF STRATA

Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations

- ALLUVIUM: Sand, fine to medium grained, brown/grey
- Clayey SAND: Fine grained, dark brown with some subrounded gravels to 3mm in size
- SANDSTONE: Weathered, quartz fragments 5 - 15mm with some subangular and subrounded weathered sandstone and siltstone fragments. Groundwater seepage at 4.5m
- Red/brown sandstone fragments, subangular with quartz bands
- GREYWACKE: Weathered, dark grey/green with ironstone and quartz bands. Groundwater seepage from 11-14m
- DOLERITE: Slightly weathered, some quartz crytals up to 10mm in size, minor red mottling
- DOLERITE: Fresh, massive, medium grained, 30-40% white plagioclase feldspar and 60-70% black pyroxene, dry

End of Hole @ 55m - Extent of Investigation

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL MB3

URS Australia Pty Ltd
Level 3, 93 Mitchell Street, Darwin 0800
Phone: 08 8980 2900
Fax: 08 8941 3920

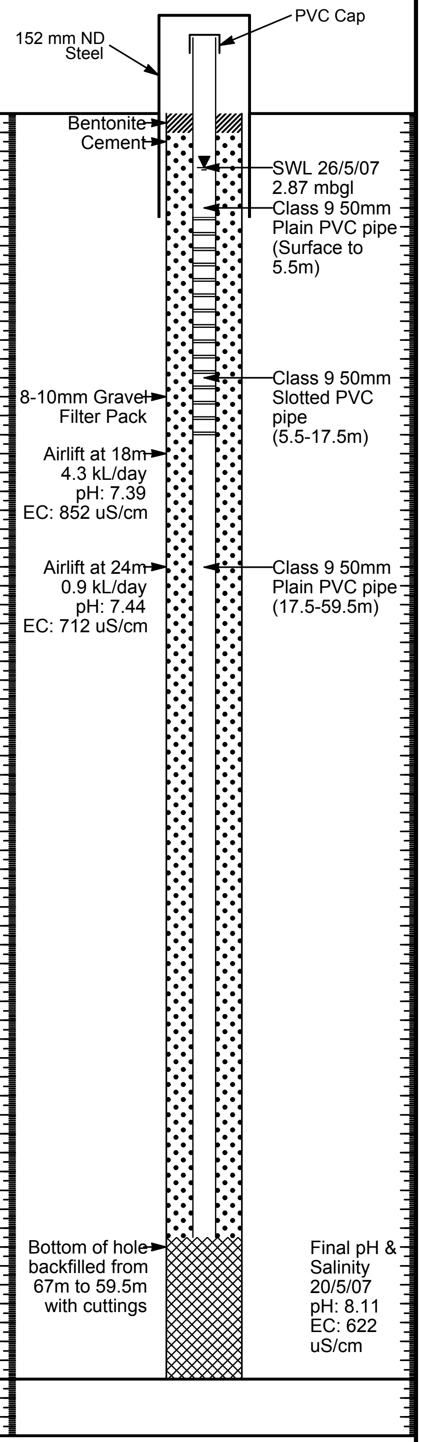
Drilling Contractor: **Bores NT**		Project Reference: **Maud Creek Hydro Studies**	Client: **Terra Gold Mining Limited**
		Project No.: **42213780**	Location: **Maud Creek**
Logged By: **C.Schenker**	Bore Size: **143 mm**	Relative Level: **139.52**	Drill Type: **Air Hammer**
Checked By: **C.MacHunter**	Total Depth: **67.00 m**	Coordinates: **8401398.27 mN**	Drill Model: **Bourne 1250**
Date Started: **18-5-07**	Casing Size: **50 mm**	**227028.34 mE**	
Date Finished: **20-5-07**		Permit No: **BCPK106**	Drill Fluid: **Water**

USC DESCRIPTION OF STRATA

Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations

Depth (m)	USC Description of Strata
0	ALLUVIUM: Clayey SAND, medium to coarse grained, brown, trace subangular gravels to 1mm in size
	BASALT: Weathered, fine grained, black/dark grey with some ironstone bands
	BASALT: Weathered, with some grey/brown sandy clay Groundwater seepage at 5.0m
10	BASALT: Slightly weathered, black/dark grey Groundwater seepage in fractured zone from 14-16m Quartz bands from 17-22m
25	BASALT: Fresh, massive, black/dark grey, dry Slightly weathered from 54-56m
67	End of Hole @ 67m - Extent of Investigation

WELL CONSTRUCTION DETAILS



URS

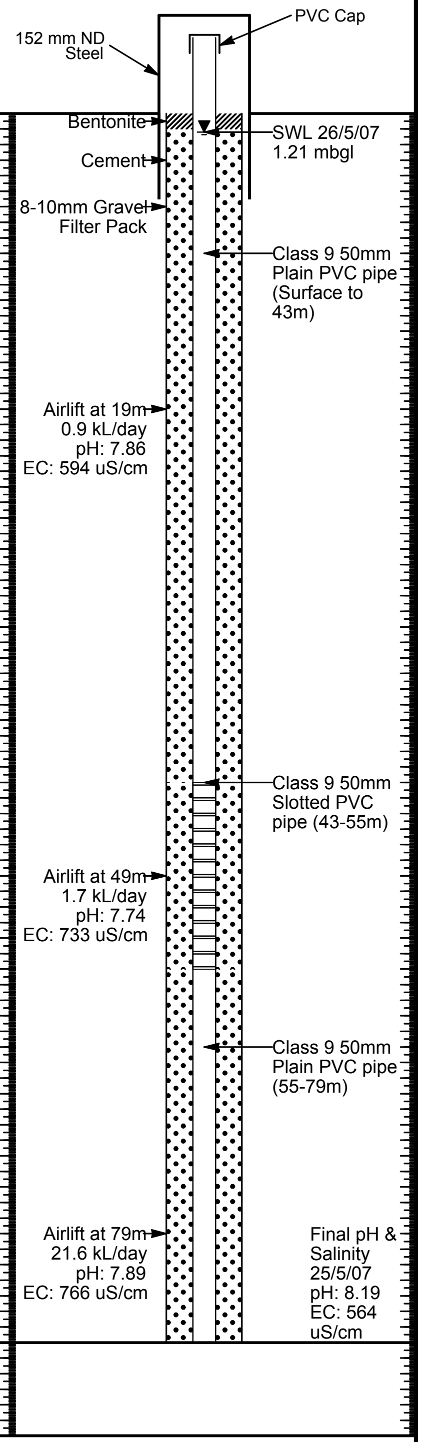
MONITORING WELL MB4

URS Australia Pty Ltd
Level 3, 93 Mitchell Street, Darwin 0800
Phone: 08 8980 2900
Fax: 08 8941 3920

