Appendix 1: Ajax Characterisation Report

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2 March 2012

Ref: 201012-00322
File: 201012-00322

Mick Anstey
Flinders Mines Limited
62 Beulah Road
Norwood South Australia 5067

Dear Mick

AJAX SITE CHARACTERISATION REPORT

Background

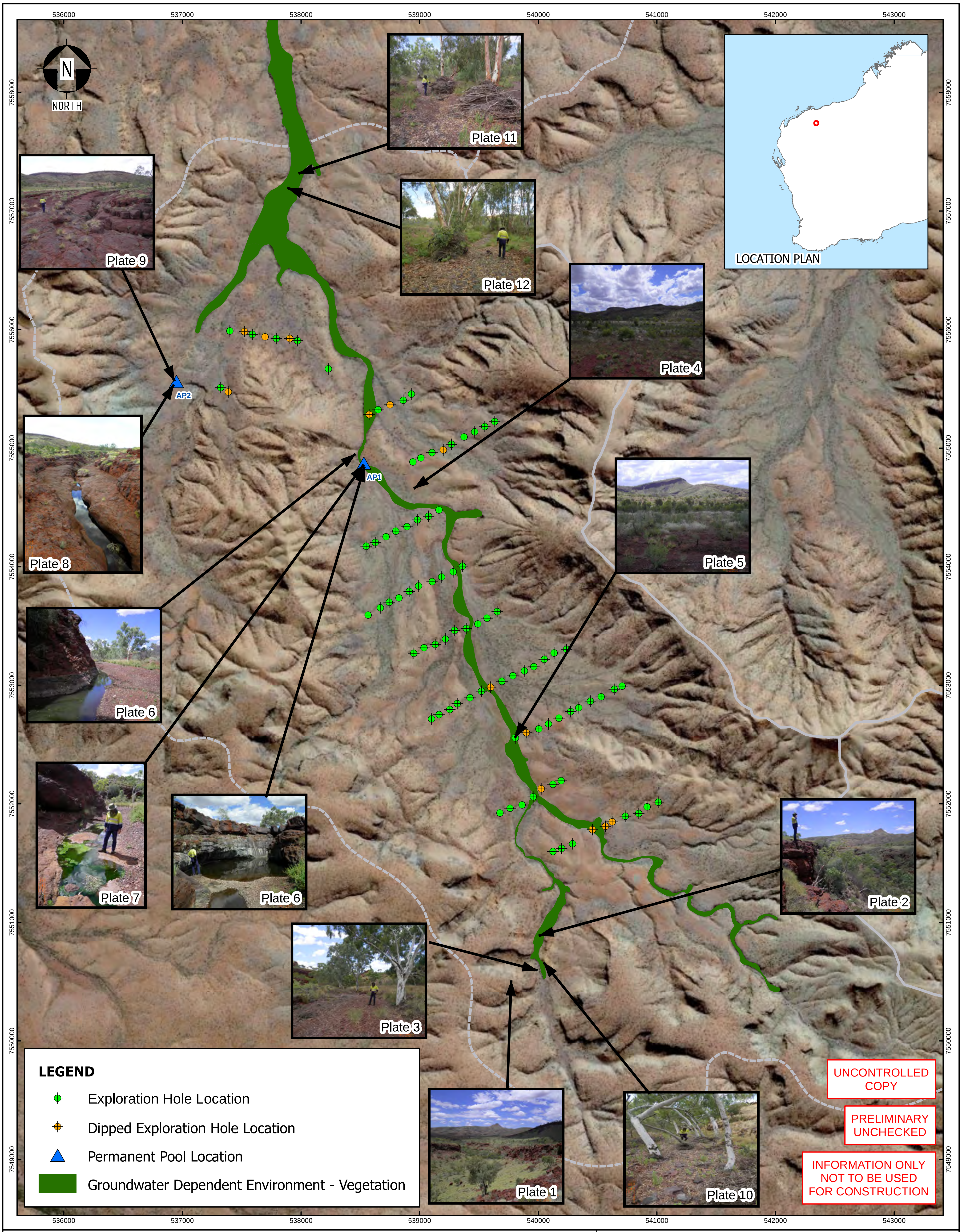
A meeting was held between Flinders, Ecoscape and WorleyParsons in Perth on the 2nd October 2011 to discuss the presence of groundwater dependant ecosystems (GDE) identified during recent surveys at locations within and in proximity to Flinders' Blacksmith and Anvil tenements. Ajax was identified as an area with GDEs including two permanent pools with significant heritage value. Figure 1 shows the Ajax catchment and location of identified GDEs.

In this meeting it was decided that further work was needed to characterise the surface water hydrology and subsurface hydrogeology of the Ajax deposit, with particular reference to GDEs and the pools with significant heritage value. This report presents the results of this investigation work.

Scope of Work

The Scope of Work (SoW) for this investigation included:

- Site visit to collect field data and observations;
- Desk top analysis of available reports and data;
- Characterisation of the hydrology and hydrogeology of the Ajax deposit;
- Discussion on the relationship between the surface hydrology and subsurface hydrogeology relative to the presence of GDEs; and
- Present potential environmental impacts associated with mining at Ajax and corresponding mitigation measures to minimise impacts.



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FLINDERS MINES - SURFACE AND GROUNDWATER FEATURES

FIGURE 1

DATE :	10 Feb 2012	SCALE :	1:30,000
CUSTOMER :	FLINDERS MINES	AUTHOR :	Robert Milton
MAP :	Ajax_Figure1_RevD_20120110.mxd		
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Site Visit

A site visit was conducted between the 20th and 23rd of November to walk over the Ajax deposit and collect field data and observations needed to evaluate the surface hydrology and hydrogeology of the Ajax deposit. Watercourses, GDEs, permanent pools and geological features were identified and photographed. A selection of these photographs is provided in Appendix A (Plates 1 to 12), while their locations are shown in Figure 1.

Two significant permanent pools with significant heritage value, defined as Ajax Pool 1 (AP1) and Ajax Pool 2 (AP2) in this report, were visited during the site visit (Plates 6 to 9), and measurements taken to estimate the approximate standing water level in mAHD. The location of these pools are shown on Figure 1.

Piles of debris deposited within the main channels of watercourses at Ajax were located and the maximum height of the debris measured and their location recorded using a hand-held GPS. The heights were converted to debris levels (in mAHD) using ground levels estimated using airborne LIDAR survey data. The debris levels represented the maximum water level experienced during recent flood events. All debris level measurements are presented in Appendix B.

Several exploration holes were located at Ajax and the depth to groundwater recorded in the holes that had not collapsed for comparison with standing water levels at the pools. These depths were then converted to water levels (in mAHD) using ground levels estimated using airborne LIDAR survey data.

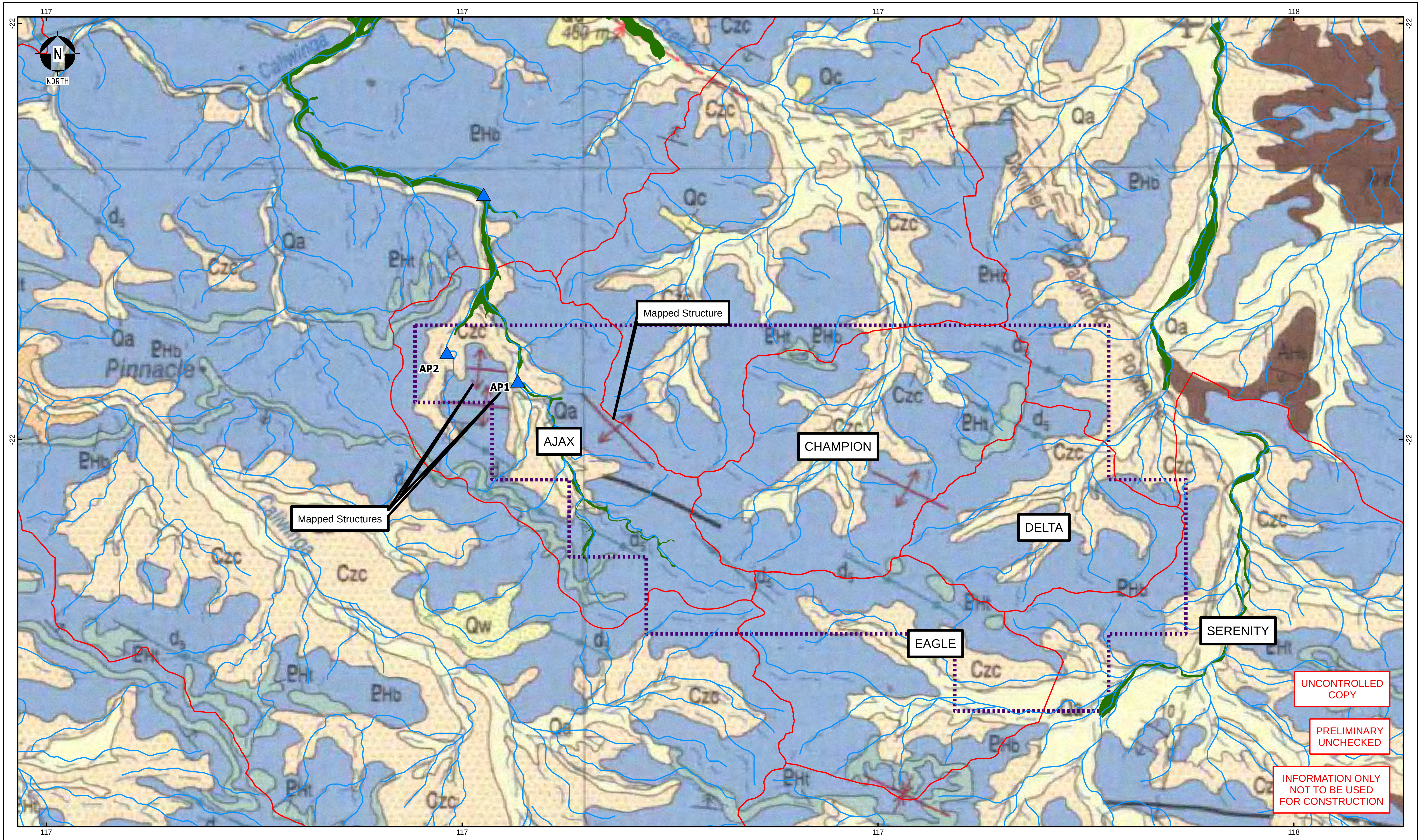
Local Hydrology

The Ajax catchment area shown in Figure 2 has an area of approximately 36km^2 delineated using topographic contours generated using LIDAR survey data and 90m SRTM data. This catchment lies within the Millstream catchment which has an approximate area of 4,770km^2. Therefore the Ajax catchment represents 0.7% of the Millstream catchment area.

The Champion, Eagle and Delta catchments are presented in Figure 1 for comparison and also lie within the Millstream catchment area.

The average annual rainfall at Ajax is 459mm based on rainfall recorded at Wittenoom between 1950 and 2011 (BoM #5026) while the average annual pan evaporation exceeds 3,000mm (BoM). Because annual evaporation greatly exceeds rainfall, the ability of porous sediments within the catchment to capture rainfall recharge, store and discharge groundwater is extremely important for preservation of the permanent pools.

The largest ephemeral creek at Ajax flows north through the centre of the catchment with a channel grade of approximately 1% and bounded by steep and rocky terrain. The majority of surface water runoff generated within the Ajax catchment during rainfall events flows via this ephemeral creek north to Caliwingina Creek before discharging into the Fortescue River (Figure 2).



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0 0.5 1 2 3 4 5

Kilometers at A3

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LEGEND

▲	Permanent Pool Locations
―	Drainage
🟩	Groundwater Dependent Environment - Vegetation
☐	Catchment Boundary
⬚	Tenement E 47/882

LOCATION PLAN

FLINDERS MINES - REGIONAL
GEOLOGY AND CATCHMENT AREAS

FIGURE 2

DATE : 10 Feb 2012
SCALE : 1:85,000
CUSTOMER : FLINDERS MINES
AUTHOR : Rob Milton
MAP : Ajax_Figure2_RevD_20120110.mxd
REV : D

Produced By: Rob Milton, Water Resources, WA

Location: I:\Projects\201012-00322 FMS VIP\10.0 Engineering\Hydrogeology\Ajax investigations\GDE_Report\ArcGIS\Map_Docs\Ajax_Figure2_RevD_20120110.mxd

The channel widths of creeks in this catchment reduce when they pass through deeply incised valleys (Plate 2), then increase in areas where the valley widens (Plate 4 and 5). The creeks have thicker alluvial sediments in areas where the channel grade is low and the channel width is greatest. This is because the flood flows have lower velocities which promote the deposition of sediments. The creeks contain thin alluvial sediments in the areas where they pass through narrow and deeply incised valleys bounded by steep rocky slopes (Plate 10). The flows in these areas are concentrated through a smaller cross sectional area, which increases flow velocities causing scour of sediments and exposure of bedrock. The permanent pools at AP1 and AP2 have been formed by erosion and scour of exposed bedrock while the creeks are in flow (Plates 6 to 9).

Due to the steep and rocky terrain, surface water runoff from this catchment is expected to be rapid in response to rainfall resulting in flash floods during extreme events associated with cyclonic activity or local thunderstorm activity. The steep terrain, incised nature of the creek and presence of exposed and near surface bedrock suggests that the catchment also has limited storage capacity. This means that groundwater recharge is limited and only occurs during a short period when there is stream-flow in the creek, with the majority of water flowing north out of the catchment area.

The Champion, Delta and Eagle catchment areas contribute water into the Serenity catchment to the East and are not linked to the Ajax catchment in any way except that they separately contribute surface water runoff to the Fortescue catchment. These catchments are similar however, in that they are each formed through the weathering and erosion of the Brockman formation and each receive similar rainfall patterns.

Local Geology

The Regional Geology of the area is described in the 1:250,000 Mt Bruce Map Sheet (SF50-11) and associated explanatory notes as first and second editions (de la Hunty, 1965; Thorne et al (GSWA), 1997). An extract from this geological map sheet is presented in Figure 2. The majority of the regional geology has no bearing upon the hydrogeology within the Ajax Catchment however it is important to note that each of the surrounding catchments within tenement E47/882 are also within the Brockman formation’s Banded Iron Formation (BIF), Cherts and Shale.

The Ajax Deposit is situated within a valley containing Quaternary and Cainozoic sediments overlying BIF bedrock from the Brockman formation, a part of the Hamersley group. The Brockman Iron Formation, with an estimated maximum thickness of about 550m, is the main iron-bearing formation within the Hamersley Group and has been described in detail by Trendall and Blockley (1970). The various members have been subdivided into the Whaleback Shale member, the Dales Gorge member, the Joffre BIF member, and the Yandicoogina Shale member (Thorne et al (GSWA), 1997). Within Ajax, the particular member could not be determined due to a lack of information however, during 250k geological mapping (GSWA, 1997), several W-E oriented (hinge) folds were encountered on the SW flank and one NW-SE oriented (hinge) fold was encountered on the NE flank of the Ajax catchment.

Large quantities of Banded Iron Formation (BIF), chert and shale are scattered throughout the landscape. Steep slopes can be found within the Ajax catchment covered with remnants of BIF and Detrital Iron and the valley contain some alluvial clay, Channel Iron Deposits (CID's) and Banded Iron Deposits (BID's) overlying BIF, chert and shale bedrock.

Exploration drilling has been performed along a number of cross sections shown in Figure 3. The geological logs and site observations have been used to develop a series of conceptualised cross sections for Ajax (Appendix C). The cross sections suggest that conceptual geology at Ajax differs from the Champion, Eagle and Delta within the FMS tenement, because there is a much shallower soil profile overlying the BIF bedrock, varying between 0m to 26m (in the drilled area). The BID and CID deposits, which are known to be the most transmissive units and most likely to contain groundwater, are thin and not extensive throughout the catchment. Therefore the storage capacity of the CID and BID units at Ajax is likely to be significantly smaller than at Champion, Eagle and Delta.

Local Hydrogeology

Groundwater levels recorded in open exploration holes and at the pools during the recent site visit were have been used to plot groundwater contours (depth bgl) in Figure 4. The contours show that direction of groundwater flow is to the north, and that near surface groundwater is present in the vicinity of the GDEs.

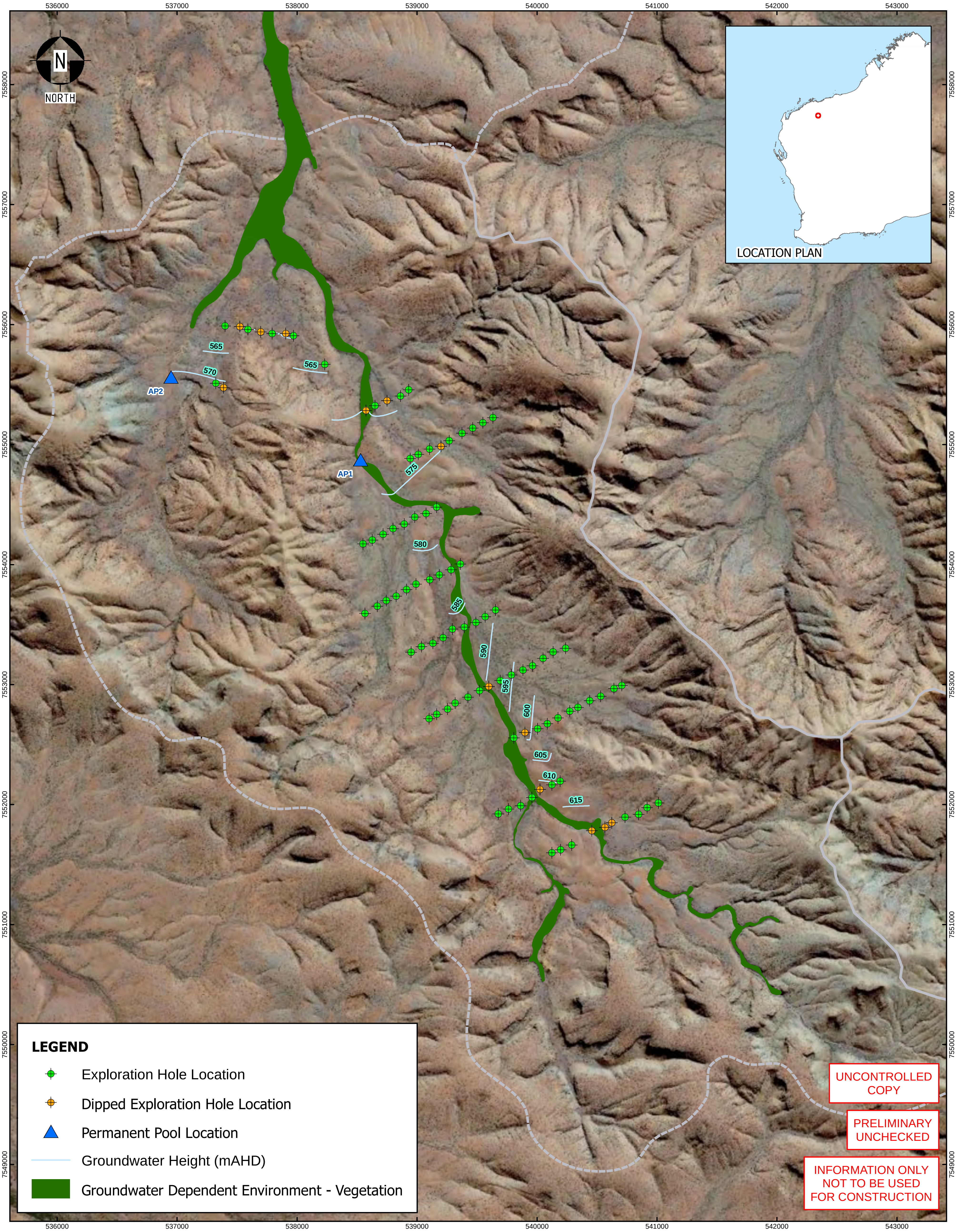
The measured groundwater levels have also been used to develop inferred groundwater levels in the cross sections presented in Appendix C.

Analysis of the geological cross sections and water levels recorded in exploration holes and pools suggests there are two distinctive occurrences of groundwater at Ajax:

1. A more extensive groundwater aquifer located at an elevation within the BID and DID deposits, just above the existing BIF bedrock; and
2. Pockets of perched groundwater associated with less extensive porous zones of alluvial sediments underlain by surface clays and located within or adjacent to creeks.

Local surface aquifers are restricted to saturated zones of a porous material above clay layers resulting from depositional changes during rainfall events. These zones naturally follow creek beds and channels within the top several metres of colluvium. The deeper aquifer tends to follow the surface of the highly-resistant and impermeable Brockman formation (BIF).

The degree of connectivity between the shallow perched groundwater and the deeper aquifer cannot be determined accurately with the existing geological data.



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FLINDERS MINES -
GROUNDWATER CONTOURS

FIGURE 3

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MAP :	Ajax_Figure3_RevA_20120110.mxd		
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Produced By: Robert Milton, Water Resources W.A.

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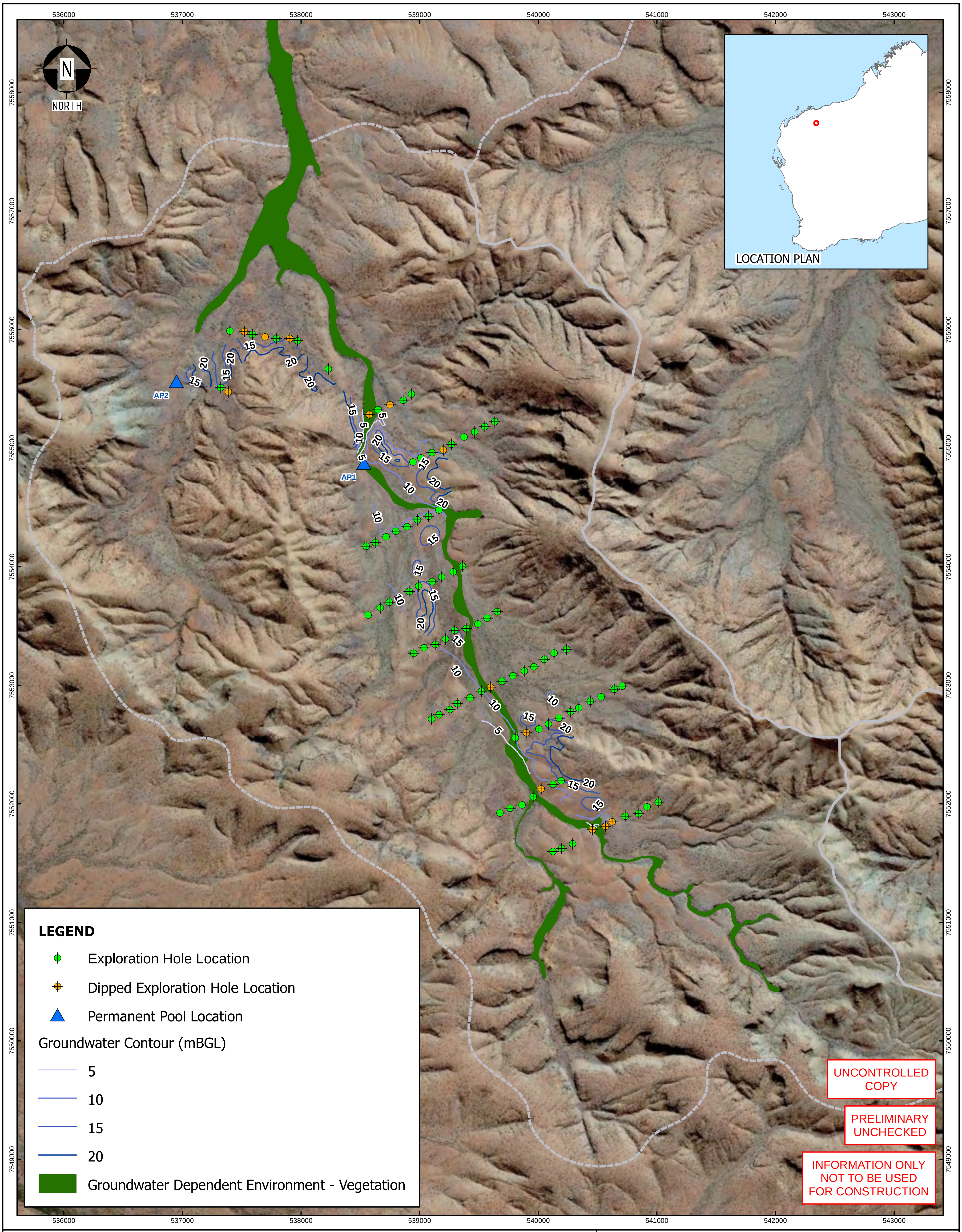

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FLINDERS MINES - GROUNDWATER CONTOURS

FIGURE 4

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SCALE : 1:30,000
CUSTOMER : FLINDERS MINES
AUTHOR : Robert Milton
MAP : Ajax_Figure4_RevA_20120110.mxd
REV : A

Produced By: Robert Milton, Water Resources W.A.

Location: I:\Projects\201012-00322 FMS VIP\10.0 Engineering\Hydrogeology\Ajax investigations\GDE_Report\ArcGIS\Map_Docs\Ajax_Figure4_RevA_20120110.mxd

The available geological data and field observations for Ajax has identified potential confining layers within the DID and underlying the shallow alluvial sediments at some locations within the catchment. This suggests that shallow perched groundwater may not be connected in many areas along the creek beds, and potentially connected at some of the deeply incised valleys where BID and CID is in direct contact with shallow alluvial sediments. Further investigation is needed to confirm the degree of connectivity between the shallow perched groundwater and the deep aquifer.

The Mt Bruce 250k map sheet (Figure 2) shows several structures present are likely to have contributed to the presence of near surface BIF bedrock observed at or in the vicinity of the permanent pools AP1 & AP2.

The long section presented in Appendix C shows the elevation of BIF bedrock gradually decreasing to the north, which promotes groundwater flow in that direction. The elevation of the bedrock increases significantly in the vicinity of permanent pool AP1, which forces groundwater to flow up and over the bedrock at this location. This channelling of flow through a thin layer of alluvial sediments causes groundwater to breach the surface, flow overland across or through fractures in exposed bedrock, and into the permanent pool AP1. Similar conditions are observed at AP2.

This continuous flow of groundwater and seasonal flooding scours and erodes the bedrock, deepening the pools and maintaining water levels. Plates 6 to 9 show the presence of the exposed bedrock at both AP1 and AP2.

Groundwater quality data was not collected at Ajax. However the geology is similar to that of Champion, Eagle and Delta, so the water quality is also expected to be similar. Water quality data collected at Champion, Eagle and Delta are presented in Appendix D.

Interpreted Influence of Groundwater on GDEs

The report completed by Ecoscape (19th Dec 2011) shows the locations of several types of GDE's and their dependence upon groundwater (Figure 1). The report does not recognise the presence of shallow perched groundwater and the deeper aquifer found within Ajax nor does it specify the depth at which the GDEs are relying upon subsurface water or the lateral distance GDEs would search for water.

The GDEs identified at Ajax are almost always located in or adjacent to creeks and low lying areas containing alluvial sediments (Figure 1). The majority of GDEs are likely to be relying on pockets of shallow perched groundwater within these sediments which is being fed by shallow through flow from up gradient areas and recharge from seasonal flooding. There may also be some areas where GDEs are accessing groundwater stored in near surface deposits of CID and BID within or adjacent to creek beds. The depth that roots would need to penetrate to access this shallow perched groundwater is not yet known, so additional investigations are needed to confirm the GDEs dependence on groundwater.

Potential Impacts of Mining at Ajax

The aquifers within the upper catchment area supply groundwater flow which supports and maintains the permanent pools and GDEs downstream. The mining of these aquifers is likely to reduce the supply of water so mitigation measures are needed to maintain the groundwater flow and quality of water reaching the permanent pools and GDEs.

The GDE's and permanent pools also rely on seasonal flooding to recharge aquifers, which increases storage and maintains groundwater flows throughout the year. Mining has the potential to starve downstream areas of surface water flow unless managed carefully using diversions and mine planning.

Conclusions & Recommendations

The proposed mining operation at Ajax has the potential to alter surface and groundwater flows and quality, which could have an adverse environmental impact on GDE's and permanent pools, if left unmanaged.

It is recommended that appropriate management measures are developed and incorporated into mine planning to ensure that surface and groundwater flows, volumes and qualities are maintained at pre development conditions, at the GDE's and permanent pools to minimise adverse environmental impacts.

Management measures may include:

- Acid mine drainage (AMD) will need to be managed during mining operations and at closure to ensure that downstream permanent pools and GDEs are not affected;
- Mining of the aquifer may impact on flows to the permanent pools and GDEs, so mine dewater may need to be pumped to sensitive areas during mining operations to maintain flows;
- Surface water flow through mine areas will need to be managed using diversions, sedimentation ponds and appropriate mine planning to ensure that pre and post development flows and quality at the GDEs and permanent pools are similar;
- Backfilling mine pits with porous sediments to ensure that sufficient water storage is retained is the upper reaches of the catchment which can maintain flow to the permanent pools and GDEs following mine closure; and
- Mine pits should be backfilled and watercourses reinstated at similar locations and using appropriate materials to maintain flow and prevent scour and sedimentation downstream following mine closure.

Yours sincerely
WorleyParsons

Stuart ATKINSON
Water Resources Manager

Dan CRAVENS
Principal Hydrogeologist

cc Appendix A: Site Photos
Appendix B: Debris Levels
Appendix C: Conceptual Hydrogeological Cross Sections
Appendix D: Water Quality Data

References

Bureau of Meteorology 2009a, Climate Statistics for Australian Locations [online] http://www/bom.gov.au/jsp/ncc/cdio/cvg/av accessed 6th February 2012

De la HUNTY, L. E., 1965, Mount Bruce, W.A.: Western Australia Geological Survey, 1:250 000 Geological Series Explanatory Notes, 28p.

Thorne, A. M., and Tyler, I. M., 1997, Mount Bruce, W.A. (2nd Edition): 1:250 000 Geological Series Explanatory Notes, 28p.

Trendall, A.F. and Blockley, J.B., 1970, *The Iron formations of the Precambrian Hamersley Group, Western Australia with special reference to the associated crocidolite*: Western Australia Geological Survey, Bulletin 119, p. 174-254.

Ecoscape (Australia) Pty Ltd, 2011, *Groundwater Dependent Ecosystem Mapping – Flinders Mines Limited* (Ref: 8086-2463-11R), unpublished document.

Appendix A: Site Photos

Plate 1. Steep rocky slopes along perimeter of the Ajax catchment

Plate 2. Steep rocky catchments and deeply incised valleys

Plate 3. Creek bed with shallow alluvium, in a narrow valley bounded by steep rocky slopes

Plate 4. Wide Valley Basins

Plate 5. Ephemeral creek flowing through a wide valley

Plate 6. Permanent Pool AP1

Plate 7. Exposed basement rock in the creek bed with little or no alluvium, adjacent Permanent Pool AP1

Plate 8. Permanent Pool AP2, with little or no alluvium

Plate 9. Exposed basement in the creek bed at Permanent Pool AP2

Plate 10. Debris levels recorded at site D01, within a deeply incised valley bounded by steep rocky slopes.

Plate 11. Debris levels recorded at site D02

Plate 12. Debris levels recorded at site D03

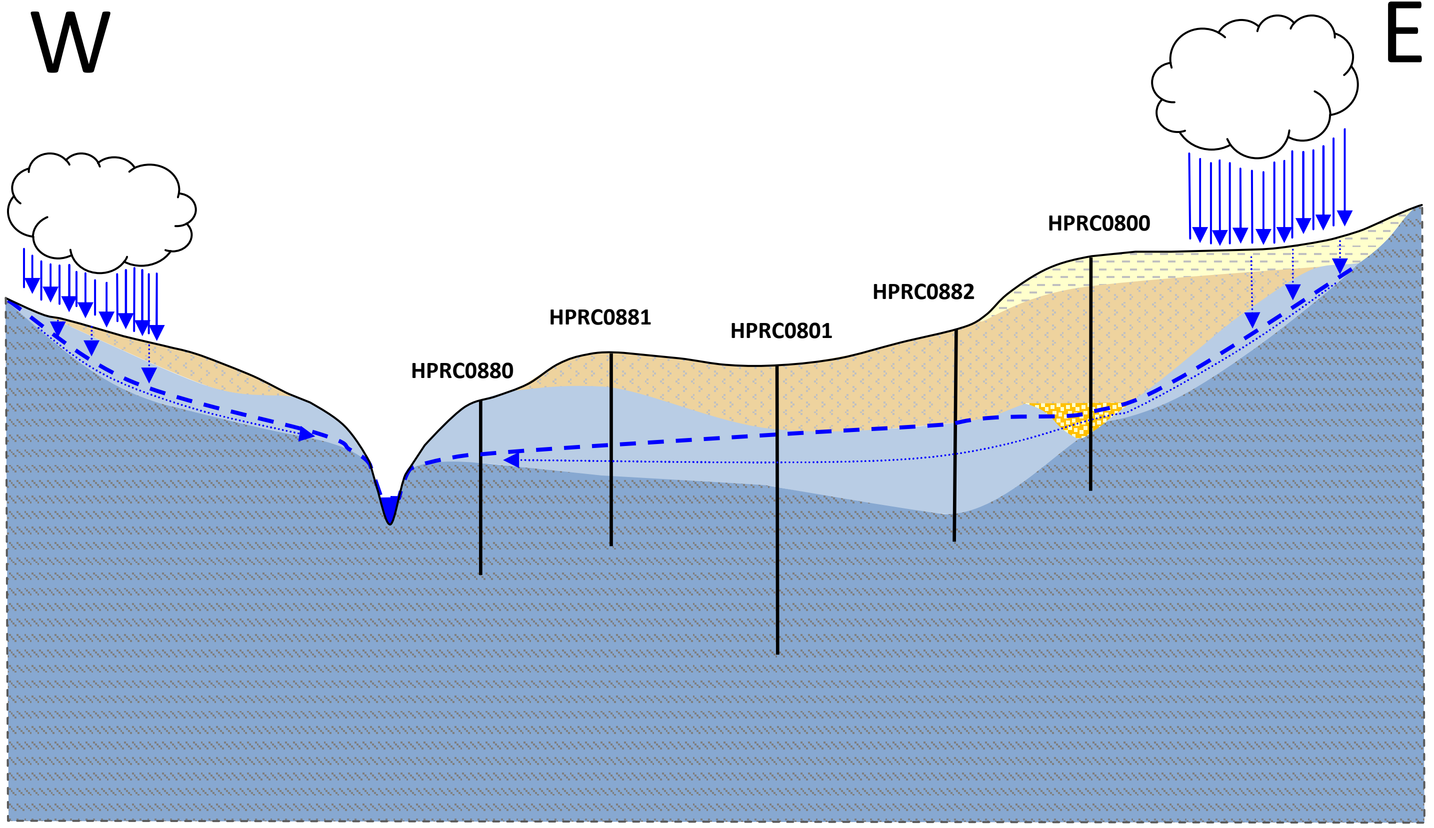
Appendix B: Debris Levels

Table 1. Ajax Debris Levels

Site Ref	Photo Ref	Easting	Northing	Estimated Debris Height (m)	Estimated Debris Level (mAHD)
D01	RIMG1124	540030	7550644	0.5	642.36
D02	RIMG1172	537961	7557300	1.8	550.49
D03	RIMG1170	537858	7557211	1.8	552.97

Appendix C: Conceptual Hydrogeological Cross Sections

AJAX - Lower Valley Section

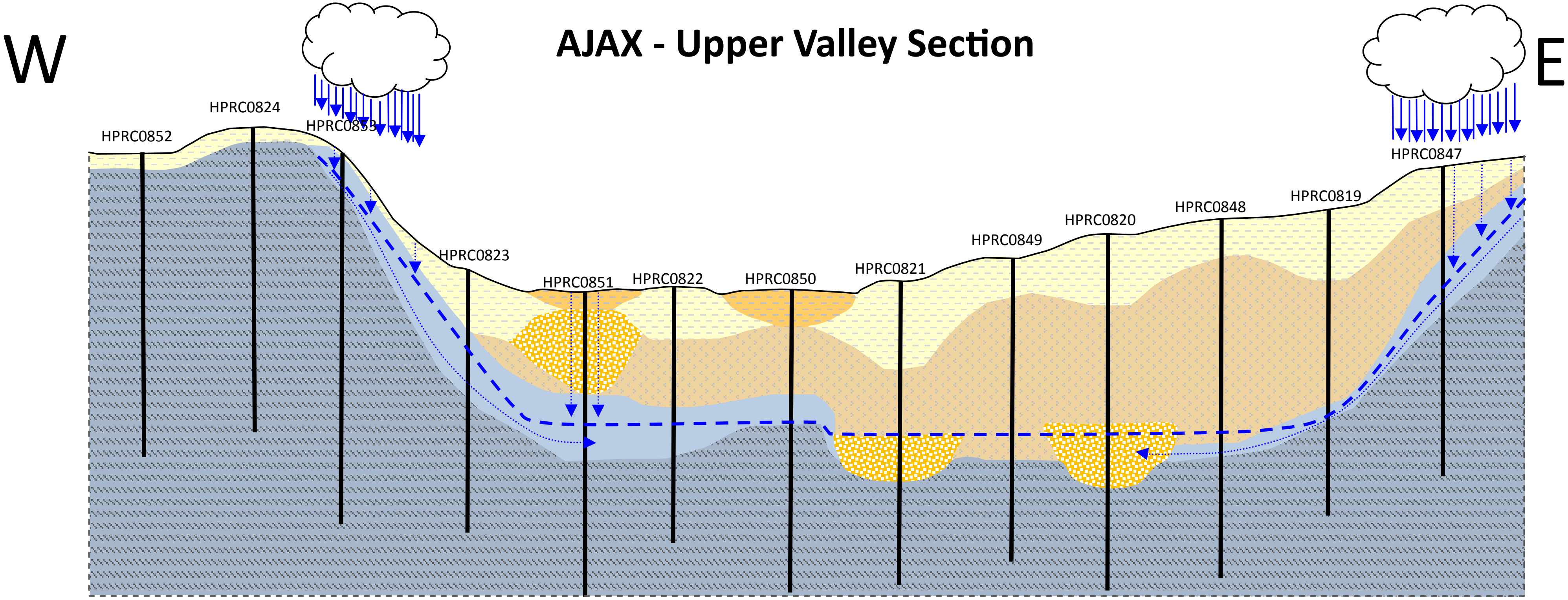


Legend

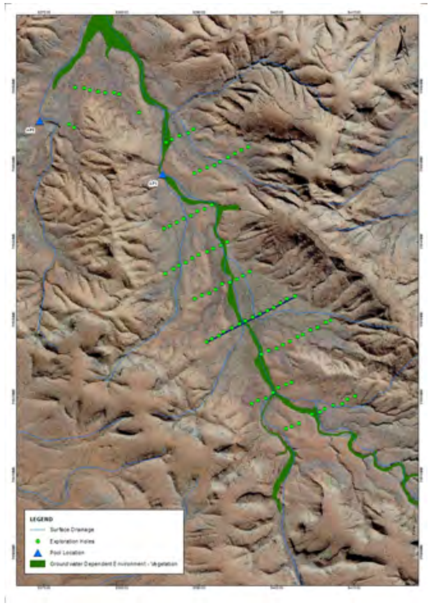
▨	RC—Recent Colluvium
▨	RC—Recent Alluvium
▨	DID—Detrital Iron Deposits
▨	CID—Channel Iron Deposits
▨	BID—Bedded Iron Deposits
▨	BIF—Banded Iron Formation
╌	Inferred Total Head

Approximately 10x Vertical exaggeration

AJAX - Upper Valley Section



Approximately 9x Vertical exaggeration



Legend

▨	RC—Recent Alluvium
▨	RC—Recent Colluvium
▨	DID—Detrital Iron Deposits
▨	CID—Channel Iron Deposits
▨	BID—Bedded Iron Deposits
▨	BIF—Banded Iron Formation
- - -	Inferred Total Head

N

Legend

- ▨ RC—Recent Colluvium
- ▨ RC—Recent Alluvium
- ▨ DID—Detrital Iron Deposits
- ▨ CID—Channel Iron Deposits
- ▨ BID—Bedded Iron Deposits
- ▨ BIF—Banded Iron Formation
- ╌ Inferred Total Head

AJAX - Along Valley Section

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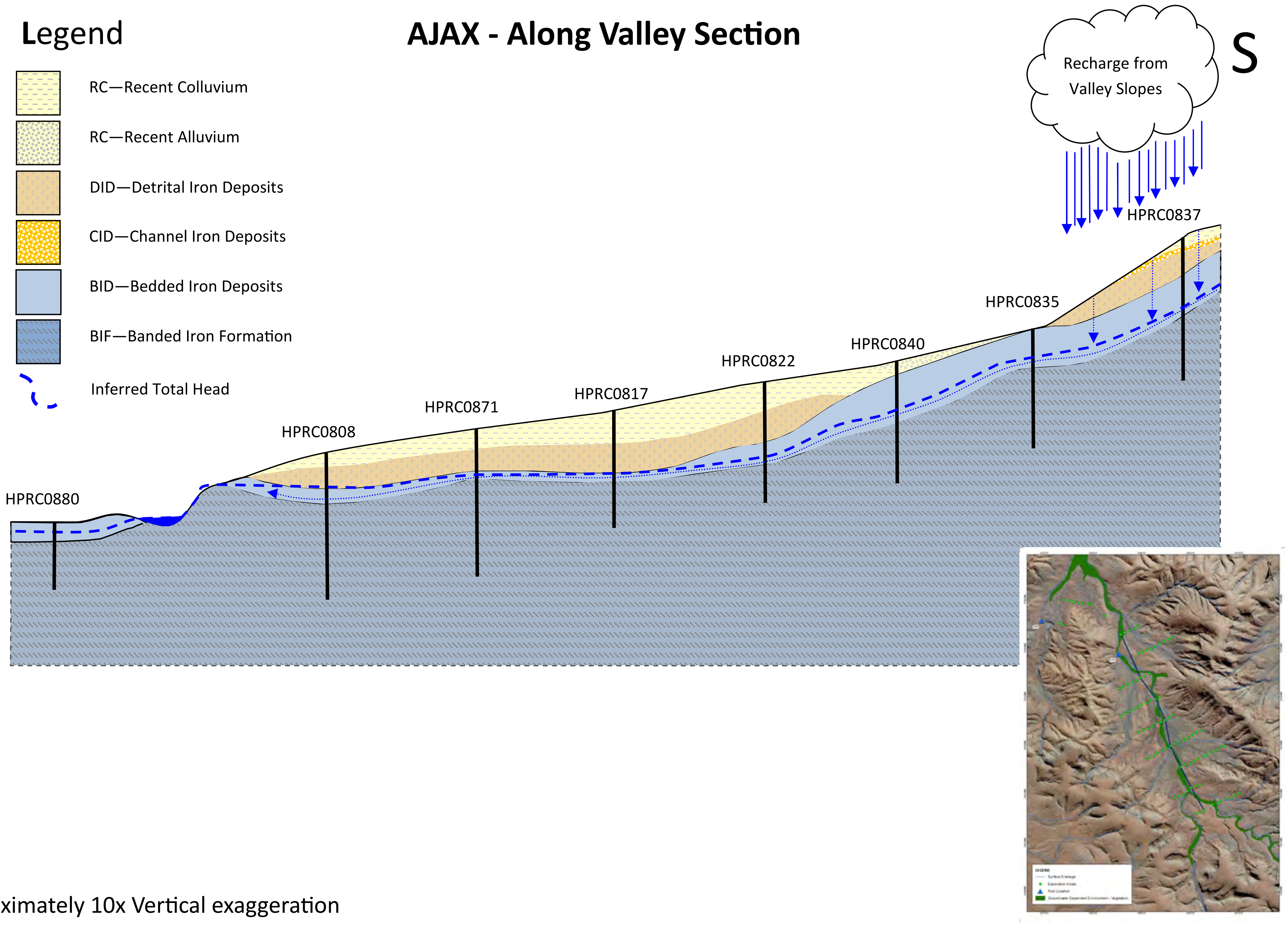
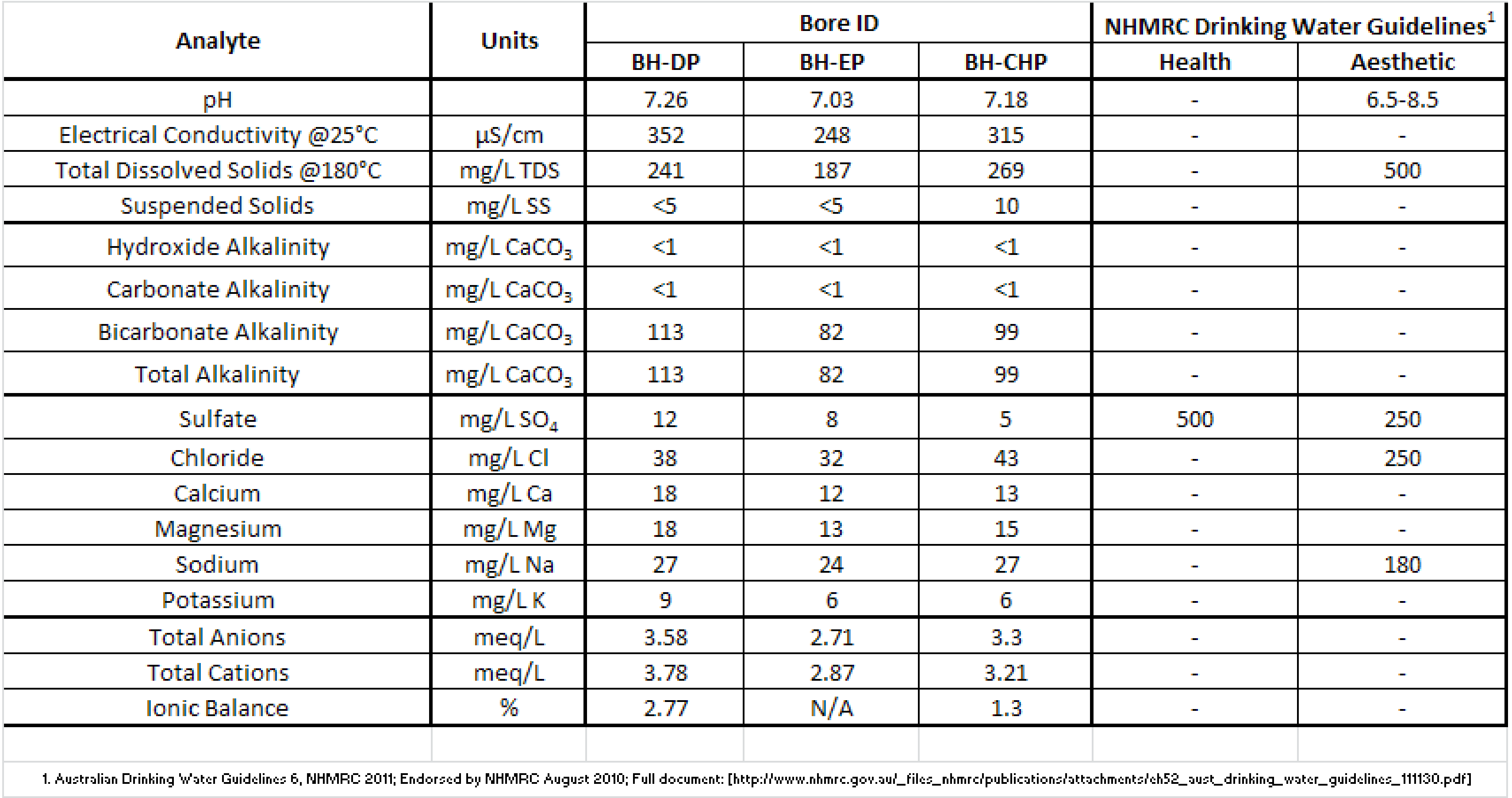


Approximately 10x Vertical exaggeration

Appendix D: Water Quality Data Collected at Champion, Eagle and Delta



Analyte	Units	Bore ID			NHMRC Drinking Water Guidelines[1]	
		BH-DP	BH-EP	BH-CHP	Health	Aesthetic
pH		7.26	7.03	7.18	-	6.5-8.5
Electrical Conductivity @25°C	µS/cm	352	248	315	-	-
Total Dissolved Solids @180°C	mg/L TDS	241	187	269	-	500
Suspended Solids	mg/L SS	<5	<5	10	-	-
Hydroxide Alkalinity	mg/L $CaCO_3$	<1	<1	<1	-	-
Carbonate Alkalinity	mg/L $CaCO_3$	<1	<1	<1	-	-
Bicarbonate Alkalinity	mg/L $CaCO_3$	113	82	99	-	-
Total Alkalinity	mg/L $CaCO_3$	113	82	99	-	-
Sulfate	mg/L SO_4	12	8	5	500	250
Chloride	mg/L Cl	38	32	43	-	250
Calcium	mg/L Ca	18	12	13	-	-
Magnesium	mg/L Mg	18	13	15	-	-
Sodium	mg/L Na	27	24	27	-	180
Potassium	mg/L K	9	6	6	-	-
Total Anions	meq/L	3.58	2.71	3.3	-	-
Total Cations	meq/L	3.78	2.87	3.21	-	-
Ionic Balance	%	2.77	N/A	1.3	-	-

1. Australian Drinking Water Guidelines 6, NHMRC 2011; Endorsed by NHMRC August 2010; Full document: [http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/eh52_aust_drinking_water_guidelines_111130.pdf]

Appendix 2: Geophysical Survey Results

Geophysical modelling of palaeochannel aquifer systems in the eastern Blacksmith tenement, W.A.

May - June 2011

Job 2455

TABLE OF FIGURES

1 JOB SUMMARY

1.1 INTRODUCTION

In May 2011 GPX Surveys performed an XTEM helicopter electromagnetic survey and interpretation of geophysical and drillhole datasets in the eastern drainage channels of Flinders Mines Blacksmith tenement in the central Pilbara. The aim of the project was to model and gain information on the structure and lithology of the area, targeting palaeochannels following the current drainage network.

Using the data acquired from this XTEM survey along with historical ground gravity, Airborne Frequency Domain EM, geophysical and geological logs and profile interpretations 'On-tenement', GPX Surveys continued to expand outside the tenement and produce a 3D sedimentary interpretation.

The project was completed in five stages:

1.) Interpretation of historical gravity and FDEM datasets for Flinders over the on-tenement areas of the block.
2.) Acquisition QC and processing of XTEM data producing Conductivity/ Depth Images (CDI).
2.) Profile modelling of the EM data comparing with other datasets and separating horizons.
3.) 2/3D expansion and combination of the EM and geological models and comparison with the previous interpretation, drillhole data and outcrop estimates to produce a modelled basement.
4.) Defining sedimentary horizons and 2/3D expansion of profile models to determine major lithology trends comparing with drillhole data.
5.) Production of final images, maps and report.

1.2 LOCATION DIAGRAM

Figure 1 and Figure 2 show maps of the acquired XTEM flight path and the drillhole locations and estimated surface outcrop boundary.

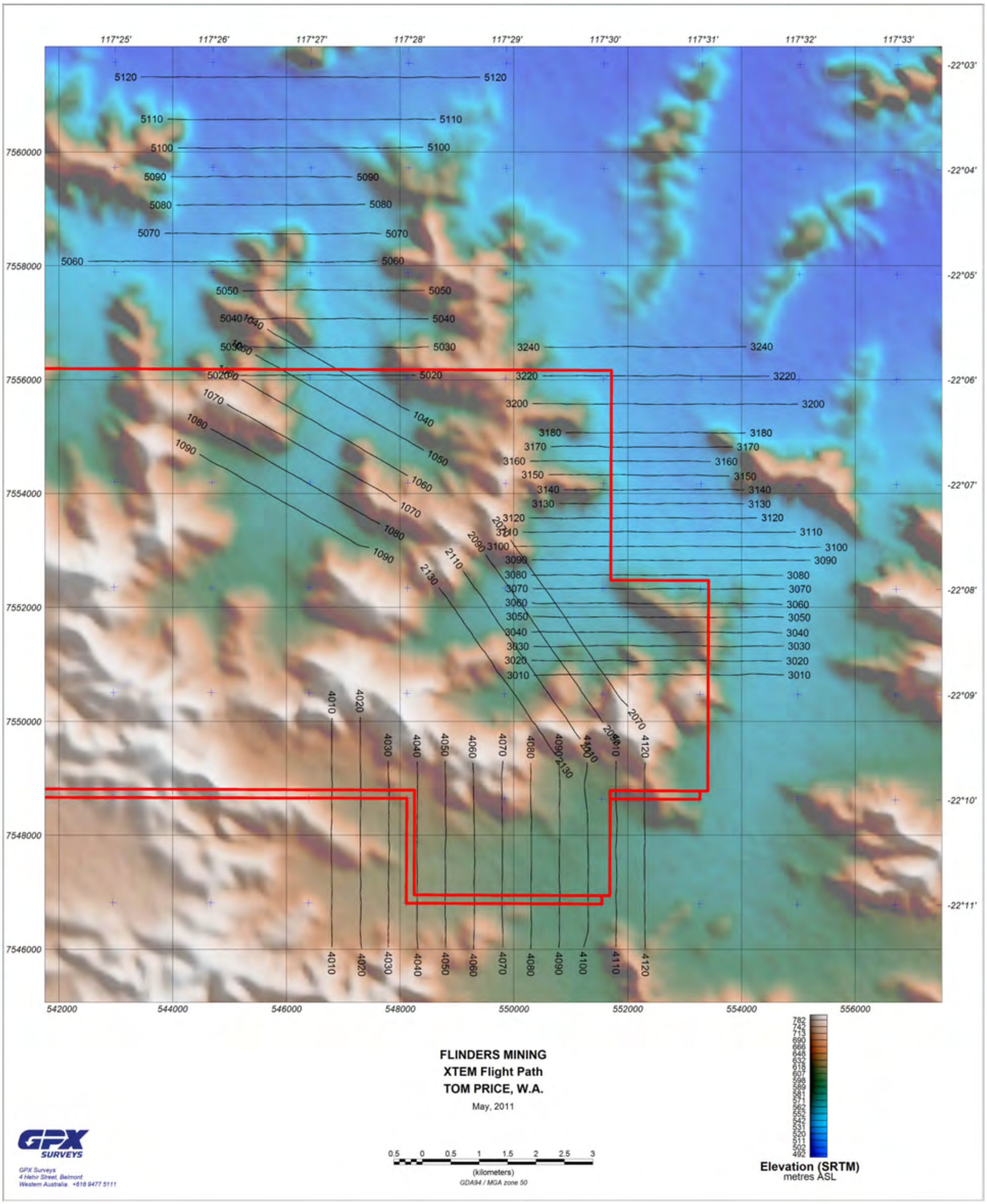


Figure 1: Flight Path map

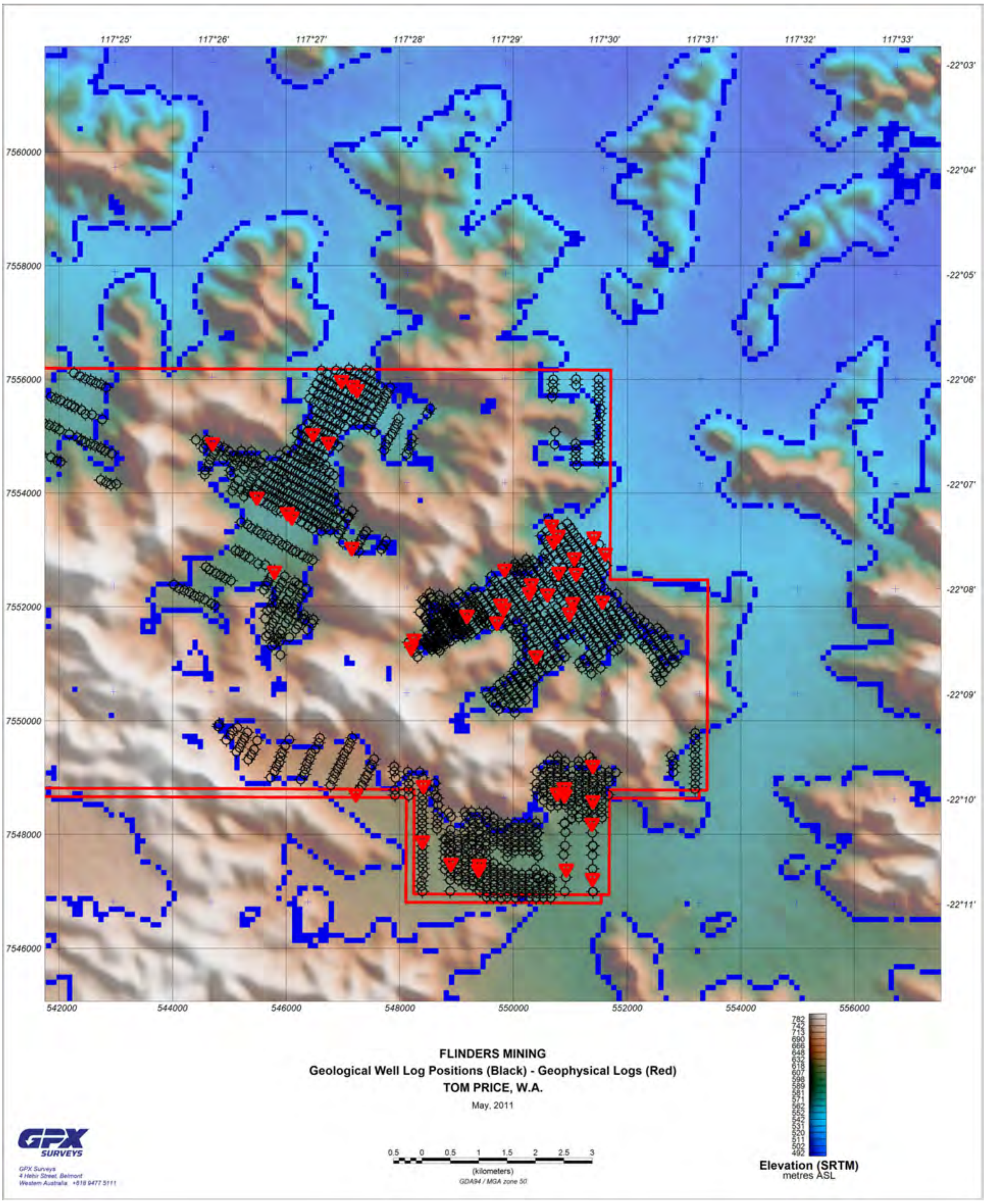


Figure 2: Drillhole Location and Basement Outcrop Map

Figure 3: Overview of the model area shown in red

1.3 PERSONNEL

The following personnel were involved in this project:

Task	
Project Manager	Katherine McKenna
XTEM Processing	
- Field Data Processor	Joe Kita
- Final Data Processing	Dean Reynolds
Interpretation and Report	Mark Lowe

1.4 XTEM SURVEY SUMMARY

On the 28th April the GPX Surveys crew began to mobilise from Perth, arriving at Blacksmith Camp on the 30th April 2011. The crew assembled the XTEM rig. The helicopter arrived on site on the 30th April and the crew conducted ground tests. High level test flights required for commencement of survey were also carried out on the 30th April and production commenced the following day. The base station magnetometer was set up near the aircraft landing site which was adjacent to the Blacksmith Camp helicopter pad. Production began on the 1st May and was completed the following day. For safety reasons and data quality line 5120 the most northern line in the survey area was shifted 250m north of its original planned survey path to avoid the 125 feet high power line that ran down the length of the planned line. At the end of each day's flying all data was sent back to the offices of GPX Surveys for further processing and review. The rig was dismantled on the 3rd May 2011 and the aircraft and crew demobilised the same day.

2 SAMPLING TECHNIQUES AND DATASETS

2.1 AIRBORNE XTEM SURVEY

Boundary Coordinates

Start and end coordinates of each line can be found in Appendix A.

Line Specifications

The line specifications for the survey areas are as follows:

Traverse line spacing:	500 metres
Traverse line direction:	000° - 180° (NW / NE)
	090° - 270° (S)
	~135° - 315° (W / Delta)
Traverse line numbers:	1040 – 5120 (54 lines)

2.2 DIGITAL ELEVATION MODEL

The elevation model used in this survey is taken from the freely available SRTM satellite digital terrain model with ~90m cell size spacing.
An interpreted basement outcrop filter file was also created in-house using the DEM.

2.3 AIRBORNE MAGNETICS

Magnetics are used in this interpretation to find major structural features. The data is taken from the merged Australia wide Geoscience Australia (GA) Mag-spec survey with ~400m cell size.

2.4 GEOPHYSICAL AND GEOLOGICAL WELL LOGS AND PROFILE INTERPRETATIONS

A suite of well logs were provided by Flinders Mines with geological, hydrological and geophysical information. All the wells are located inside Flinders tenement boundary accounting for around 35% of the model area. These were accompanied with profile geological interpretations which were used along with the well logs.

2.5 GROUND GRAVITY AND FREQUENCY DOMAIN EM

Flinders Mines provided ground gravity over the delta deposit and 5 – frequency DigHEM data over much of the on-tenement part of the survey and also extending in the northeast. The DigHEM data was limited in penetration depth by the targeted frequencies – 900 Hz, 5500 Hz, 7200 Hz and 56000 Hz.

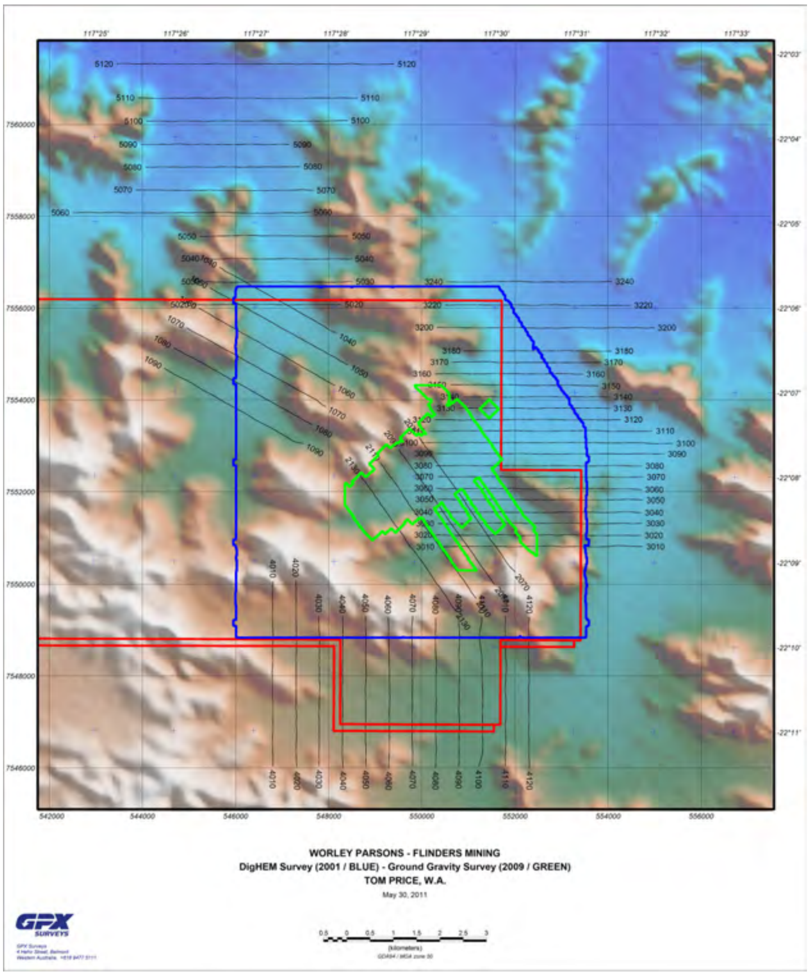


Figure 4: DigHEM and Ground Gravity Survey

2.6 GEOPHYSICAL DATASETS AND RANGE OF INVESTIGATION

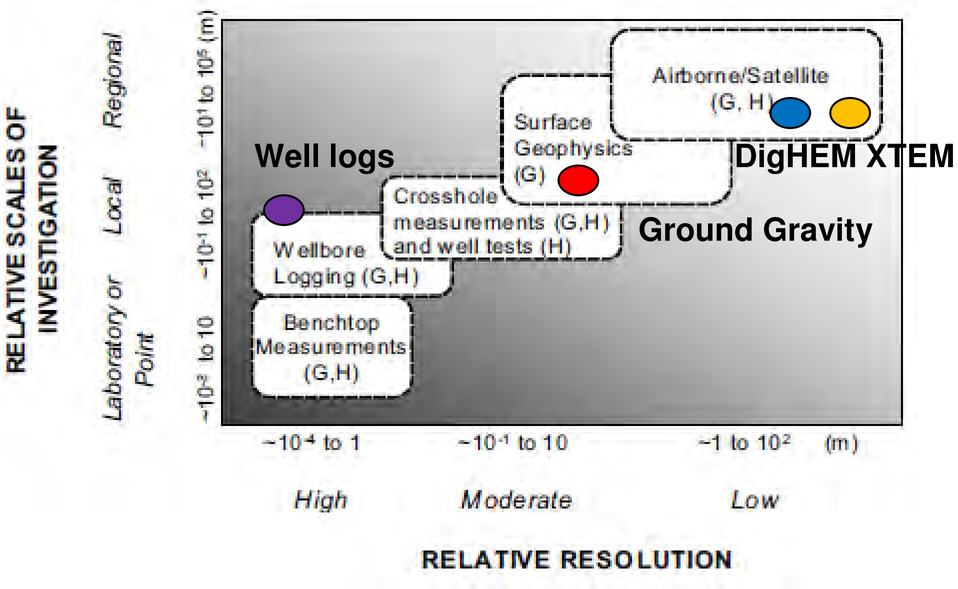


Figure 5: Scale of resolution for each of the survey types used (Rubin Y., 2005)

3 PROCESSING AND INTERPRETATION WORKFLOW

This section focuses on the process of constructing and defining geological models based on the different geophysical datasets and geological borehole and surface observations. Processing steps for airborne EM including creating CDI's are expanded on in the logistics reports for Job's 2455 and have been left out of this report, though parameters for the system are shown in Appendix B: J2455 XTEM Survey Specifications A schematic summary of the geophysical modelling steps involved are illustrated in Figure 6.

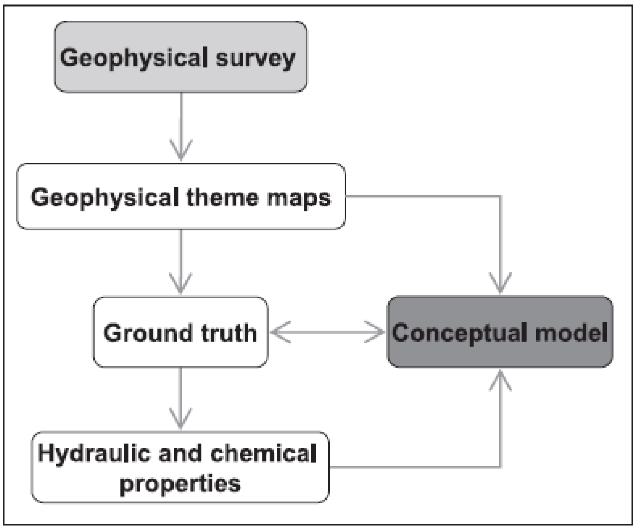


Figure 6: Workflow of a hydrogeophysical survey (Esben Auker, 2003)

In this case a preliminary model was created using historic DigHEM and ground gravity to assess the trend of the targeted basement surface off-tenement and to better focus the flight lines.

3.1 PRELIMINARY MODELLING USING HISTORIC GROUND GRAVITY AND FREQUENCY DOMAIN EM.

Figure 4 shows the extent of the 2009 ground gravity and 2001 DigHEM surveys. The purpose of the DigHEM survey was to detect zones of conductive mineralization and to provide information which could be used to map the geology and structure of the survey area (Fugro Report #3010). The frequencies used for this survey allow for only a moderate depth of penetration given the bulk conductivity of the area. The ground gravity was modelled for a single basement horizon using depth-to-basement and apparent density calculations. This was used to fit the depth solutions from the lowest frequency (900 Hz) DiGHEM response in the thicker parts of the palaeochannel where the EM couldn't penetrate the cover. This produced a preliminary depth-to-basement surface (Figure 7) which was used in the targeting of the XTEM flight lines.

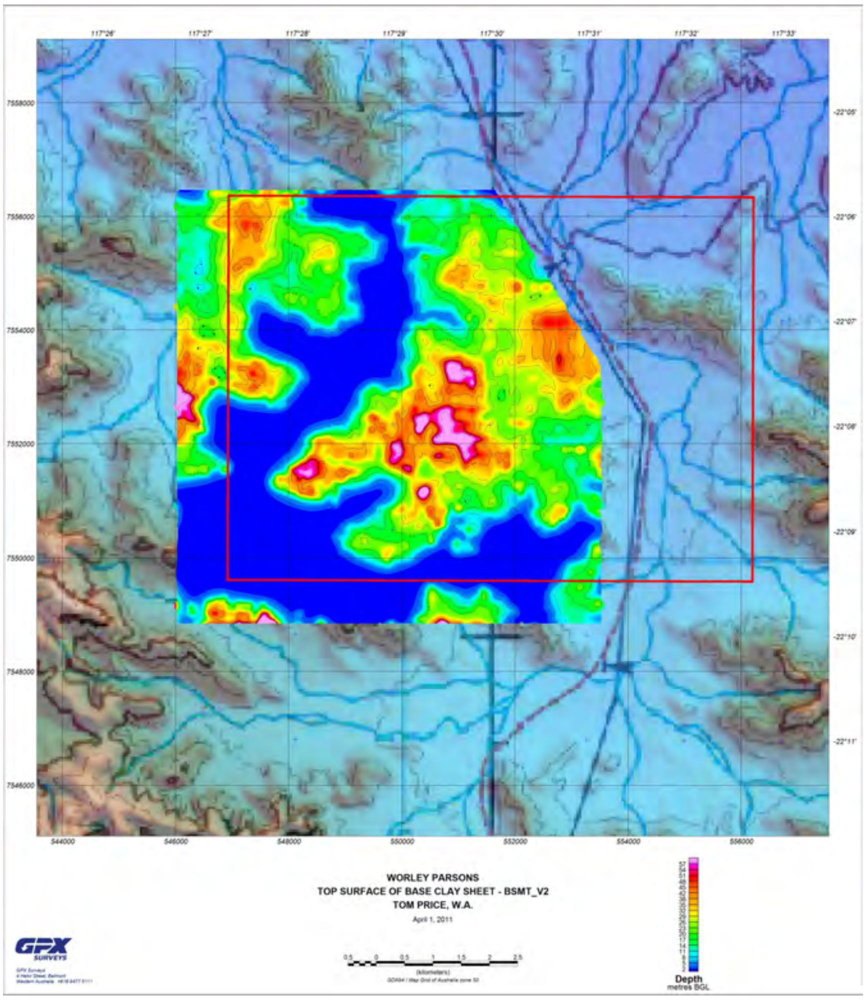


Figure 7: Initial basement clay surface interpretation using DigHEM and ground gravity

3.2 PROFILE MODELLING & CONSTRUCTING THEMATIC MAPS

The next stage of the modelling project involved importing final CDI databases and depthslice grids from XTEM Job 2455. These CDI databases have been produced using EMaxAir software (see Theory section below). 1D filtering was then applied to the EM to produce preliminary depth-to-basement models along the profiles.

3.2.1 Initial processing

Targeting potential fields requires an amount of observation and pass/rejecting of spurious or regionally biased effects based on an understanding of the geological background. The sedimentary geology in this area is assumed to be a lateral sequence of horizons with changing thickness and elevation, determined by the lie of the tectonic basement and having undergone some weathering. Target conductivities are extracted from the TEM profiles by using a suite of 1D filters of the cond vs. depth, cond vs. distance, and depth vs. distance. Horizontal and vertical derivatives are used to seek out lateral changes in EM and separate their apparent magnitude by comparing with the entire along-line dataset. Conductivity vs. depth processing produces conductivity roughness and minima-maxima profiles and grids which are used to determine continuous levels. These target conductivities are used to constrain the limits of 'significant' solutions, i.e. those conductivity solutions assumed to be related to geology at a given depth, and especially those above the level of the tectonic basement.

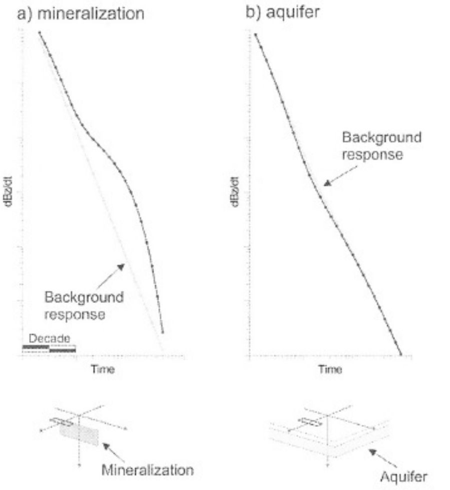
With these constraints, thematic maps based on changes in bulk conductivity and measurement density distribution are used to highlight any faults or rapid changes in elevation of highly contrasting units.

Figure 8: Isosurface map showing areas of high conductivity over the survey area

Theory

3.2.1.1.1 Airborne EM in Groundwater Exploration:

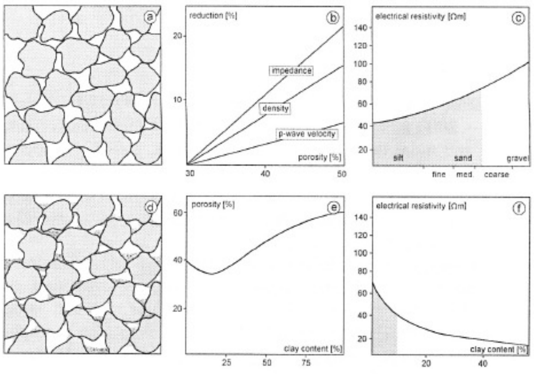
A number of important parameters that are used for groundwater exploration can be derived from variations in conductivity. It is sensitive to variations of porosity, water saturation, conductivity of the pore fluid and the clay content (Kirsch, 2010). If the background geology is known, these variations can be extracted from the conductivity measurements. The example below shows a typical TEM response of a discrete conductor compared to the response from a modelled aquifer.



[illegible] Comparison of the responses of a base metal mineral exploration and a hydrological target as approximated by a vertical thin sheet and layered-earth model, respectively. The mineral exploration target is a vertical sheet measuring 90 m by 30 m at a depth of 20 m, with a conductance of 100 S, in a 100 Ωm half space. The parameters for a three-layer hydrological model with a layer representing a sandy aquifer are: $\rho_1 = 50$ Ωm, $\rho_2 = 100$ Ωm, $\rho_3 = 10$ Ωm, $t_1 = 30$ m, and $t_2 = 50$ m, where t is the layer thickness. The parameters for the background model (without an aquifer or a sheet) are: $\rho_1 = 50$ Ωm, $\rho_2 = 10$ Ωm and $t_1 = 80$

Figure 9: EM Aquifer target (Kirsch, 2010)

Targetting these aquifers is dependent on relative change in conductivity. Because of the nature of TEM measurement there is only limited sensitivity to high-resistivity layers. This means that the conductivity of resistive layers sandwiched between conductive layers will produce only a minimal distortion and it is up to the accuracy of measurements of the conductive layers to determine the appropriate thickness and relative conductivity of the resistors. This causes models to produce similar results within the measuring error, called equivalent models. The grey shaded areas in the image below denote similar resistivities for clayey and clay-free material (Kirsch, 2010).



Physical properties of pore aquifer material (Gabriel et al 2003, with permission from Elsevier): influence of porosity and clay content on density, seismic velocity, and electrical resistivity: **(a)** well sorted, clay free sediment, **(b)** reduction of p-wave velocity (after Morgan 1969), density, and impedance as a function of porosity, **(c)** electrical resistivity as a function of grain size for fresh water saturated material (after TNO 1976), **(d)** clayey sediments, pore space partly filled with clay minerals, **(e)** porosity related to clay content (artificial sand – clay mixture, Marion et al. 1992), **(f)** electrical resistivity related to clay content after Sen et al. (1988)

Figure 10: Sediment / fluid effect on conductivity (Kirsch, 2010)

Typical values for effective porosity are: clay < 5%, fine sand 10-20%, coarse sand 15-30%. It follows that most geophyiscal aquifer targets are relatively resistive.

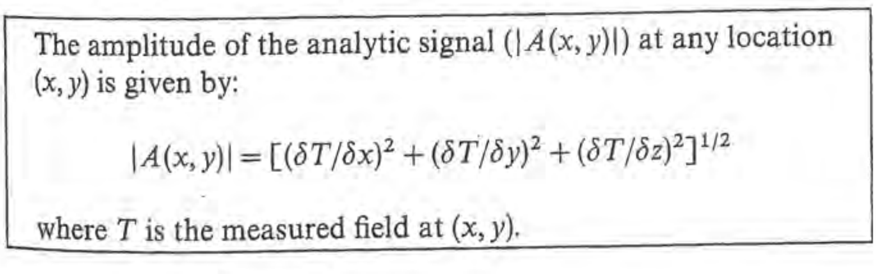
3.2.1.1.2 Horizontal and Vertical Derivative

The horizontal and vertical derivatives of profiles are used to find lateral and mixed lateral/vertical changes. These are then combined in the depth-to-basement calculations discussed below.

3.2.1.1.3 Analytic Signal

The Analytic solution uses line profile data to estimate the depth to source. The model assumes that the source is either a vertical or horizontal contact with infinite depth. A window of different width increments slides along the line profile and solutions for both types of sources are generated. The solutions are derived from dx, dy and dz and then interpolated and defined by the window width and increment.

To reduce the number of possible sources the solutions may be clustered. The final clustered solutions are then plotted on a map and a depth analysis can be conducted. The technique is summarised in the following equation by (MacLeod I.N., 1993)



The amplitude of the analytic signal ($|A(x, y)|$) at any location (x, y) is given by:

$$|A(x, y)| = [(\delta T/\delta x)^2 + (\delta T/\delta y)^2 + (\delta T/\delta z)^2]^{1/2}$$

where T is the measured field at (x, y).

Figure 11: The amplitude of the 3D analytic signal (Macleod et al., 1993)

This is used for determining the palaeochannel depth in the ground gravity.

3.2.1.1.4 eMax Air CDI

EM CDI sections of the flight lines are created using eMaxAir software (by Fullagar Geophysics).

> "Conductivity-depth transformation is accomplished in two steps. Measured voltages or B-field at a given delay time are first transformed to apparent conductivity. For dB/dt data, the assigned depth, z(t), at each time is the depth of the electric field or current maximum (Emax depth) in a half-space with conductivity equal to the apparent conductivity. For B-field data, the depth to the halfspace B-field maximum (Bmax depth) is employed. CDI sections based on apparent conductivity provide a vertically smoothed representation of the true conductivity profile. The apparent conductivity at any time can be represented as an inner product of the true conductivity with the Frechet kernel. The Frechet kernel at time t can be approximated as a linear function, decreasing from its maximum value at the surface to zero at a depth d(t). Therefore, given apparent conductivities from the CDI algorithm, a sharper estimate of the true conductivity can be generated via solution of a simple integral equation." (Fullagar, 2001)

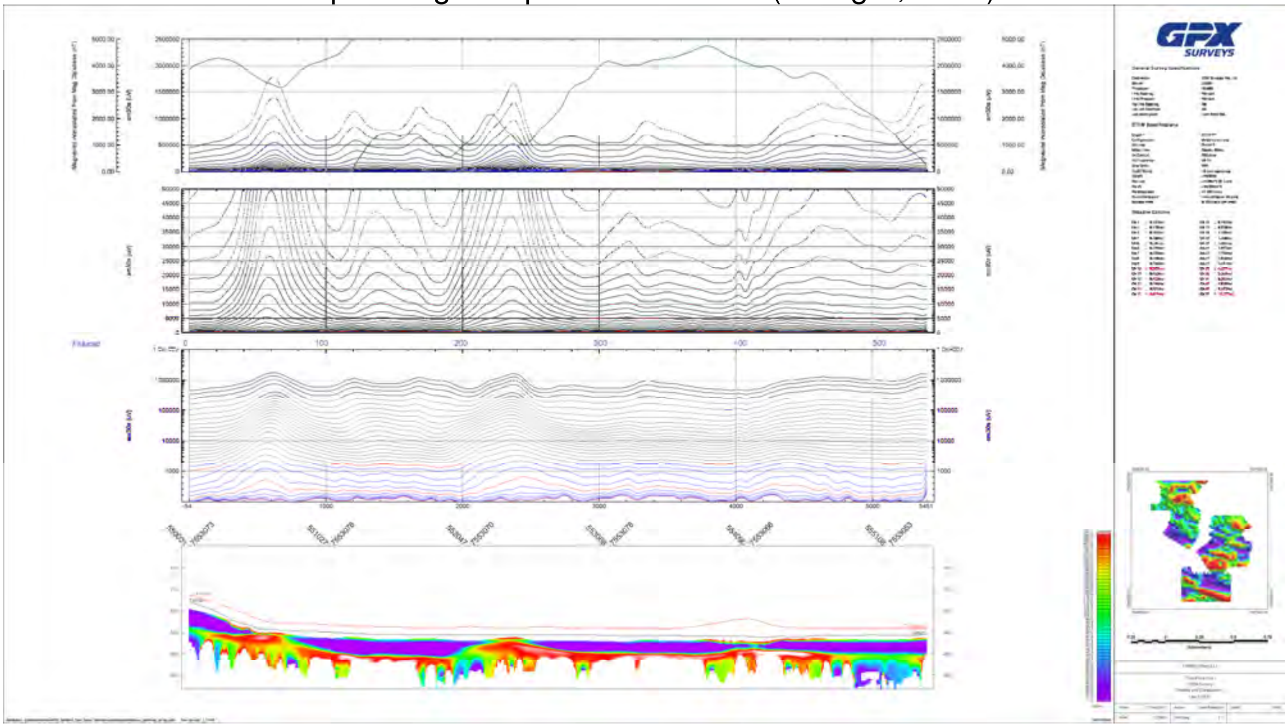


Figure 12: XTEM CDI section example

Processing Summary

A combination of Geosoft Oasis Montaj extensions, 1D-FFT, MAGMAP and Depth-to-Basement (PDepth) was used to generate profile model depths/ densities while the apparent conductivities were produced using eMax Air.

For a good review of 1D filtering methods used and a brief description on their effect on the data GETECH has a published document 'Advanced Processing and Interpretation of Gravity and Magnetic Data, 2007' (GETECH, 2007).

3.3 CONSTRAINTING TO THE GEOLOGY

Geological information is compared to geophysical responses to target horizons and thicknesses, better defining the model along line and then in 3D. Surface outcrop maps and borehole positions are used to fit the horizons between the modelled profiles.

3.3.1 Technique

The process of collaborating information under probabilistic parameters according to the resolution of the different geophysical methods is based on Bayes' Theorem.
"Bayes' theorem serves to update the plausibility of a proposition as the state of information changes because of the availability of new data" (Rubin Y., 2005).

Bulk conductivities and densities are established from the boreholes and surface geology, using any geophysical measurements, or assumptions from the lithology and structural background. The fitting resolution for the targeted geology will be proportional to the resolution of the geophysical and geological surveys. In areas with little geological information, depth to the basement surface determines whether the results are better determined by gravity or TEM models.

It is assumed that there is generally a lower conductivity and density contrast between the sedimentary horizons than the basement/ sediment horizon. The large density contrast between the basement and the sedimentary horizons causes the gravity solutions to be skewed. 'Visible' variation in the near surface for potential field methods is proportional to the difference in depth/thickness * conductivity/density when compared to the surrounding units (see Theory). It follows that when finding the depth-to-basement, in areas with deep basement, the EM will generally have decreased resolution and reduced conductivity contrast, and the gravity solutions will generate a more accurate result. Conversely in areas of complex and highly contrasting near surface, the TEM results are given more preference.

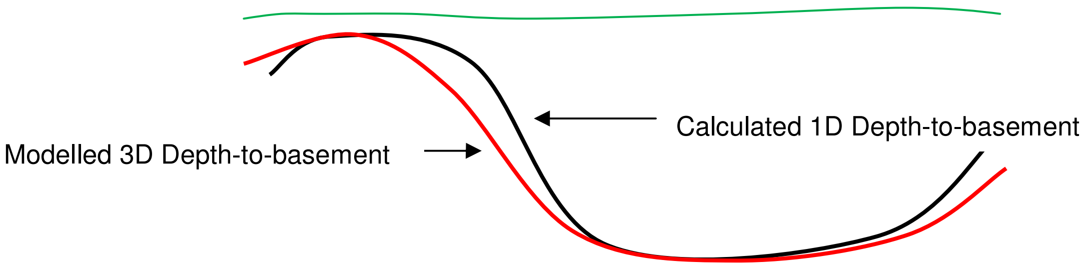
Importing drillhole information

Flinders Mines provided GPX Surveys with a database of the position and extent of the geological groups at the on-tenement drillhole positions. Geophysical information was also interpreted from well-logs of PDF documents though, because of the time-intensive nature of the data format and that the measurement units were not provided, only a small selection of the geophysical well logs were used for calibrating the bulk conductivities for each of the sediment groups. These groups were then gridded with varying levels of expansion to compare with the line data and to assess structural trends.

Expanding the depth-to-basement models to 2/3D.

The next stage of the processing work involved expanding the profiled basement models to an x/y/ value domain. The EM and gravity 1D-model profiles are gridded, expanded and filled in the model area. Results from both survey types are combined using the geological constraints to decrease the uncertainty between the survey lines and increase resolution. An iterative process of fit to the model is then applied with a Gaussian or cosine drop-off filter and increasingly smaller filter lengths decreasing to roughly ¼ cell size of the constraint separation.

The filtering will causes a distortion of the basement level in areas with high gradient responses but will remain true to depth-to-basement calculations in areas with constant depths over distances greater than the minimum filter width. An example of this is shown below.



Separating and extracting layered earth horizons

The bulk conductivities for the assumed sedimentary groups are clustered to the resolution of the model and then the surface horizons are estimated by the level of sharpness in the depth/conductivity gradients and proximity to relative (Downhole geophysics) and 'textbook' results for the modeled rock types. Constraints are applied from the height of the DEM and the depth of the calculated basement depth.

Geological Group	Conductivity (mS/m)
Recent Alluvial (RCT)	70
Detrital Iron (DID)	30
Clay (CLY)	100-500
Channel Iron (CIDg)	120
Channel Iron (CIDh)	80
Banded Iron (BID)	300
Basement (BMT)	250 - 1500

Table 1: Estimated bulk conductivities

Expansion of stratigraphy model to 2/3D

The sedimentary horizons were expanded similar to that applied to the basement calculation. After finalising the profile models the data is gridded and then expanded to the survey area, before being filled. The constraints grid consists of a combination of horizon conflicts and proximity to EM flight lines, drillholes and outcrop (Figure 30). Non-uniqueness is compensated for by accepting the depths and thickness most geological likely and by masking less 'visible' units.

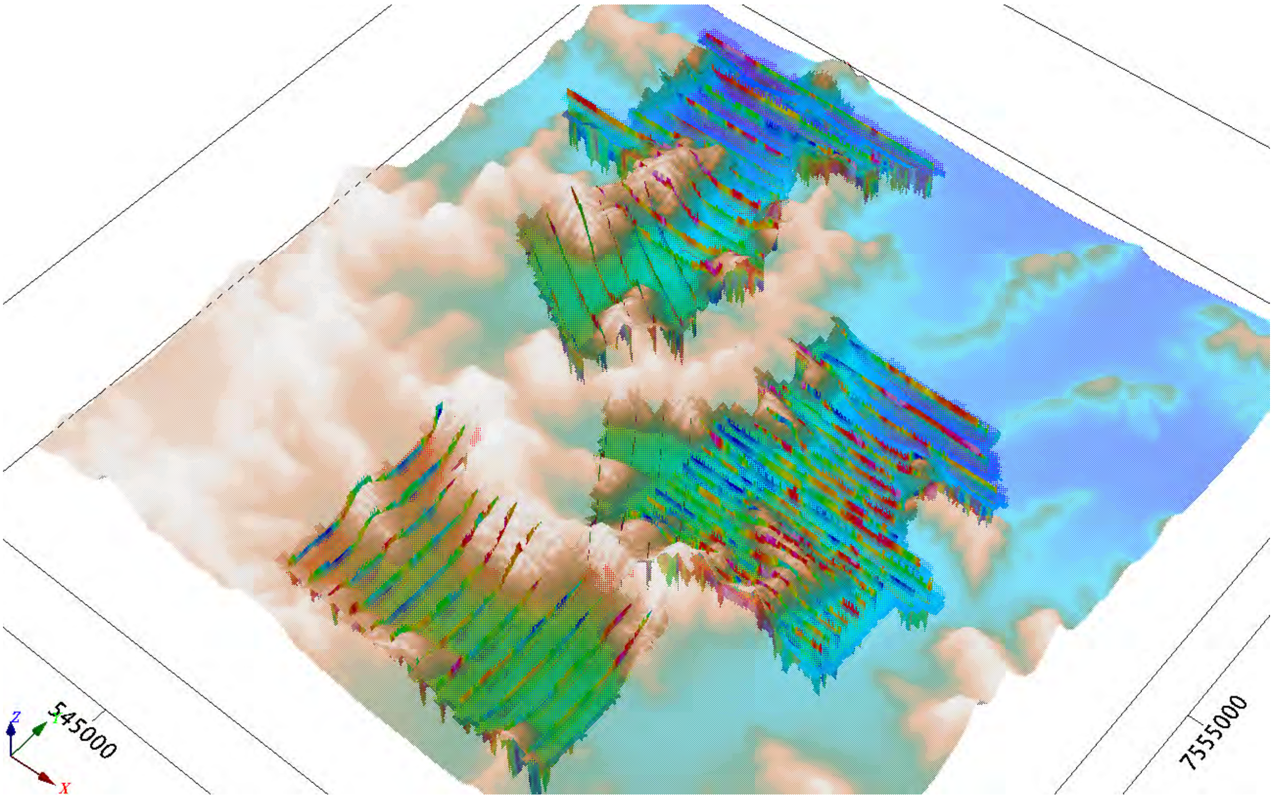


Figure 13: Basement model with CDI profiles

Processing Summary

Yoram Rubin and Susan Hubbard expand on the theory and implications of applying Bayes' Theorem and probability modelling in the section 'Stochastic Forward and Inverse Modeling: The "Hydrogeophysical" Challenge' in their book Hydrogeophysics, 2005.

4 PRODUCTS DELIVERED

Products were delivered throughout the course of the project. EM Channel MapInfo Tiffs were sent at the completion of the survey along with depth slices and CDI's. During the modelling process preliminary and final located images were sent to Flinders Mines consultants.
Final products for the interpretation and report were delivered on 17th June 2011.

DIGITAL PRODUCTS

- CDI profiles and depthslices are included in the 2455 Final Logistics Report.
- Geosoft Grids and MapInfo/ ArcView Tiffs of
    - Recent (RCT) / Detrital Iron (DID) interface Depth Model
    - Detrital Iron (DID) / Channel Iron (CID) interface Depth Model
    - Channel Iron (CID) base surface Depth Model
    - Clay (CLY) top surface Depth Model
    - Clay (CLY) base surface Depth Model
    - Banded Iron (BID) top surface Depth Model
    - Banded Iron (BID) base surface Depth Model
    - Basement (BMT) Depth Model
    - DID Thickness Model
    - Clay Thickness Model
    - Consolidated Channel Iron (CIDg) –Thickness Model
    - Porous Channel Iron (CIDh) – Thickness Model
    - BID Thickness Model
    - Valley Flatness Factor
    - Average Conductivity
    - Conductivity Roughness
    - Uncertainty of measurements
    - Digital Elevation Model
    - Flight Path
- Digital version of the modelling and interpretation report.

HARDCOPY PRODUCTS

Two hardcopies of the final report were sent along with a DVD containing a digital version of the maps, profiles and report.