Project Reference:	**Maud Creek Hydro Studies**	Client:	**Terra Gold Mining Limited**
Drilling Contractor:	**Bores NT**	Location:	**Maud Creek**
Project No.:	**42213780**		
Logged By:	**C.Schenker**	Bore Size:	**143 mm**
Checked By:	**C.MacHunter**	Total Depth:	**79.00 m**
Date Started:	**23-5-07**	Casing Size:	**50 mm**
Date Finished:	**24-5-07**		
Relative Level:	**149.56**	Drill Type:	**Air Hammer**
Coordinates:	**8400037.33 mN** **225126.65 mE**	Drill Model:	**Bourne 1250**
Permit No:	**BCPK106**	Drill Fluid:	**Water**

Depth (m)	Legend	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations
		Clayey SAND: Fine to medium grained, dark brown with some weathered laterite fragments, orange/red/brown
		Groundwater seepage from 2-4m.
		SANDSTONE: Slightly weathered, medium grained, grey/red, dry
		Sandy CLAY: Low plasticity, grey/purple, with some grey/green weathered sandstone fragments
		SANDSTONE: Fresh, medium grained, dark grey/red, fractured 22-23m
		Sandy CLAY: low plasticity, brown/grey, with minor fragments of sandstone
		SILTSTONE: Fresh, massive, grey/red/purple with some minor green colour
		End of Hole @ 79m - Extent of Investigation

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL MB5

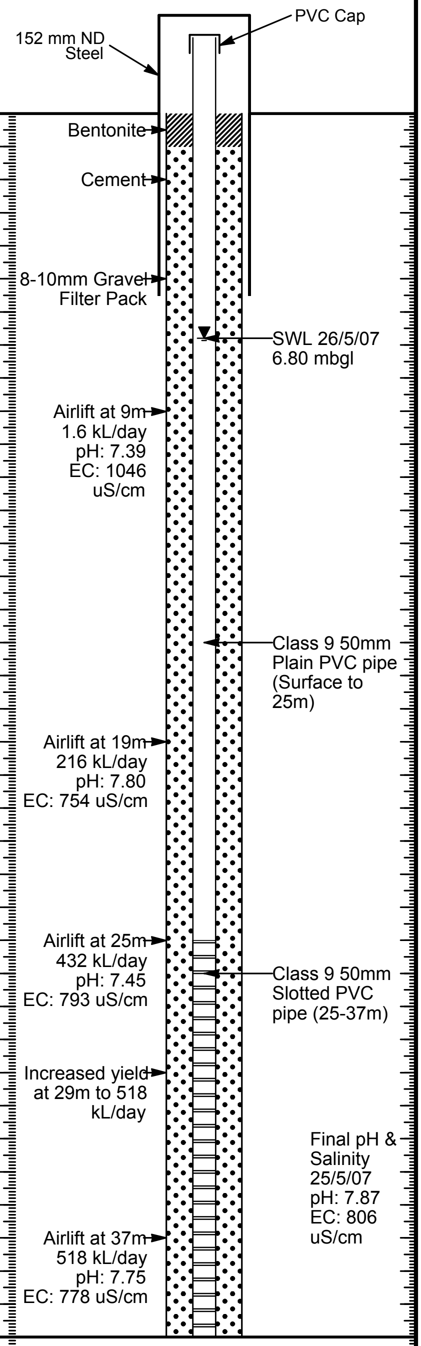
URS Australia Pty Ltd Level 3, 93 Mitchell Street, Darwin 0800	Phone: 08 8980 2900 Fax: 08 8941 3920	Project Reference: **Maud Creek Hydro Studies**	Client: **Terra Gold Mining Limited**
Drilling Contractor: **Bores NT**		Project No.: **42213780**	Location: **Maud Creek**
Logged By: **C.Schenker** Checked By: **C.MacHunter** Date Started: **24-5-07** Date Finished: **25-5-07**	Bore Size: **143 mm** Total Depth: **37.00 m** Casing Size: **50 mm**	Relative Level: **160.57** Coordinates: **8400119.90 mN** **223429.98 mE** Permit No: **BCPK106**	Drill Type: **Air Hammer** Drill Model: **Bourne 1250** Drill Fluid: **None**

USC DESCRIPTION OF STRATA

Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations

Depth (m)	Legend	USC Description of Strata
0 – 0.6		SILT: orange/brown
0.6 – 4		Silty CLAY: low plasticity, brown/red
4 – 22		LIMESTONE: Slightly weathered, grey/white, some quartz bands Cavities in limestone - groundwater inflow at 9m. Orange/grey limestone with some ironstone bands Cavities in limestone - increased groundwater inflow from 12m
22 – 27		GREYWACKE: Fractured, grey/green/blue colour with quartz bands, some pyrite
27 – 29		SANDSTONE: Weakly cemented, coarse grained, light brown/orange with clay
29 – 32		GREYWACKE: Fractured, grey/green/blue colour with quartz bands
32 – 37		GREYWACKE: Fresh, massive, grey/green/blue colour
37		End of Hole @ 37m - Extent of Investigation

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL MB6

URS Australia Pty Ltd
Level 3, 93 Mitchell Street, Darwin 0800
Phone: 08 8980 2900
Fax: 08 8941 3920

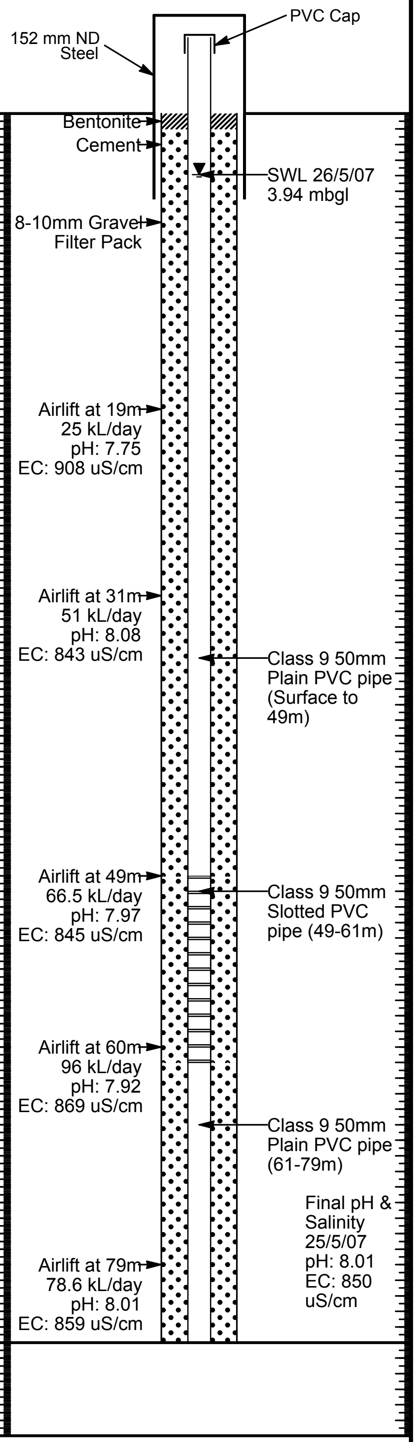
Project Reference:	**Maud Creek Hydro Studies**	Client:	**Terra Gold Mining Limited**
Drilling Contractor:	**Bores NT**	Location:	**Maud Creek**
Project No.:	**42213780**		
Logged By:	**C.Schenker**	Bore Size:	**143 mm**
Checked By:	**C.MacHunter**	Total Depth:	**79.00 m**
Date Started:	**22-5-07**	Casing Size:	**50 mm**
Date Finished:	**23-5-07**		
Relative Level:	**150.15**	Drill Type:	**Air Hammer**
Coordinates:	**8400042.82 mN** / **226656.45 mE**	Drill Model:	**Bourne 1250**
Permit No:	**BCPK106**	Drill Fluid:	**None**

USC DESCRIPTION OF STRATA

Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations

Depth (m)	USC Description of Strata
0–2	Clayey SAND: Brown/orange, fine to medium grained with coarse grained sandstone fragments, grey/orange/brown
2–7	Gravelly SAND: Coarse grained, brown, subangular gravels to 2mm in size
7–9	Sandy CLAY: Low plasticity, light brown/grey, with some quartz fragments to 5mm and weathered grey sandstone fragments
9–79	SANDSTONE: Weathered, medium grained, grey, with quartz bands and some ironstone fragments
	DOLERITE: Fresh, medium grained, some pink/orange mottling Minor fractures: 16-18m 21-22m 26-27m 46-47m 64-67m
57	Quartz band from 57-58m
79	End of Hole @ 79m - Extent of Investigation

WELL CONSTRUCTION DETAILS



Appendix B Groundwater Chemistry Data

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: URS AUSTRALIA PTY LTD	*Laboratory*	: Environmental Division Sydney	*Page*	: 1 of 5
Contact	: MR CHRIS Mac HUNTER	*Contact*	: Victor Kedicioglu	*Work Order*	: ES0707098
Address	: G P O BOX 2005 DARWIN NT AUSTRALIA 0801	*Address*	: 277-289 Woodpark Road Smithfield NSW Australia 2164		
E-mail	: chris_machunter@urscorp.com	*E-mail*	: Victor.Kedicioglu@alsenviro.com		
Telephone	: 89802900	*Telephone*	: 61-2-8784 8555		
Facsimile	: 89413920	*Facsimile*	: 61-2-8784 8500		
Project	: 42213780	*Quote number*	: EN/001/07	*Date received*	: 29 May 2007
Order number	: - Not provided -			*Date issued*	: 5 Jun 2007
C-O-C number	: - Not provided -			*No. of samples*	- *Received* : 6
Site	: MAUD CREEK				*Analysed* : 6

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

Accredited for compliance with ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

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

Signatory	*Position*	*Department*
Ankit Joshi		Inorganics - NATA 825 (10911 - Sydney)
Celine Conceicao	Spectroscopist	Inorganics - NATA 825 (10911 - Sydney)
Sarah Millington	Senior Inorganic Chemist	Inorganics - NATA 825 (10911 - Sydney)

Comments

This report for the ALSE reference ES0707098 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**
- **Surrogate Recovery Data**

The analytical procedures used by ALS Environmental 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 herein. Reference methods from which ALSE methods are based are provided in parenthesis.

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.

Specific comments for Work Order **ES0707098**

LOR has been raised for Chromium due to matrix interference.

Analytical Results

Analyte	CAS number	LOR	Units	MB1	MB2	MB3	MB4	MB5
Sample Matrix Type / Description				WATER	WATER	WATER	WATER	WATER
Sample Date / Time				21 May 2007 15:00	24 May 2007 15:00	21 May 2007 15:00	26 May 2007 15:00	26 May 2007 15:00
Laboratory Sample ID				ES0707098-001	ES0707098-002	ES0707098-003	ES0707098-004	ES0707098-005
EA005: pH								
pH Value		0.01	pH Unit	7.81	7.44	7.14	7.27	7.36
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	636	502	434	320	462
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	331	458	356	264	466
Total Alkalinity as CaCO3		1	mg/L	331	458	356	264	466
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	16	28	60	40	5
Sulphur as S	63705-05-5	1	mg/L	5	9	20	13	2
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1.0	mg/L	134	9.3	7.4	9.7	4.7
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	19	53	45	38	82
Magnesium	7439-95-4	1	mg/L	16	72	66	36	60
Sodium	7440-23-5	1	mg/L	206	29	19	32	8
Potassium	7440-09-7	1	mg/L	12	7	8	9	4
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.009	0.006	0.012	0.018	0.003
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.012	<0.005	0.007
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.09	<0.05	<0.05
EN055: Ionic Balance								
Total Anions		0.01	meq/L	10.7	9.99	8.56	6.37	9.54
Total Cations		0.01	meq/L	11.6	9.98	8.69	6.49	9.43
Ionic Balance		0.01	%	3.77	0.07	0.75	0.87	0.57