4.1 FINAL IMAGES AND MAPS

4.1.1 Recent (RCT) / Detrital Iron (DID) interface Depth Model

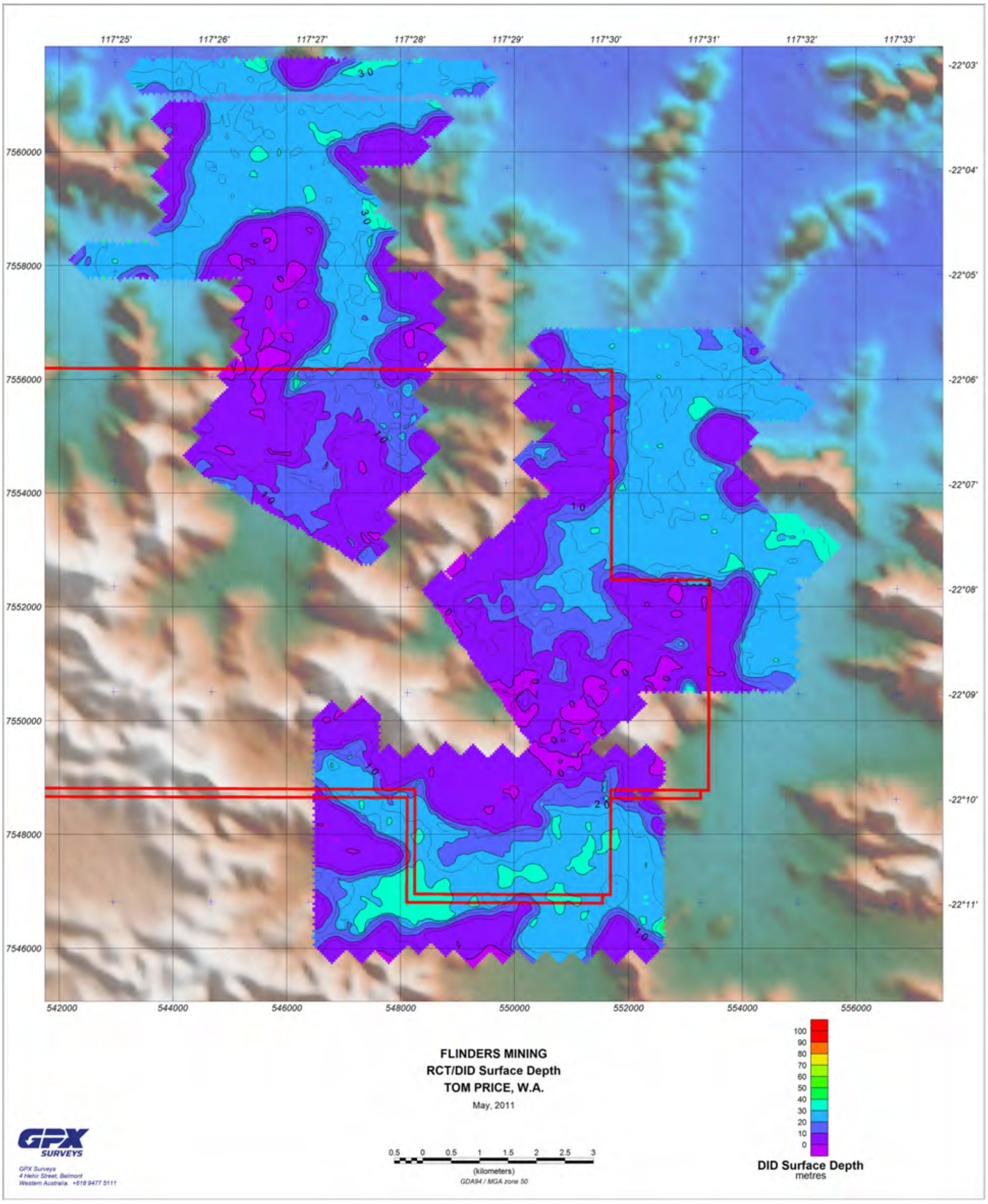


Figure 14: DID Top Surface Depth Model

4.1.2 Detrital Iron (DID) / Channel Iron (CID) interface Depth Model

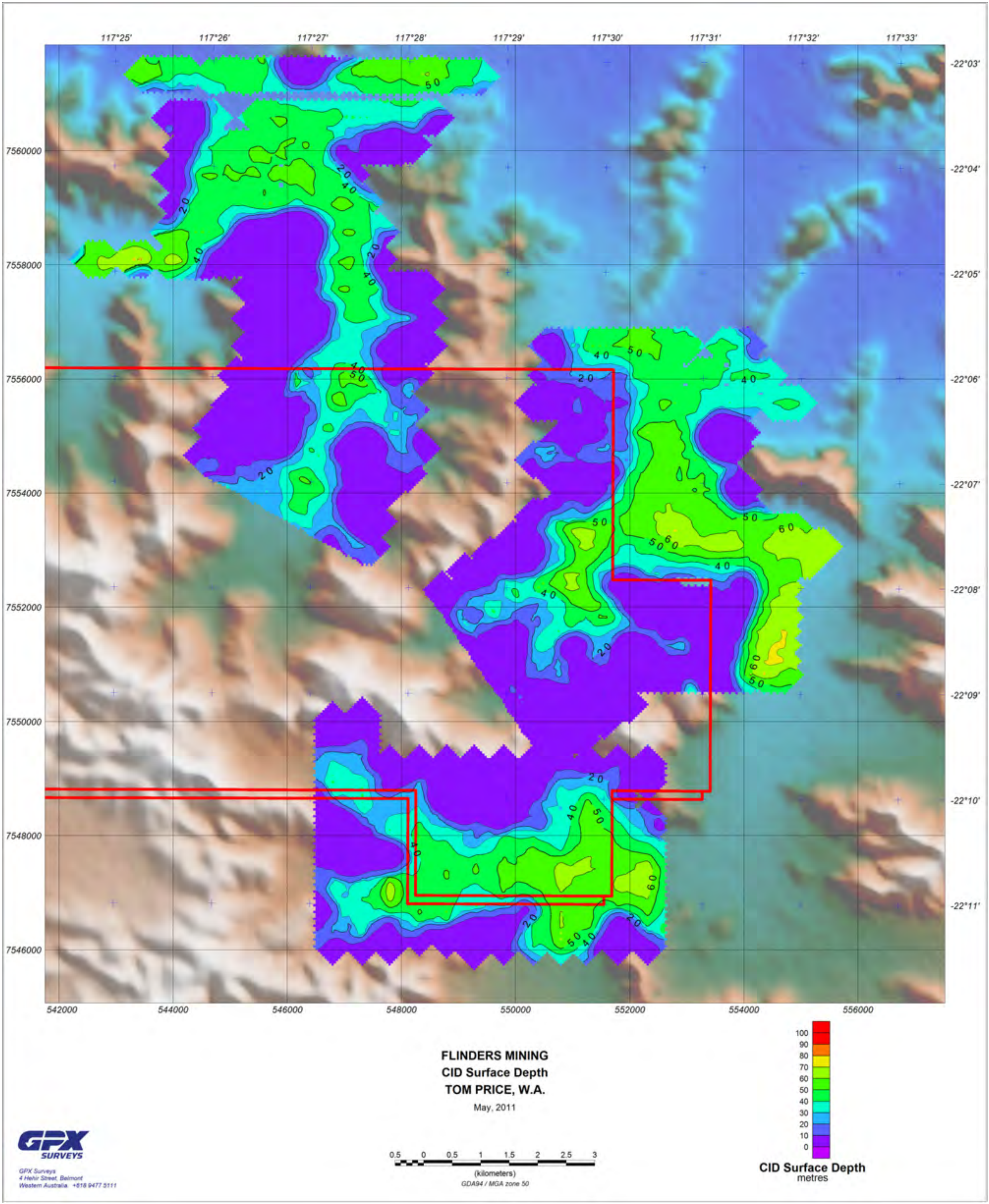


Figure 15: CID Top Surface Depth Model

4.1.3 Channel Iron (CID) base surface Depth Model

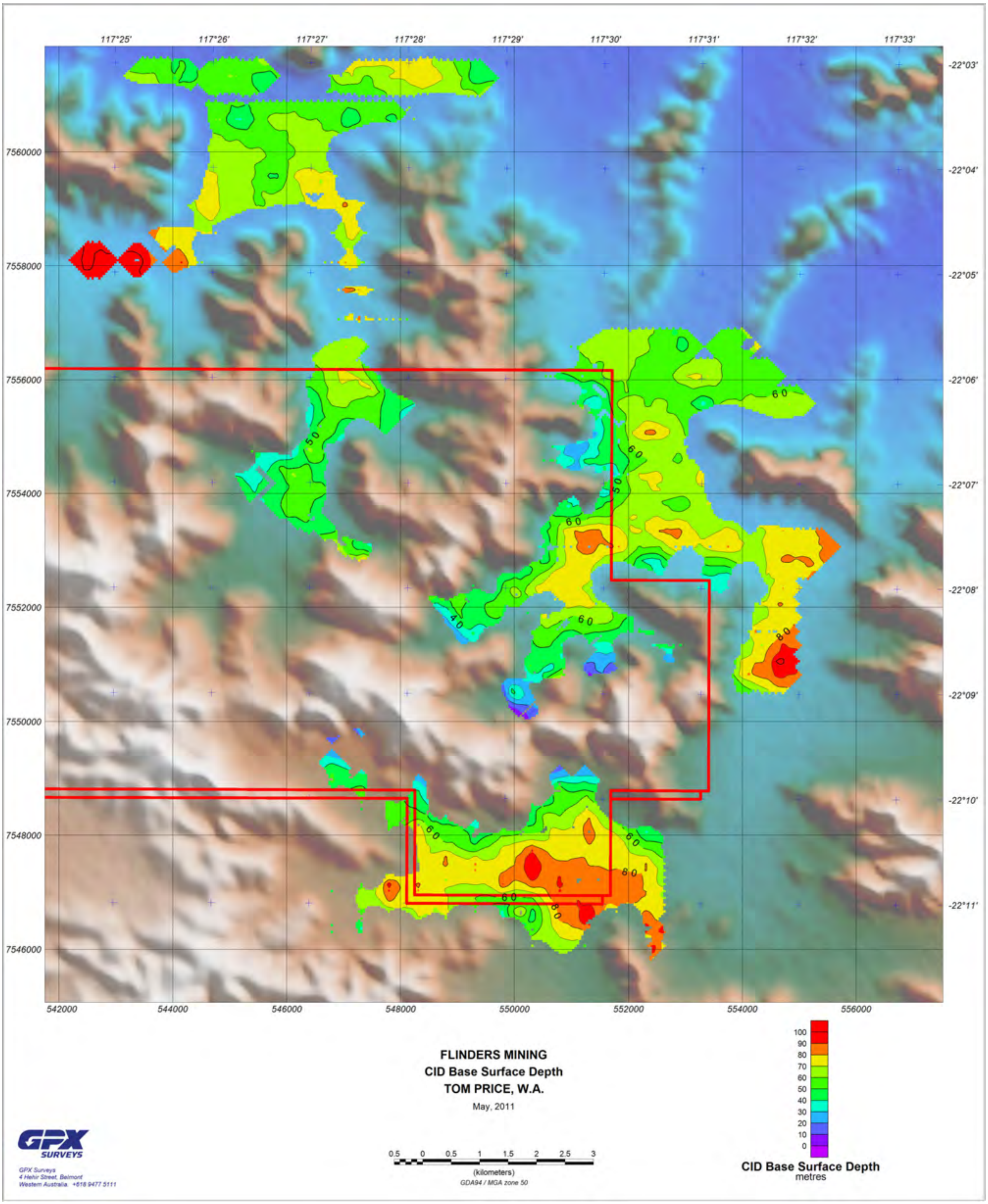


Figure 16: CID Base Surface Depth Model

4.1.4 Clay (CLY) top surface Depth Model

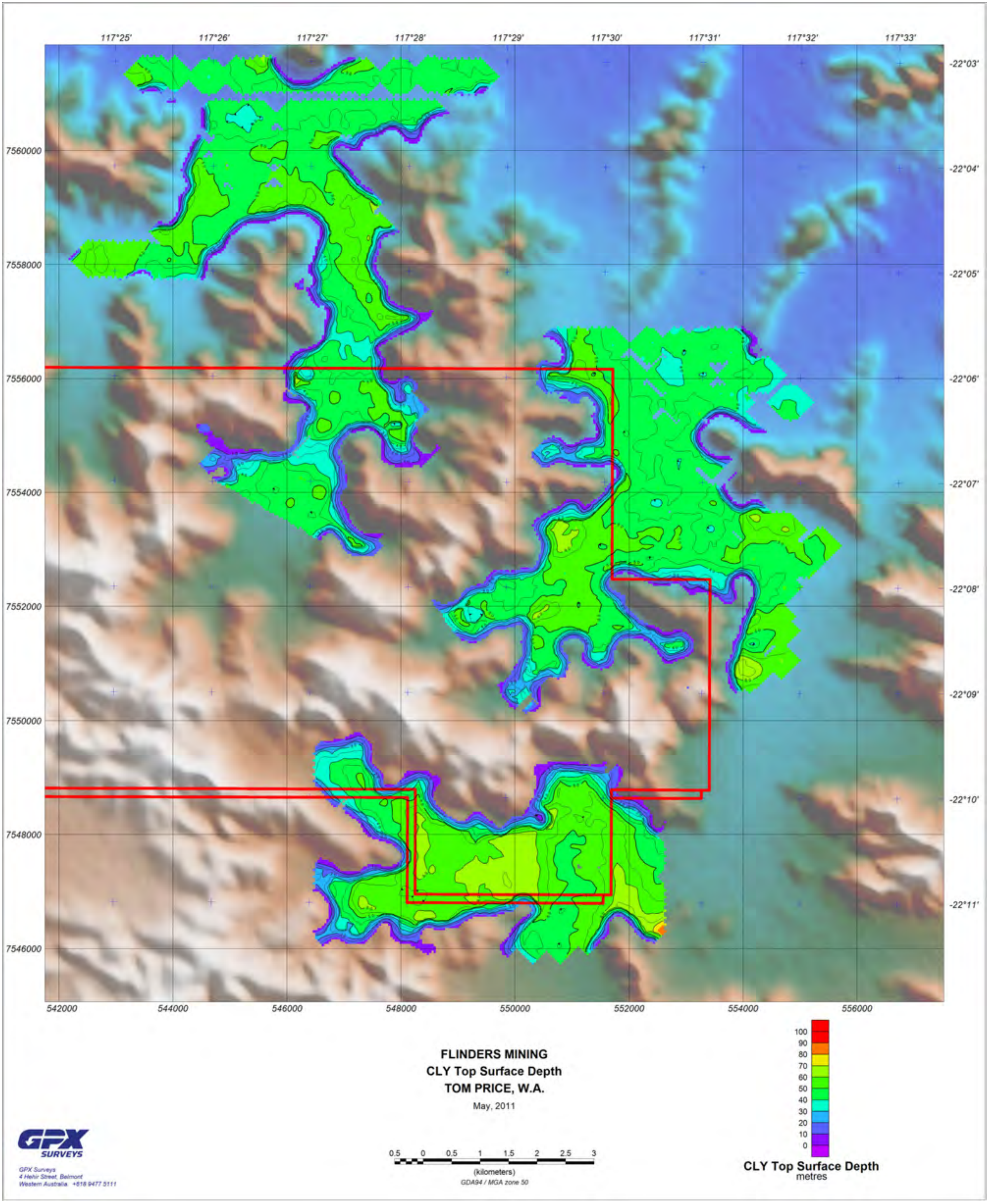


Figure 17: Clay Top Surface Depth Model

4.1.5 Clay (CLY) base surface Depth Model

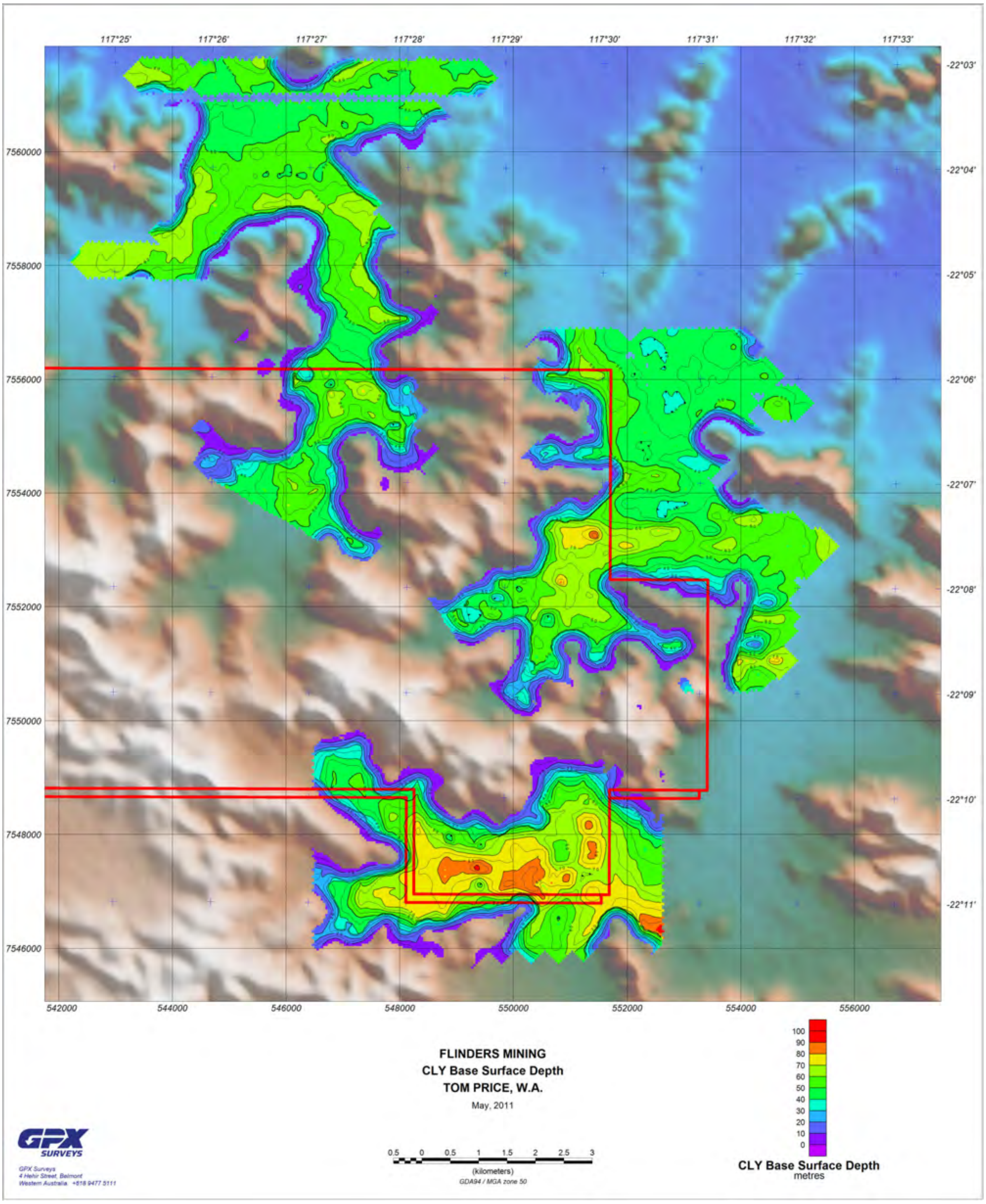


Figure 18: Clay Base Surface Depth Model

4.1.6 Banded Iron (BID) top surface Depth Model

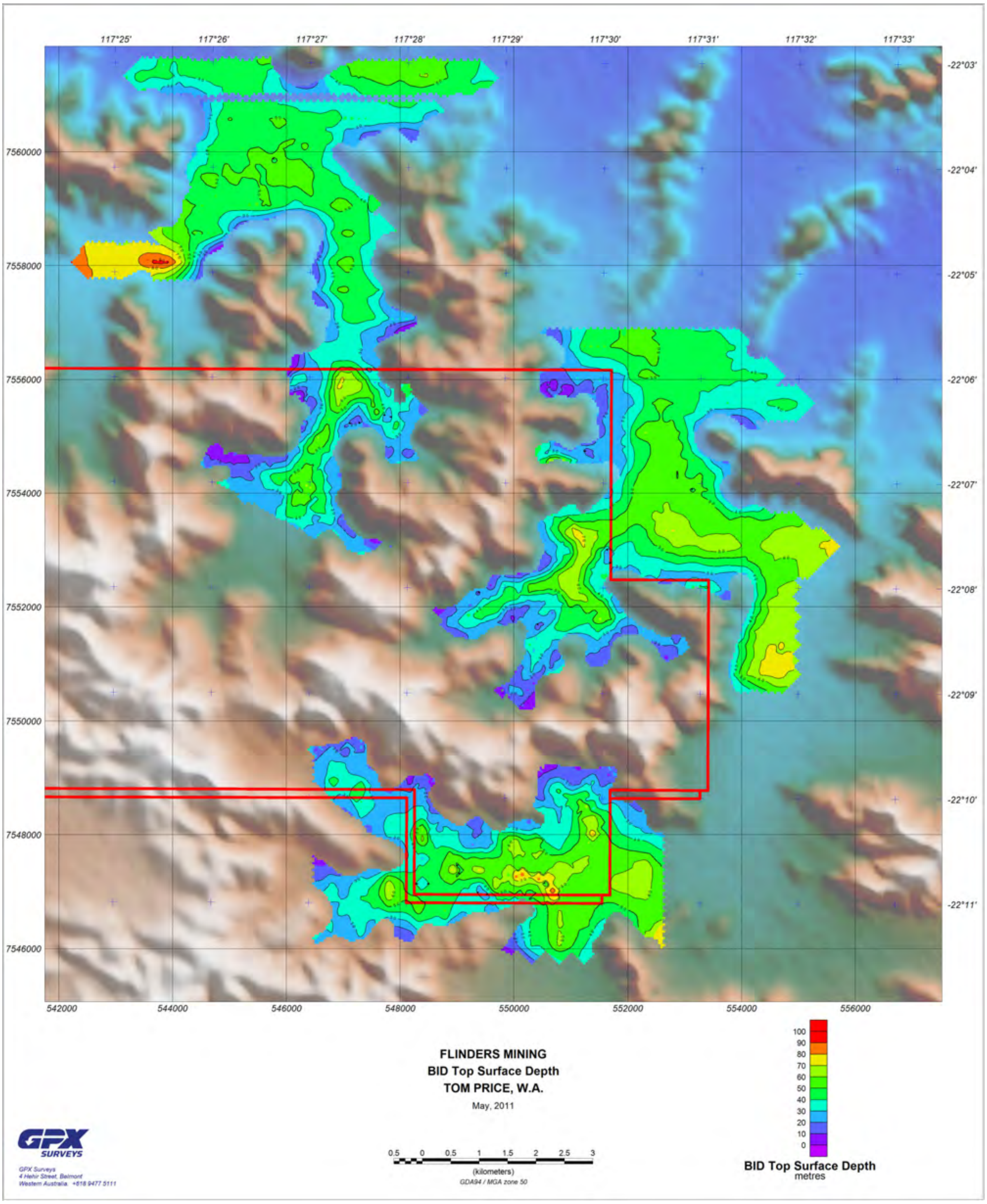


Figure 19: BID Top Surface Depth Model

4.1.7 Banded Iron (BID) base surface Depth Model

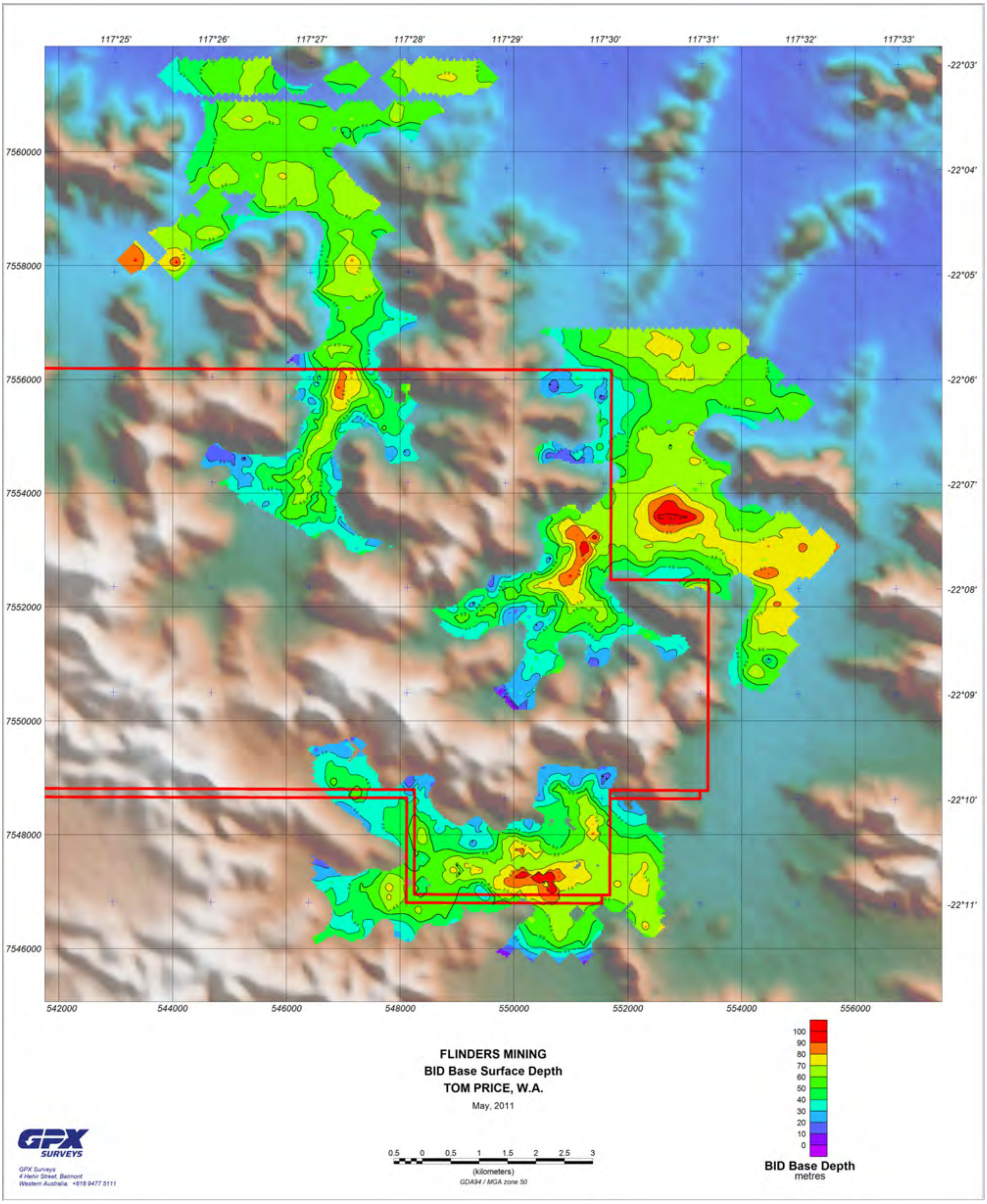


Figure 20: BID Base Surface Depth Model

4.1.8 Basement (BMT) Depth Model

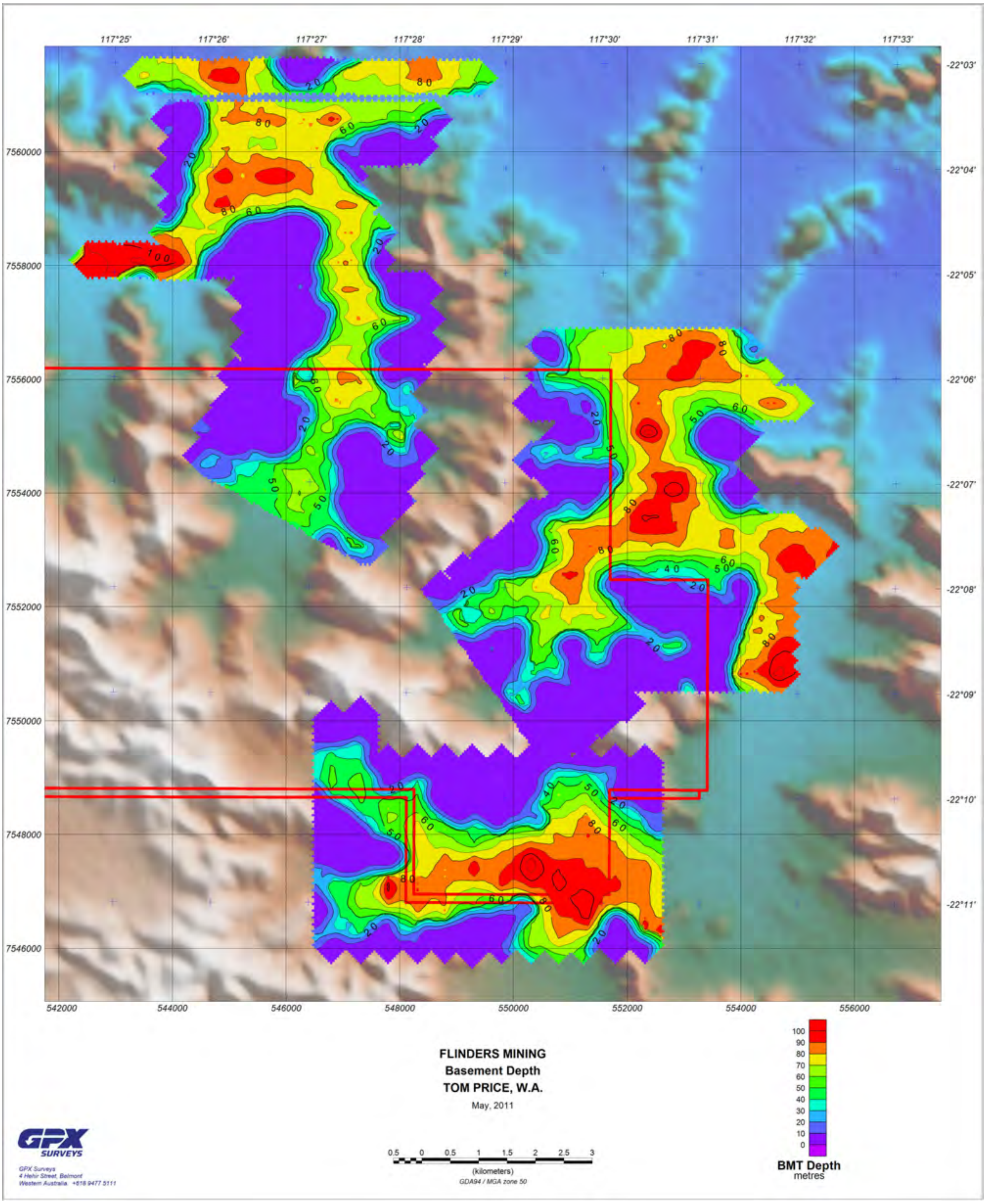


Figure 21: Basement Depth Model

4.1.9 DID Thickness Model

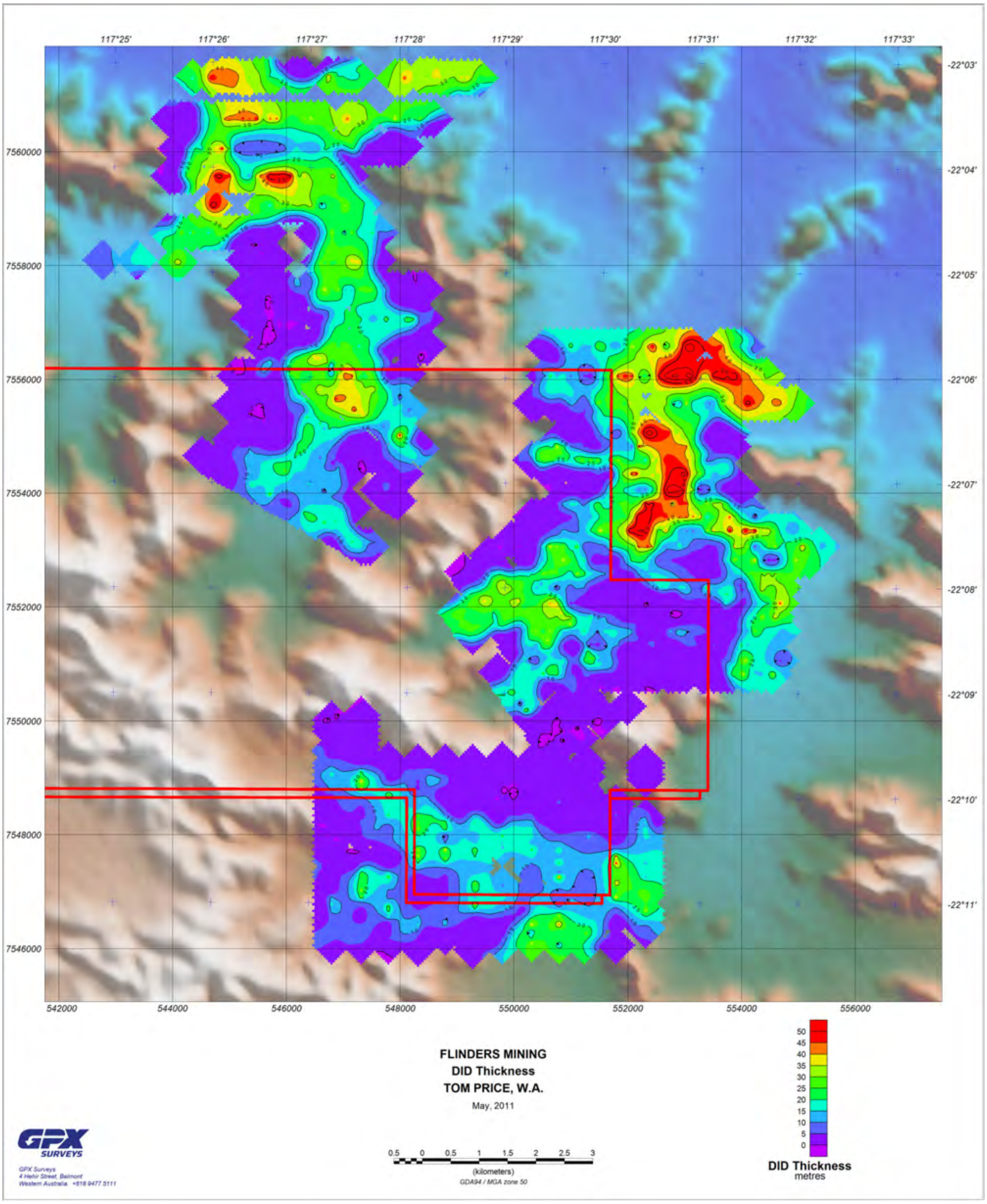


Figure 22: DID Thickness Model

4.1.10 Clay Thickness Model

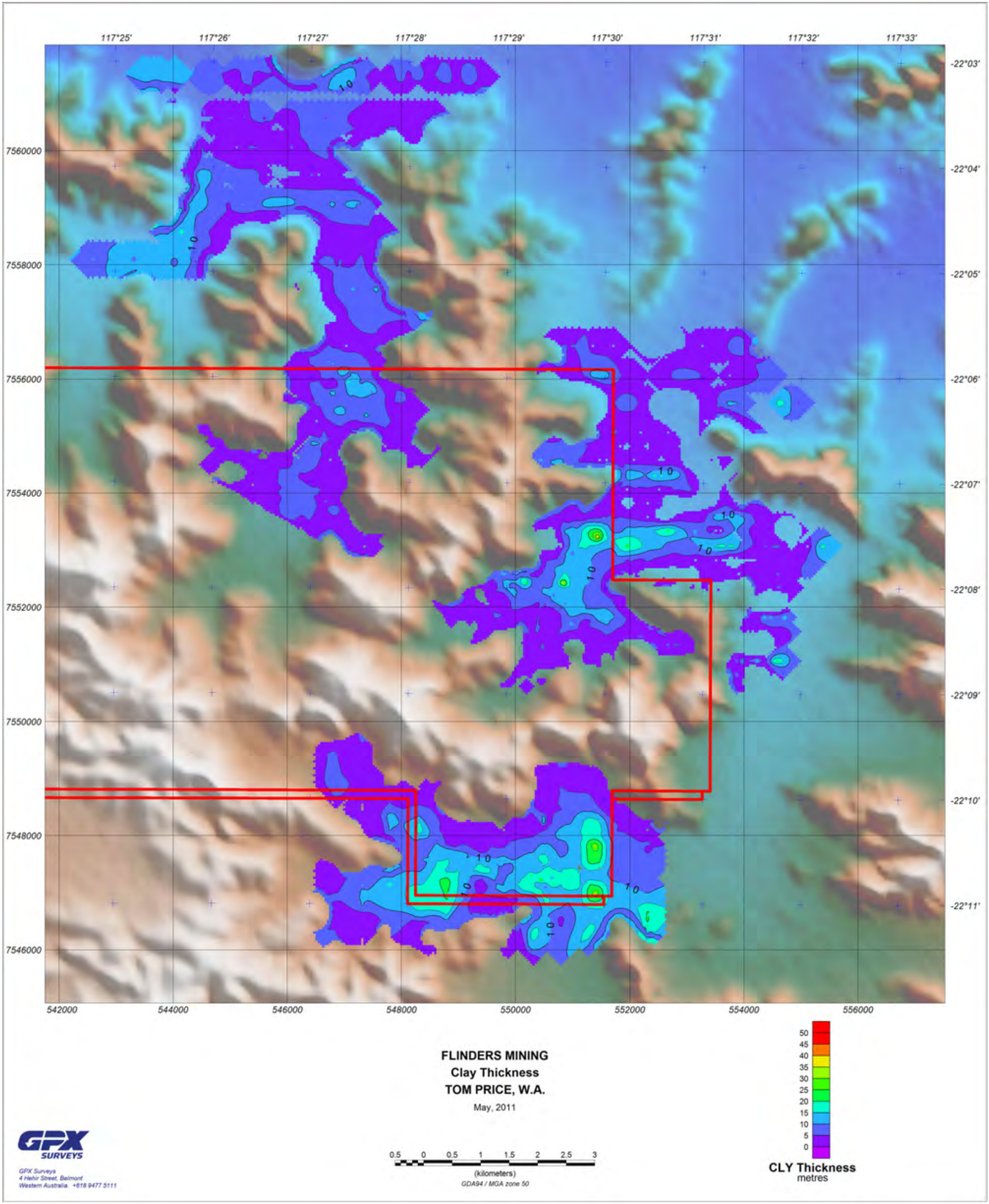


Figure 23: Clay Thickness Model

4.1.11 Consolidated Channel Iron (CIDg) –Thickness Model

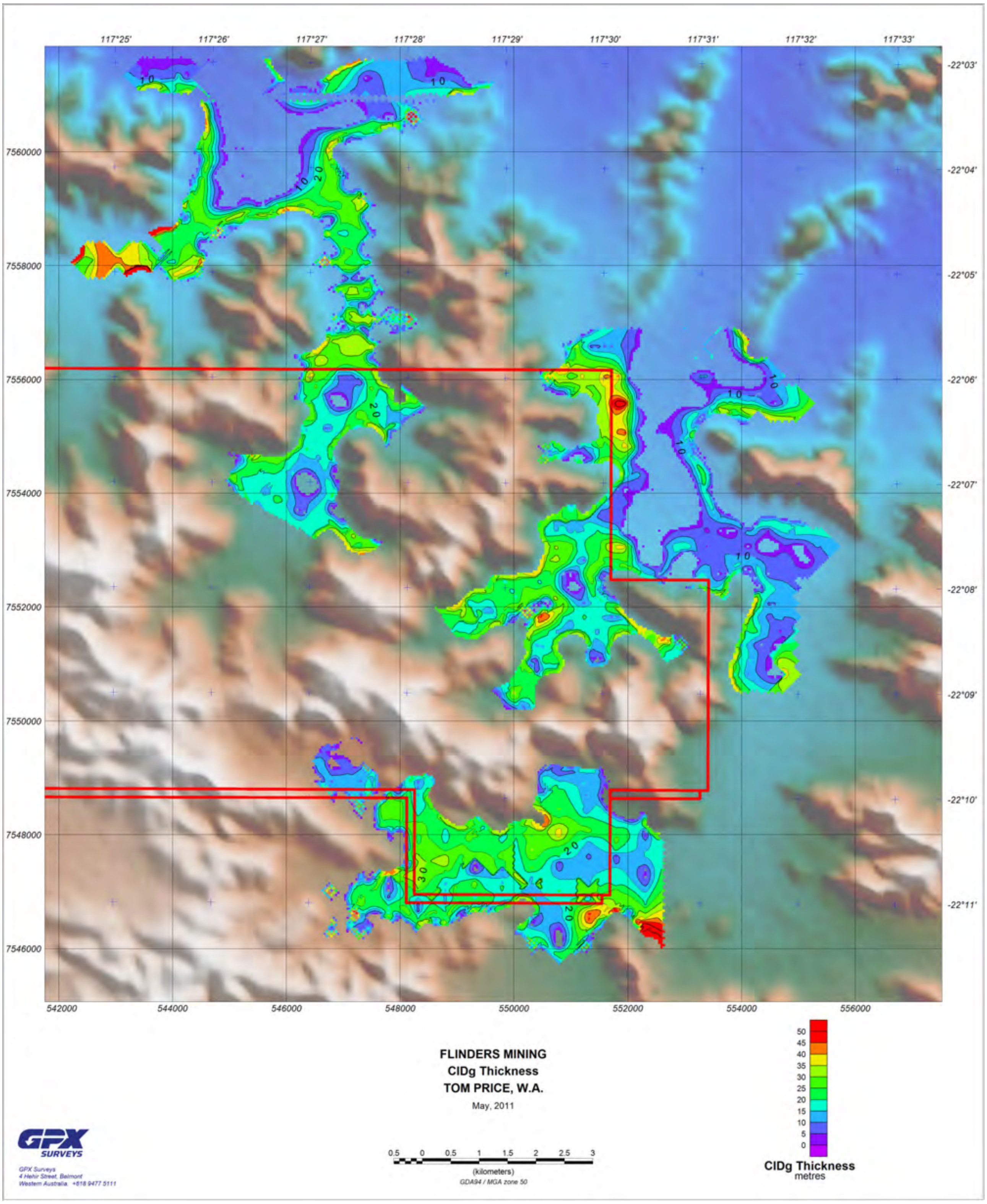


Figure 24: CIDg Thickness Model

4.1.12 Porous Channel Iron (CIDh) – Thickness Model

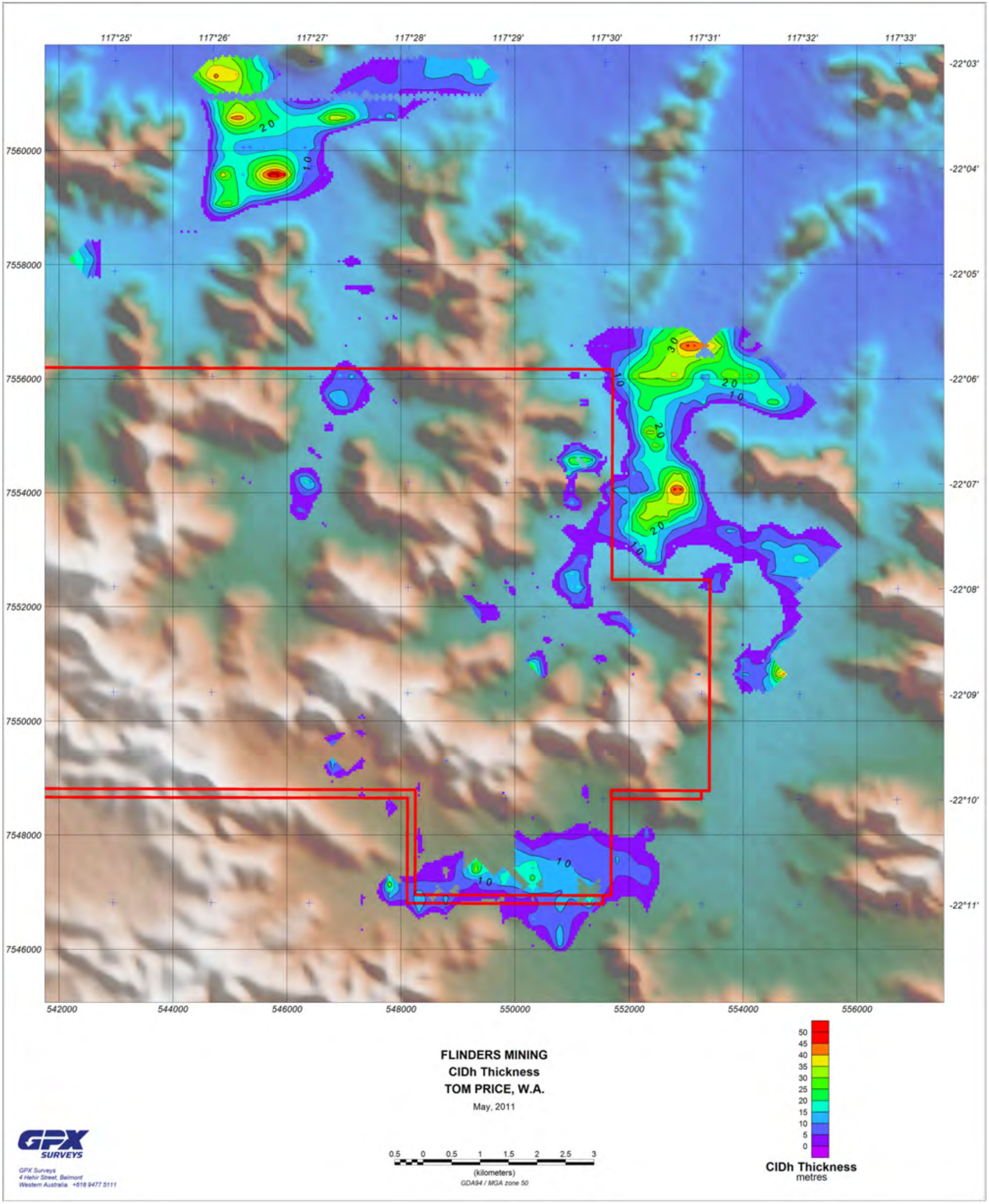


Figure 25: CIDh Thickness Model

4.1.13 BID Thickness Model

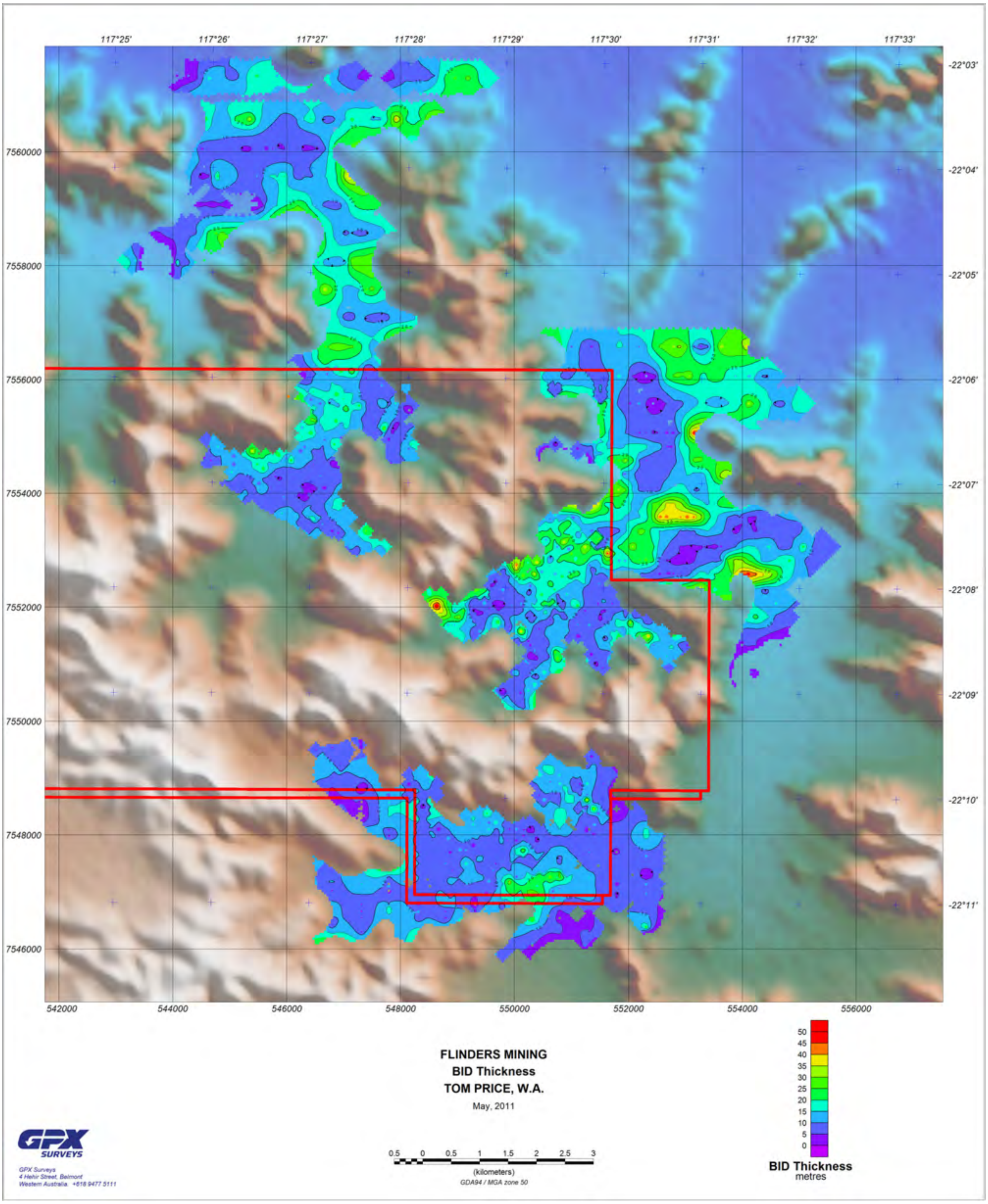


Figure 26: BID Thickness Model

4.1.14 Valley Flatness Factor

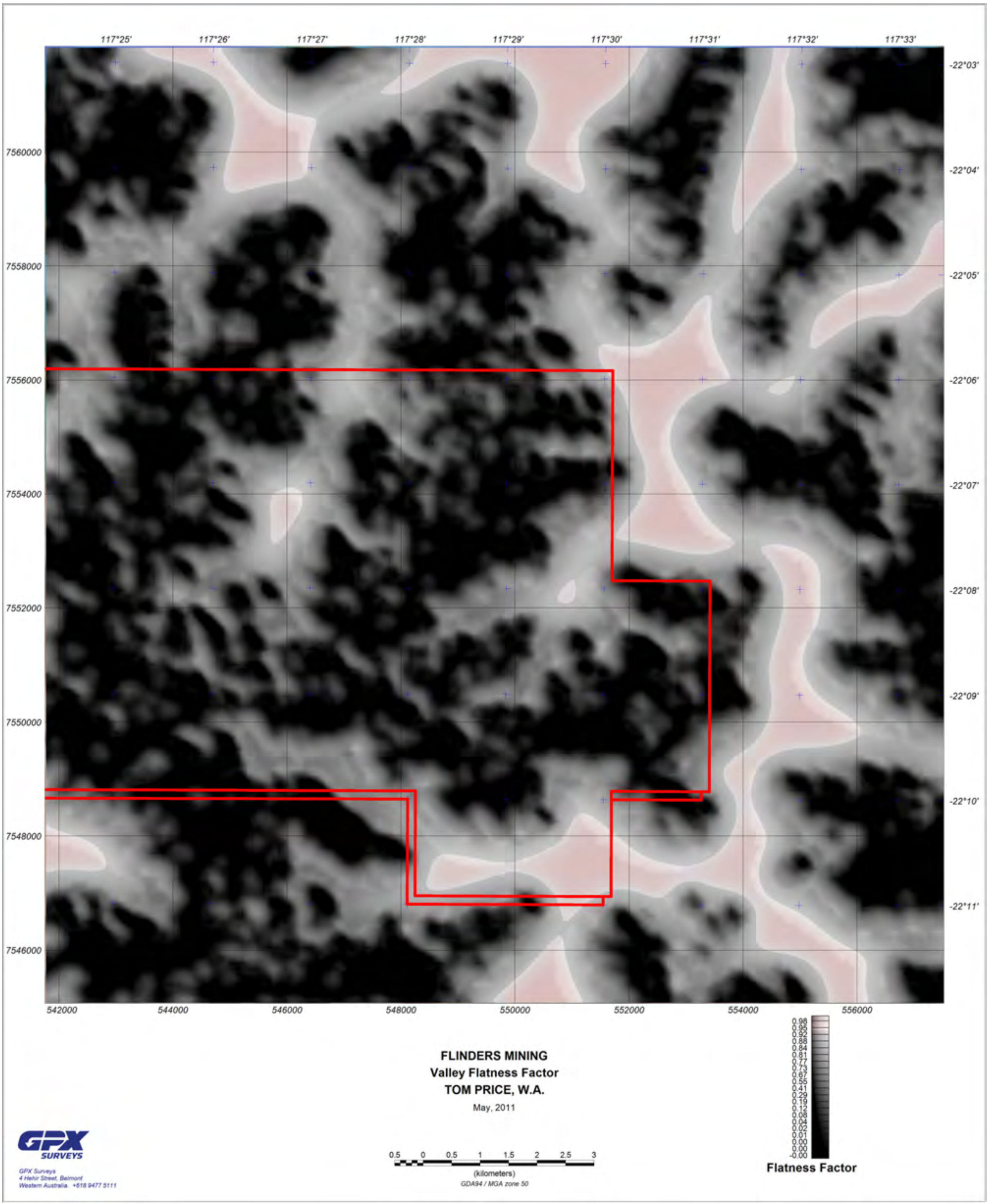


Figure 27: Palaeochannel valley bottom flatness factor - used in outcrop estimates