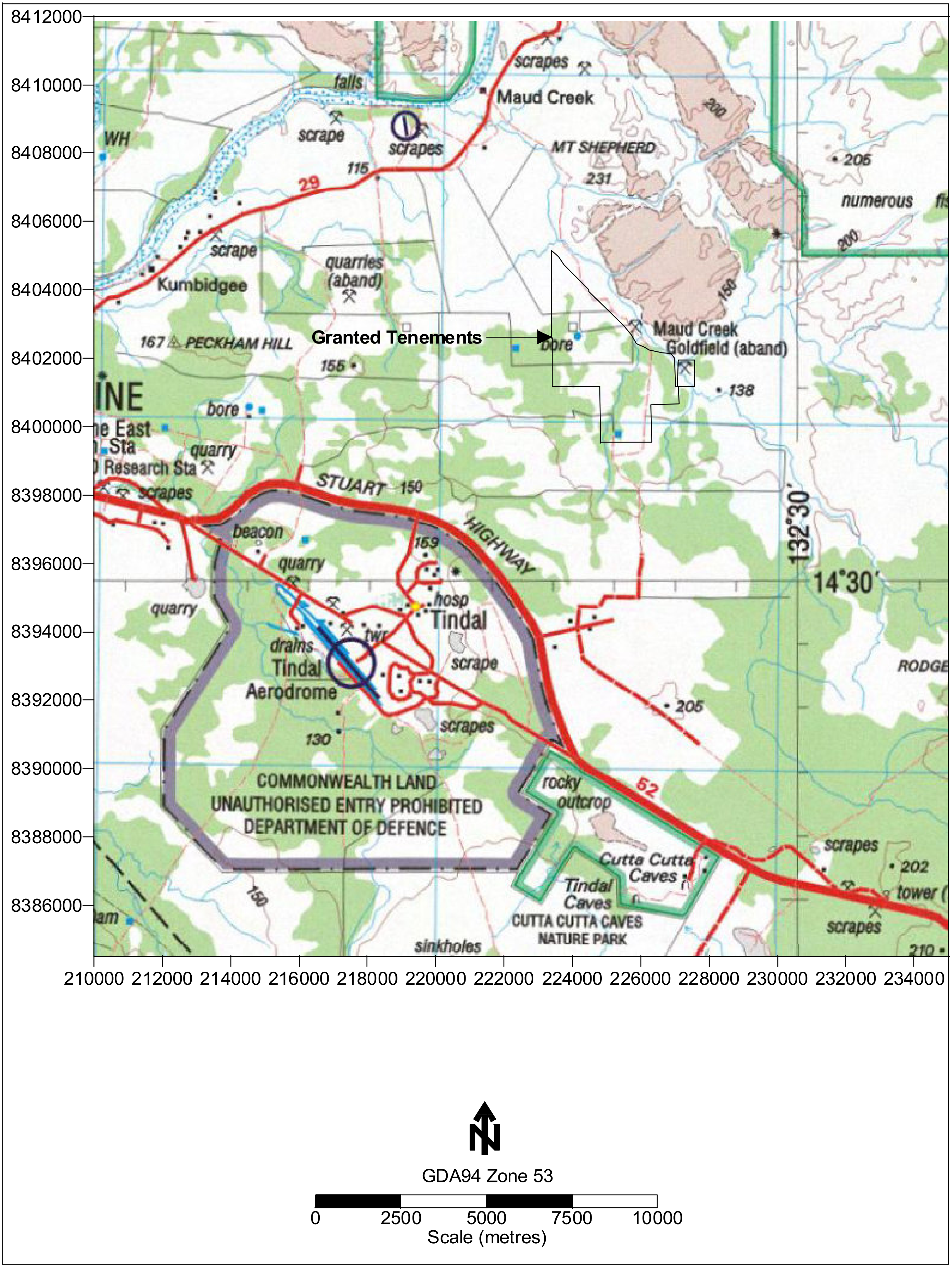
ALS Environmental

Analytical Results

			Client Sample ID :	MB6				
			Sample Matrix Type / Description :	WATER				
			Sample Date / Time :	26 May 2007 15:00				
			Laboratory Sample ID :	ES0707098-006				
Analyte	***CAS number***	***LOR***	***Units***					
EA005: pH								
pH Value		0.01	pH Unit	7.75				
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	528				
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1				
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1				
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	448				
Total Alkalinity as CaCO3		1	mg/L	448				
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	50				
Sulphur as S	63705-05-5	1	mg/L	16				
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1.0	mg/L	10.0				
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	58				
Magnesium	7439-95-4	1	mg/L	70				
Sodium	7440-23-5	1	mg/L	28				
Potassium	7440-09-7	1	mg/L	18				
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.011				
Cadmium	7440-43-9	0.0001	mg/L	<0.0001				
Chromium	7440-47-3	0.001	mg/L	0.009				
Copper	7440-50-8	0.001	mg/L	0.001				
Lead	7439-92-1	0.001	mg/L	<0.001				
Nickel	7440-02-0	0.001	mg/L	0.002				
Zinc	7440-66-6	0.005	mg/L	<0.005				
Iron	7439-89-6	0.05	mg/L	<0.05				
EN055: Ionic Balance								
Total Anions		0.01	meq/L	10.3				
Total Cations		0.01	meq/L	10.4				
Ionic Balance		0.01	%	0.44				