4.1.15 Average Conductivity

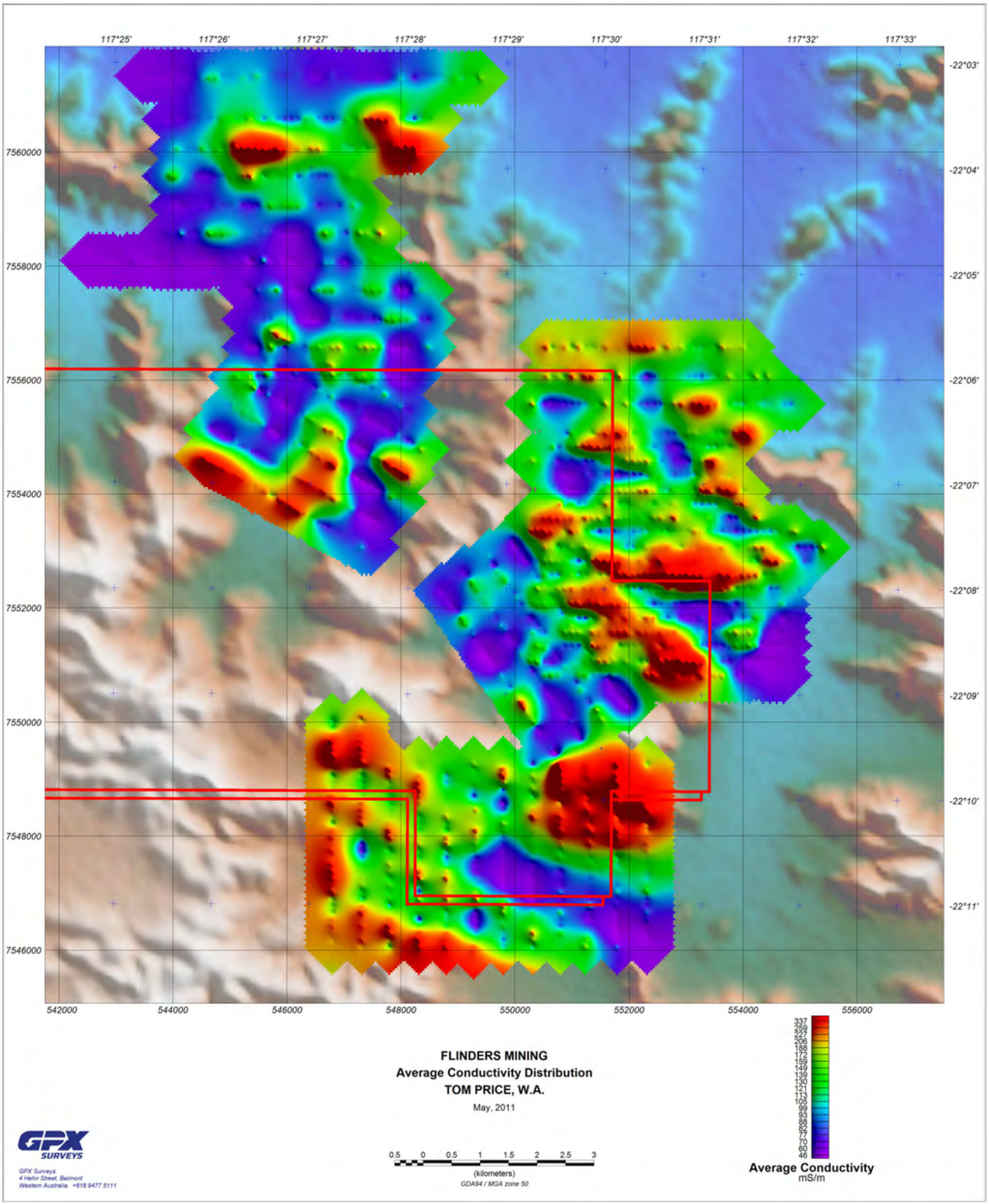


Figure 28: Average conductivity distribution

4.1.16 Conductivity Roughness

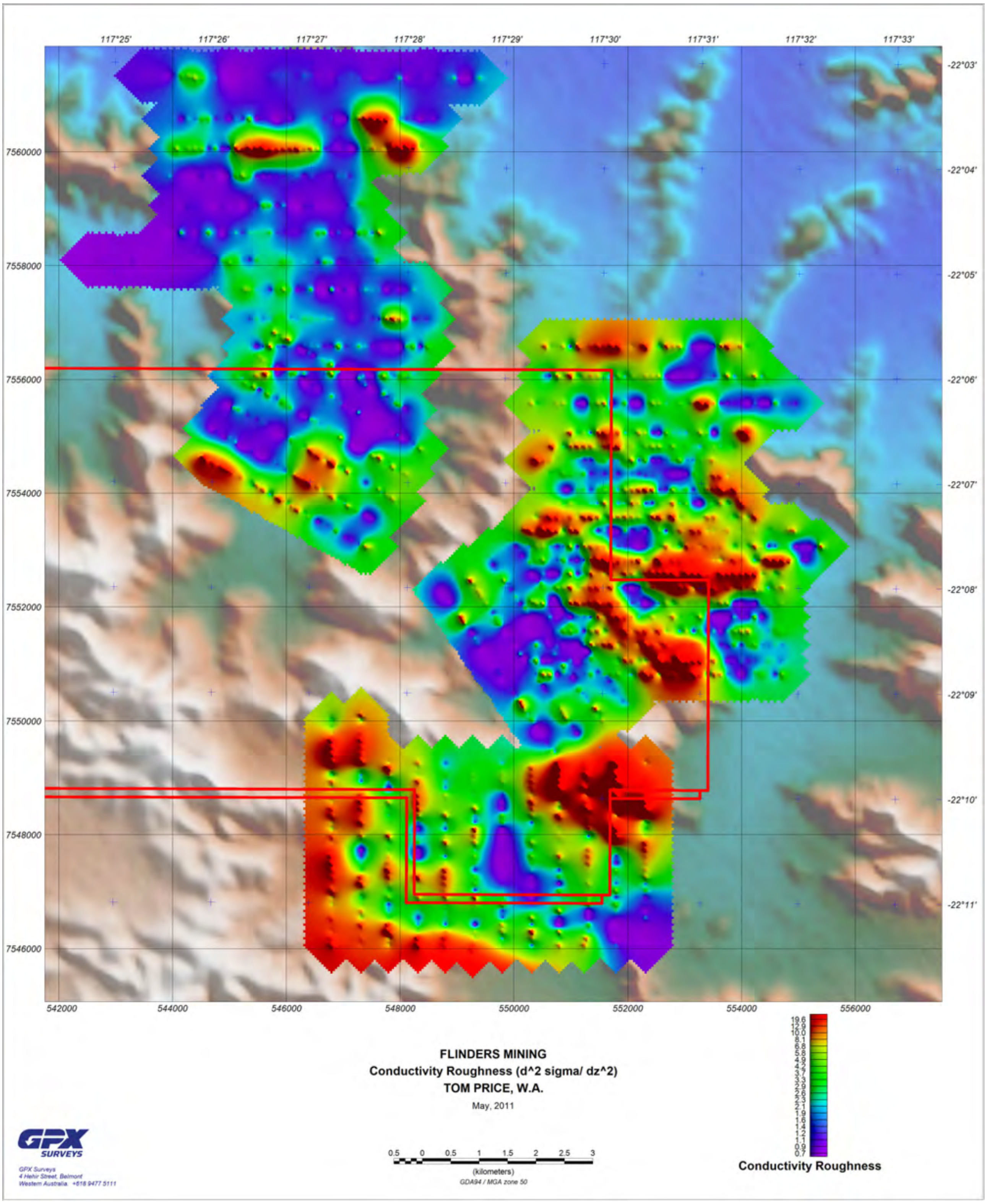


Figure 29: Magnitude of the rate-of-change in conductivity with depth

4.1.17 Uncertainty of measurements

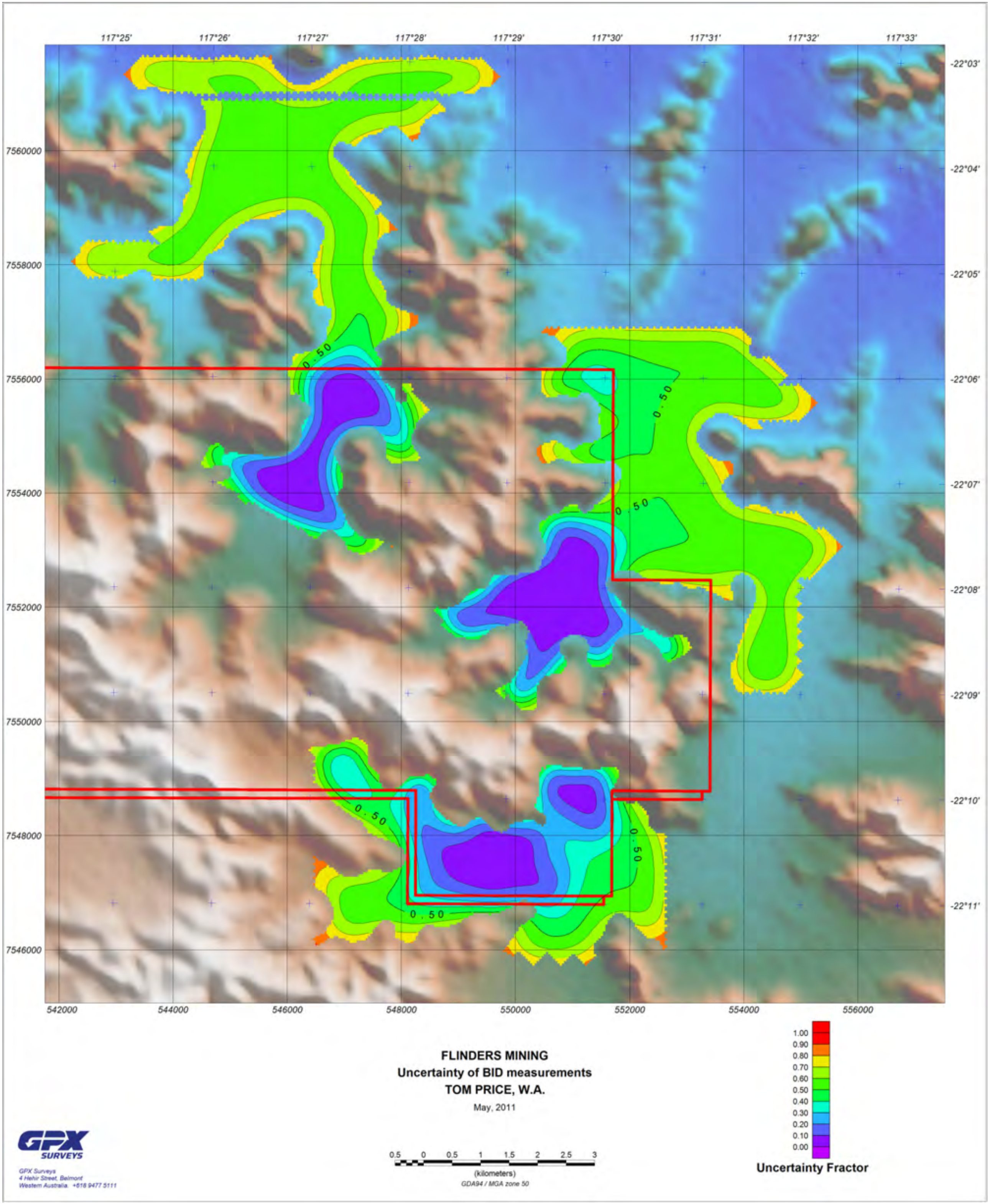


Figure 30: Uncertainty related to borehole proximity and survey density

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 BACKGROUND AND GUIDING FACTORS

There has been extensive geophysical and geological exploration of the survey area, especially in those areas close to the known iron deposits. However, resources in those areas adjacent to and outside the tenement boundary are very limited with no exploration boreholes to use for constraining the model. Through consultation with Flinders Mines consultants, horizons were targeted that would best define the extent of the palaeochannel and these were refined by comparing downhole geophysical measurements and geological interpretations with the airborne EM.

5.2 EXTENT AND CONFIDENCE

The gridded model was extended 500m outside of the EM lines. Depths on the grids are relative to ground level but also based on elevations from the SRTM. The SRTM model takes 400m wide windows and averages the results and causes areas with high gradient and dense changes in topography to become smeared. These areas are filtered based on their valley flatness factor and the availability of other resources.

5.2.1 Noise, misfit and resolution

This is a geophysicist's interpretation and the limits of the model are always changing with the input of more information. With limited access to drillhole information outside of the tenement boundary the variability in the model is proportional to the line spacing of the model along with the distance from the drillholes. In areas with little geological constraints depth resolution is ~10-15m and ¼ line spacing cell size. In those areas near drillholes on-tenement, the resolution is increased due to the constraints of the third-party interpretations and depth estimates.

Figure 30 illustrates the change in the certainty of measurements with distance from the observed drillholes. Higher values show that a wider filter has been applied whereas a lower factor represents constraints defined more by the known geology. Values close to the mean show areas more defined by the depth and conductivity constraints from the XTEM CDI's.

Noise due to increased levels of magnetic permeability is ignored because the targeted horizons have undergone oxidation of the majority of the magnetite content. In those areas with near surface solutions for the basement, the solutions are filtered with a fraction of the valley flatness factor.

5.3 ASSUMPTIONS

5.3.1 Airborne EM - Conductivity

Contrasting susceptibility units are compared between the model profiles and the borehole information. From this information it is assumed that the basement is continuous, dense and highly conductive and the sediments increase in conductivity with decreasing porosity and grain size. Separation of the recently deposited sediments and the DID is based on the first continuous increase in conductivity with depth. To delineate the contrasting horizons, it was assumed that the clayey sediments would have conductivities much higher and thicknesses far less than the surrounding coarser sediments. The CIDg and CIDh horizons are separated by the change in the conductivity gradient of the CID and also the knowledge that the DID is constrained by a clay horizon separating it with the CID. The separation of the basement and BID zones is based on changes in the continuity of the profiles and 2/3D models. Given that they have similar measurements and generally occur very close to each other this is harder to estimate by the EM solutions alone.

5.4 RECOMMENDATIONS

Figure 30 shows how result certainty based on boreholes is heavily skewed to the on-tenement areas of the survey. Ground based surveying, such as downhole geophysics (resistivity and neutron) along with ground gravity traverses will help in fitting this model more accurately in those areas further away from the tenement.

Further Work - 3D Structural Inversion

The previous steps to profile model the EM and expand to 2/3D planes can produce unrealistic crossovers in units and geophysical parameters. By using the downhole geophysical constraints and then inverting back from the forward modelled response, small changes in geophysical constants and depth can be applied iteratively to create a ‘more likely’ distribution of rock units and parameters.

While it has been possible to produce density and magnetic 3D inversions it is at present not possible to do inversions on TEM-data in more than one dimension. In this case, the inferred relative densities from the downhole geophysics can be used to refine the model, however, further ground gravity work would have to be done to generate an observed gravity plane to run an inversion.

DISCLAIMER

Every effort has been made to make this model a useful general reference. No guarantee can be made that this model is a true representation of the structures and depths. The conclusions made in the interpretation have been based on assumptions about the data collected by GPX Surveys and another party (Flinders Mines/ Worley Parsons supplied historical FDEM, Ground gravity, downhole geophysics, geological logs and geological profile interpretations). GPX SURVEYS BEARS NO RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF THIRD PARTY DATA AND RESULTING INTERPRETATION.

6 CONTRACTOR INFORMATION

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7 BIBLIOGRAPHY

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8 APPENDIX A: SURVEY LINES START AND END COORDINATES

Coordinates are GDA94 MAG Z50

XTEM Survey Lines

Line	St East	St Nth	End East	End Nth
1040	545754.40	7556829.65	548569.87	7555231.46
1050	545522.54	7556390.77	548313.16	7554809.14
1060	545307.24	7555943.61	548056.46	7554361.98
1070	545025.69	7555521.29	547857.72	7553914.82
1080	544768.99	7555090.69	547576.17	7553500.78
1090	544545.41	7554643.53	547344.31	7553045.34
2070	551929.00	7550338.00	549984.00	7553116.00
2090	551517.00	7550055.00	549573.00	7552832.00
2110	551105.00	7549771.00	549161.00	7552547.00
2130	550695.00	7549486.00	548751.00	7552262.00
3010	550420.00	7550820.00	554635.00	7550820.00
3020	550420.00	7551070.00	554635.00	7551070.00
3030	550420.00	7551320.00	554638.00	7551320.00
3040	550420.00	7551570.00	554642.00	7551570.00
3050	550420.00	7551820.00	554645.00	7551820.00
3060	550420.00	7552070.00	554649.00	7552070.00
3070	550420.00	7552320.00	554652.00	7552320.00
3080	550420.00	7552570.00	554656.00	7552570.00
3090	550401.00	7552820.00	555095.00	7552820.00
3100	550114.00	7553070.00	555317.00	7553070.00
3110	550237.00	7553320.00	554851.00	7553320.00
3120	550360.00	7553570.00	554216.00	7553570.00
3130	550879.00	7553820.00	553937.00	7553820.00
3140	550988.00	7554070.00	553988.00	7554070.00
3150	550688.00	7554320.00	553688.00	7554320.00
3160	550386.00	7554570.00	553386.00	7554570.00
3170	550739.00	7554820.00	553739.00	7554820.00
3180	551015.00	7555070.00	554015.00	7555070.00
3200	550405.00	7555570.00	554887.00	7555570.00
3220	550612.00	7556070.00	554403.00	7556070.00
3240	550600.00	7556570.00	553977.00	7556570.00
4010	546800.00	7546100.00	546800.00	7549950.00

4020	547300.00	7546100.00	547300.00	7550000.00
4030	547800.00	7546100.00	547800.00	7549200.00
4040	548300.00	7546100.00	548300.00	7549200.00
4050	548800.00	7546100.00	548800.00	7549200.00
4060	549300.00	7546100.00	549300.00	7549200.00
4070	549800.00	7546100.00	549800.00	7549200.00
4080	550300.00	7546100.00	550300.00	7549200.00
4090	550800.00	7546100.00	550800.00	7549200.00
4100	551300.00	7546100.00	551300.00	7549200.00
4110	551800.00	7546100.00	551800.00	7549200.00
4120	552300.00	7546100.00	552300.00	7549200.00
5020	545159.00	7556070.00	548159.00	7556070.00
5030	545423.00	7556570.00	548423.00	7556570.00
5040	545393.00	7557070.00	548393.00	7557070.00
5050	545343.00	7557570.00	548343.00	7557570.00
5060	542605.00	7558070.00	547494.00	7558070.00
5070	543966.00	7558570.00	547609.00	7558570.00
5080	544157.00	7559070.00	547275.00	7559070.00
5090	544075.00	7559570.00	547075.00	7559570.00
5100	544165.00	7560070.00	548303.00	7560070.00
5110	543997.00	7560570.00	548509.00	7560570.00
5120	543549.00	7561070.00	549334.00	7561070.00

9 APPENDIX B: J2455 XTEM SURVEY SPECIFICATIONS

The specifications of the XTEM transmitter, receiver and receiver coil are as follows:

Transmitter

Waveform: 25% duty cycle square wave
Pulse on Time: 5 ms (inc. 1ms cosine ramp on)
Pulse off Time: 15 ms
Pulse Current: 300 Amps
Switch on Ramp: 0.75 ms
Switch off Ramp: 45 µs
Tx Loop Area: 340 m^2
Tx NIA: 103,200
Tx Frequency: 25 Hz

Receiver

A-D Circuitry: 24 bit
Sample Time: 0 – 12 ms
Sampling: 512 Linear channels
Windowed Data: 30 channels

Receiver Coil

Effective NA: 10,000 Square Metres

Bandwidth: 45,000 Hz

EM Data Channel Specifications

NB: Time 0 is at the start of the switch off ramp and all times are in μSec.

30 Channel Sampling Scheme (45 μSec ramp)				
Channel	**Begin Time**	**End Time**	**Centre Time**	**Width in Time**
1	101.01	126.26	113.64	25.25
2	126.26	151.52	138.89	25.25
3	151.52	176.77	164.14	25.25
4	176.77	202.02	189.39	25.25
5	202.02	227.27	214.65	25.25
6	227.27	252.53	239.90	25.25
7	252.53	277.78	265.15	25.25
8	277.78	303.03	290.40	25.25
9	303.03	328.28	315.66	25.25
10	328.28	378.54	353.41	50.25
11	378.54	428.79	403.66	50.25
12	428.79	479.04	453.91	50.25
13	479.04	554.29	516.67	75.25
14	554.29	629.55	591.92	75.25
15	629.55	729.80	679.67	100.25
16	729.80	855.05	792.42	125.25
17	855.05	1005.30	930.18	150.25
18	1005.30	1205.56	1105.43	200.25
19	1205.56	1455.81	1330.68	250.25
20	1455.81	1756.06	1605.93	300.25
21	1756.06	2131.31	1943.69	375.25
22	2131.31	2581.57	2356.44	450.25
23	2581.57	3131.82	2856.69	550.25
24	3131.82	3832.07	3481.94	700.25
25	3832.07	4682.32	4257.20	850.25
26	4682.32	5732.58	5207.45	1050.25
27	5732.58	7032.83	6382.70	1300.25
28	7032.83	8608.08	7820.45	1575.25
29	8608.08	10558.33	9583.21	1950.25
30	10558.33	12908.58	11733.46	2350.25

Table 2: Data channel specifications for XTEM.

Appendix 3: Borehole Logs

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resources & energy

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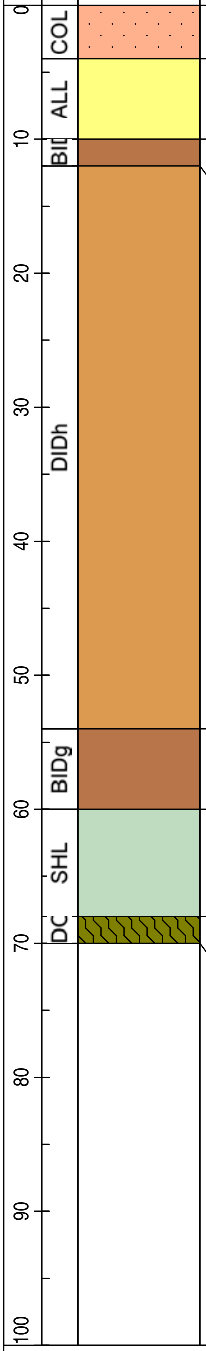
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC4053

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	70
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	25.56-43.65
DATE DRILLED	40772	**EASTING**	551285.983	**ELEVATION (mAHD)**	594.413
LOGGED BY		**NORTHING**	7548613.494	**WATER LEVEL (mBGL)**	32.6

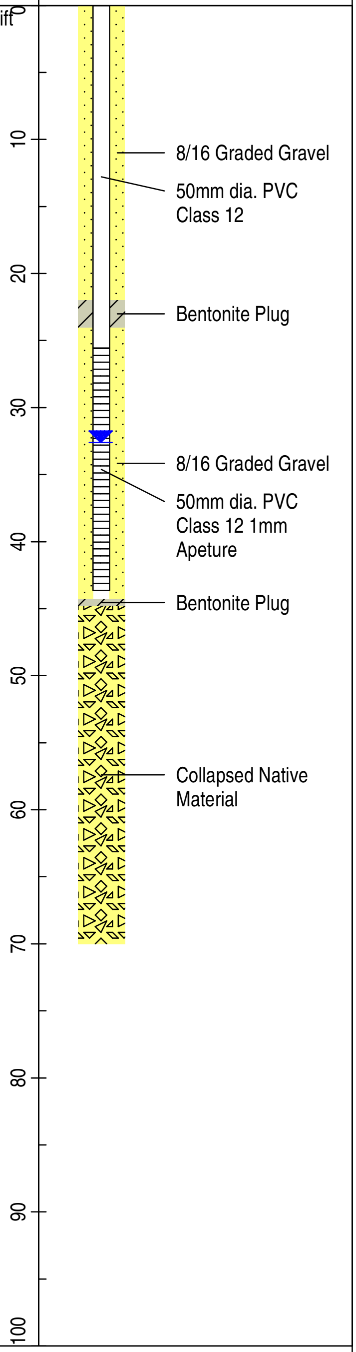
Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	

Depth (m)	Geological Unit	**Graphic Log**	**Lithology**	**Field Notes**	**Bore Construction**



Geological Unit	Lithology
COL	COL: Recent Colluvium
ALL	ALL: Recent Alluvium
BIDh	BIDh: Bedded Iron Deposit - goethite with hematite
DIDh	DIDh: Detrital Iron Deposit - hematite dominant
BIDg	BIDg: Bedded Iron Deposit - goethite dominant
SHL	SHL: Shale
DOL	DOL: Dolerite

"Development Duration - 15min - airlift ceased thereafter; TDS- 112.0ppm



SHEET:1 OF 1

Job Number 201012-00322

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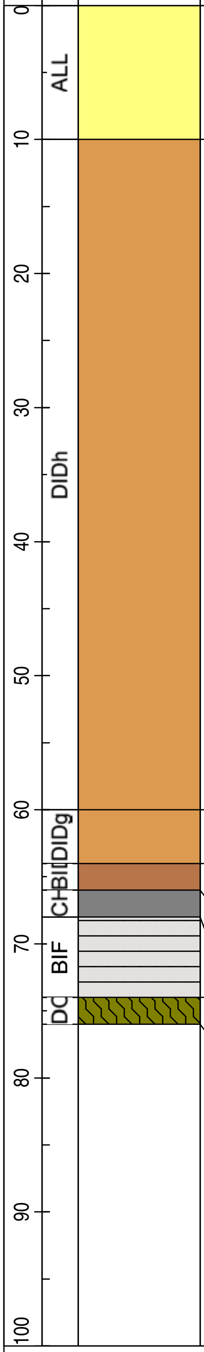
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC4052

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	76
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	11.50-43.50
DATE DRILLED	01NOV2011	**EASTING**	551272.683	**ELEVATION (mAHD)**	592.768
LOGGED BY		**NORTHING**	7548503.04	**WATER LEVEL (mBGL)**	Dry

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	Dry	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	**Graphic Log**	**Lithology**	**Field Notes**	**Bore Construction**



ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

DIDg: Detrital Iron Deposit - goethite dominant

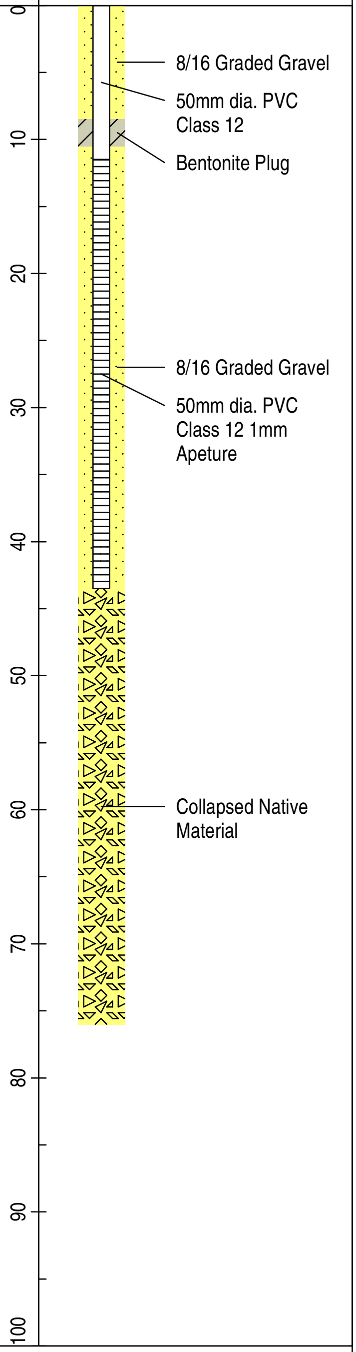
BIDg: Bedded Iron Deposit - goethite dominant

CHT: Chert

BIF: Banded Iron Formation

DOL: Dolerite

"Dry Bore"



SHEET:1 OF 1

Job Number 201012-00322

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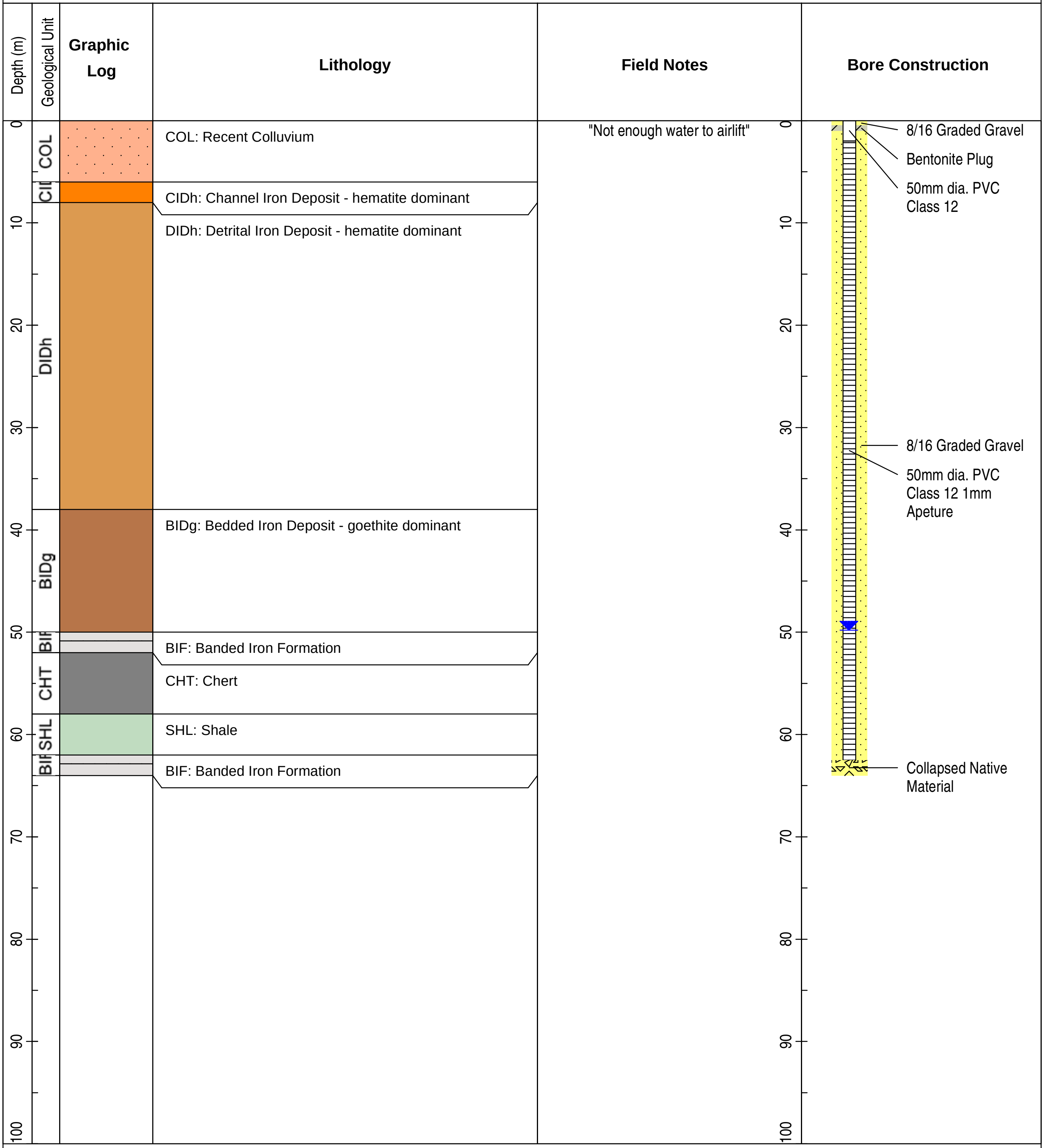
BOREHOLE:
HPRC4029

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	64
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.00-62.50
DATE DRILLED	01NOV2011	**EASTING**	550653.063	**ELEVATION (mAHD)**	610.99
LOGGED BY		**NORTHING**	7548792.622	**WATER LEVEL (mBGL)**	49.8

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**		**Salinity (mS/cm)**
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**



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Job Number 201012-00322

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Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
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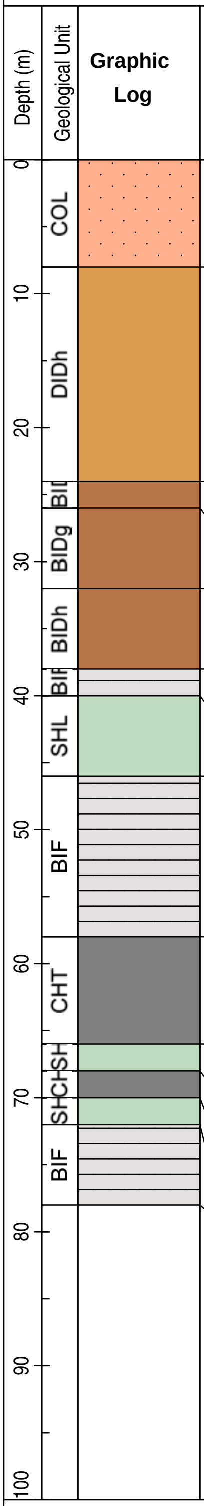
BOREHOLE:
HPRC3029

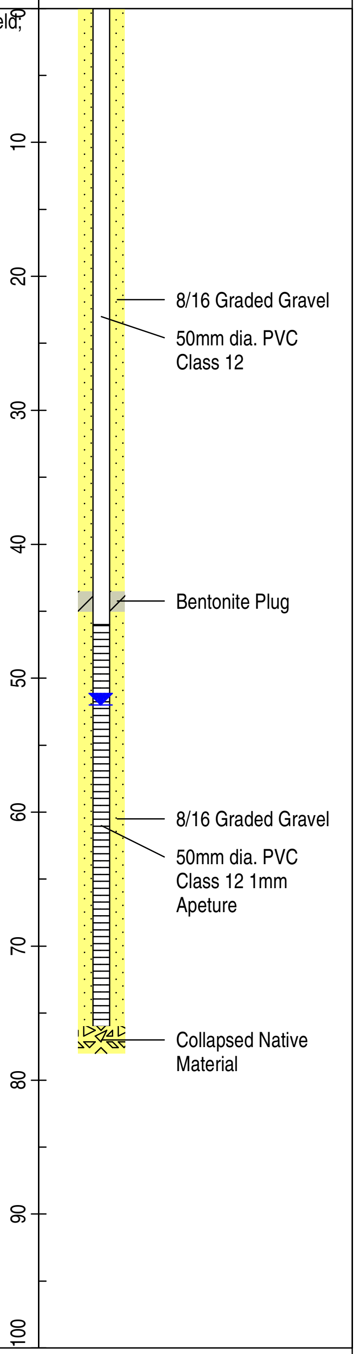
CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	78
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	46.00-76.00
DATE DRILLED	29OCT2011	**EASTING**	551731.499	**ELEVATION (mAHD)**	561.529
LOGGED BY		**NORTHING**	7551693.877	**WATER LEVEL (mBGL)**	51.99

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



Lithology	Field Notes
COL: Recent Colluvium	"Development Duration 30min- No Yield, TDS- 398ppm"
DIDh: Detrital Iron Deposit - hematite dominant	
BIDh: Bedded Iron Deposit - goethite with hematite	
BIDg: Bedded Iron Deposit - goethite dominant	
BIDh: Bedded Iron Deposit - goethite with hematite	
BIF: Banded Iron Formation	
SHL: Shale	
BIF: Banded Iron Formation	
CHT: Chert	
SHL: Shale	
CHT: Chert	
SHL: Shale	
BIF: Banded Iron Formation	

Bore Construction



SHEET:1 OF 1

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BOREHOLE:
HPRC3019

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	82
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	41.00-77.00
DATE DRILLED	29OCT2011	**EASTING**	552339.719	**ELEVATION (mAHD)**	568.504
LOGGED BY		**NORTHING**	7551490.384	**WATER LEVEL (mBGL)**	58.08

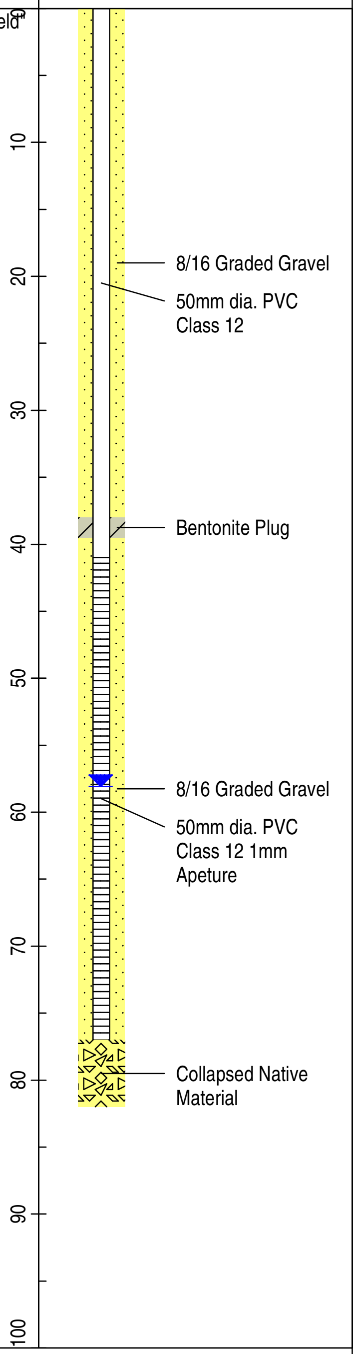
Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Geological Unit	Lithology
COL	COL: Recent Colluvium
DIDh	DIDh: Detrital Iron Deposit - hematite dominant
BIDh	BIDh: Bedded Iron Deposit - goethite with hematite
CHT	CHT: Chert
SHL	SHL: Shale
BIDh	BIDh: Bedded Iron Deposit - goethite with hematite
CHT	CHT: Chert
SHL	SHL: Shale
BIF	BIF: Banded Iron Formation

Field Notes

"Development Duration 15min - No Yield"

Bore Construction



SHEET:1 OF 1

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Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

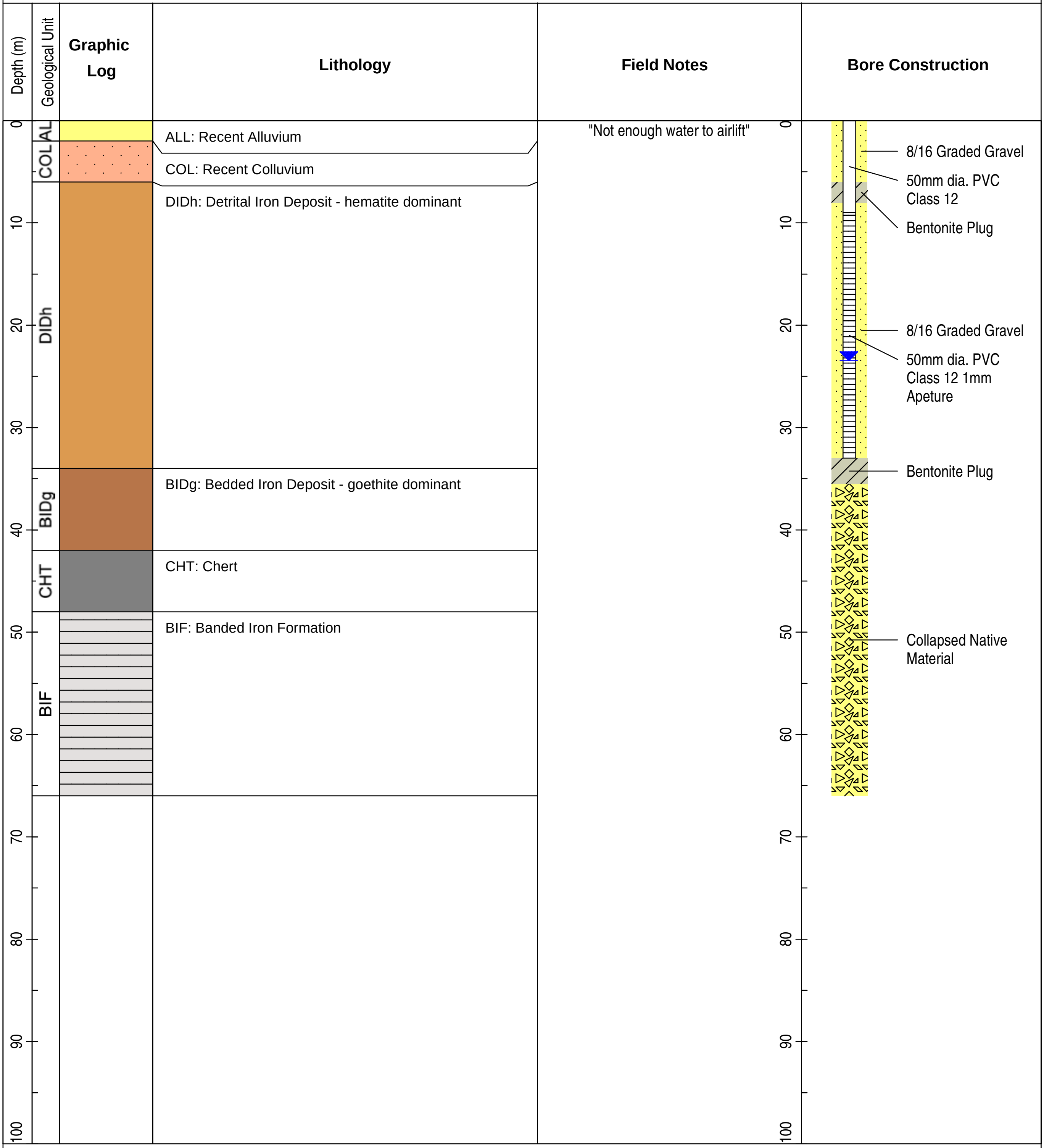
BOREHOLE:
HPRC2302

CLIENT FMS
PROJECT PIOP
DATE DRILLED 31OCT2011
LOGGED BY

LOCATION DELTA
PROJECTION
EASTING 550189.613
NORTHING 7550852.432

DRILLED DEPTH (m) 66
SCREEN (mBGL) 9.00-33.00
ELEVATION (mAHD) 577.423
WATER LEVEL (mBGL) 23.46

Contractor
Rig Type AIR CORE RC
Drill Bit 5.5"
Drill Fluid A/W
Airlift (L/s) 0
Temperature (℃)
Salinity (mS/cm)
pH