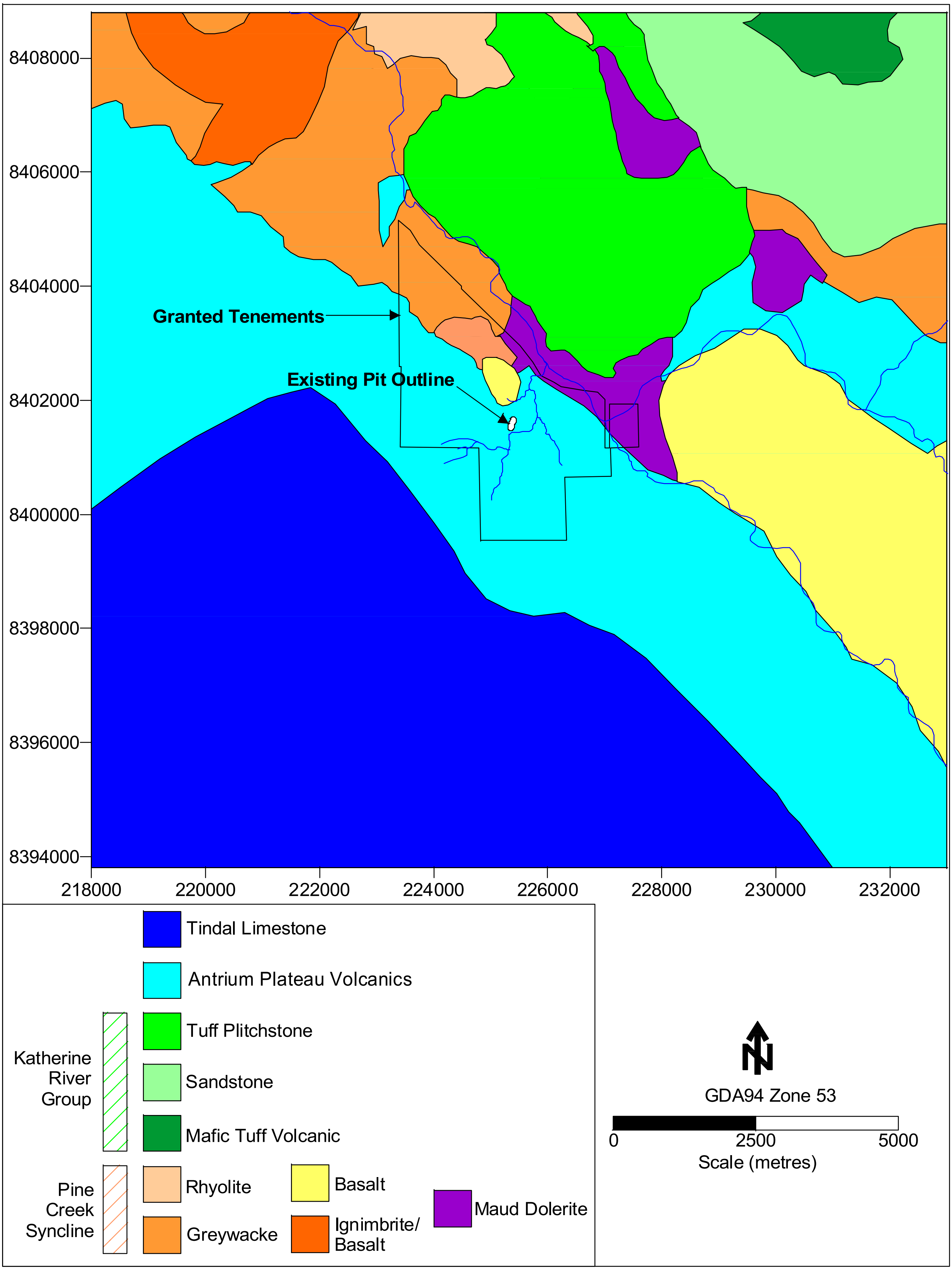
Surrogate Control Limits

- **No surrogates present on this report.**



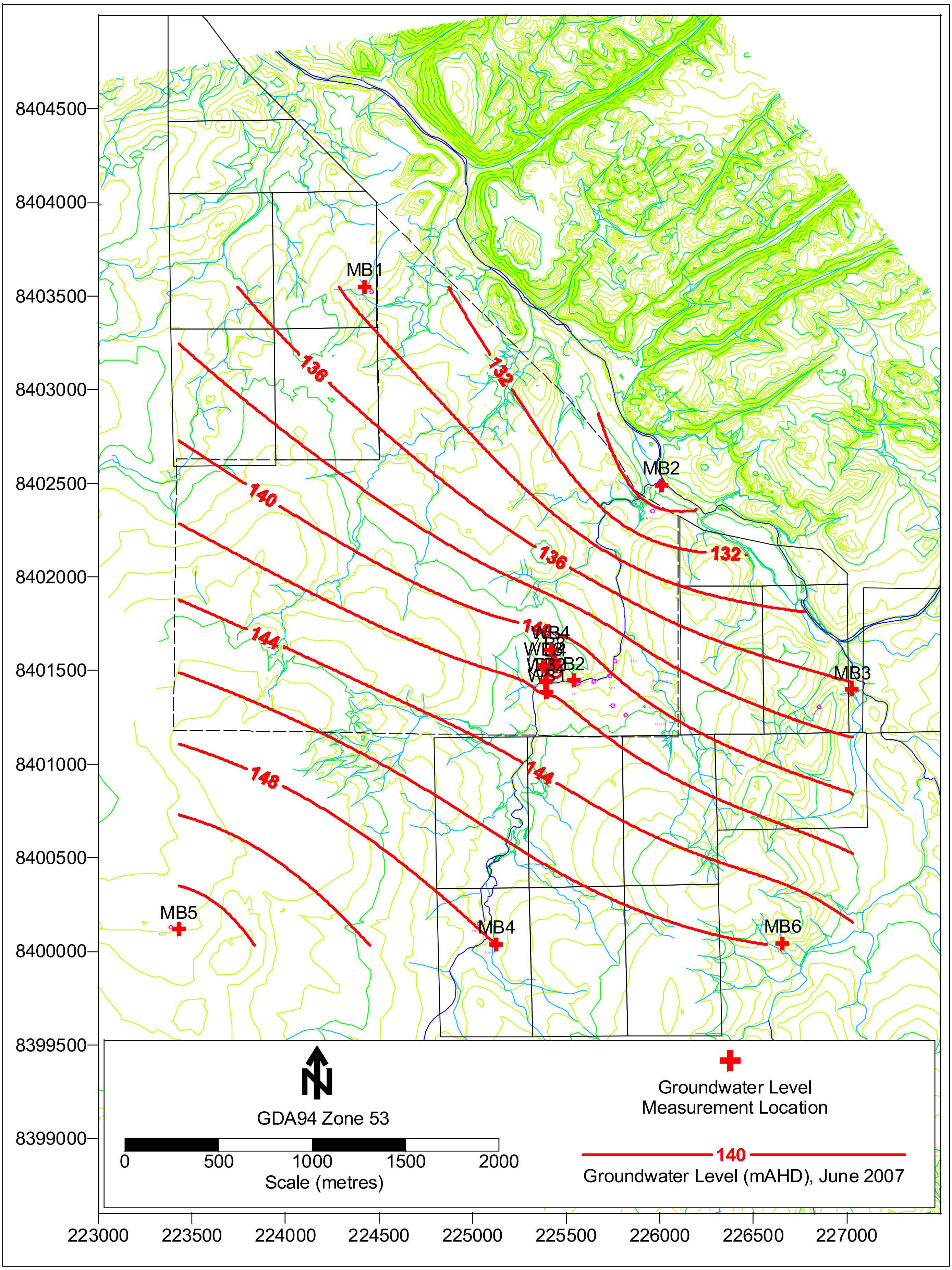
Source: NTGS Image Web Server 1:250,000 Topographic Map