SHEET:1 OF 1

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Perth WA 6000
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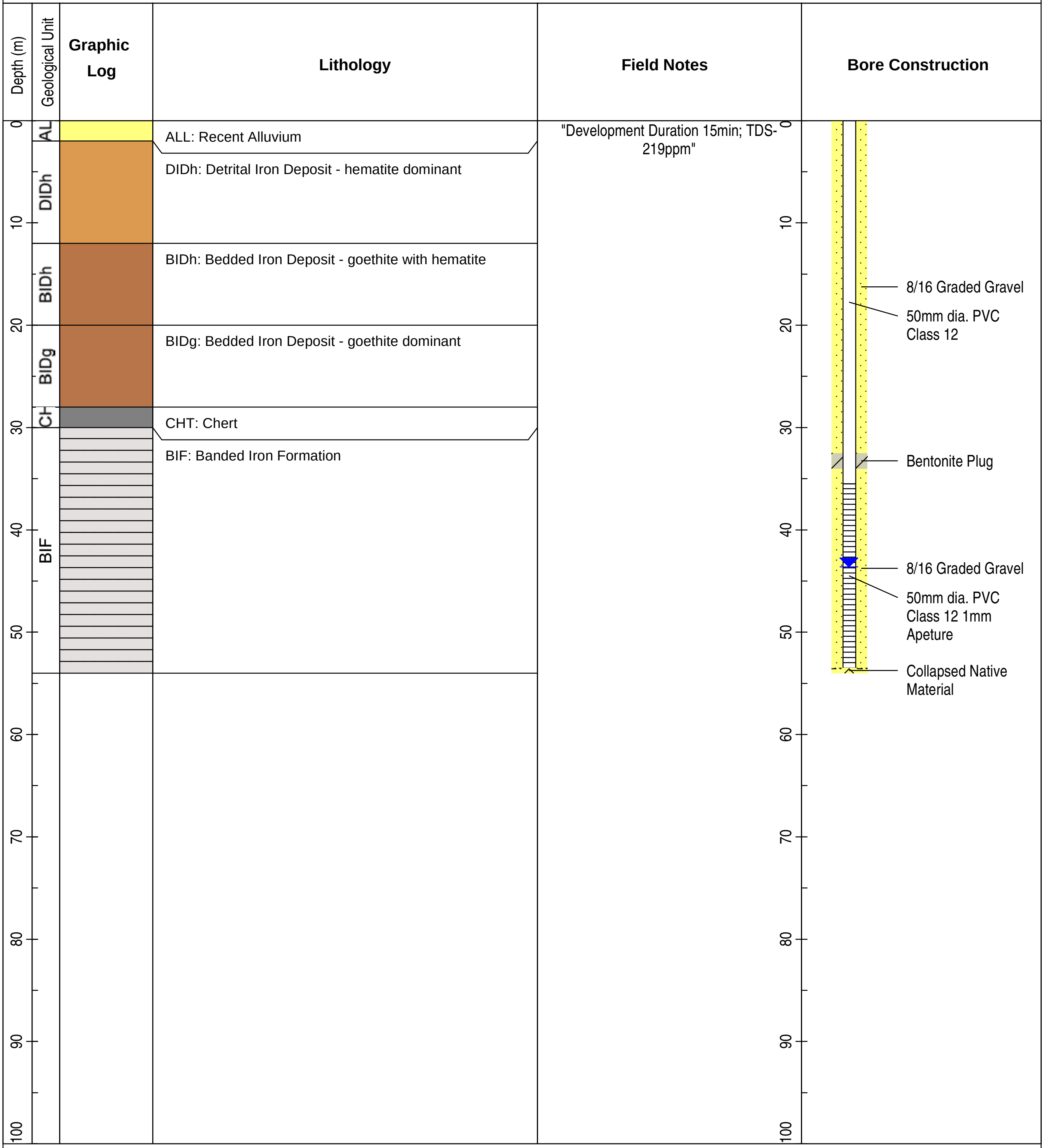
BOREHOLE:
HPRC2249

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	54
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	35.50-53.50
DATE DRILLED	30OCT2011	**EASTING**	550720.202	**ELEVATION (mAHD)**	558.081
LOGGED BY		**NORTHING**	7551836.465	**WATER LEVEL (mBGL)**	43.61

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.01	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDh: Bedded Iron Deposit - goethite with hematite

BIDg: Bedded Iron Deposit - goethite dominant

CHT: Chert

BIF: Banded Iron Formation

"Development Duration 15min; TDS-219ppm"

SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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Level 7 | QV1 Building
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Perth WA 6000
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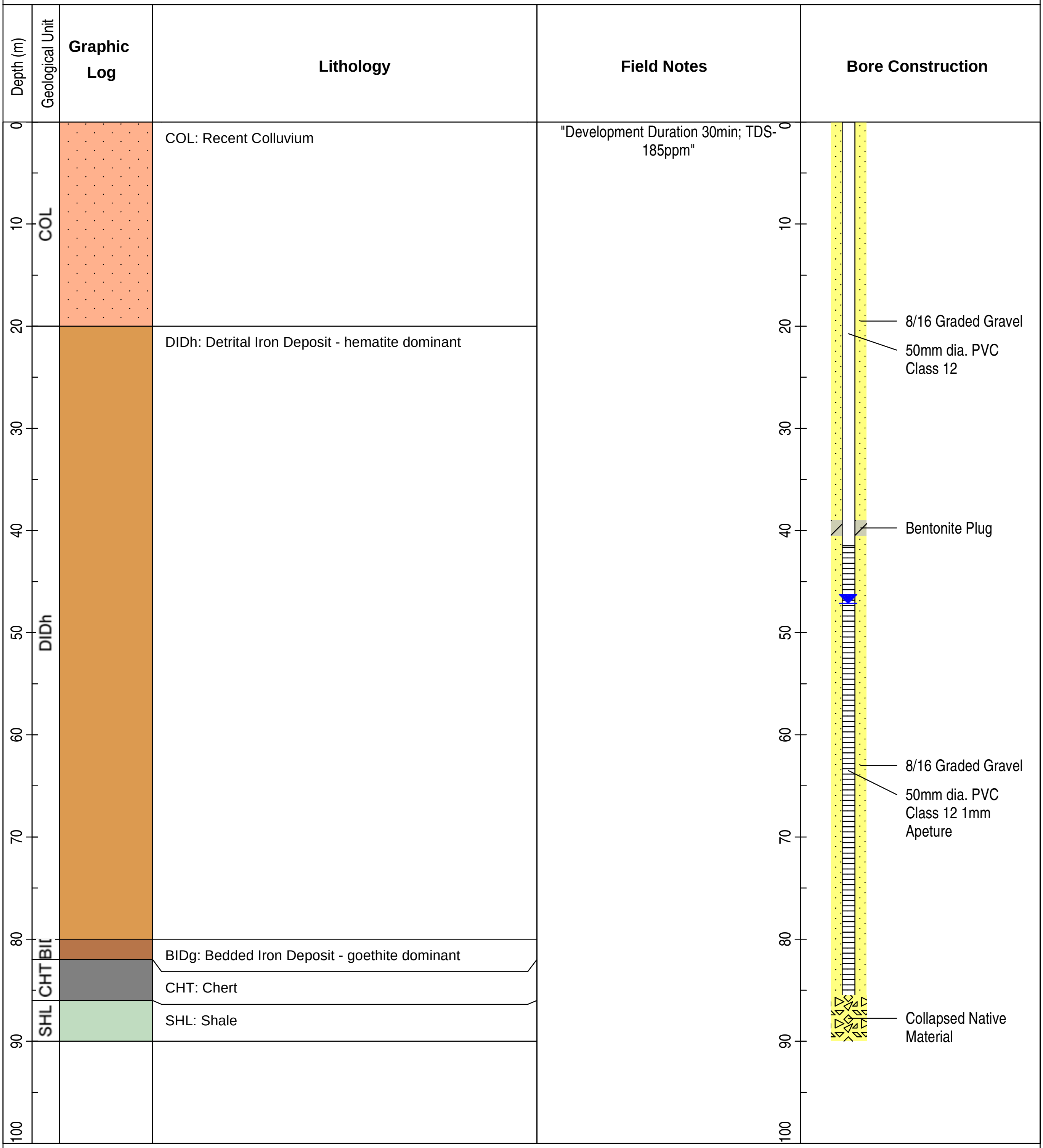
BOREHOLE:
HPRC2174

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	90
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	41.50-85.50
DATE DRILLED	28OCT2011	**EASTING**	551059.185	**ELEVATION (mAHD)**	549.187
LOGGED BY		**NORTHING**	7553294.069	**WATER LEVEL (mBGL)**	47.12

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.13	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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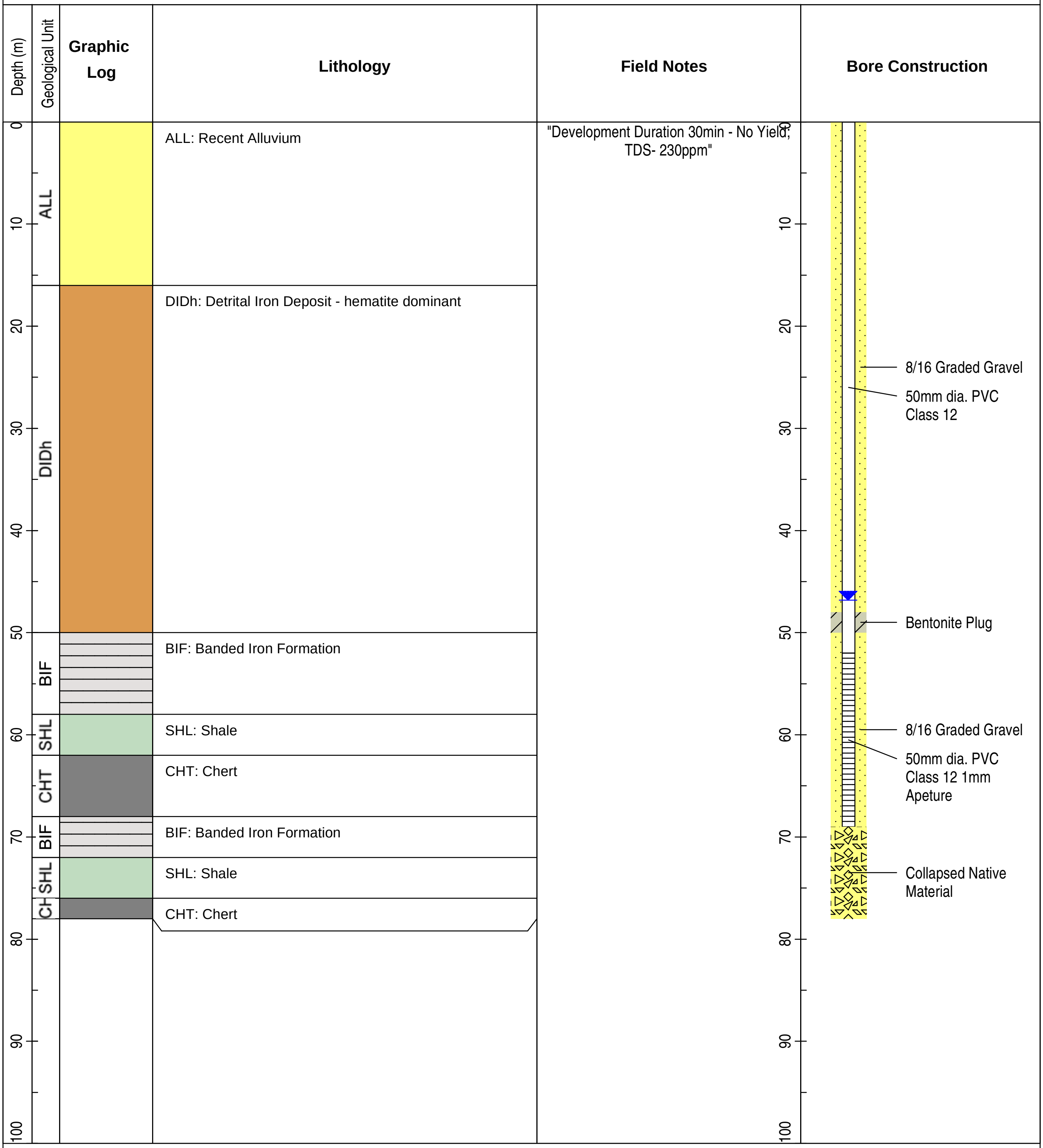
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC2144

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	78
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	52-69
DATE DRILLED	28OCT2011	**EASTING**	550102.991	**ELEVATION (mAHD)**	559.453
LOGGED BY		**NORTHING**	7552276.963	**WATER LEVEL (mBGL)**	46.82

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	



Lithology

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIF: Banded Iron Formation

SHL: Shale

CHT: Chert

BIF: Banded Iron Formation

SHL: Shale

CHT: Chert

Field Notes

"Development Duration 30min - No Yield; TDS- 230ppm"

Bore Construction

SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

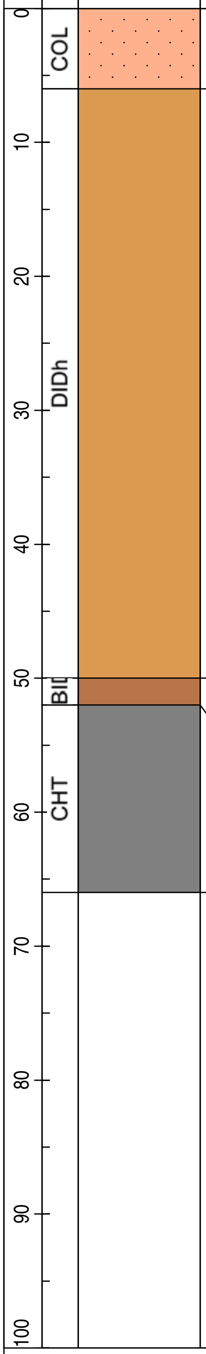
BOREHOLE:

HPRC2118

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	66
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	46.00-64.00
DATE DRILLED	28OCT2011	**EASTING**	549487.191	**ELEVATION (mAHD)**	569.84
LOGGED BY		**NORTHING**	7551828.264	**WATER LEVEL (mBGL)**	51.18

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0L/s	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m) | Geological Unit | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



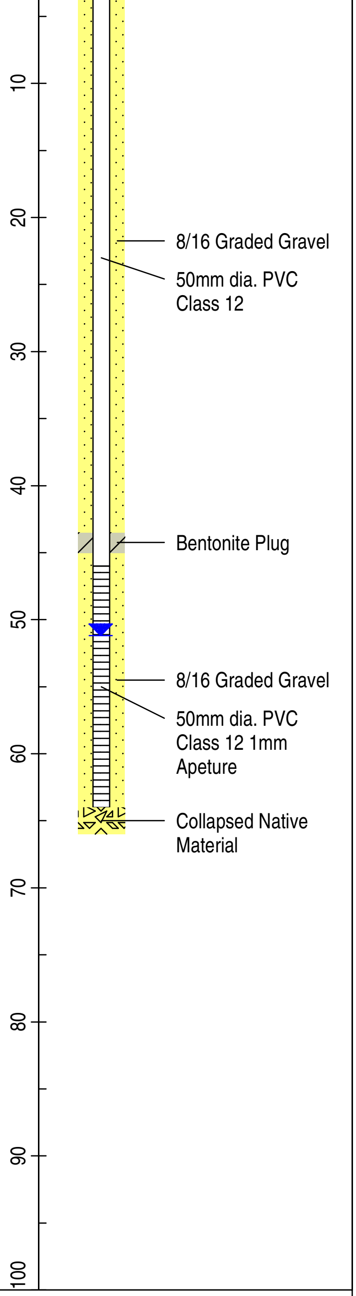
COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

CHT: Chert

"Development Duration 30min - No Yield; TDS- 192ppm"



SHEET:1 OF 1

Job Number 201012-00322

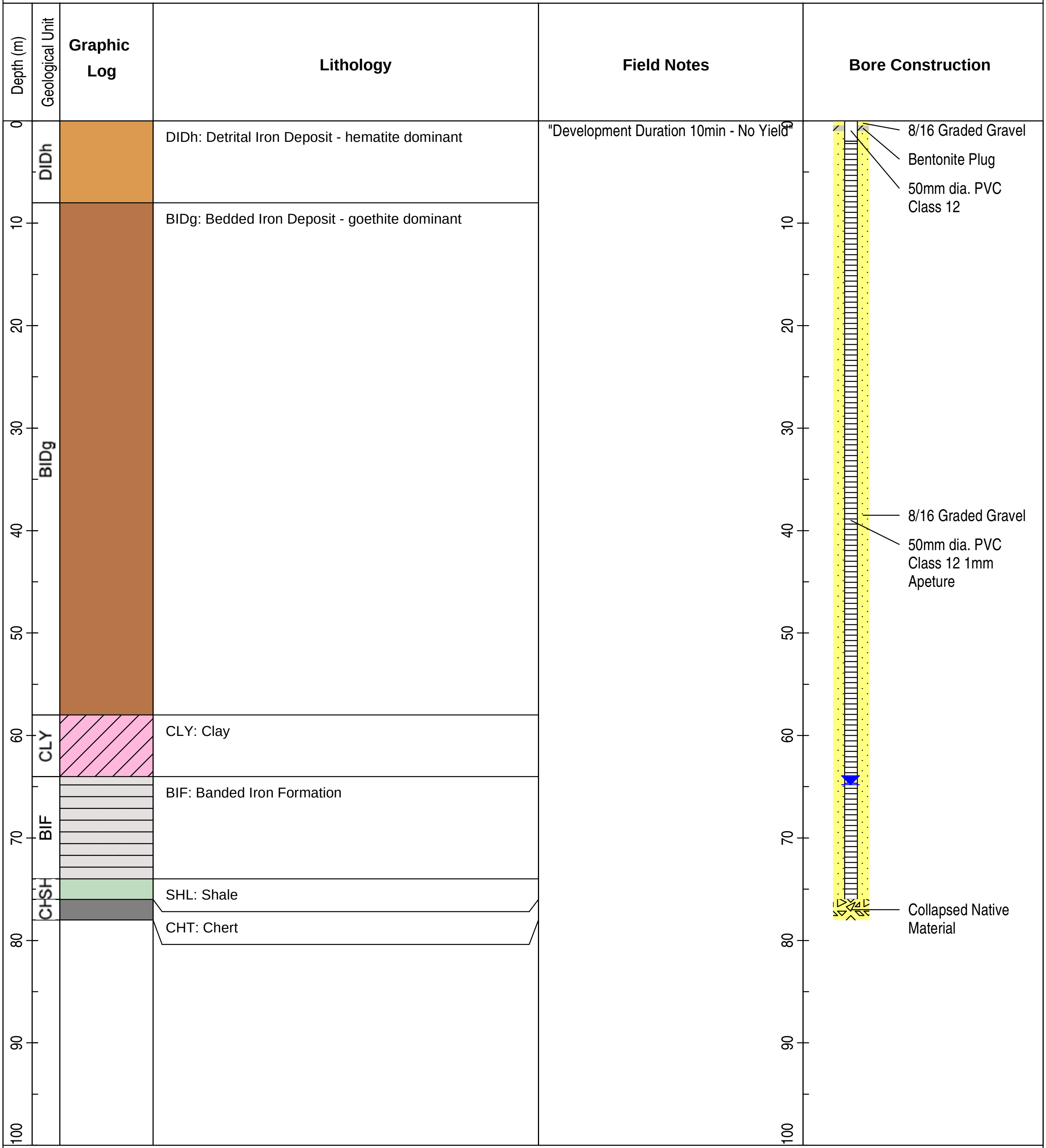
WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC2084

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	78
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.00-76.00
DATE DRILLED	28OCT2011	**EASTING**	548542.273	**ELEVATION (mAHD)**	591.73
LOGGED BY		**NORTHING**	7551893.928	**WATER LEVEL (mBGL)**	64.79

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0L/s	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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Perth WA 6000
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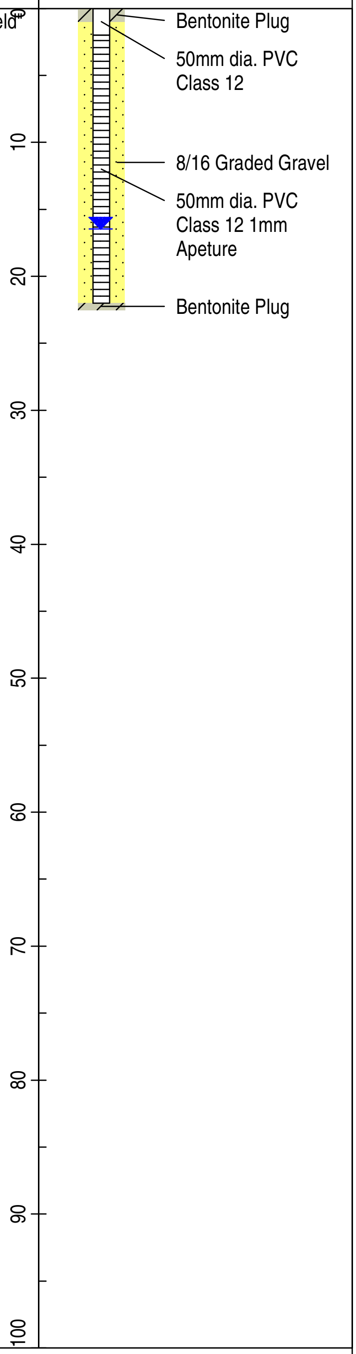
BOREHOLE:
HPRC1026

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	22
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.00-22.00
DATE DRILLED	23OCT2011	**EASTING**	547882.973	**ELEVATION (mAHD)**	595.701
LOGGED BY		**NORTHING**	7553186.708	**WATER LEVEL (mBGL)**	16.46

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes
0	ALL	🟨	ALL: Recent Alluvium	"Development Duration 10min- No Yield"
10 20	SHL	🟩	SHL: Shale	
30 40 50 60 70 80 90 100				

Bore Construction



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SHEET:1 OF 1

Job Number 201012-00322

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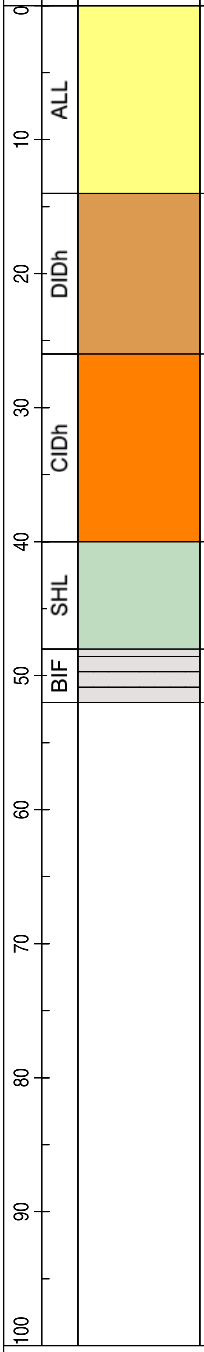
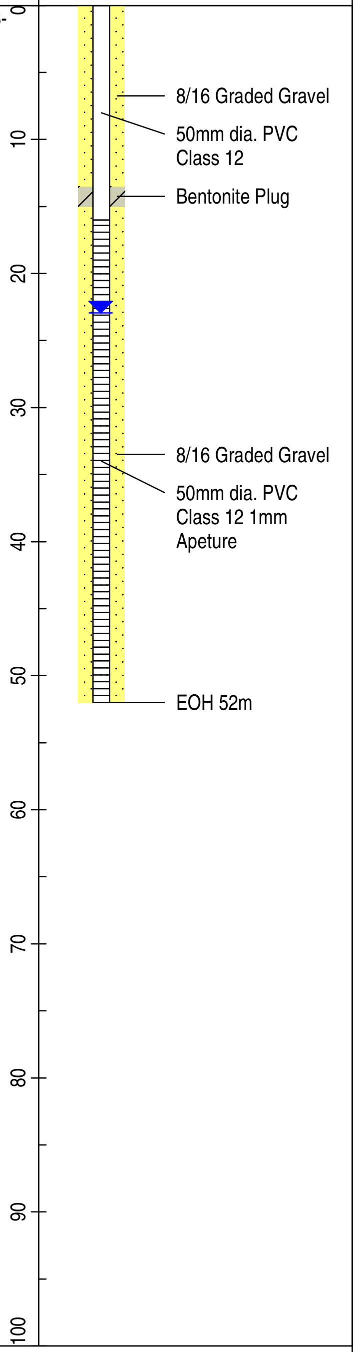
BOREHOLE:
HPRC0973

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	52
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	16.00-52.00
DATE DRILLED	26OCT2011	**EASTING**	548034.734	**ELEVATION (mAHD)**	562.843
LOGGED BY		**NORTHING**	7555166.046	**WATER LEVEL (mBGL)**	22.93

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.38	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction
0	ALL	🟨	ALL: Recent Alluvium	"Development Duration 30min; TDS-152ppm"	
	DIDh	🟫	DIDh: Detrital Iron Deposit - hematite dominant		
	CIDh	🟧	CIDh: Channel Iron Deposit - hematite dominant		
	SHL	🟩	SHL: Shale		
	BIF	▤	BIF: Banded Iron Formation		





SHEET:1 OF 1

Job Number 201012-00322

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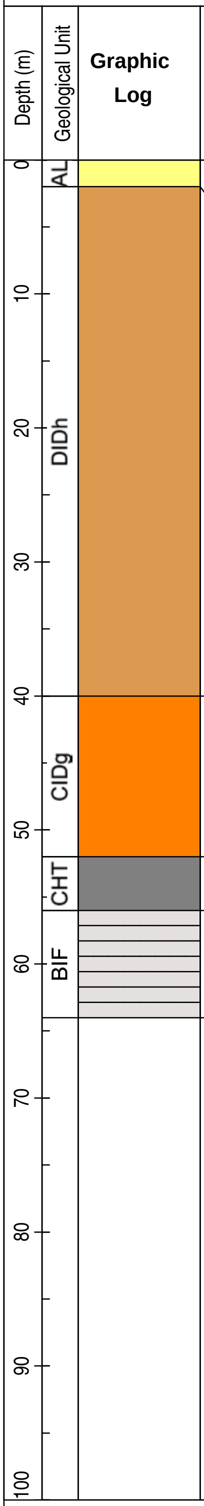
BOREHOLE:
HPRC0919

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	64
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	42.00-59.00
DATE DRILLED	27OCT2011	**EASTING**	546259.945	**ELEVATION (mAHD)**	568.602
LOGGED BY		**NORTHING**	7553639.857	**WATER LEVEL (mBGL)**	38.13

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.12	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



Lithology

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

CIDg: Channel Iron Deposit - goethite dominant

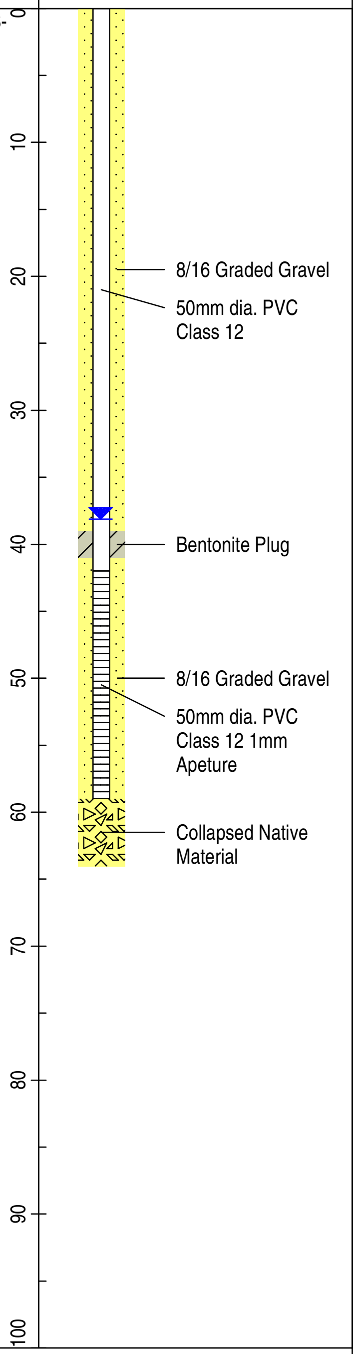
CHT: Chert

BIF: Banded Iron Formation

Field Notes

"Development Duration 30min; TDS-218ppm"

Bore Construction



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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Level 7 | QV1 Building
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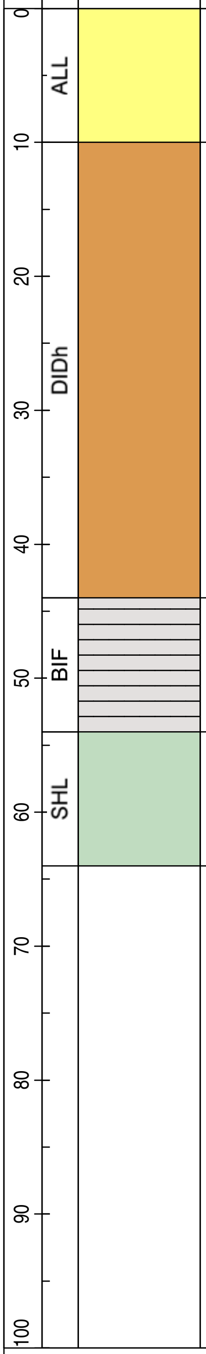
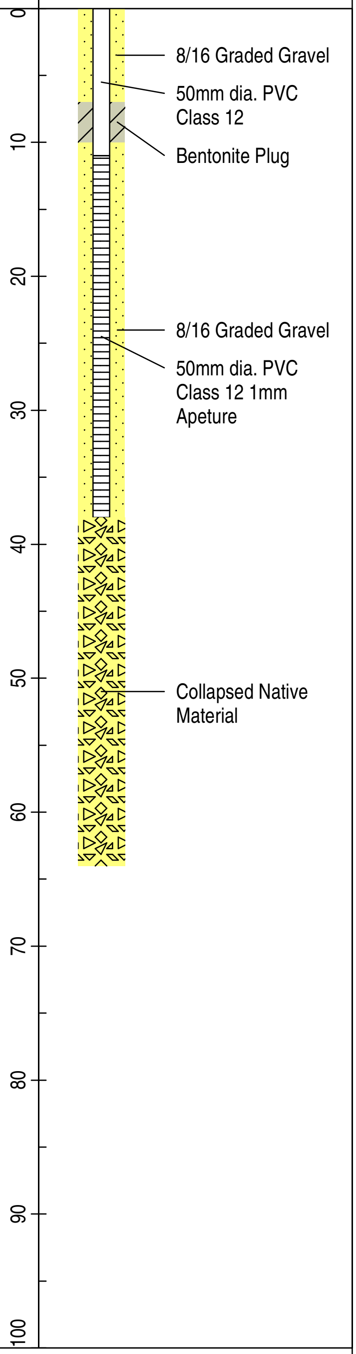
BOREHOLE:
HPRC0792

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	64
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	11.00-38.00
DATE DRILLED	25OCT2011	**EASTING**	546895.888	**ELEVATION (mAHD)**	574.932
LOGGED BY		**NORTHING**	7553541.338	**WATER LEVEL (mBGL)**	Dry

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**		**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction
0	ALL		ALL: Recent Alluvium	"Dry Bore"	
10	DIDh		DIDh: Detrital Iron Deposit - hematite dominant		
44	BIF		BIF: Banded Iron Formation		
54	SHL		SHL: Shale		





SHEET:1 OF 1

Job Number 201012-00322

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Level 7 | QV1 Building
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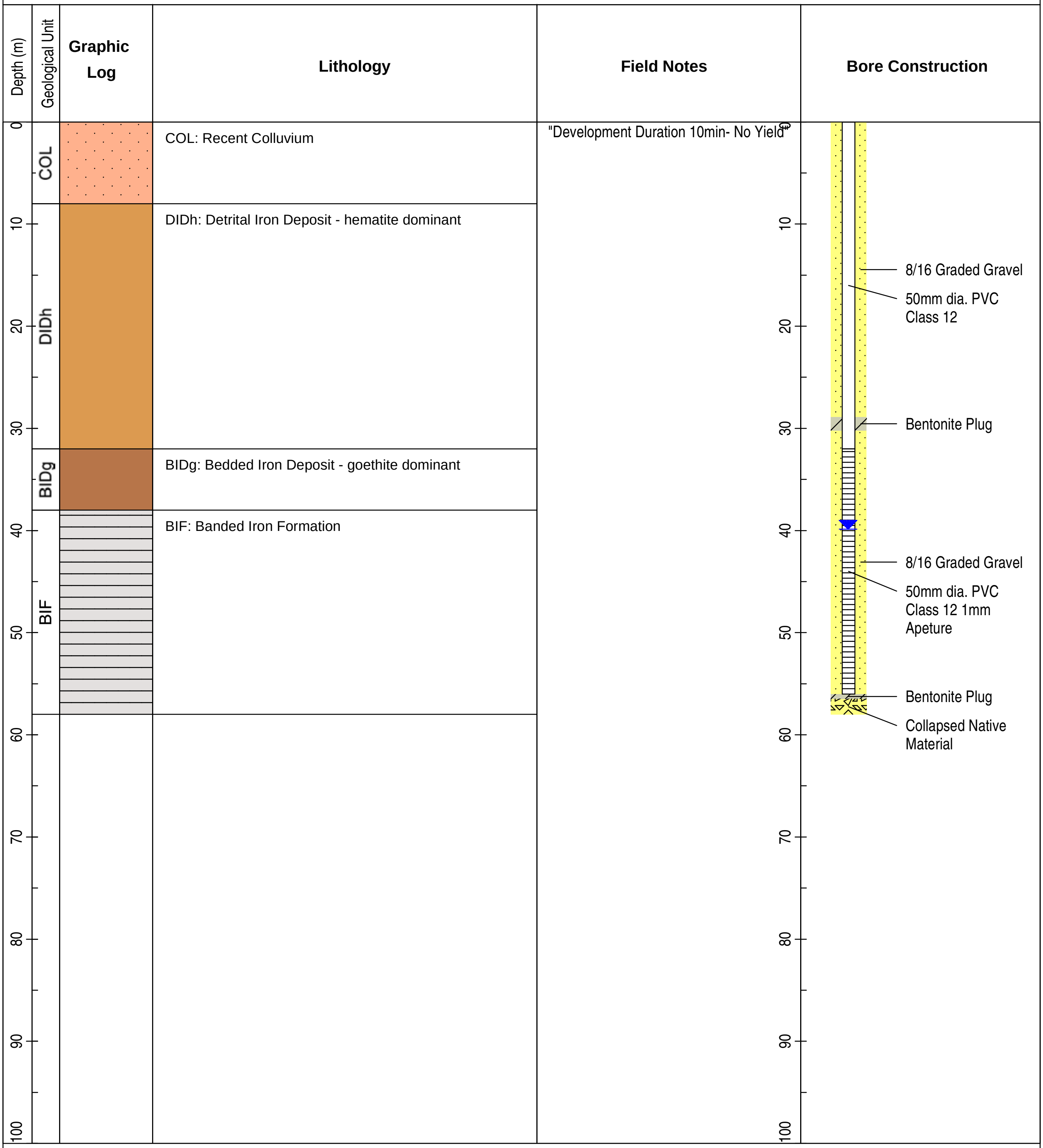
BOREHOLE:
HPRC0766

CLIENT FMS
PROJECT PIOP
DATE DRILLED 24OCT2011
LOGGED BY

LOCATION CHAMPION
PROJECTION
EASTING 545920.967
NORTHING 7554368.005

DRILLED DEPTH (m) 58
SCREEN (mBGL) 32.00-56.00
ELEVATION (mAHD) 568.461
WATER LEVEL (mBGL) 39.87

Contractor
Rig Type AIR CORE RC
Drill Bit 5.5"
Drill Fluid A/W
Airlift (L/s) 0
Temperature (℃)
Salinity (mS/cm)
pH



COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

"Development Duration 10min- No Yield"

SHEET:1 OF 1

Job Number 201012-00322

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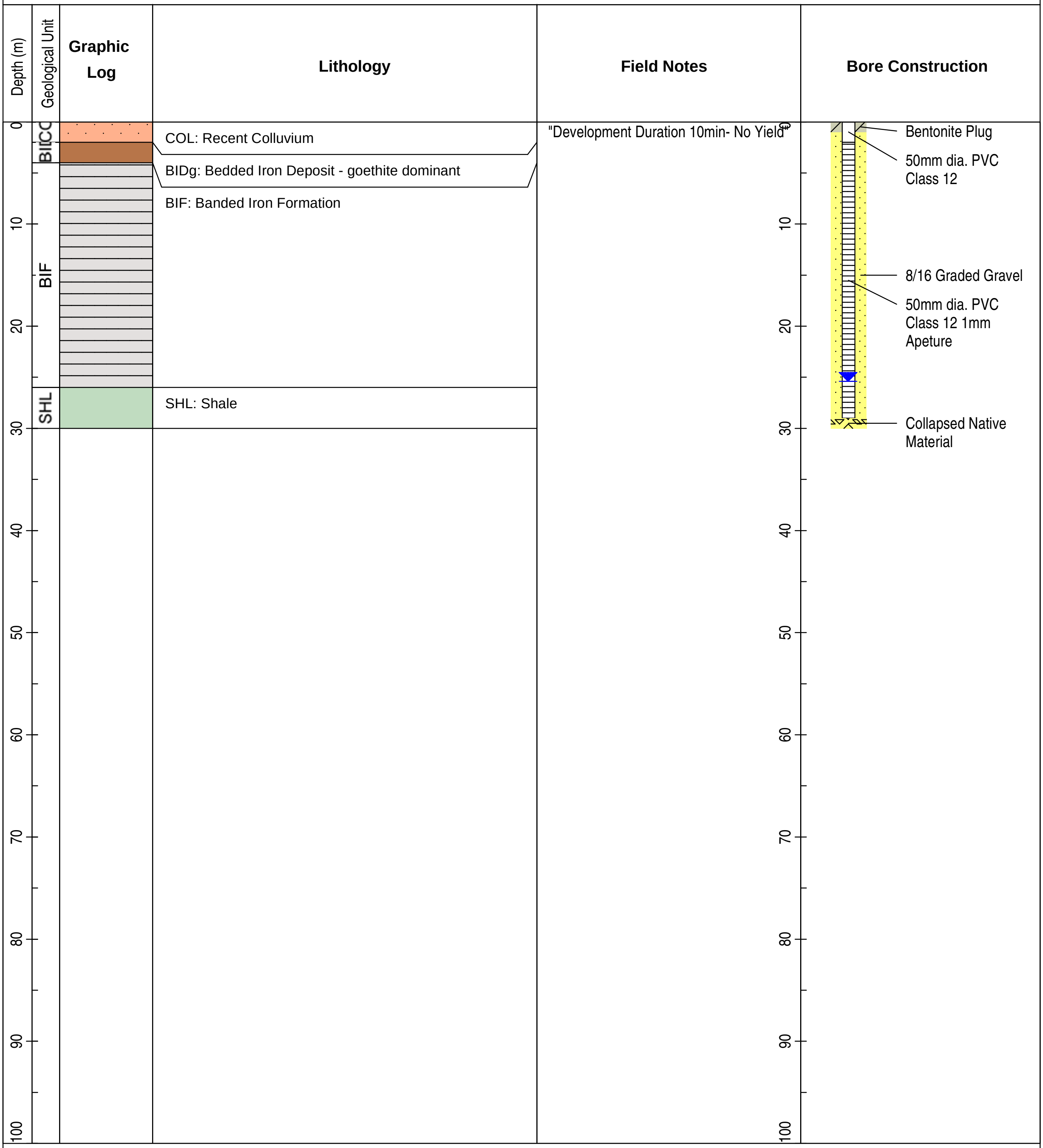
BOREHOLE:
HPRC0689

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	30
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.00-29.00
DATE DRILLED	24OCT2011	**EASTING**	544663.444	**ELEVATION (mAHD)**	592.44
LOGGED BY		**NORTHING**	7554588.262	**WATER LEVEL (mBGL)**	25.39

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**			
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**			



COL: Recent Colluvium

BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

SHL: Shale

"Development Duration 10min- No Yield"

SHEET:1 OF 1

Job Number 201012-00322

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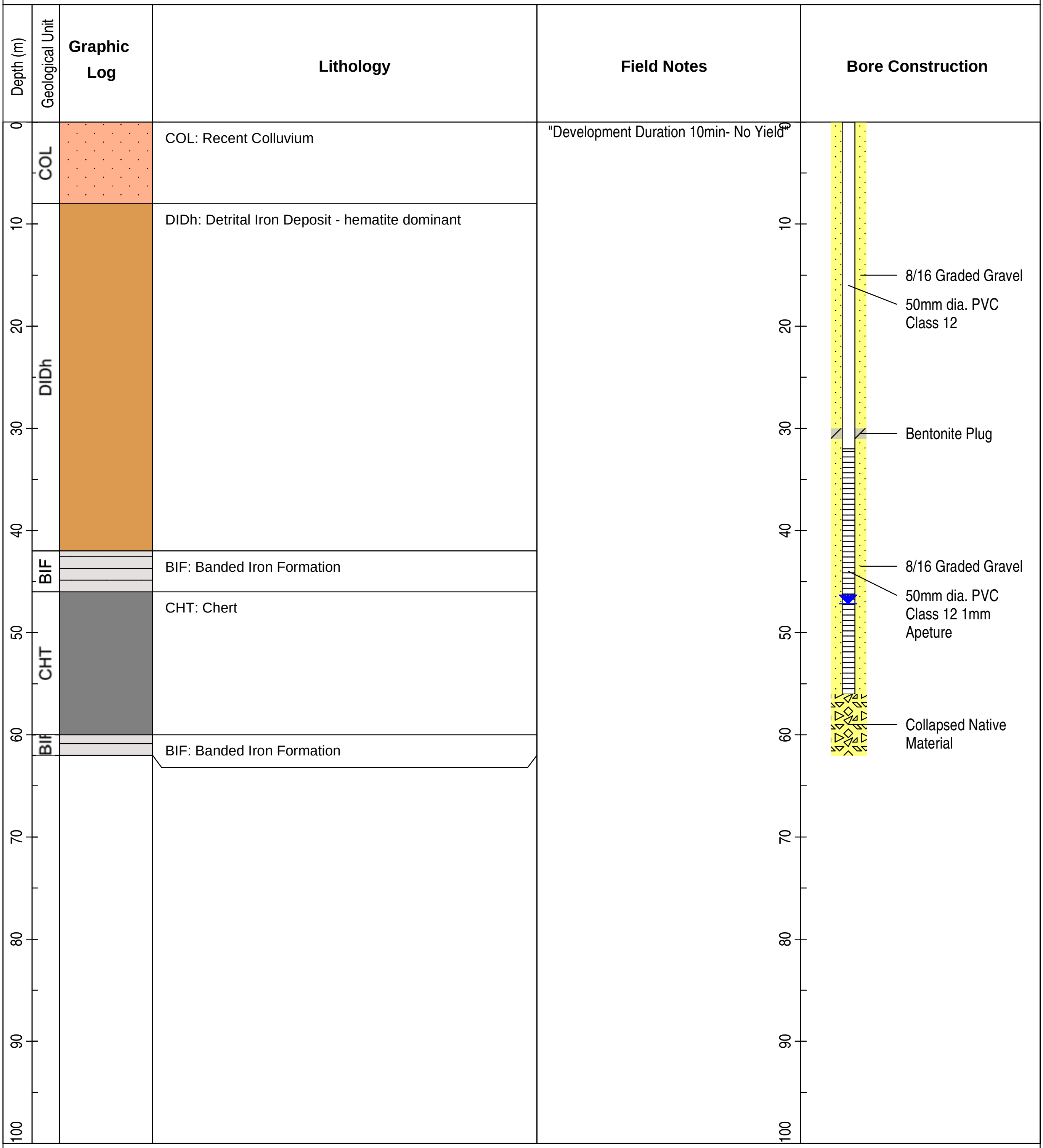
BOREHOLE:
HPRC0672

CLIENT FMS
PROJECT PIOP
DATE DRILLED 23OCT2011
LOGGED BY

LOCATION CHAMPION
PROJECTION
EASTING 547008.045
NORTHING 7553444.277

DRILLED DEPTH (m) 62
SCREEN (mBGL) 32.00-56.00
ELEVATION (mAHD) 577.397
WATER LEVEL (mBGL) 47.17

Contractor
Rig Type AIR CORE RC
Drill Bit 5.5"
Drill Fluid A/W
Airlift (L/s) 0
Temperature (℃)
Salinity (mS/cm)
pH



COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIF: Banded Iron Formation

CHT: Chert

BIF: Banded Iron Formation

"Development Duration 10min- No Yield"