Client:	Project:	Title:
Terra Gold Mining Ltd	Hydrogeological Assessment of the Maud Creek Gold Project	**Site Location**
URS	Drawn: IBdR / Approved: CM / Date: 2 Aug 07 / Job No: 42213780 / File No: Figure 01 - Location.srf	Figure: 1 / Rev A / A4



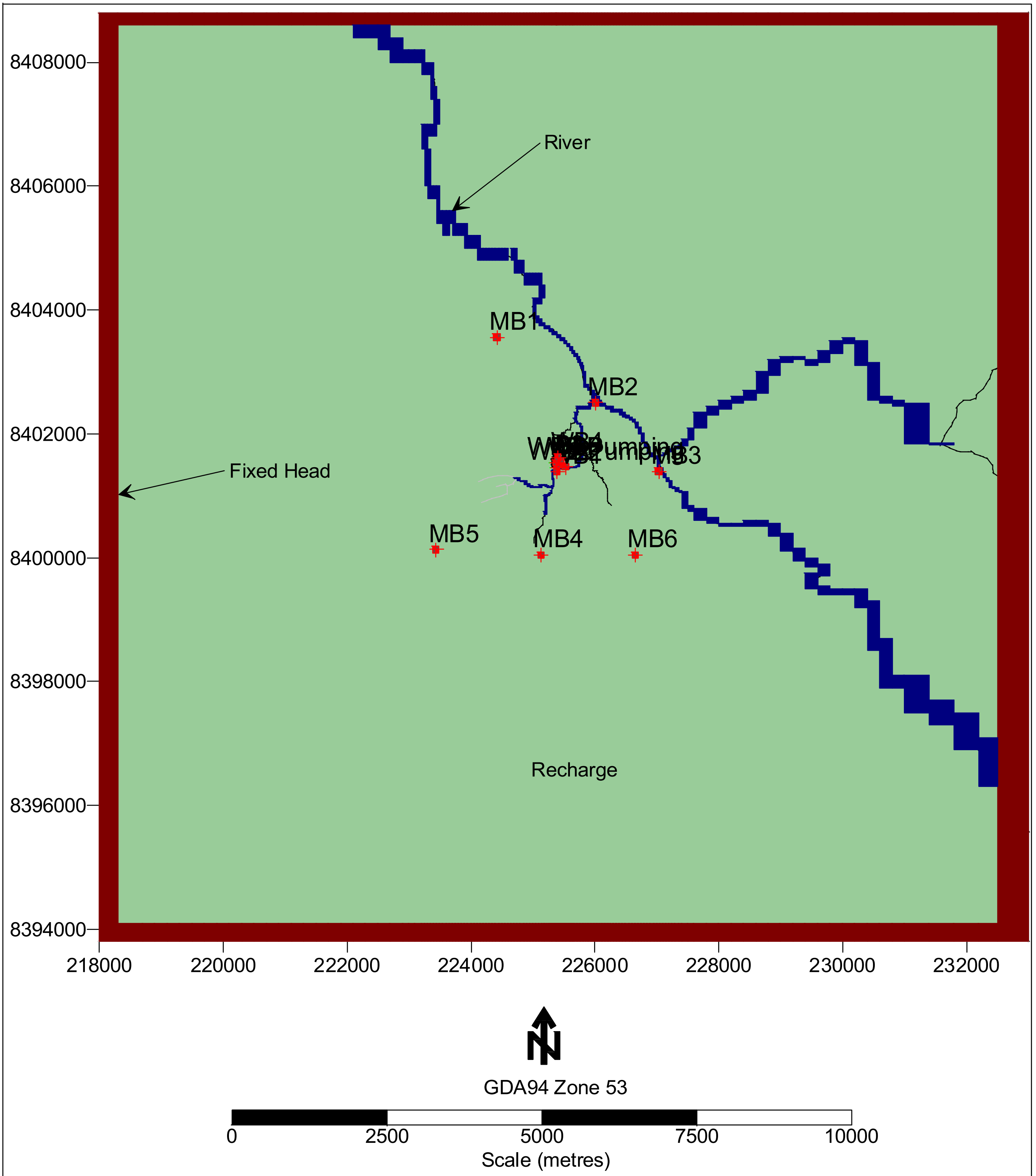
Source: after NTGS Image Web Server 1:250,000 Geological Map

Client: Terra Gold Mining Ltd	Project: Hydrogeological Assessment of the Maud Creek Gold Project		Title: **Regional Geology (Simplified)**	
URS	Drawn: IBdR	Approved: CM	Date: 2 Aug 07	Figure: **2**	Rev A
	Job No: 42213780	File No: Figure 02 - Geology.srf			A4