SHEET:1 OF 1
Job Number 201012-00322

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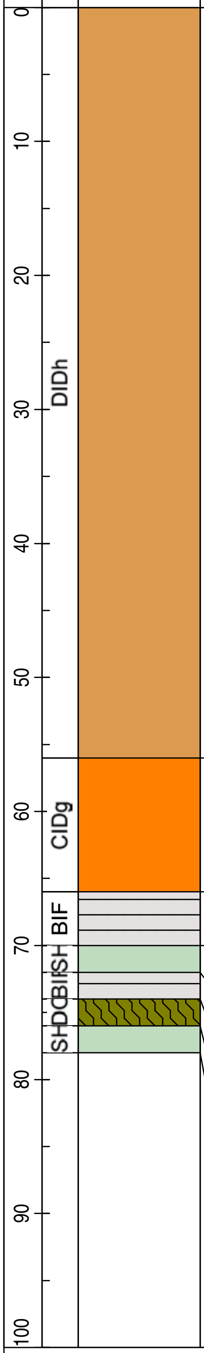
BOREHOLE:
HPRC0641

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	78
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	40.00-70.00
DATE DRILLED	24OCT2011	**EASTING**	546441.869	**ELEVATION (mAHD)**	566.984
LOGGED BY		**NORTHING**	7554919.119	**WATER LEVEL (mBGL)**	49.63

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



DIDh: Detrital Iron Deposit - hematite dominant

CIDg: Channel Iron Deposit - goethite dominant

BIF: Banded Iron Formation

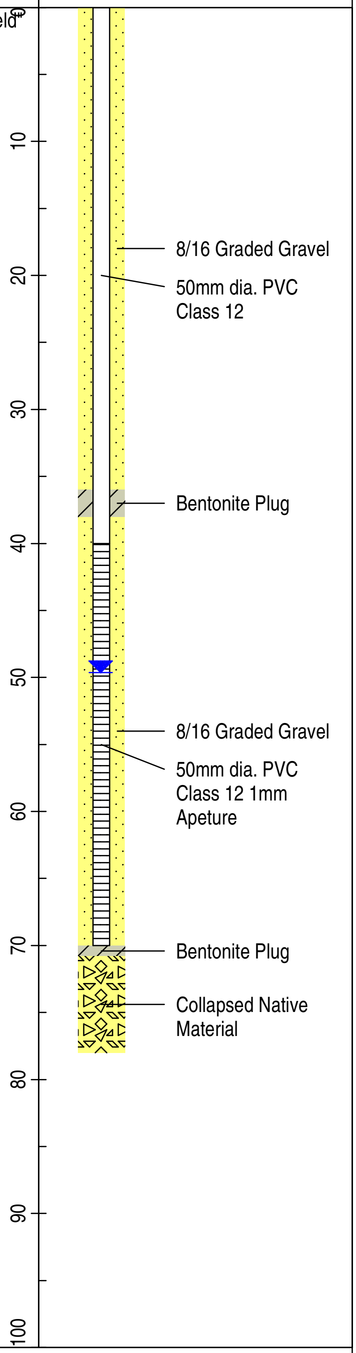
SHL: Shale

BIF: Banded Iron Formation

DOL: Dolerite

SHL: Shale

"Development Duration 10min- No Yield"



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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Level 7 | QV1 Building
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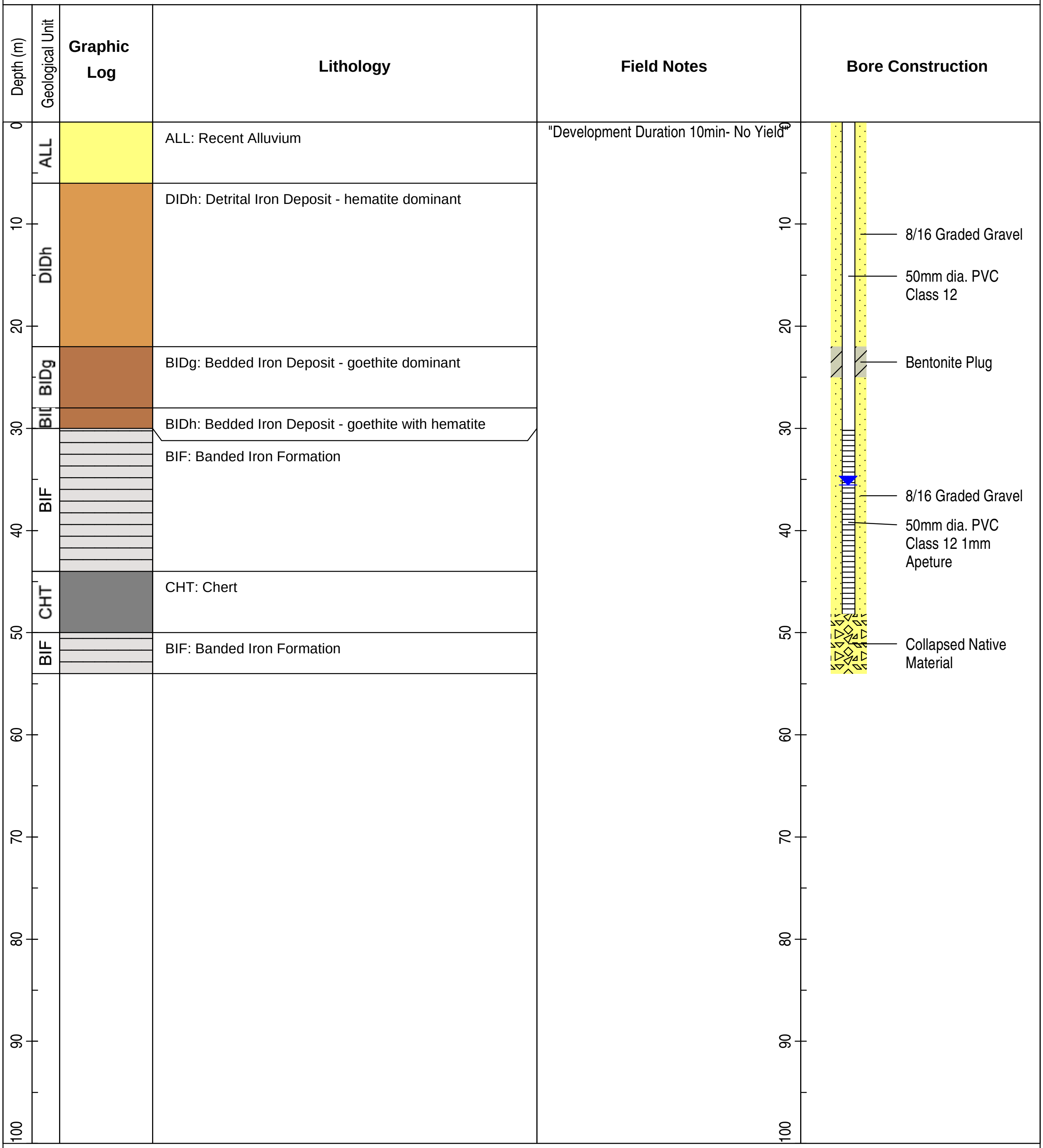
BOREHOLE:
HPRC0631

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	54
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	30.2-48.2
DATE DRILLED	07SEP2011	**EASTING**	546893.535	**ELEVATION (mAHD)**	552.823
LOGGED BY		**NORTHING**	7555104.519	**WATER LEVEL (mBGL)**	35.54

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

BIDh: Bedded Iron Deposit - goethite with hematite

BIF: Banded Iron Formation

CHT: Chert

BIF: Banded Iron Formation

"Development Duration 10min- No Yield"

SHEET:1 OF 1

Job Number 201012-00322

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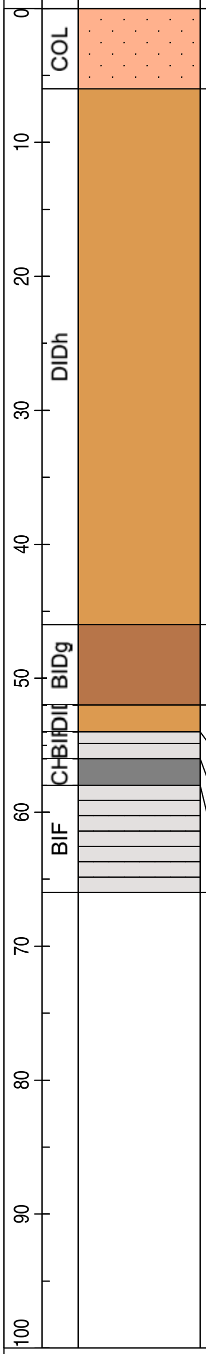
BOREHOLE:
HPRC0549

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	66
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	24.50-59.50
DATE DRILLED	26OCT2011	**EASTING**	547642.192	**ELEVATION (mAHD)**	553.989
LOGGED BY		**NORTHING**	7555493.228	**WATER LEVEL (mBGL)**	30.46

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.2	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	

Depth (m) | **Geological Unit** | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

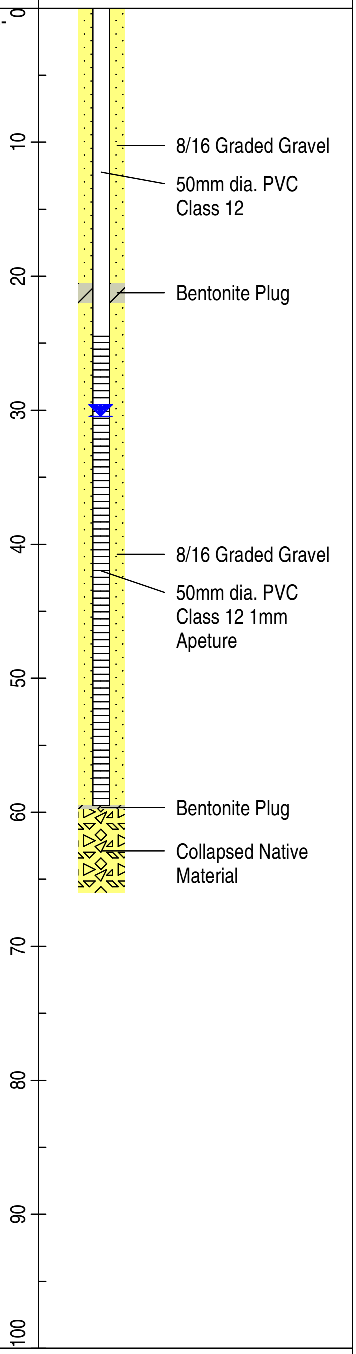
DIDh: Detrital Iron Deposit - hematite dominant

BIF: Banded Iron Formation

CHT: Chert

BIF: Banded Iron Formation

"Development Duration 30min; TDS-164ppm"



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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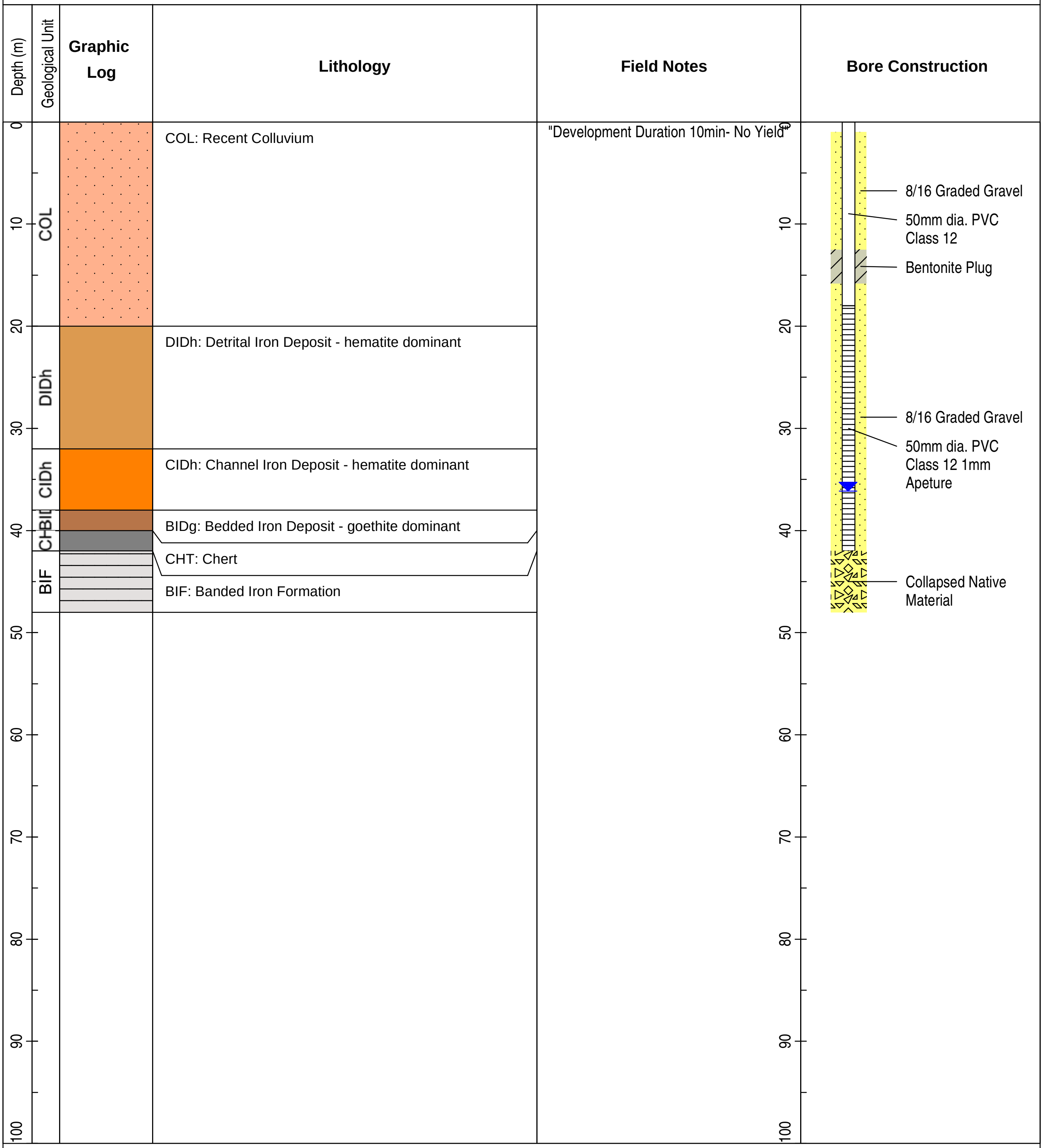
BOREHOLE:
HPRC0531

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	48
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	18.00-42.00
DATE DRILLED	23OCT2011	**EASTING**	545490.472	**ELEVATION (mAHD)**	577.112
LOGGED BY		**NORTHING**	7553341.661	**WATER LEVEL (mBGL)**	36.14

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

CIDh: Channel Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

CHT: Chert

BIF: Banded Iron Formation

"Development Duration 10min- No Yield"

SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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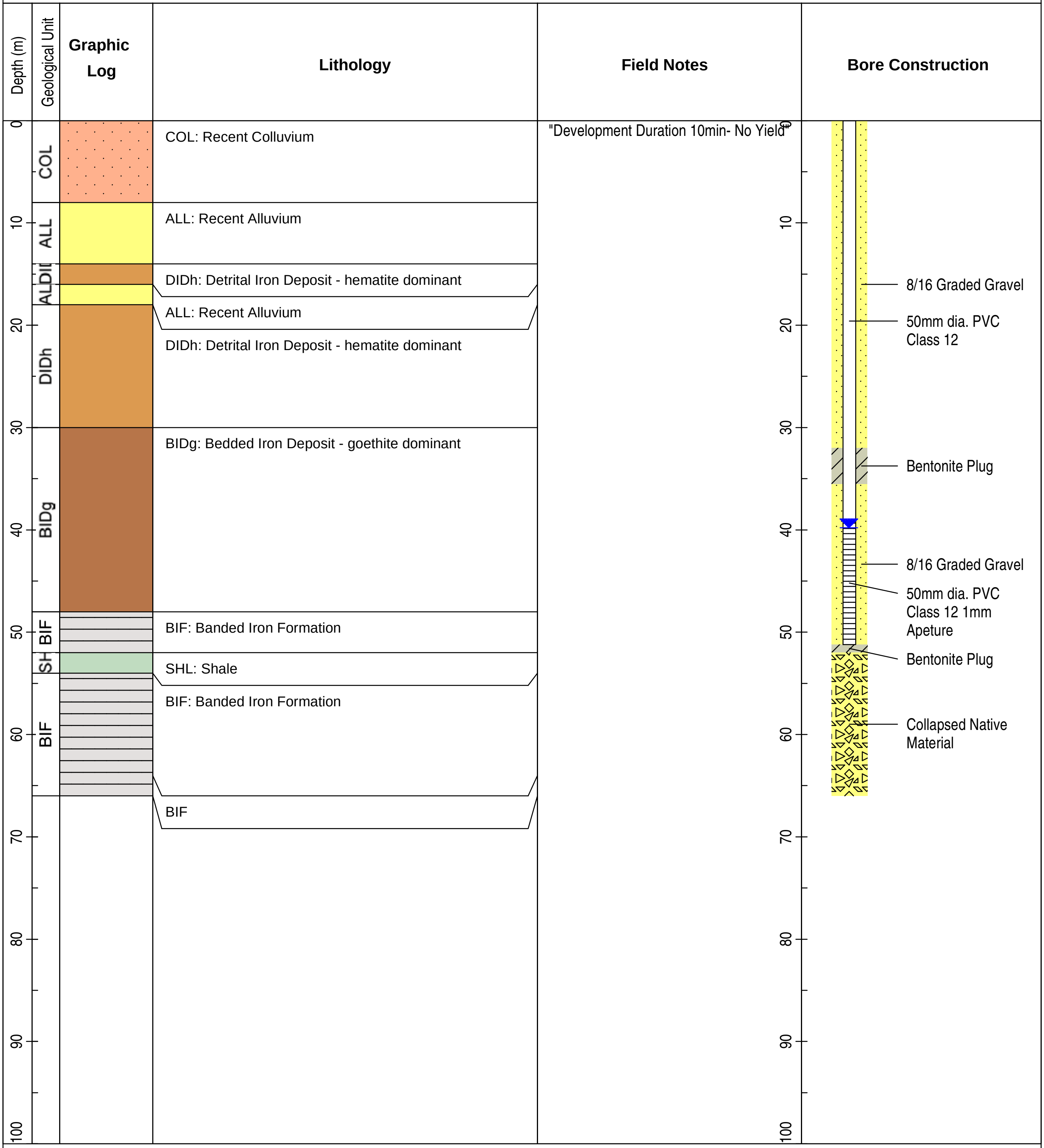
BOREHOLE:
HPRC0395

CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	66
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	39.20-51.20
DATE DRILLED	07SEP2011	**EASTING**	546661.13	**ELEVATION (mAHD)**	555.13
LOGGED BY		**NORTHING**	7555504.01	**WATER LEVEL (mBGL)**	39.8

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
resources & energy

Level 7 | QV1 Building
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Perth WA 6000
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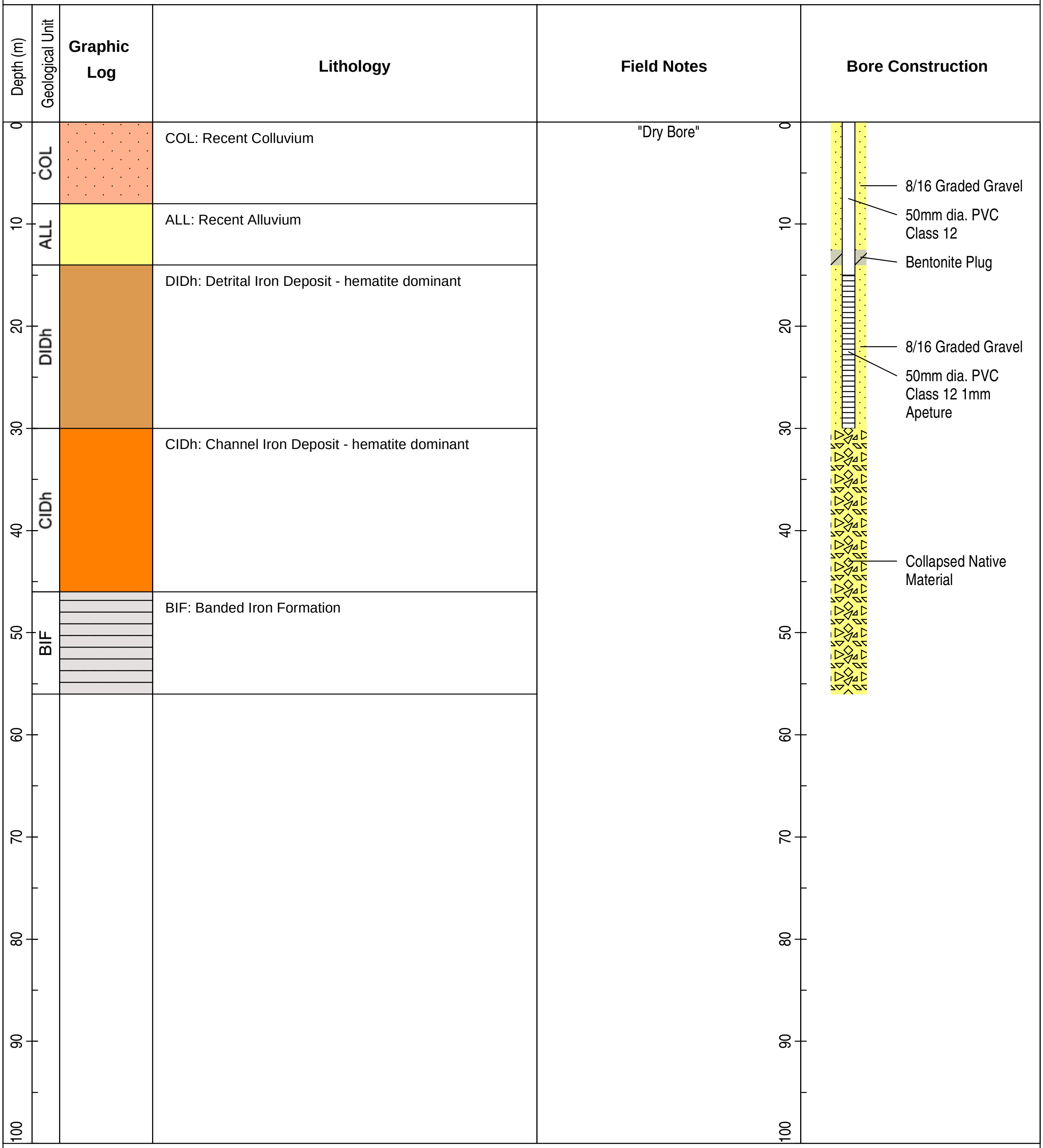
BOREHOLE:
HPRC0352

CLIENT FMS
PROJECT PIOP
DATE DRILLED 25OCT2011
LOGGED BY

LOCATION CHAMPION
PROJECTION
EASTING 545564.959
NORTHING 7553282.635

DRILLED DEPTH (m) 56
SCREEN (mBGL) 15.00-30.00
ELEVATION (mAHD) 577.199
WATER LEVEL (mBGL) Dry

Contractor
Rig Type AIR CORE RC
Drill Bit 5.5"
Drill Fluid A/W
Airlift (L/s)
Temperature (°C)
Salinity (mS/cm)
pH



COL: Recent Colluvium

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

CIDh: Channel Iron Deposit - hematite dominant

BIF: Banded Iron Formation

"Dry Bore"

SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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250 St George's Terrace
Perth WA 6000
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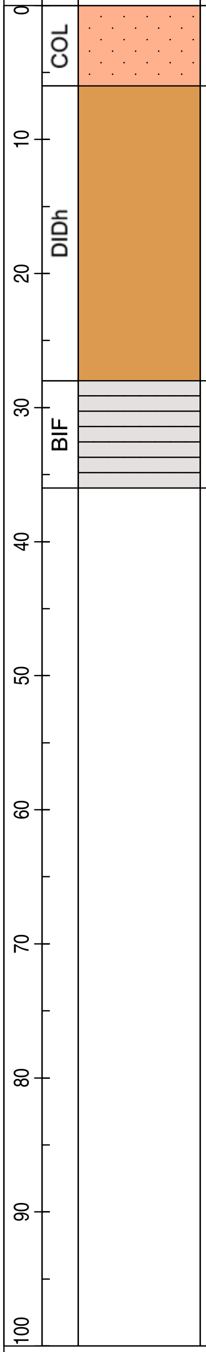
BOREHOLE:
HPRC0321

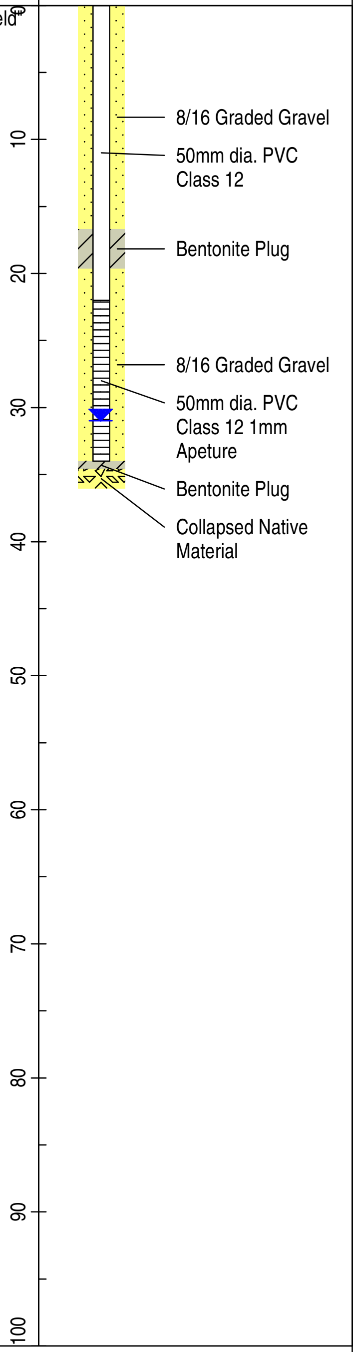
CLIENT	FMS	**LOCATION**	CHAMPION	**DRILLED DEPTH (m)**	36
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	22.00-34.00
DATE DRILLED	24OCT2011	**EASTING**	546581.314	**ELEVATION (mAHD)**	559.275
LOGGED BY		**NORTHING**	7554467.782	**WATER LEVEL (mBGL)**	30.98

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes
0	COL		COL: Recent Colluvium	"Development Duration 10min- No Yield"
	DIDh		DIDh: Detrital Iron Deposit - hematite dominant	
30	BIF		BIF: Banded Iron Formation	



Bore Construction



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

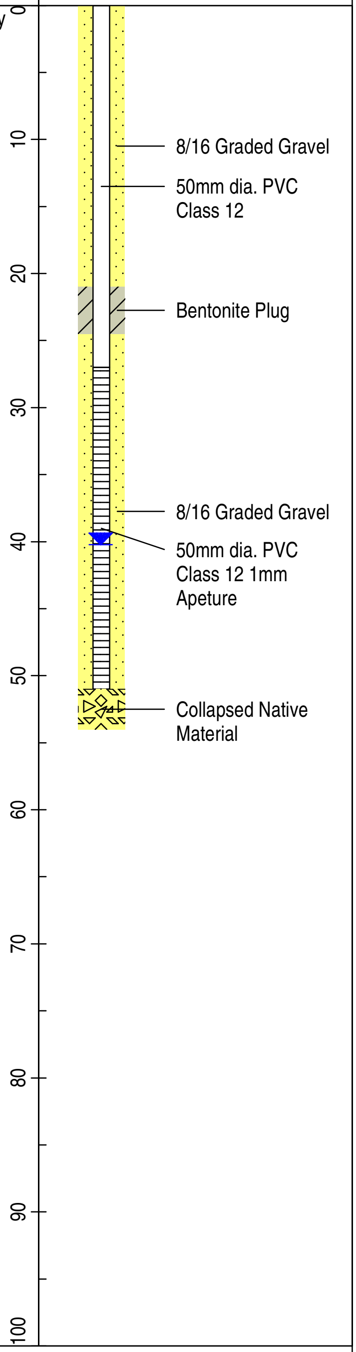
BOREHOLE:
HPRC0285

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	54
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	27.00-51.00
DATE DRILLED	31OCT2011	**EASTING**	550088.931	**ELEVATION (mAHD)**	579.832
LOGGED BY		**NORTHING**	7550744.462	**WATER LEVEL (mBGL)**	40.22

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	~0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes
0	ALL	🟨	ALL: Recent Alluvium	"Development Duration 30min - only dribble; TDS-177ppm"
10	DIDh	🟧	DIDh: Detrital Iron Deposit - hematite dominant	
30	BIDg	🟫	BIDg: Bedded Iron Deposit - goethite dominant	
	BIF	▤	BIF: Banded Iron Formation	
40	SHL	🟩	SHL: Shale	
	CHT	⬛	CHT: Chert	
50	BIF	▤	BIF: Banded Iron Formation	

Bore Construction



SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
resources & energy

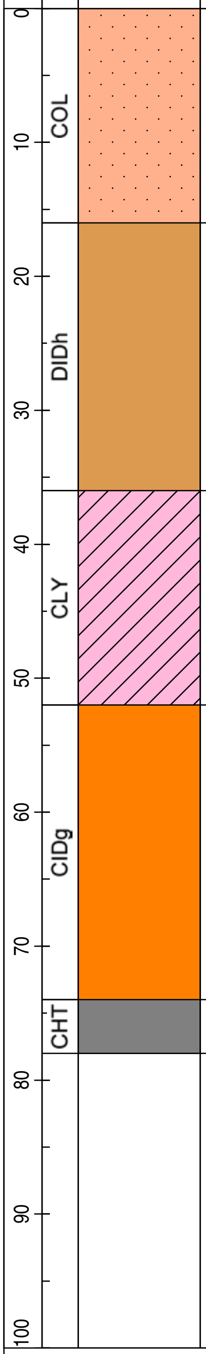
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

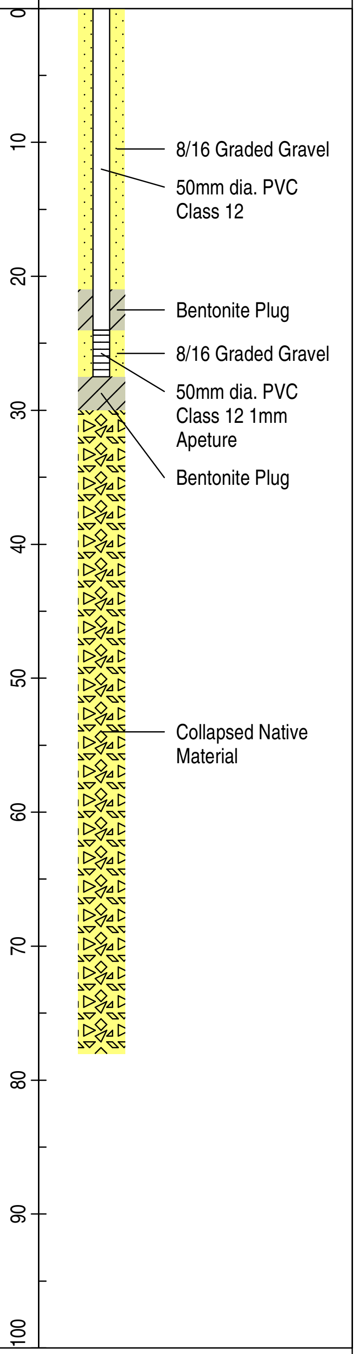
BOREHOLE:
HPRC0269

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	78
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	24.00-27.5
DATE DRILLED	30OCT2011	**EASTING**	551507.881	**ELEVATION (mAHD)**	539.518
LOGGED BY		**NORTHING**	7553095.877	**WATER LEVEL (mBGL)**	Dry

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction
0–16	COL	🟧	COL: Recent Colluvium		
16–36	DIDh	🟫	DIDh: Detrital Iron Deposit - hematite dominant		
36–52	CLY	▨	CLY: Clay		
52–74	CIDg	🟧	CIDg: Channel Iron Deposit - goethite dominant		
74–78	CHT	⬛	CHT: Chert		





SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
resources & energy

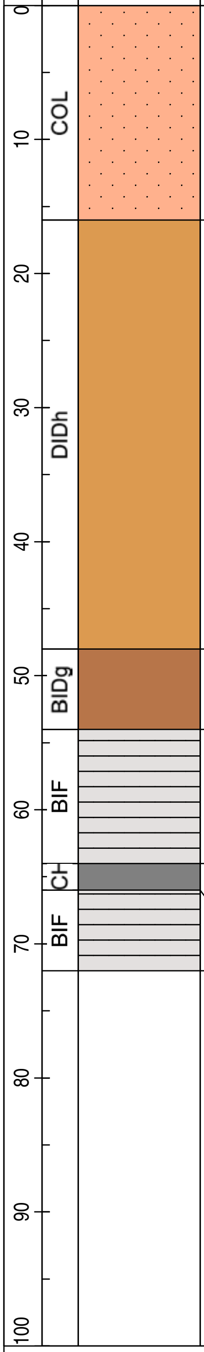
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC0216

CLIENT FMS
LOCATION DELTA
DRILLED DEPTH (m) 72
PROJECT PIOP
PROJECTION
SCREEN (mBGL) 19.00-31.00
DATE DRILLED 31OCT2011
EASTING 550278.222
ELEVATION (mAHD) 556.827
LOGGED BY
NORTHING 7552257.507
WATER LEVEL (mBGL) 29.7

Contractor
Drill Bit 5.5"
Airlift (L/s) 0
Salinity (mS/cm)
Rig Type AIR CORE RC
Drill Fluid A/W
Temperature (℃)
pH

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

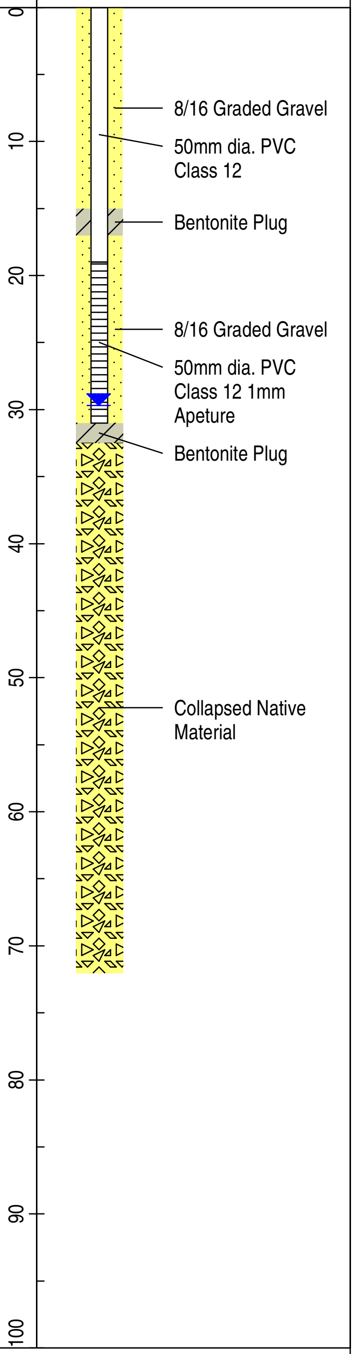
BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

CHT: Chert

BIF: Banded Iron Formation

"Not enough water to airlift"



SHEET:1 OF 1

Job Number 201012-00322

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Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
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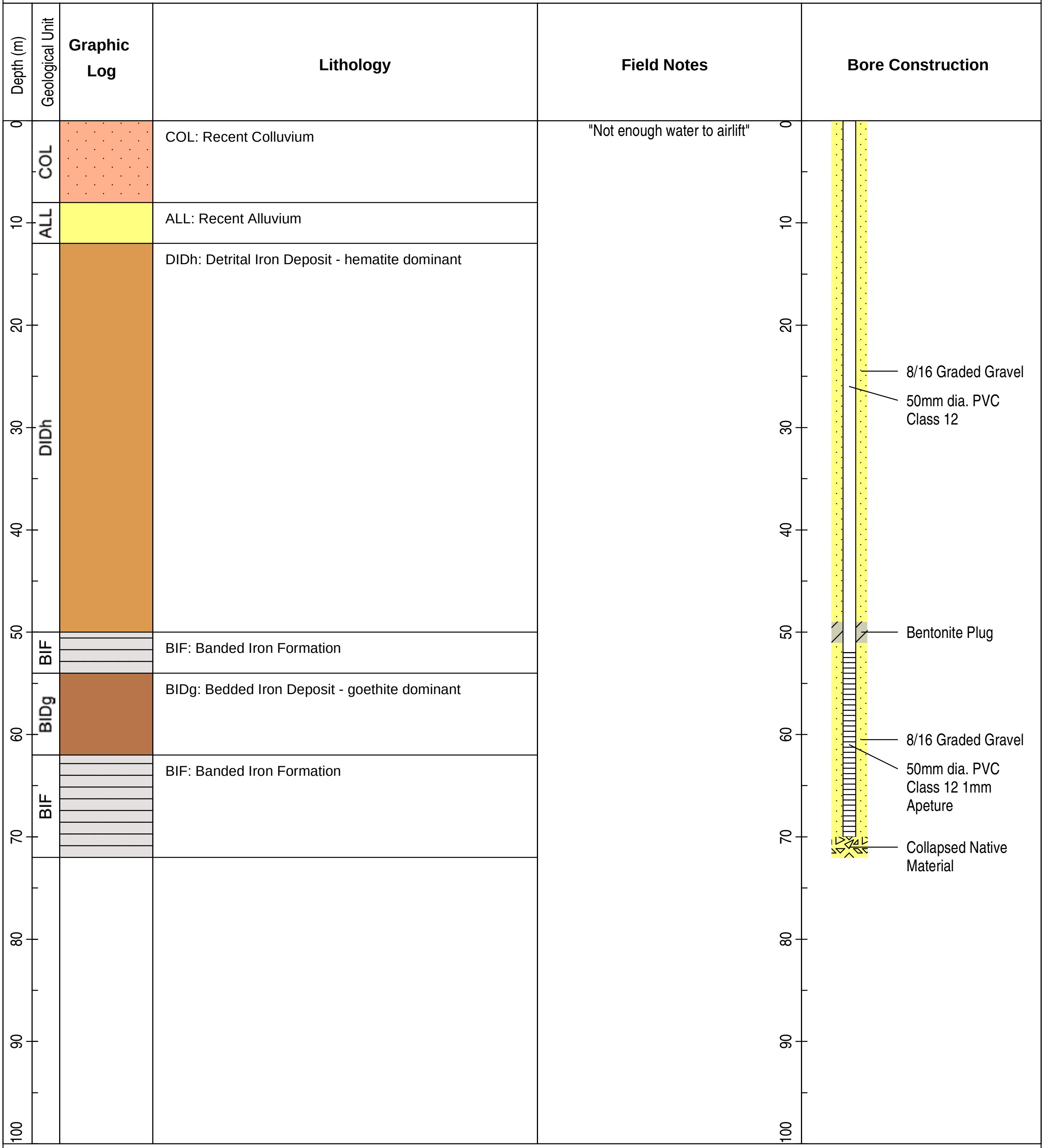
BOREHOLE:
HPRC0121

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	72
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	52.0-70.0
DATE DRILLED	01NOV2011	**EASTING**	549899.447	**ELEVATION (mAHD)**	599.975
LOGGED BY		**NORTHING**	7547696.095	**WATER LEVEL (mBGL)**	Dry

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**		**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



COL: Recent Colluvium

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIF: Banded Iron Formation

BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

"Not enough water to airlift"

SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
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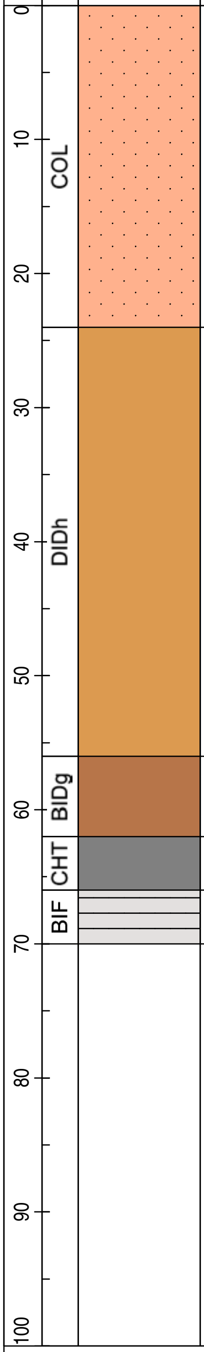
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC0108

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	70
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	48.5-60.5
DATE DRILLED	02NOV2011	**EASTING**	548395.622	**ELEVATION (mAHD)**	619.982
LOGGED BY		**NORTHING**	7548102.472	**WATER LEVEL (mBGL)**	54.5

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**	**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



COL: Recent Colluvium

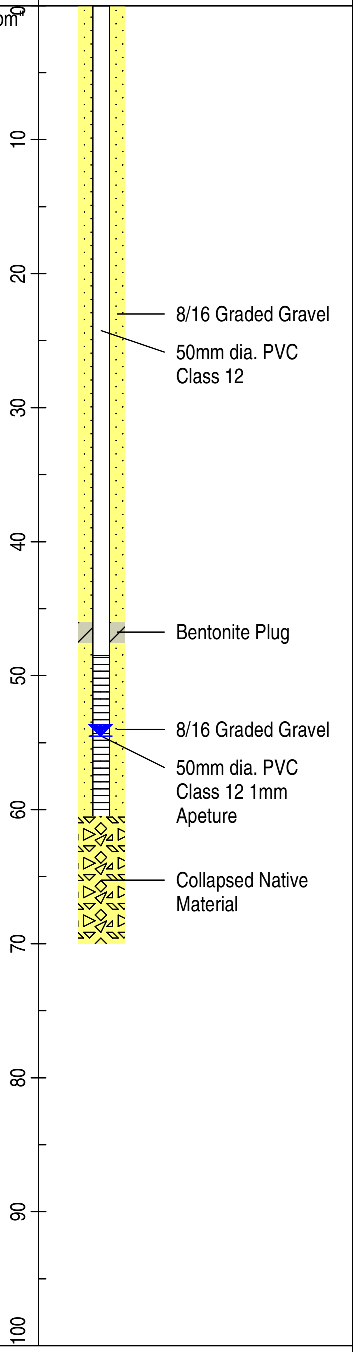
DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

CHT: Chert

BIF: Banded Iron Formation

"Yield ceased after 15min; TDS-902ppm"



SHEET:1 OF 1

Job Number 201012-00322

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Level 7 | QV1 Building
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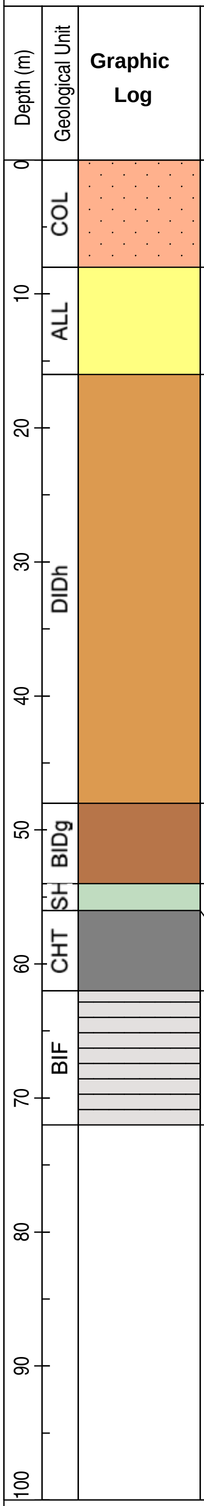
BOREHOLE:
HPRC0098

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	72
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	53.00-71.40
DATE DRILLED	01NOV2011	**EASTING**	547225.338	**ELEVATION (mAHD)**	630.841
LOGGED BY		**NORTHING**	7548717.863	**WATER LEVEL (mBGL)**	61.6

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**

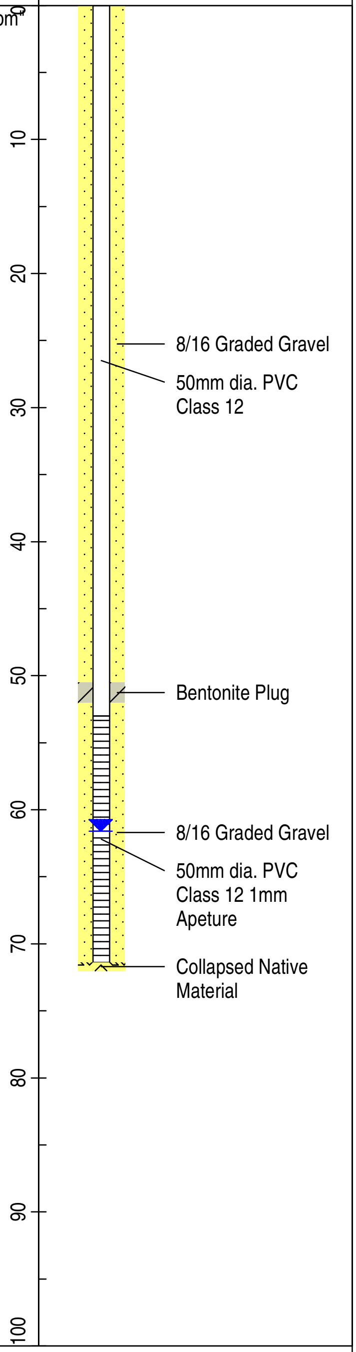


Geological Unit	Lithology
COL	COL: Recent Colluvium
ALL	ALL: Recent Alluvium
DIDh	DIDh: Detrital Iron Deposit - hematite dominant
BIDg	BIDg: Bedded Iron Deposit - goethite dominant
SH	SHL: Shale
CHT	CHT: Chert
BIF	BIF: Banded Iron Formation

Field Notes

"Yield ceased after 10min; TDS-255ppm"

Bore Construction



SHEET:1 OF 1

Job Number 201012-00322

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Level 7 | QV1 Building
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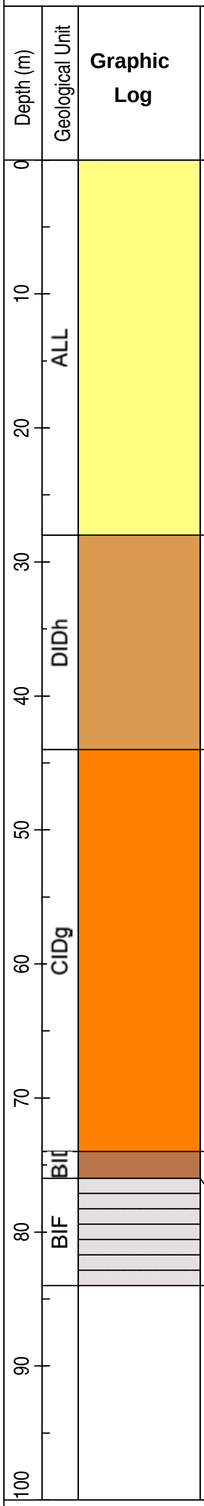
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC0068