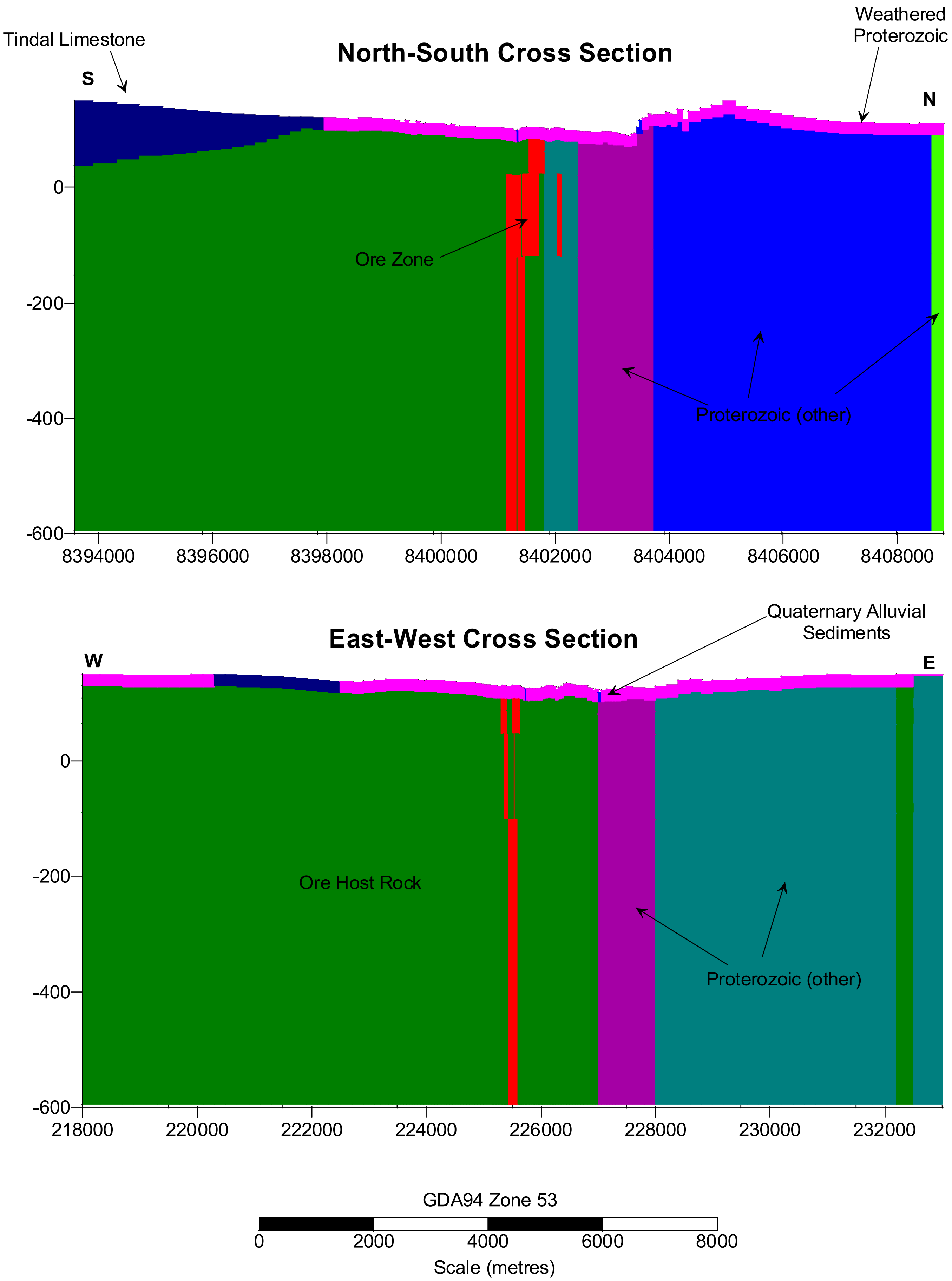
Source:

Client:	Project:	Title:
Terra Gold Mining Ltd	Hydrogeological Assessment of the Maud Creek Gold Project	**Groundwater Levels (June 2007)**
URS	Drawn: IBdR · Approved: CM · Date: 2 Aug 07 · Job No: 42213780 · File No: Figure 03.srf	Figure: **3** · Rev A · A4



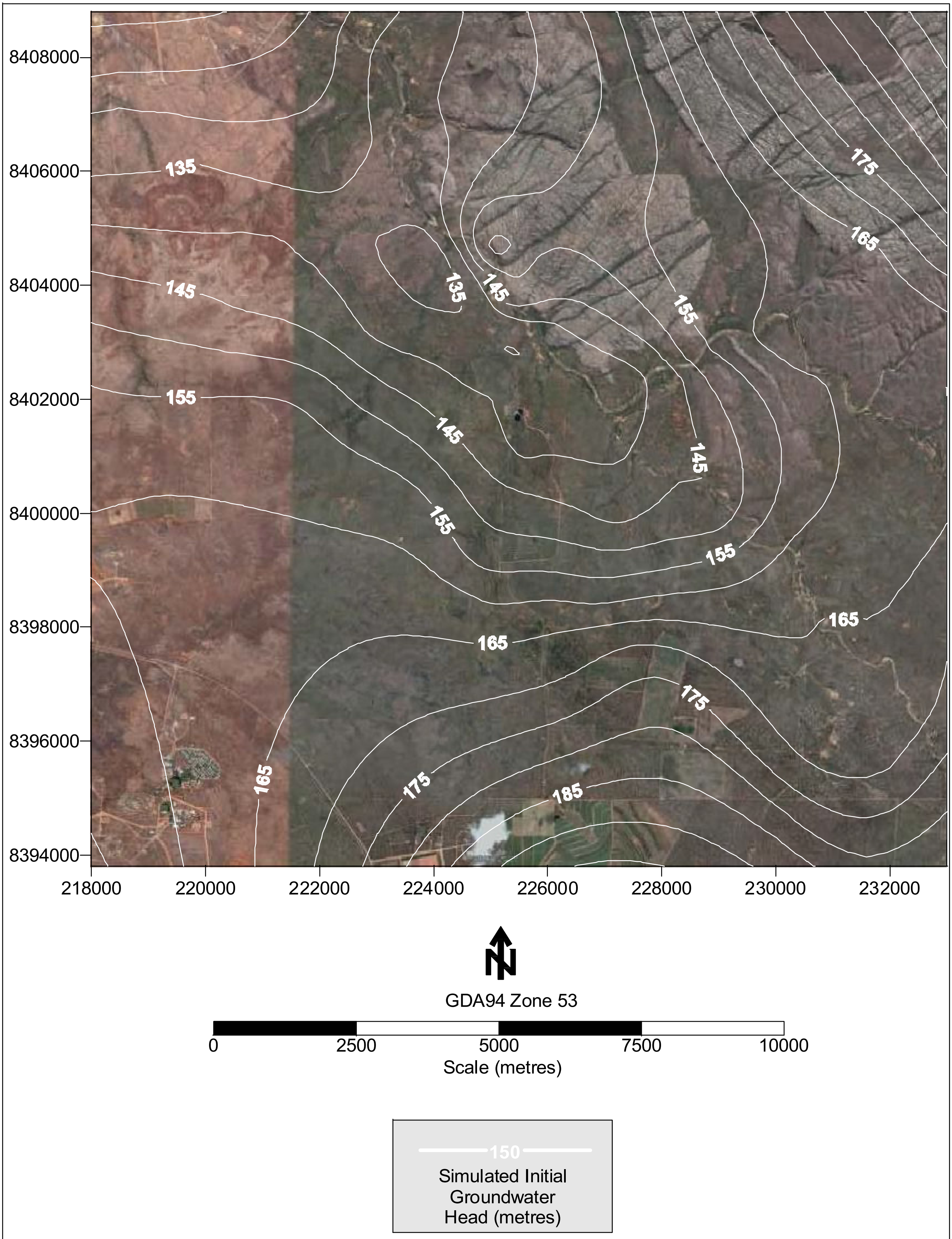
Source:

Client: Terra Gold Mining Ltd	Project: Hydrogeological Assessment of the Maud Creek Gold Project	Title: **Model Domain and Boundary Conditions**
URS	Drawn: IBdR · Approved: CM · Date: 2 Aug 07 · Job No: 42213780 · File No: Figure 04.srf	Figure: **4** · Rev A · A4



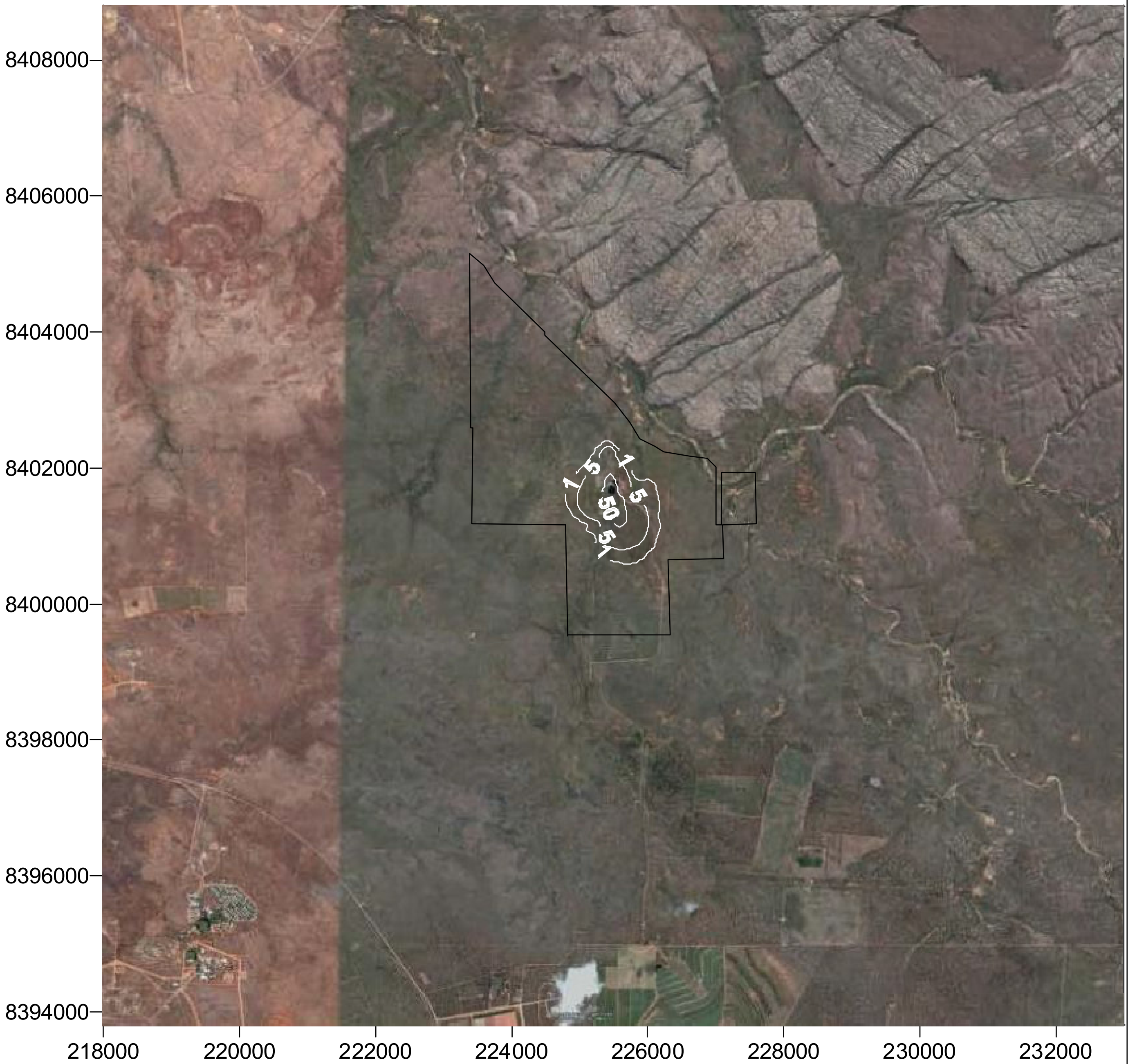
Source:

Client: Terra Gold Mining Ltd	Project: Hydrogeological Assessment of the Maud Creek Gold Project		Title: Model Cross Sections	
URS	Drawn: IBdR	Approved: CM	Date: 2 Aug 07	Rev A
	Job No: 42213780	File No: Figure 05.srf	Figure: 5	A4



Source: Google Earth

Client: Terra Gold Mining Ltd	Project: Hydrogeological Assessment of the Maud Creek Gold Project		Title: Simulated Groundwater Levels (Steady State)	
URS	Drawn: IBdR	Approved: CM	Date: 2 Aug 07	Figure: 6	Rev A
	Job No: 42213780	File No: Figure 06.srf		A4



GDA94 Zone 53

0 2500 5000 7500 10000

Scale (metres)

20

Simulated Groundwater Drawdown (metres)

Source: Google Earth

Client:	Project:	Title:
Terra Gold Mining Ltd	Hydrogeological Assessment of the Maud Creek Gold Project	**Simulated Groundwater Drawdown - Year 2**

URS	Drawn: IBdR	Approved: CM	Date: 2 Aug 07	Figure: 7	Rev A
	Job No: 42213780	File No: Figure 7.srf			A4

Source: Google Earth

Client:	Project:		Title:	
Terra Gold Mining Ltd	Hydrogeological Assessment of the Maud Creek Gold Project		**Simulated Groundwater Drawdown - Year 10**	
URS	Drawn: IBdR	Approved: CM / Date: 2 Aug 07	Figure: **8**	Rev A
	Job No: 42213780	File No: Figure 08.srf		A4