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	84
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	59.00-83.00
DATE DRILLED	17AUG2011	**EASTING**	548902.035	**ELEVATION (mAHD)**	607.706
LOGGED BY		**NORTHING**	7547396.143	**WATER LEVEL (mBGL)**	61.2

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



Lithology

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

CIDg: Channel Iron Deposit - goethite dominant

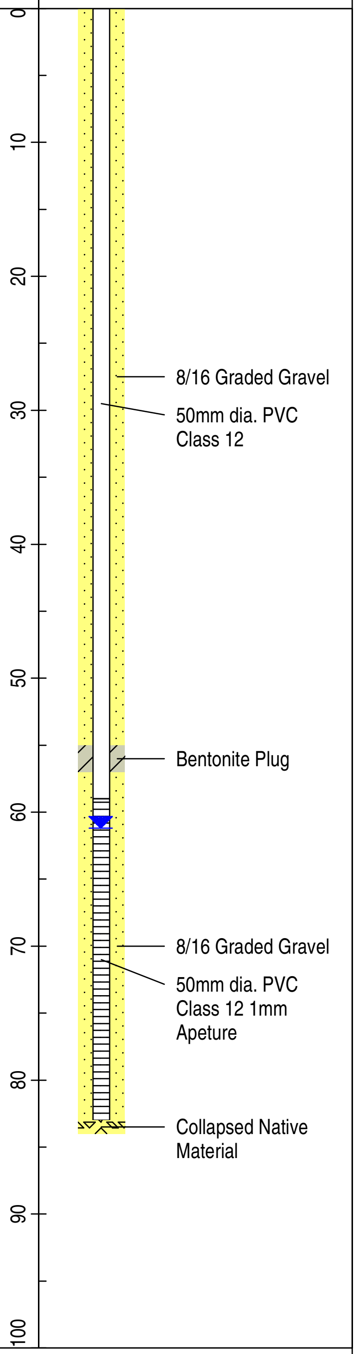
BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

Field Notes

"Not enough Water to airlift"

Bore Construction



SHEET:1 OF 1

Job Number 201012-00322

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Level 7 | QV1 Building
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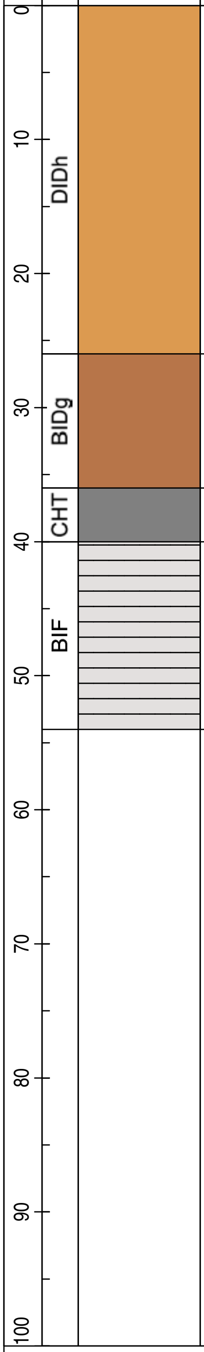
ABN 61001 279 812

BOREHOLE:
HPRC0035

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	54
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.00-51.50
DATE DRILLED	01NOV2011	**EASTING**	548398.962	**ELEVATION (mAHD)**	646.919
LOGGED BY		**NORTHING**	7548996.028	**WATER LEVEL (mBGL)**	Dry

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (°C)**	**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



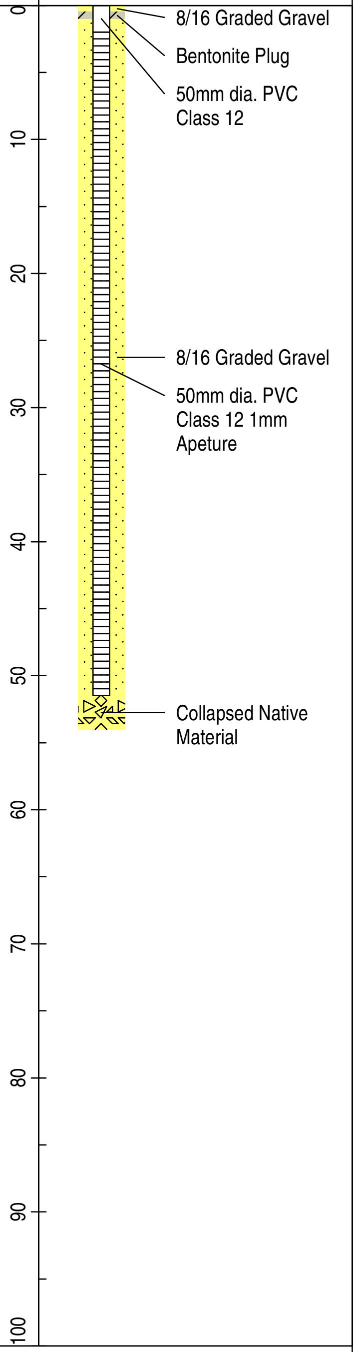
DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

CHT: Chert

BIF: Banded Iron Formation

"Not enough water to airlift"



SHEET:1 OF 1

Job Number 201012-00322

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Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

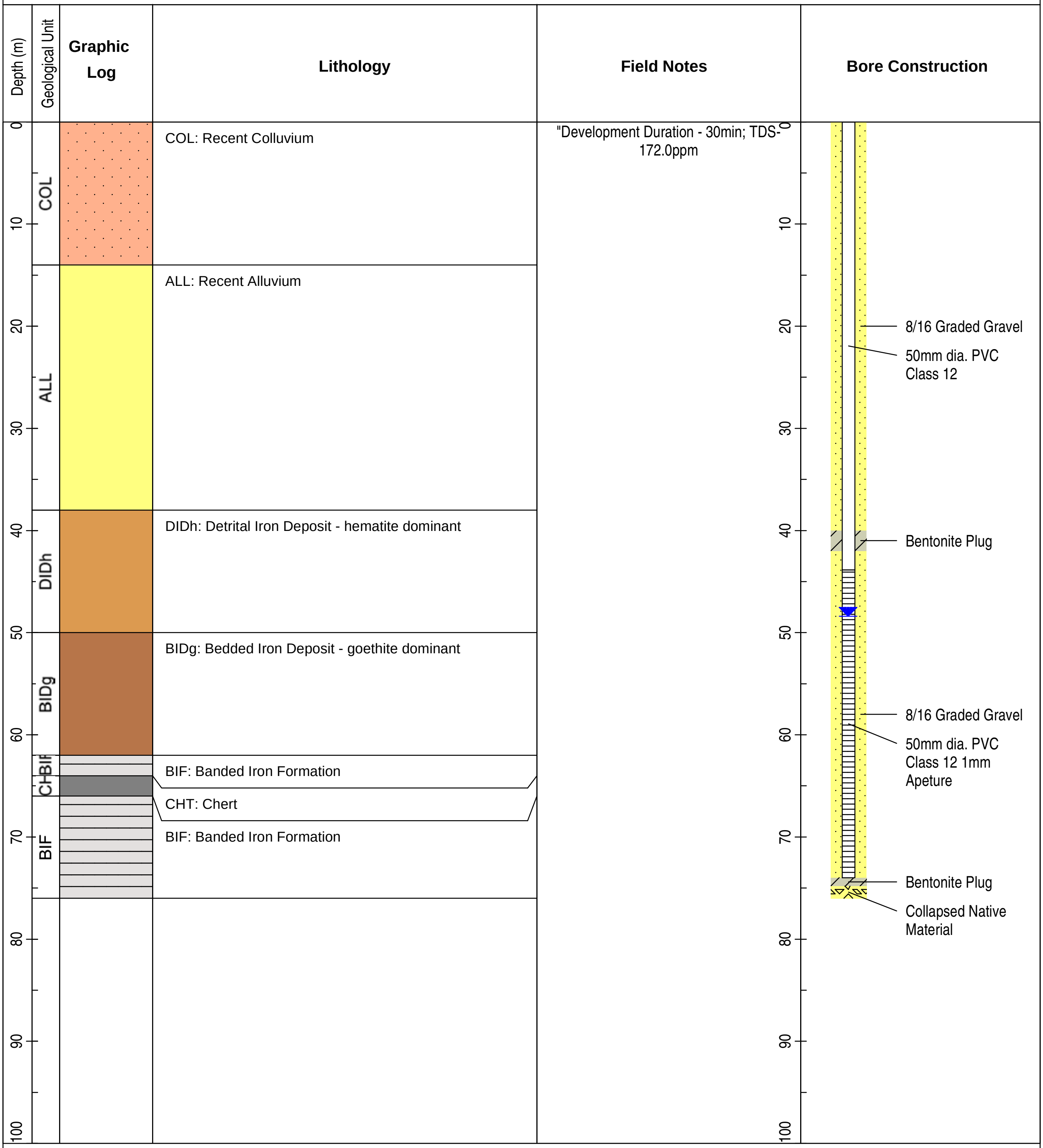
BOREHOLE:
HPRC0004

CLIENT FMS
PROJECT PIOP
DATE DRILLED 16AUG2011
LOGGED BY

LOCATION EAGLE
PROJECTION
EASTING 550929.499
NORTHING 7547398.306

DRILLED DEPTH (m) 76
SCREEN (mBGL) 43.85-74.00
ELEVATION (mAHD) 589.115
WATER LEVEL (mBGL) 48.4

Contractor
Rig Type AIR CORE RC
Drill Bit 5.5"
Drill Fluid A/W
Airlift (L/s) 0.1
Temperature (℃)
Salinity (mS/cm)
pH



COL: Recent Colluvium

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

CHT: Chert

BIF: Banded Iron Formation

"Development Duration - 30min; TDS-172.0ppm

SHEET:1 OF 1

Job Number 201012-00322

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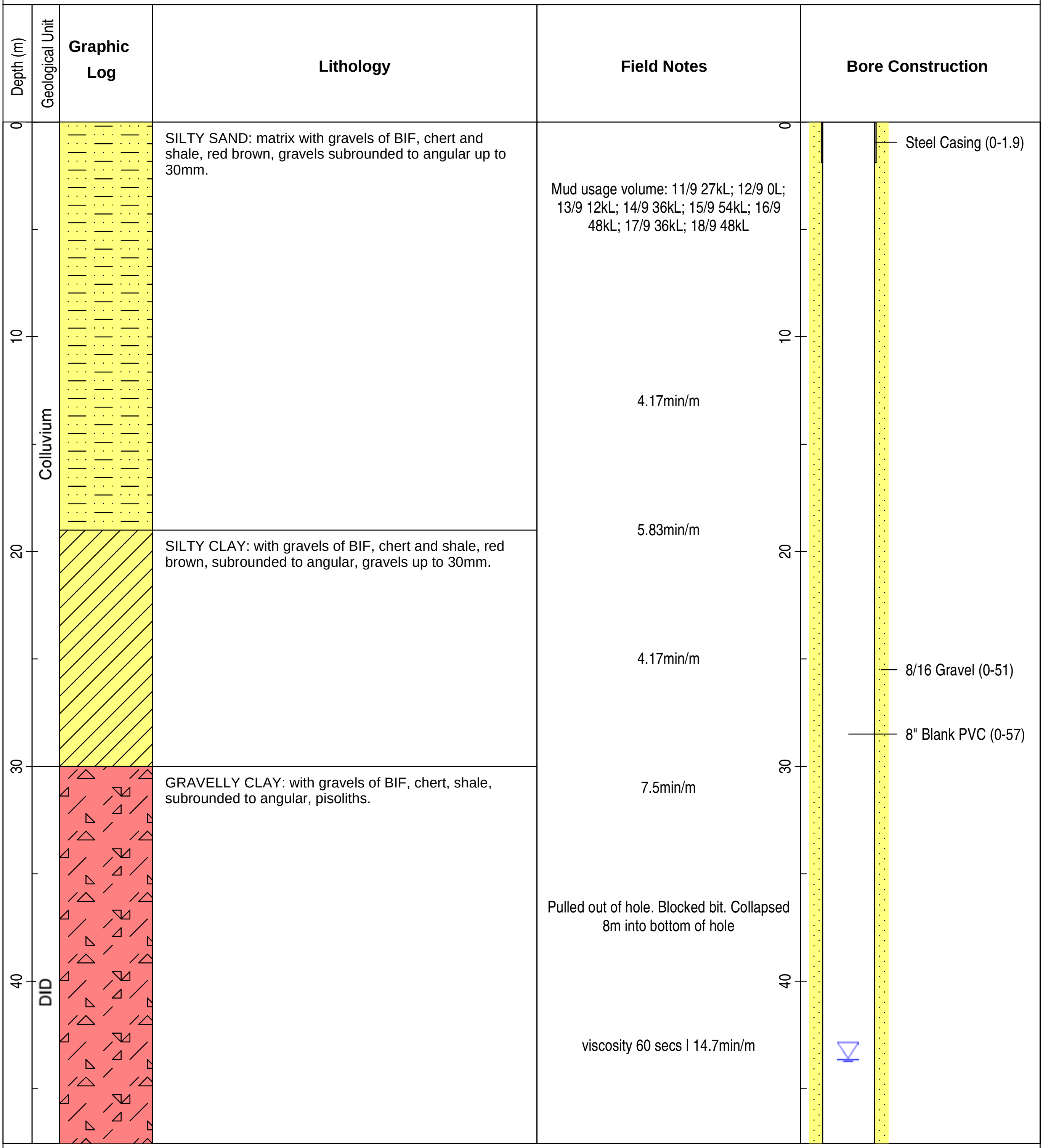
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-PROD-1

CLIENT	FMS	**LOCATION**	EAGLE DEPOSIT	**TOTAL DEPTH (m)**	119.5
PROJECT	PIOP	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	57-114.3
DATE DRILLED	10-18 SEP 2011	**EASTING**	551396.24	**ELEVATION (mAHD)**	584.08
LOGGED BY	R BAIRD	**NORTHING**	7547002.15	**WATER LEVEL (mBGL)**	43.28

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	15	**Salinity (mS/cm)**	0.36
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (°C)**	29.2	**pH**	8.25



SILTY SAND: matrix with gravels of BIF, chert and shale, red brown, gravels subrounded to angular up to 30mm.

SILTY CLAY: with gravels of BIF, chert and shale, red brown, subrounded to angular, gravels up to 30mm.

GRAVELLY CLAY: with gravels of BIF, chert, shale, subrounded to angular, pisoliths.

Mud usage volume: 11/9 27kL; 12/9 0L; 13/9 12kL; 14/9 36kL; 15/9 54kL; 16/9 48kL; 17/9 36kL; 18/9 48kL

4.17min/m

5.83min/m

4.17min/m

7.5min/m

Pulled out of hole. Blocked bit. Collapsed 8m into bottom of hole

viscosity 60 secs I 14.7min/m

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WorleyParsons
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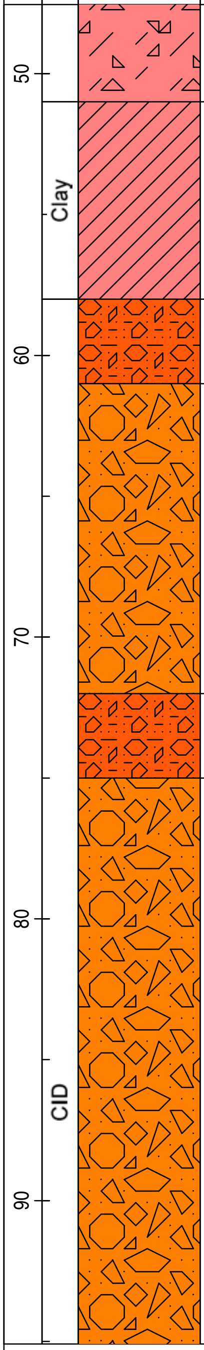
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-PROD-1

CLIENT	FMS	**LOCATION**	EAGLE DEPOSIT	**TOTAL DEPTH (m)**	119.5
PROJECT	PIOP	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	57-114.3
DATE DRILLED	10-18 SEP 2011	**EASTING**	551396.24	**ELEVATION (mAHD)**	584.08
LOGGED BY	R BAIRD	**NORTHING**	7547002.15	**WATER LEVEL (mBGL)**	43.28

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	15	**Salinity (mS/cm)**	0.36
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (°C)**	29.2	**pH**	8.25

Depth (m) | **Geological Unit** | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



Lithology

Clay: with minor gravels, mottled grey, yellow, medium plasticity, sticky, minor gravels of BIF, chert, shale, may be contamination due to different up hole velocities of clay and BIF.

CLAYEY GRAVEL: alternating bands of yellow clay (40%), with gravels of BIF, chert, shale (50%), subangular.

GRAVEL: with BIF, chert, shale, red brown silty matrix, gravel subangular up to 20mm, minor clay lenses <5%, ooids and peloids.

CLAYEY GRAVEL: beige-grey, gravels of BIF, chert, shale, poor samples.

GRAVEL: yellow brown, partially cemented, medium grained gravel, BIF and chert, subangular, red brown matrix, minor clay <5%

From 90m increase in clay content to 10%

From 100m partially cemented gravels of BIF, chert, shale, yellow-brown, ooids and peloids, subangular gravels up to 18mm, minor lenses of thinly banded clay <5%

From 114m slight increase in clay

Field Notes

4.0min/m

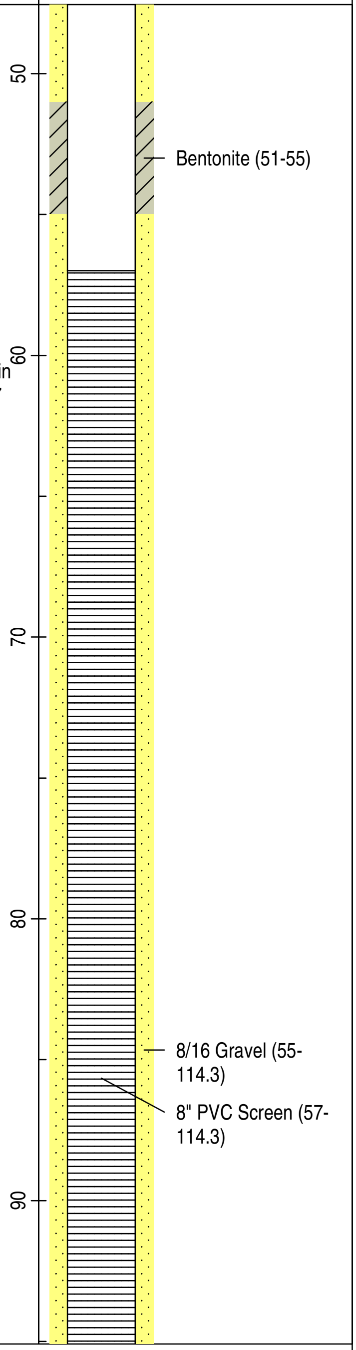
very slow penetration

Pulled rod out. End of clay. Tagged in morning at 54. 7m collapse | 14.17

15min/m

Mud loss started | 8.3min/m

End of day. Mud loss increased | 11.67min/m



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WorleyParsons
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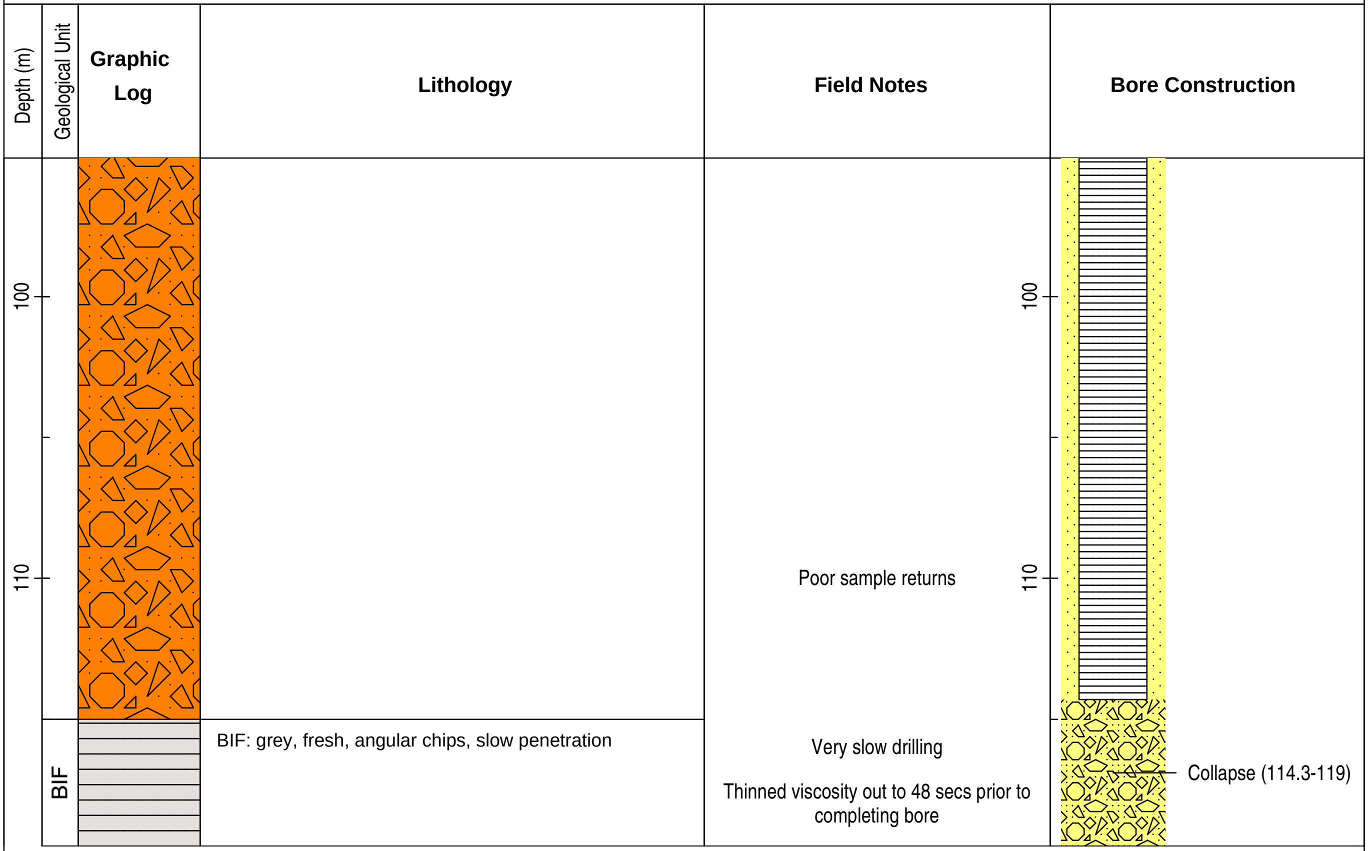
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-PROD-1

CLIENT	FMS	**LOCATION**	EAGLE DEPOSIT	**TOTAL DEPTH (m)**	119.5
PROJECT	PIOP	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	57-114.3
DATE DRILLED	10-18 SEP 2011	**EASTING**	551396.24	**ELEVATION (mAHD)**	584.08
LOGGED BY	R BAIRD	**NORTHING**	7547002.15	**WATER LEVEL (mBGL)**	43.28

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	15	**Salinity (mS/cm)**	0.36
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	29.2	**pH**	8.25



BIF: grey, fresh, angular chips, slow penetration

Poor sample returns

Very slow drilling

Thinned viscosity out to 48 secs prior to completing bore

Collapse (114.3-119)

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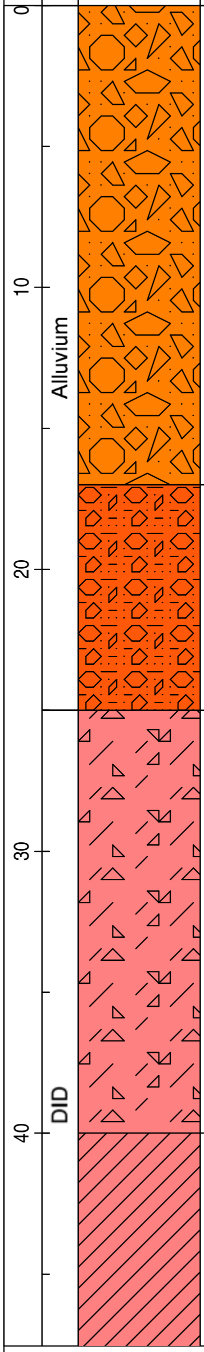
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-OBS-4-NESTED

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	120
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	23-26SEP2011	**EASTING**	551406.96	**ELEVATION (mAHD)**	584.1
LOGGED BY	S BEAR	**NORTHING**	7547011.00	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5"	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T640	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



Lithology

SANDY GRAVEL: red brown, gravels of BIF, chert and shale, subrounded to angular

CLAYEY GRAVEL: red brown, rounded to subangular, BIF, hematite

GRAVELLY CLAY: red brown, rounded to subangular, BIF, hematite

CLAY: red brown, minor gravels of BIF, pisoliths, decreasing gravel with depth
From 50m, mottled grey yellow, very hard, minor gravels at base

Field Notes

Bore A: Screened 56-65, WL 43.30 mAHD, 0.27 mS/cm, 550 mg/L, 28.1 oC, pH 8.81

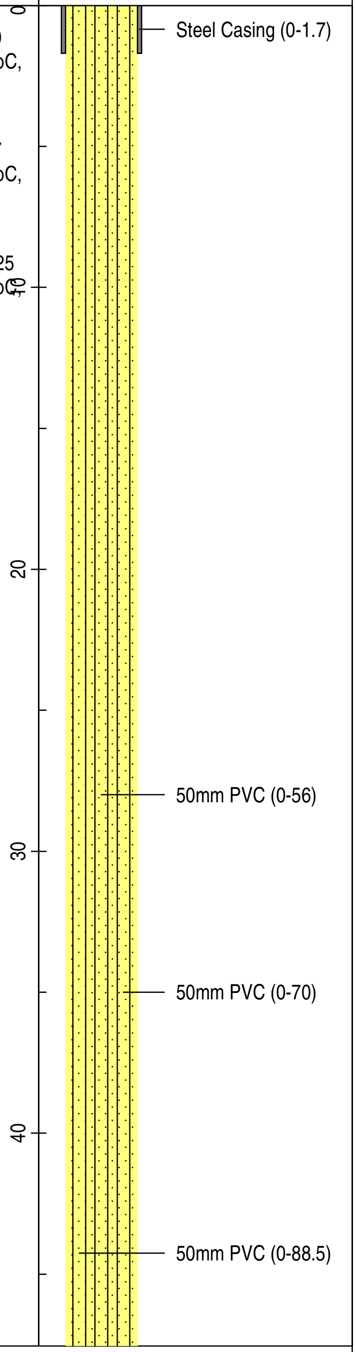
Bore B: Screened 70-82, WL 43.27 mAHD, 0.25 mS/cm, 490 mg/L, 29.2 oC, pH 8.56

Bore C: Screened 88.5-114, WL 43.25 mAHD, 0.17 mS/cm, 340 mg/L, 29.6 oC, pH 8.13

3.5min/m

2.5min/m

Bore Construction



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Job Number 201012-00322

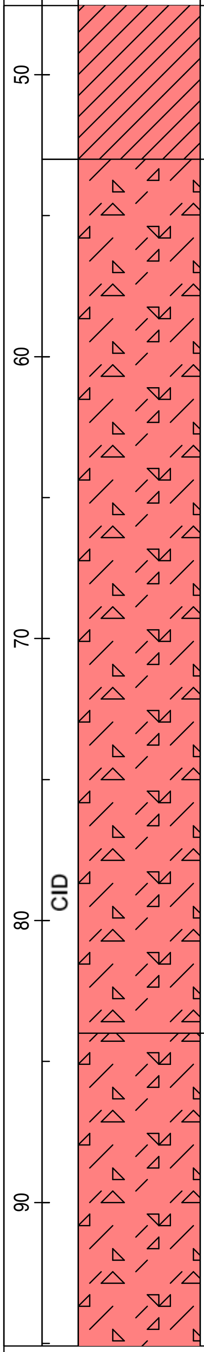
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-OBS-4-NESTED

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	120
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	23-26SEP2011	**EASTING**	551406.96	**ELEVATION (mAHD)**	584.1
LOGGED BY	S BEAR	**NORTHING**	7547011.00	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5"	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T640	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



GRAVELLY CLAY: yellow brown, cemented ooids in goethite clay matrix, vitrious goethite and hematite present
from 65-68m, clay content increased
from 79m, woody fragments present

GRAVELLY CLAY: yellow brown, clay content increasing
from 95m, yellow brown with minor gravels of CIDg

4.17min/m

8.17min/m

6.83min/m

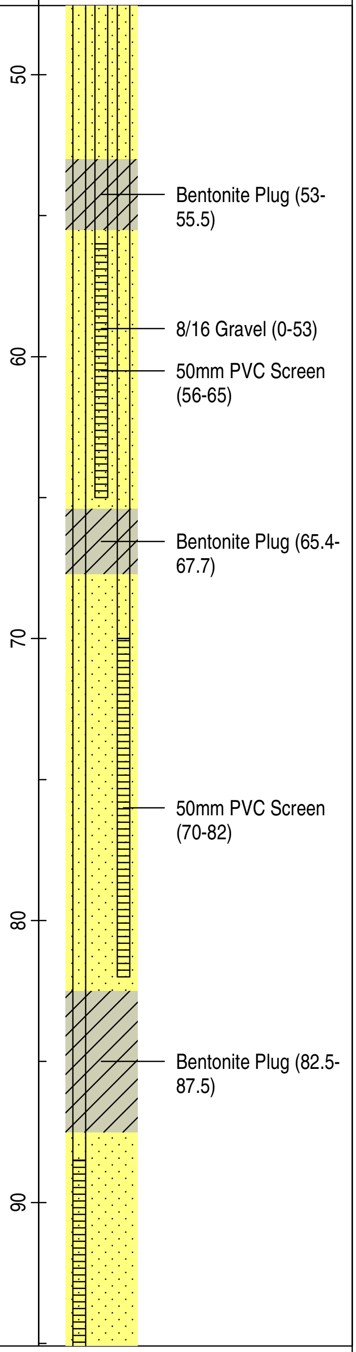
11.67min/m

10.5min/m

10min/m

3.17min/m

2.5min/m



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SHEET:2 OF 3

Job Number 201012-00322

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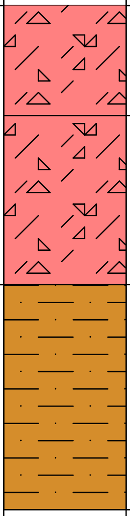
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-OBS-4-NESTED

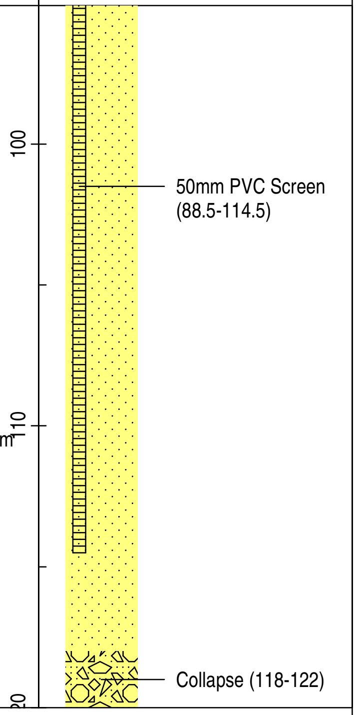
CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	120
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	23-26SEP2011	**EASTING**	551406.96	**ELEVATION (mAHD)**	584.1
LOGGED BY	S BEAR	**NORTHING**	7547011.00	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5"	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T640	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes
				3.75min/m
100			GRAVELLY CLAY: yellow brown with cemented ooids, altered goethite matrix	3.33min/m
110	BIDg		BID: grey yellow, goethitic clay altered BIF, quartz present, gravels are more angular, no ooids	Lost circulation 113-120m I 2.67min/m
20			Lost circulation and returns	0.38min/m



Bore Construction



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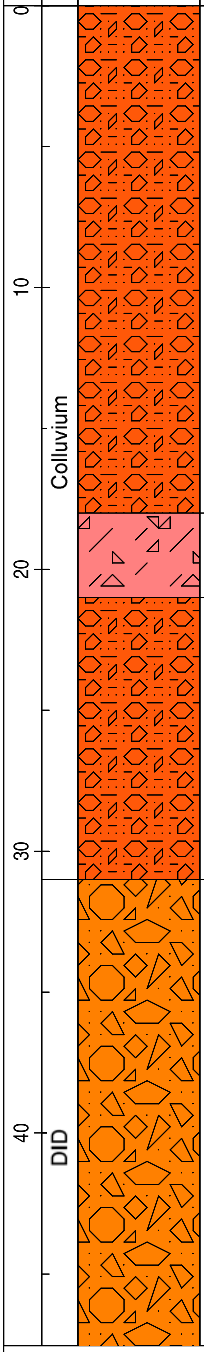
BOREHOLE:
EAGLE-OBS-3

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	82.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	40-82
DATE DRILLED	24-25 AUG 2011	**EASTING**	551373.0	**ELEVATION (mAHD)**	584.75
LOGGED BY	R BAIRD	**NORTHING**	7547809.75	**WATER LEVEL (mBGL)**	43.78

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	1.5	**Salinity (mS/cm)**	0.24
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	26.9	**pH**	8.23

Depth (m) | **Geological Unit** | **Graphic Log**



Lithology

CLAYEY GRAVEL: red brown matrix with fragments of shale, chert, BIF, subangular to subrounded, 30% clayey silt, 70% fragments, fragments up to 30mm.

GRAVELLY CLAY: red, soft, gravels of shale, chert and BIF.

CLAYEY GRAVEL: red brown matrix with fine to coarse gravel consisting of shale, chert, BIF, subangular to subrounded, 30mm fragments, unconsolidated.

GRAVEL: red, fine to coarse, subangular to subrounded, pisoliths, well rounded, gravel consists of shale, chert, BIF, some clay and silt ~20%.

Field Notes

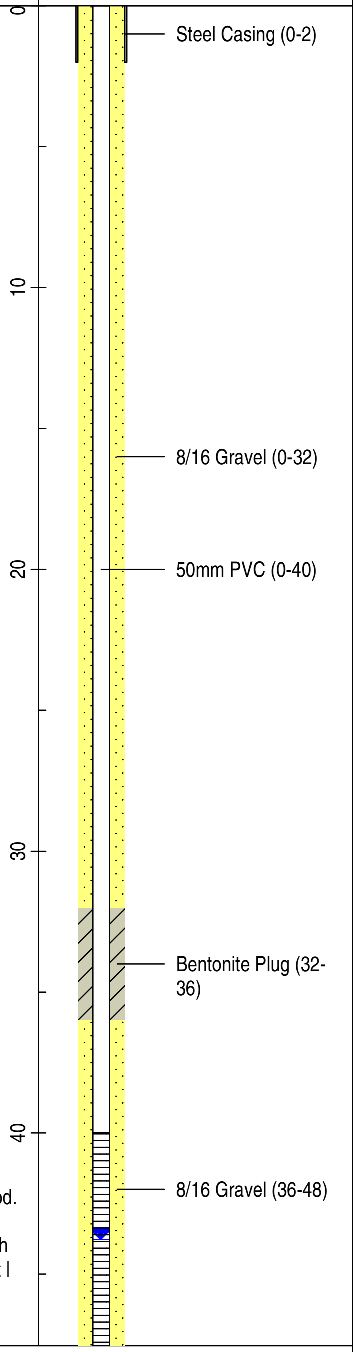
hammer with foam and water

2.6min/m

Pisoliths presents, less clay

Hammer blocked with clay. Missed rod. No samples laid out from 44-50m. happened when they tripped out with hammer and back in with air core bit l 1.92min/m

Bore Construction



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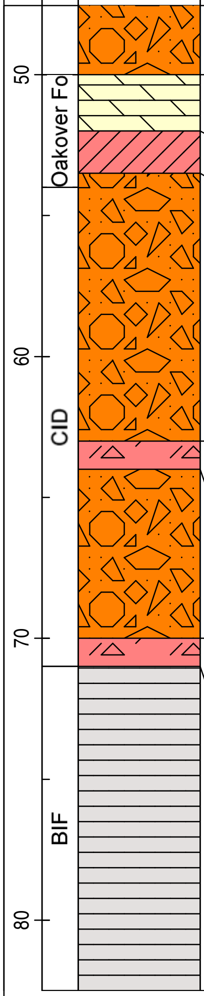
BOREHOLE:
EAGLE-OBS-3

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	82.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	40-82
DATE DRILLED	24-25 AUG 2011	**EASTING**	551373.0	**ELEVATION (mAHD)**	584.75
LOGGED BY	R BAIRD	**NORTHING**	7547809.75	**WATER LEVEL (mBGL)**	43.78

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	1.5	**Salinity (mS/cm)**	0.24
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	26.9	**pH**	8.23

Depth (m) | Geological Unit | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



SILCRETE: biege, very hard, chemical precipitation of carbonates and silica.

CLAY: mottled grey green, stiff, tight, high plasticity.

GRAVEL: yellow grey, gravels of shale and BIF, subangular. From 58m fine to coarse gravel in matrix of yellow silty clay,
goethite, gravel up to 20mm.

GRAVELLY CLAY: tan to yellow, sticky, medium plasticity.

GRAVEL: cemented CID

GRAVELLY CLAY: light brown, gravel 20%, clay 80%, sticky, medium plasticity.

BIF: grey, weathered, overturned.
From 75m, weathered with white clay lenses.
From 80m, grey fresh BIF & chert.

water cut |0.14mS | 0.07ppt | pH7.91 | 28.6°C | 12min/m | 0.44L/s

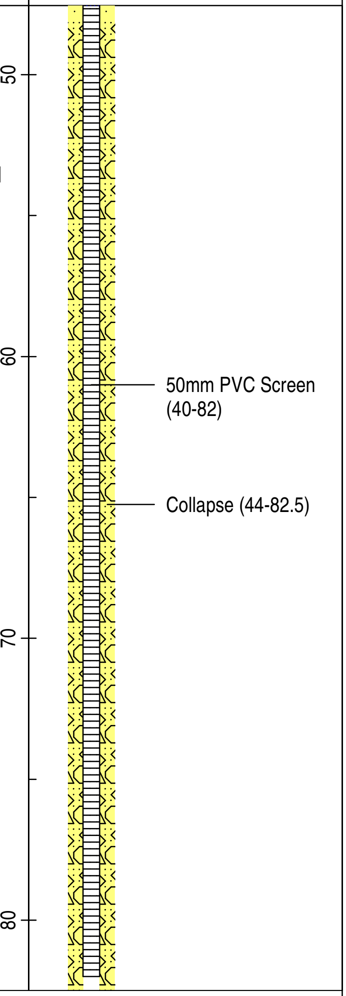
0.26mS | 0.13ppt | pH7.90 | 27.0°C | 5min/m | 0.11L/s

0.19mS | 0.09ppt | pH7.63 | 29.6°C | 5min/m | 0.74L/s

0.19mS | 0.09ppt | pH7.71 | 28.9°C | 4.17min/m | 0.4L/s

0.22mS | 0.11ppt | pH7.69 | 30.0°C | 10min/m | 1.33L/s

0.24mS | 0.12ppt | pH7.74 | 29.5°C |



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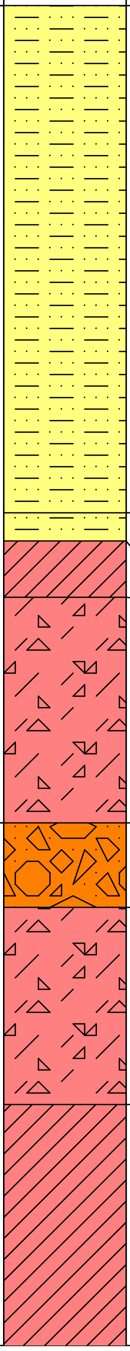
BOREHOLE:
EAGLE-OBS-2

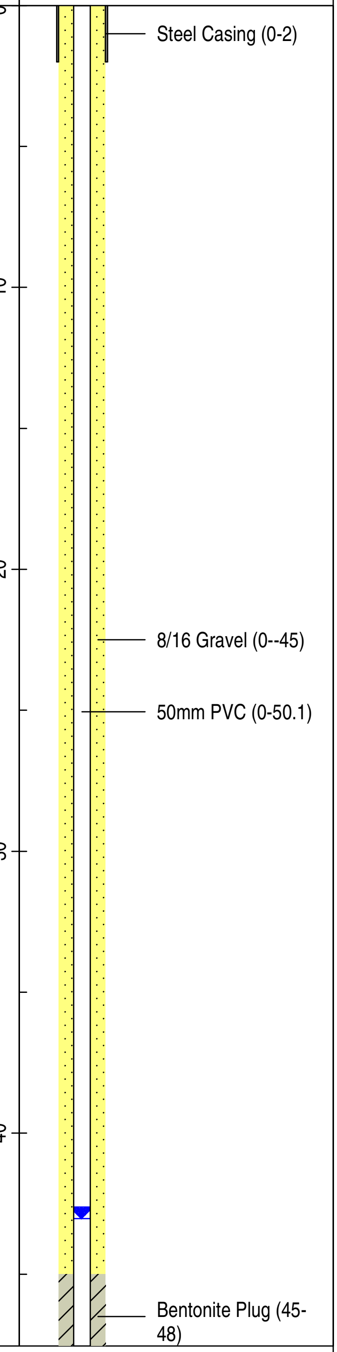
CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	118
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	50.1-116.1
DATE DRILLED	21-23 AUG 2011	**EASTING**	551403.55	**ELEVATION (mAHD)**	583.78
LOGGED BY	R BAIRD	**NORTHING**	7546985.32	**WATER LEVEL (mBGL)**	43.03

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	6.5	**Salinity (mS/cm)**	0.29
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	27.6	**pH**	8.03



Depth (m)	Geological Unit	Lithology	Field Notes
0 10	Colluvium	SILTY SAND: brown, fine grained, fragments of chert, shale, BIF, subrounded to angular, fragments up to 50mm in size.	5.38min/m
		CLAYEY SILT: red, dry, sticky when wet.	
20		CLAY: red, sticky, high plasticity.	Wet samples - added water
		GRAVELLY CLAY: red, sticky, high plasticity, fragments of chert and BIF, subrounded to angular, gravel 30%, clay 70%.	Hammer blocked with clay.Trip out, put on air core bit. Dry samples, not adding water
30	DID	GRAVEL: red brown, fragments of chert and BIF up to 30mm, subangular, minor silt and sand.	9.06 min/m
		GRAVELLY CLAY: red, medium plasticity, contains fragments of BIF and chert up to 20mm, subrounded, Gravel 30%, Clay 70%.	Hole in cyclone hose, 1hr to repair
40		CLAY: red, medium plasticity, sticky. From 49m, grey green yellow, mottled, very stiff, tight. From 53m, red, medium plasticity. From 54m, red, minor grey green mottling, high plasticity.	8.08 min/m

Bore Construction



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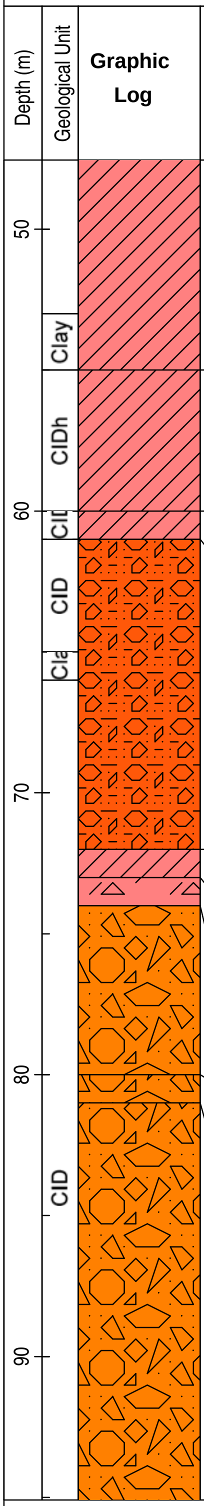
BOREHOLE:
EAGLE-OBS-2

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	118
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	50.1-116.1
DATE DRILLED	21-23 AUG 2011	**EASTING**	551403.55	**ELEVATION (mAHD)**	583.78
LOGGED BY	R BAIRD	**NORTHING**	7546985.32	**WATER LEVEL (mBGL)**	43.03

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	6.5	**Salinity (mS/cm)**	0.29
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	27.6	**pH**	8.03



Lithology

CLAY: yellow red, alternating bands of medium to coarse grained gravel with minor clay lenses, highly cemented in layers with goethite and hematite matrix.

CLAY: red, minor grey yellow mottling, stiff, tight.

CLAYEY GRAVEL: yellow red, alternating bands of medium to coarse grained gravel with minor clay lenses, highly cemented in layers with goethite and hematite matrix, minor yellow clay, gravels of chert and BIF, angular, some ooids and pisoliths.

CLAY: beige, tight, very stiff, hard, high plasticity.

GRAVELLY CLAY: beige, gravel 10%, clay 90%, sticky, medium plasticity.

GRAVEL: red brown grey, partially cemented, medium grained gravels of BIF and chert, subangular, minor clay <5%.
From 80m, cemented fine to medium gravel with ooids and peloids, grey red brown, minor vugs and cavities.

GRAVEL: yellow, cemented, geothite matrix, vuggy, ooids and peloids.

GRAVEL: red, cemented, hematite matrix, vuggy, ooids and peloids.
Wood fragments at 90m.
From 95m higher cementation, finer grained, cemented ooids and peloids, red-yellow, vuggy clay matrix.

Field Notes

3.75 min/m
Colour change from red to yellow

Drillers noted water cut

0.28mS | pH8.16 | 2.92min/m | 0.8L/s

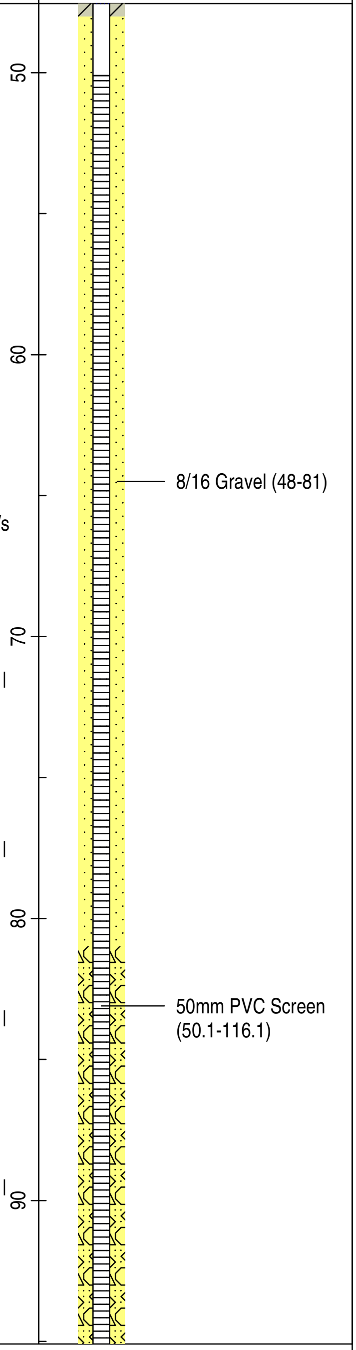
0.28mS | 0.14ppt | pH7.98 | 28.6°C | 1.33L/s

0.28mS | 0.14ppt | pH8.01 | 27.9°C | 5.42min/m | 2.86L/s

0.29mS | 0.14ppt | pH8.06 | 28.3°C | 3.33L/s

0.28mS | 0.14ppt | pH8.05 | 27.6°C | 3.75min/m | 4.0L/s

Bore Construction



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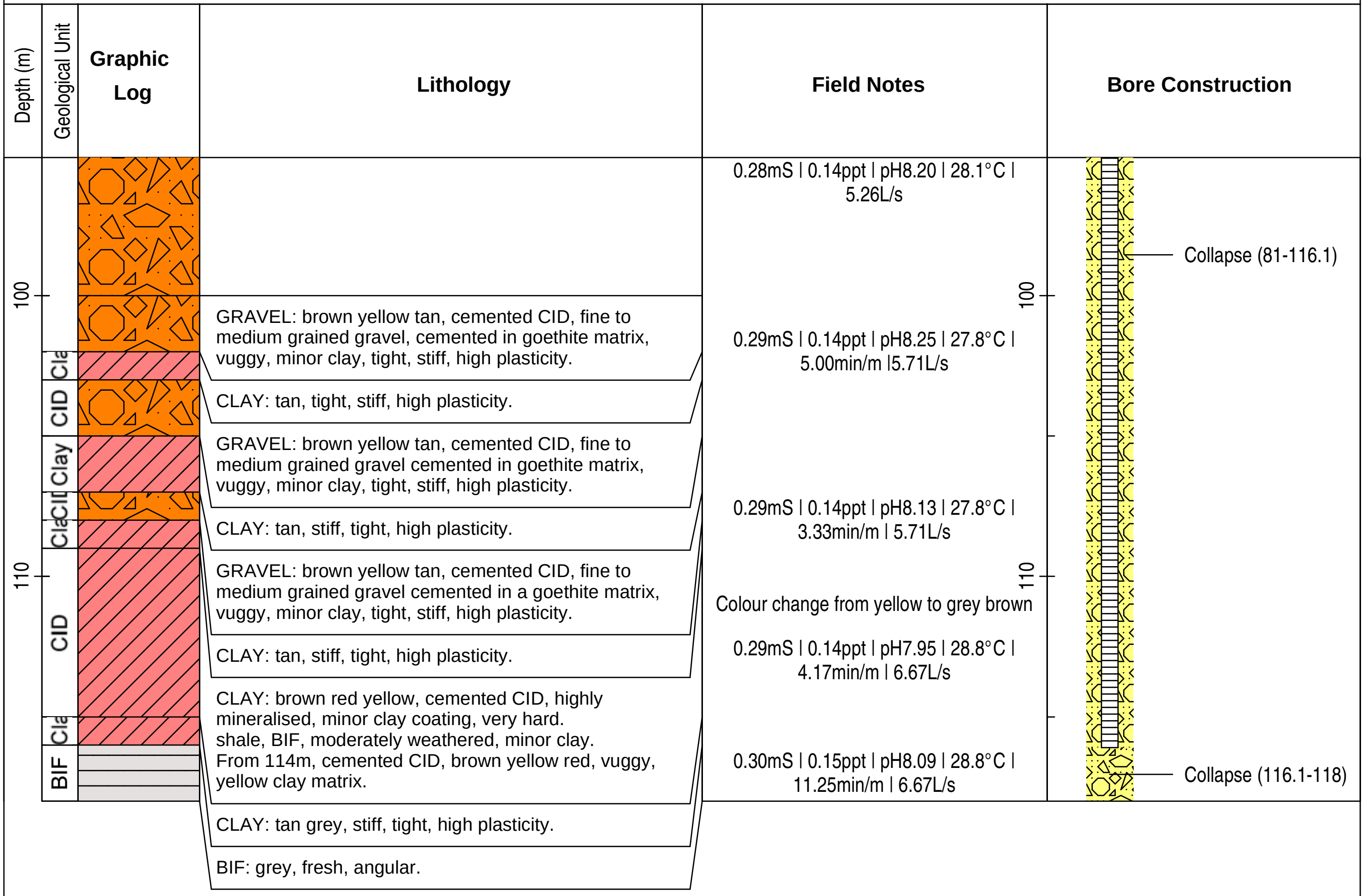
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
EAGLE-OBS-2

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	118
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	50.1-116.1
DATE DRILLED	21-23 AUG 2011	**EASTING**	551403.55	**ELEVATION (mAHD)**	583.78
LOGGED BY	R BAIRD	**NORTHING**	7546985.32	**WATER LEVEL (mBGL)**	43.03

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	6.5	**Salinity (mS/cm)**	0.29
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	27.6	**pH**	8.03



Lithology

GRAVEL: brown yellow tan, cemented CID, fine to medium grained gravel, cemented in goethite matrix, vuggy, minor clay, tight, stiff, high plasticity.

CLAY: tan, tight, stiff, high plasticity.

GRAVEL: brown yellow tan, cemented CID, fine to medium grained gravel cemented in goethite matrix, vuggy, minor clay, tight, stiff, high plasticity.

CLAY: tan, stiff, tight, high plasticity.

GRAVEL: brown yellow tan, cemented CID, fine to medium grained gravel cemented in a goethite matrix, vuggy, minor clay, tight, stiff, high plasticity.

CLAY: tan, stiff, tight, high plasticity.

CLAY: brown red yellow, cemented CID, highly mineralised, minor clay coating, very hard.
shale, BIF, moderately weathered, minor clay.
From 114m, cemented CID, brown yellow red, vuggy, yellow clay matrix.

CLAY: tan grey, stiff, tight, high plasticity.

BIF: grey, fresh, angular.

Field Notes

0.28mS | 0.14ppt | pH8.20 | 28.1°C | 5.26L/s

0.29mS | 0.14ppt | pH8.25 | 27.8°C | 5.00min/m |5.71L/s

0.29mS | 0.14ppt | pH8.13 | 27.8°C | 3.33min/m | 5.71L/s

Colour change from yellow to grey brown

0.29mS | 0.14ppt | pH7.95 | 28.8°C | 4.17min/m | 6.67L/s

0.30mS | 0.15ppt | pH8.09 | 28.8°C | 11.25min/m | 6.67L/s

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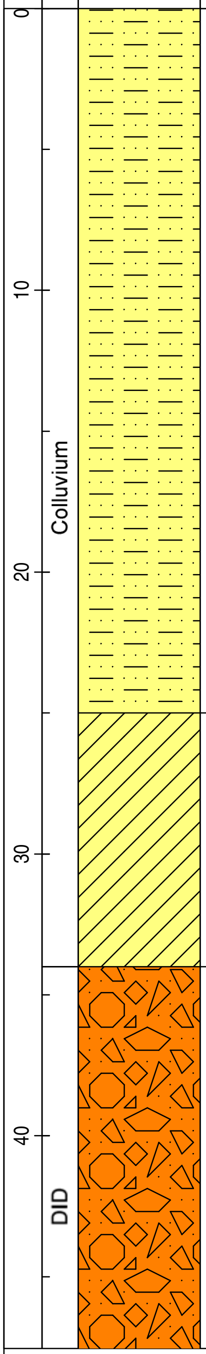
BOREHOLE:
EAGLE-OBS-1

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	120.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	41.15-113.15
DATE DRILLED	14-20 AUG 2011	**EASTING**	550278.4	**ELEVATION (mAHD)**	594.7
LOGGED BY	R BAIRD	**NORTHING**	7547283.5	**WATER LEVEL (mBGL)**	53.69

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	4	**Salinity (mS/cm)**	0.35
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	29.2	**pH**	8.1

Depth (m) | **Geological Unit** | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



Geological Unit	Lithology
Colluvium	SILTY SAND: fine grained matrix with fragments of chert, shale, BIF up to 5cm, fragments angular, brown matrix, minor silt and clay.
	SILTY CLAY: red brown matrix with fragments of BIF, shale, chert, low plasticity, low cohesion, fragments subangular, up to 20mm, decrease in clay percentage at 31m, clay percentage increases again at 33m.
DID	GRAVEL: BIF and chert, subangular to subrounded, red hematite matrix, gravels up to 20mm, at 41m gravels up to 20mm, pisoliths present.

Difficulty with samples returning

4.29min/m

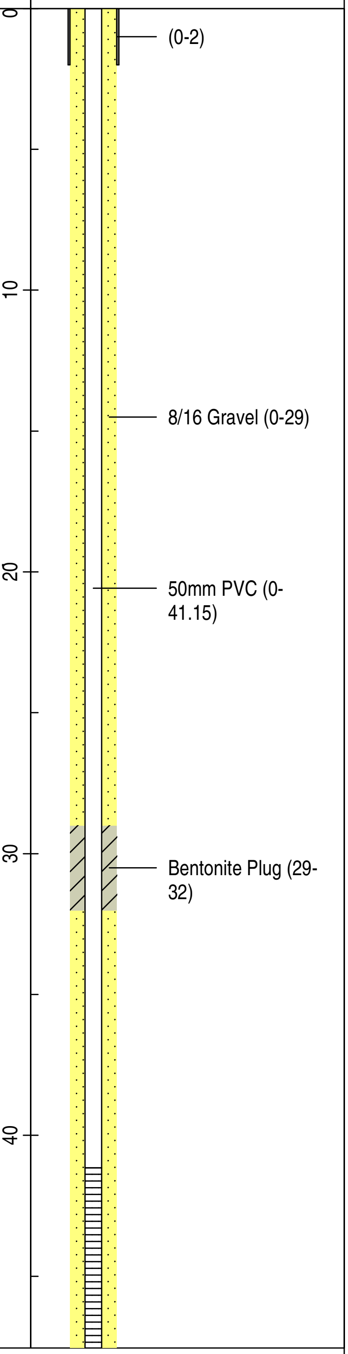
Drilled with hammer to 67m

Very hard from 120m. Rods bouncing. Samples of BIF. EOH at at 120.5m

Developed for 5 hrs. Cleaned up ok. Teaspoon of sediment in 20L bucket, slightly turbid

4.33min/m

4.17min/m



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SHEET:1 OF 3

Job Number 201012-00322

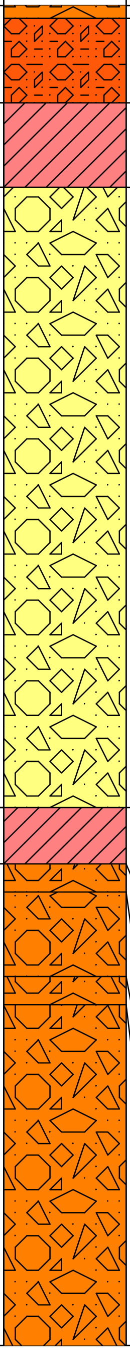
BOREHOLE:
EAGLE-OBS-1

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	120.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	41.15-113.15
DATE DRILLED	14-20 AUG 2011	**EASTING**	550278.4	**ELEVATION (mAHD)**	594.7
LOGGED BY	R BAIRD	**NORTHING**	7547283.5	**WATER LEVEL (mBGL)**	53.69

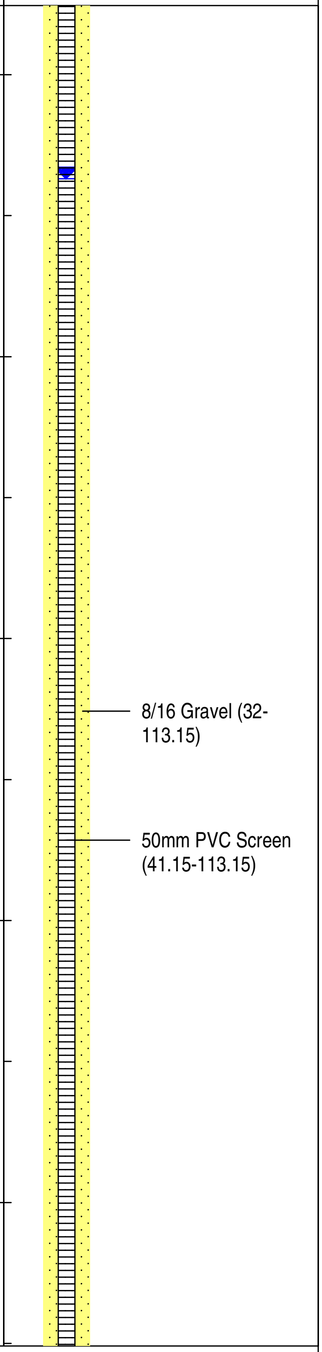
Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	4	**Salinity (mS/cm)**	0.35
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	29.2	**pH**	8.1

Depth (m)	Geological Unit	Lithology	Field Notes
50		CLAYEY GRAVEL: as above with ~30% clay	4.17min/m
	Clay	CLAY: brown-red, medium plasticity with minor fragments of BIF and chert, grading to yellow brown from 53-54m.	
60 70	CID	GRAVELLY SILT: CID, yellow brown, fine grained silty matrix with fragments of BIF, chert, shale, partially cemented matrix, contains ooids and peloids, cemented in layers, minor clay <10%, iron rich matrix.	Becoming moist | 5.0min/m Water cut. Difficult to determine exactly where because adding water/foam | 5.0min/m | 0.05L/s slow penetration | 15min/m Finish for day. Hole colapsed to 44m. Cleaned out hole overnight. Hammer jammed twice. Switch to air core drilling
	Clay	CLAY: yellow-light brown, tight and hard, confining layer, dry, minor grey brown red medium to coarse grained gravel, up to 10mm.	13min/m | 0.16L/s
80	CID	GRAVEL: red brown grey, medium to coarse grained gravel consisting of BIF and chert, up to 10mm, subangular.	
		GRAVEL: yellow, contains ooids and peloids, minor BIF and chert fragments	End of day. Resumed from 84m. Collapsed to 59m overnight | 7.14 | 1.6L/s
		GRAVEL: red brown grey, medium to coarse grained gravels of BIF and chert, up to 10mm, subangular.	
90		GRAVEL: red brown grey, medium to coarse grained gravels of BIF and chert, up to 10mm, subangular, colour change at 90m to grey-black with minor red.	

Graphic Log



Bore Construction



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Perth WA 6000
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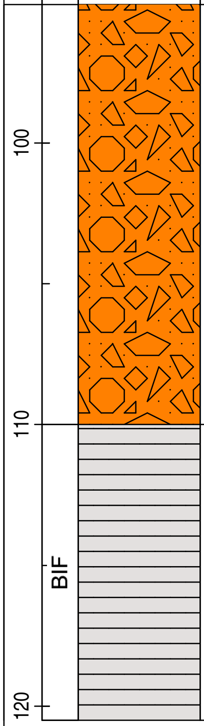
BOREHOLE:
EAGLE-OBS-1

CLIENT	FMS	**LOCATION**	EAGLE	**TOTAL DEPTH (m)**	120.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	41.15-113.15
DATE DRILLED	14-20 AUG 2011	**EASTING**	550278.4	**ELEVATION (mAHD)**	594.7
LOGGED BY	R BAIRD	**NORTHING**	7547283.5	**WATER LEVEL (mBGL)**	53.69

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	4	**Salinity (mS/cm)**	0.35
Rig Type	SCHRAMM T640	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	29.2	**pH**	8.1

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



BIF: grey, weathered
112m cemented ooids and peltiods red brown grey
116m with pisoliths
118m BIF, slightly weathered to fresh at 120.5m

0.33mS | 2L/s

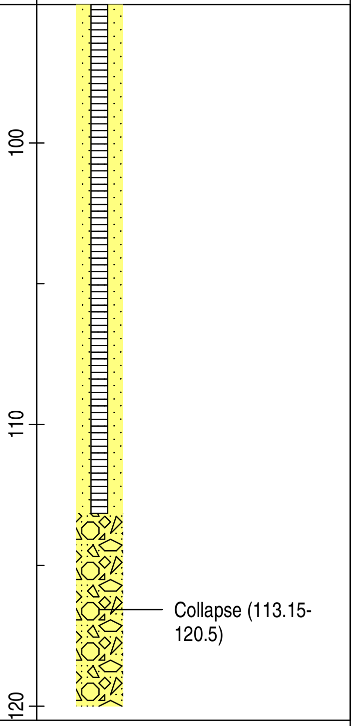
0.34mS | 2.8L/s

0.33mS | 3.3L/s

0.45mS | 6.67min/m | 4L/s

Colour change from red/hemalite to yellowish/geothite

0.32mS | 4L/s



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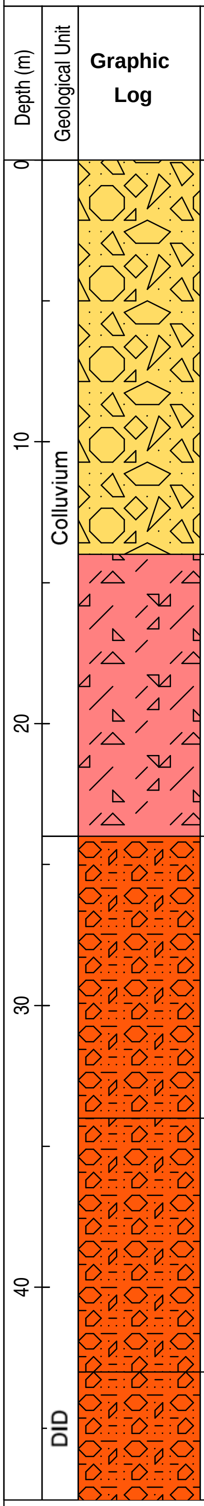
BOREHOLE:
DELTA-PROD-1

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	108
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	68-106
DATE DRILLED	30SEP2011	**EASTING**	551424.94	**ELEVATION (mAHD)**	540.82
LOGGED BY	S BEAR	**NORTHING**	7553228.15	**WATER LEVEL (mBGL)**	38.70

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	13	**Salinity (mS/cm)**	0.182
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (°C)**	29.7	**pH**	7.22



Lithology

SILTY GRAVEL: red brown, subangular gravels of BIF, shale & chert, poorly sorted, clay increasing with depth

GRAVELLY CLAY: red brown, subrounded gravels of BIF, shale & chert

CLAYEY GRAVEL: red brown, subangular gravels of BIF, shale , chert & ooids

CLAYEY GRAVEL: red brown, pisoliths present

CLAYEY GRAVEL: red brown, increased clay ~30%, more ooids

Field Notes

1.75min/m

3.5min/m

3.0min/m

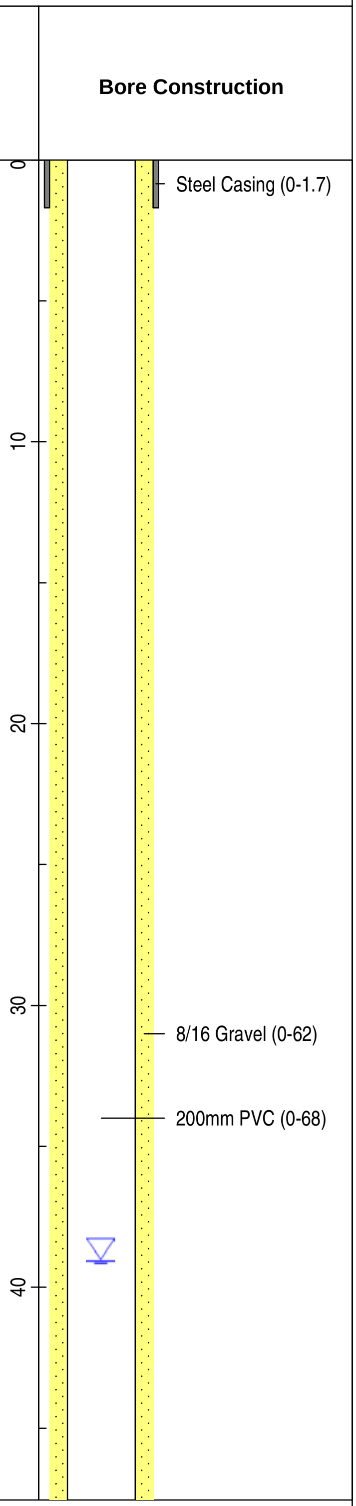
4.83min/m

2.83min/m

3.17min/m

3.0min/m

2.17min/m



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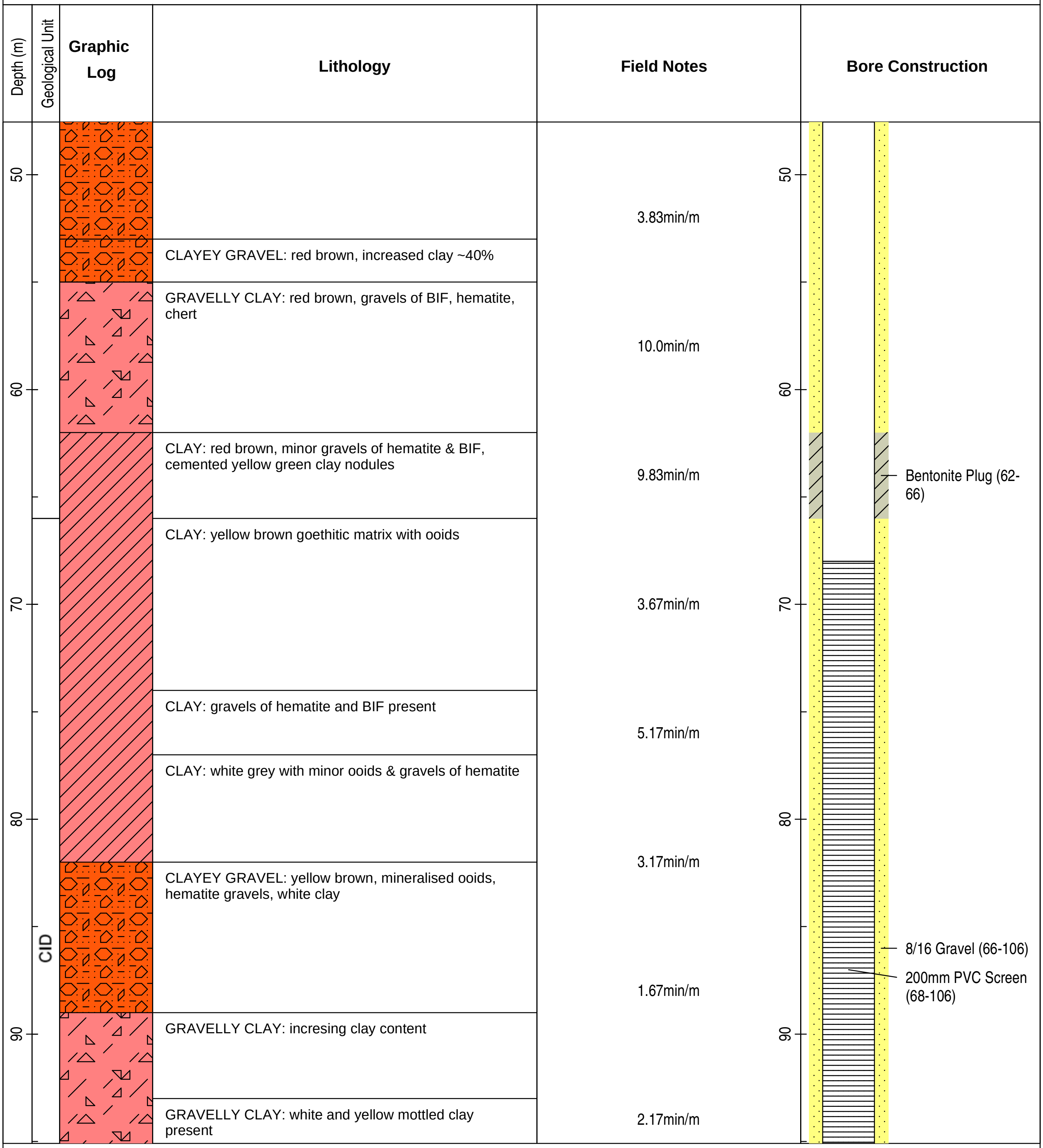
WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
DELTA-PROD-1

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	108
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	68-106
DATE DRILLED	30SEP2011	**EASTING**	551424.94	**ELEVATION (mAHD)**	540.82
LOGGED BY	S BEAR	**NORTHING**	7553228.15	**WATER LEVEL (mBGL)**	38.70

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	13	**Salinity (mS/cm)**	0.182
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	29.7	**pH**	7.22



Lithology

- CLAYEY GRAVEL: red brown, increased clay ~40%
- GRAVELLY CLAY: red brown, gravels of BIF, hematite, chert
- CLAY: red brown, minor gravels of hematite & BIF, cemented yellow green clay nodules
- CLAY: yellow brown goethitic matrix with ooids
- CLAY: gravels of hematite and BIF present
- CLAY: white grey with minor ooids & gravels of hematite
- CLAYEY GRAVEL: yellow brown, mineralised ooids, hematite gravels, white clay
- GRAVELLY CLAY: incresing clay content
- GRAVELLY CLAY: white and yellow mottled clay present

Field Notes

- 3.83min/m
- 10.0min/m
- 9.83min/m
- 3.67min/m
- 5.17min/m
- 3.17min/m
- 1.67min/m
- 2.17min/m

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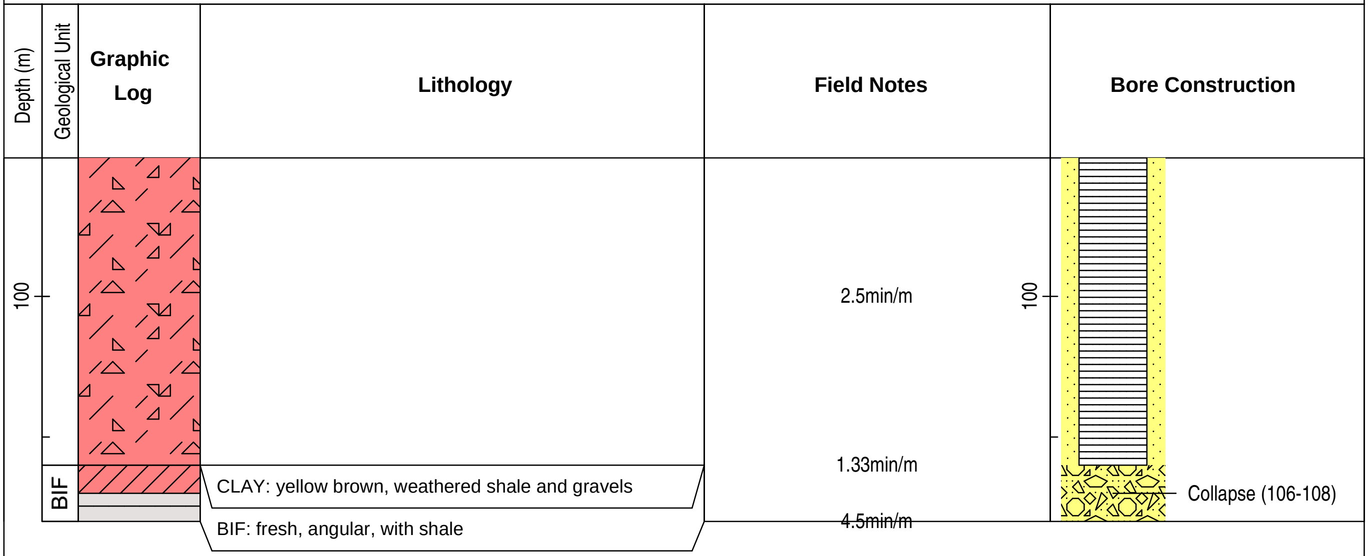
Perth WA 6000
ABN 61001 279 812

BOREHOLE:

DELTA-PROD-1

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	108
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	68-106
DATE DRILLED	30SEP2011	**EASTING**	551424.94	**ELEVATION (mAHD)**	540.82
LOGGED BY	S BEAR	**NORTHING**	7553228.15	**WATER LEVEL (mBGL)**	38.70

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	13	**Salinity (mS/cm)**	0.182
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	29.7	**pH**	7.22



CLAY: yellow brown, weathered shale and gravels

BIF: fresh, angular, with shale

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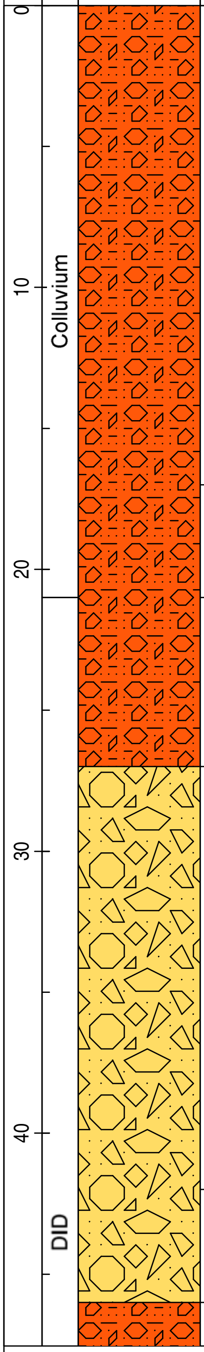
BOREHOLE:
DELTA-OBS-4-NEST

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	100
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	08-09 OCT 2011	**EASTING**	551418.36	**ELEVATION (mAHD)**	540.65
LOGGED BY	R BAIRD	**NORTHING**	7553214.16	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5" Tricone	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



Lithology

CLAYEY GRAVEL: red brown, gravels of BIF, chert & shale up to 30mm diameter, subrounded to subangular, minor silt and clay in matrix ~20%, poorly sorted

CLAYEY GRAVEL: increased clay content to ~40%

CLAYEY GRAVEL: red brown, poorly sorted subrounded gravels of BIF & chert 50% with pisoliths, 50% clay

SILTY GRAVEL: red brown, gravels of BIF, chert & shale 30mm dia, subrounded, minor pisoliths, silt 10%

SILTY GRAVEL: as above, abundant pisoliths

CLAYEY GRAVEL: red brown, gravels of BIF chert & shale, subrounded, minor pisoliths, clay 30%

Field Notes

Bore A: Screened 68.33-77.41, WL 38.79 mAHD, 0.18 mS/cm, 332 mg/L, 30.4 oC, pH 8.80

Bore B: Screened 84.42-98.55, WL 38.80 mAHD, 0.20 mS/cm, 363 mg/L, 30.1 oC, pH 9.16

2.5min/m

3.33min/m

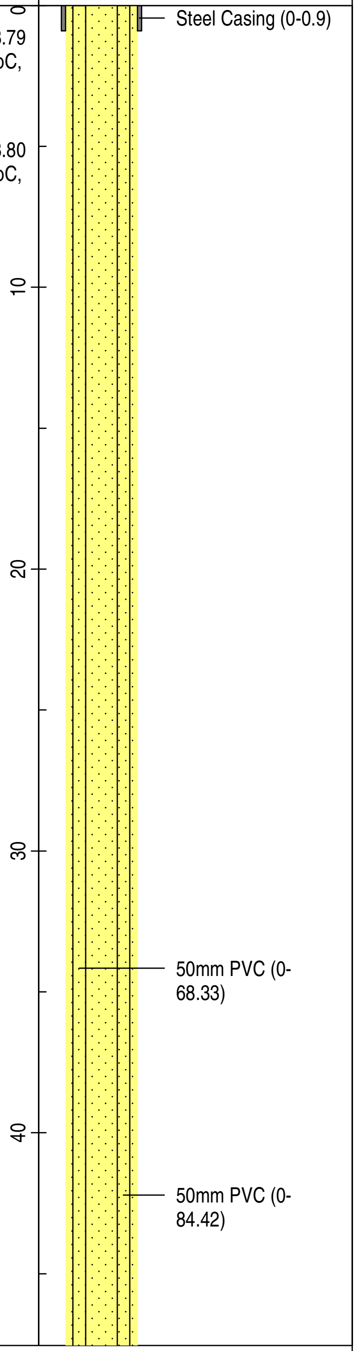
4.17min/m

3.33min/m

2.5min/m

3.33min/m

3.33min/m



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SHEET:1 OF 3

Job Number 201012-00322

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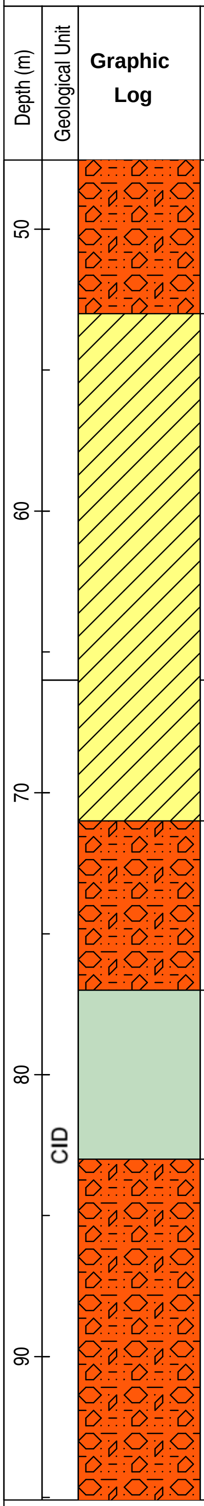
ABN 61001 279 812

BOREHOLE:
DELTA-OBS-4-NEST

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	100
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	08-09 OCT 2011	**EASTING**	551418.36	**ELEVATION (mAHD)**	540.65
LOGGED BY	R BAIRD	**NORTHING**	7553214.16	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5" Tricone	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes



Lithology

SILTY CLAY: red brown, medium plasticity, sticky, gravels <10% of BIF and chert, minor pisoliths

SILTY CLAY: yellow grey brown, low plasticity, minor gravels of BIF

CLAYEY GRAVEL: yellow grey, clay 50%, gravels of BIF with pisoliths, subangular, poorly sorted, goethitic clay matrix, yellow

CLAY : green light grey, medium to high plasticity, sticky

CLAYEY GRAVEL: red brown yellow, partially cemented, gravels of BIF and chert 10mm diameter, ooids, peloids & pisoliths, vuggy, minor lenses of clay

Field Notes

3.33min/m

"Slow penetration through clay" | 7.5min/m

5.0min/m

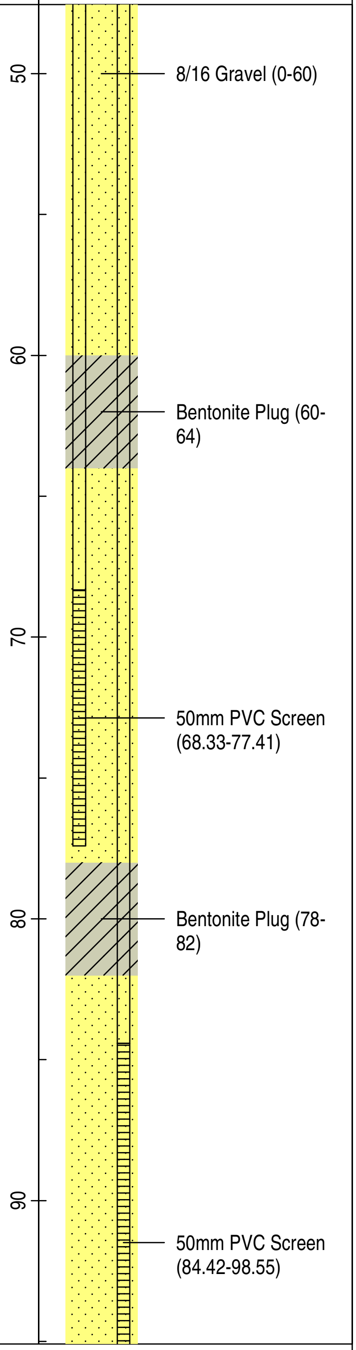
4.17min/m

7.5min/m

3.33min/m

3.33min/m

Bore Construction



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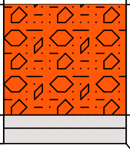
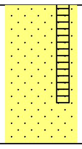
BOREHOLE:
DELTA-OBS-4-NEST

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	100
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	08-09 OCT 2011	**EASTING**	551418.36	**ELEVATION (mAHD)**	540.65
LOGGED BY	R BAIRD	**NORTHING**	7553214.16	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5" Tricone	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction
					
100	BIF		BIF: grey, clean, angular chips, very hard	Refusal- basement very hard | ~100min/m	100

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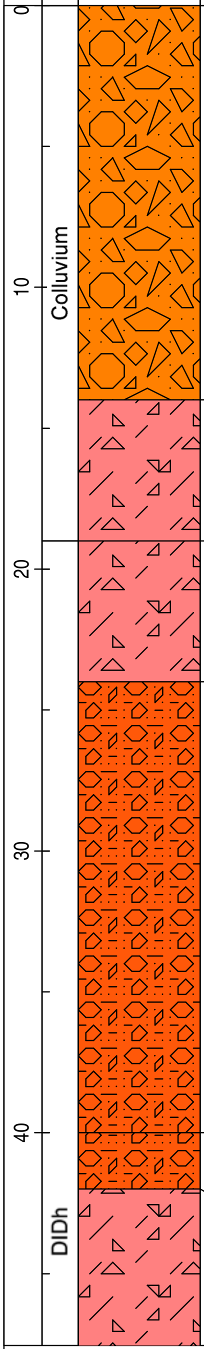
BOREHOLE:
DELTA OBS 3

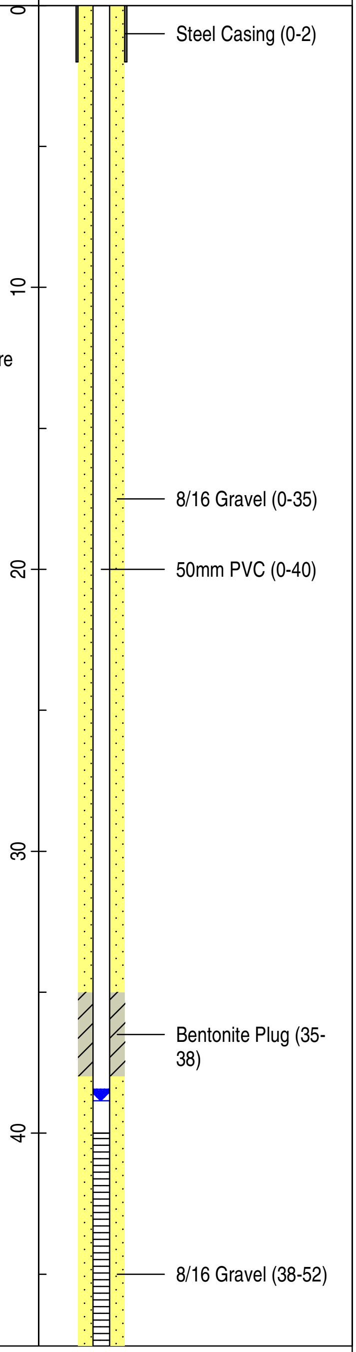
CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	106
PROJECT	FLINDERS PI0P	**PROJECTION**	DELTA OBS 3	**SCREEN (mBGL)**	40-106
DATE DRILLED	29-31 AUG 2011	**EASTING**	551411.90	**ELEVATION (mAHD)**	540.82
LOGGED BY	S BEAR	**NORTHING**	7553238.58	**WATER LEVEL (mBGL)**	38.85

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.40
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	30.2	**pH**	8.2

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



Geological Unit	Lithology	Field Notes
Colluvium	GRAVEL: red brown, some silt and clay, angular to subangular, poorly sorted, BIF, chert, coarse grained gravels >15mm, clay 20% from 1m	Hammer to 13m, switching to Air Core RC
	GRAVELLY CLAY: red brown, gravels subangular to subrounded, poorly sorted >30mm diameter, loose, dry, with minor ooids	
DIDh	GRAVELLY CLAY: red brown with increasing ooids and less gravel, 15mm diameter, ooid rich clay	
	CLAYEY GRAVEL: red brown, ooids, poorly sorted >15mm diameter, predominantly 10-20mm, subangular to subrounded, 20% clay Cemented fragments present from 26m Larger ooids and pisoliths >5mm diameter and increasing clay 40% at 29m Large gravels at 30m, >30mm diameter Pisoliths 5-7mm diameter at 38m	Rig overheated I 0.8m/min
	CLAYEY GRAVEL: dark red brown, poorly sorted, >40mm diameter, pisoliths 2-7mm diameter, clay 10%	
	GRAVELLY CLAY: red brown, ooids in clay matrix, subangular gravels of BIF Nodules of hard clay with ooids at 44m	



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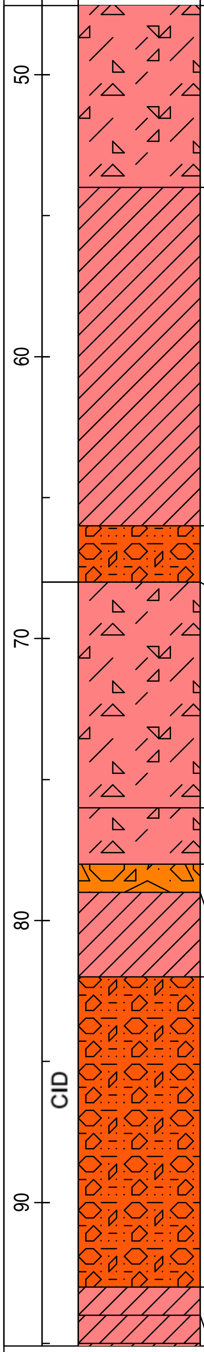
BOREHOLE:
DELTA OBS 3

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	106
PROJECT	FLINDERS PI0P	**PROJECTION**	DELTA OBS 3	**SCREEN (mBGL)**	40-106
DATE DRILLED	29-31 AUG 2011	**EASTING**	551411.90	**ELEVATION (mAHD)**	540.82
LOGGED BY	S BEAR	**NORTHING**	7553238.58	**WATER LEVEL (mBGL)**	38.85

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.40
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	30.2	**pH**	8.2

Depth (m) | **Geological Unit** | **Graphic Log**



Lithology

CLAY: red brown, minor ooids >10%
Nodules of cemented yellow/green clay from 63m
(opaline silica)

CLAYEY GRAVEL: red brown, 30% clay ooids in clay matrix

GRAVELLY CLAY: red brown mottled yellow, ooid rich
hard nodules of green clay from 69m

GRAVELLY CLAY: yellow with grey green mottling

GRAVEL: red brown, gravels of BIF, angular, poorly sorted, coarse grained

CLAY: green white

CLAYEY GRAVEL: white red brown, fragments of cemented ooids and wood, vuggy
becoming gravelly sand at 83m, coarse grained brown with cemented ooids/wood goethite
from 85-87m, red brown (hematite)
from 89-90m, dark red brown and coarser grained gravels of BIF >10mm, angular at 90.0m

CLAY: yellow brown white, coarse grained up to 10mm diameter gravels, angular

Field Notes

Water added at 42m

0.42mS | 0.21ppt | pH8.18 | 30.7°C | 0L/s

1.5min/m | 0L/s

0.32mS | 0.16ppt | pH8.19 | 29.5°C | 1.2min/m | 0.1L/s

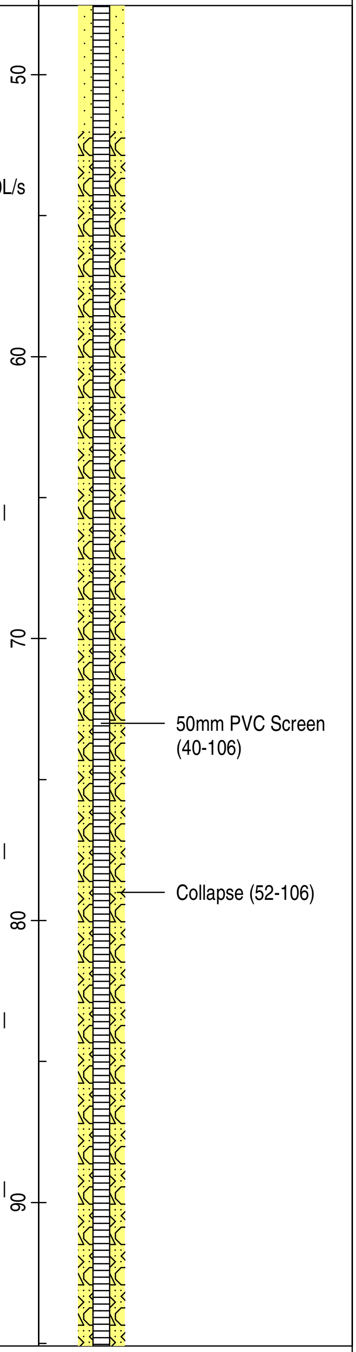
3.8min/m | 0L/s

0.40mS | 0.20ppt | pH8.18 | 29.5°C | 3.8min/m | 0.9L/s

0.40mS | 0.20ppt | pH8.25 | 30.1°C | 4.5min/m | 3L/s

0.40mS | 0.20ppt | pH8.26 | 30.2°C | >7L/s

Bore Construction



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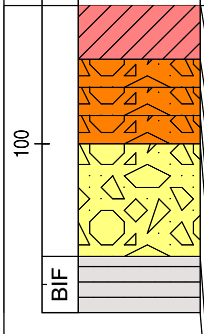
ABN 61001 279 812

BOREHOLE:
DELTA OBS 3

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	106
PROJECT	FLINDERS PI0P	**PROJECTION**	DELTA OBS 3	**SCREEN (mBGL)**	40-106
DATE DRILLED	29-31 AUG 2011	**EASTING**	551411.90	**ELEVATION (mAHD)**	540.82
LOGGED BY	S BEAR	**NORTHING**	7553238.58	**WATER LEVEL (mBGL)**	38.85

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.40
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	30.2	**pH**	8.2

Depth (m) | Geological Unit | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



Lithology

CLAY: sandy, cemented nodules of clay with green mottling

CLAY: yellow brown and green grey mottling with gravels of BIF >10mm

GRAVEL: yellow brown, fine grained

GRAVEL: light red brown, minor clay 5%, rounded to subangular, poorly to moderately sorted

GRAVEL: brown, sandy, fragments of BIF >10mm

GRAVELLY SAND: brown, medium grained, gravels of CID and BIF >10mm, subangular to subrounded
Becoming yellow brown with cemented clay, BIF and chert at 104m
Becoming mottled white with angular BIF at 105m

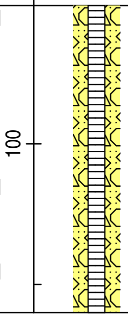
BIF: BIF

Field Notes

0.41mS | 0.20ppt | pH8.32 | 28.8°C | >7L/s

0.41mS | 0.20ppt | pH8.32 | 29.5°C | >7L/s

0.41mS | 0.20ppt | pH8.32 | 29.2°C | >7L/s



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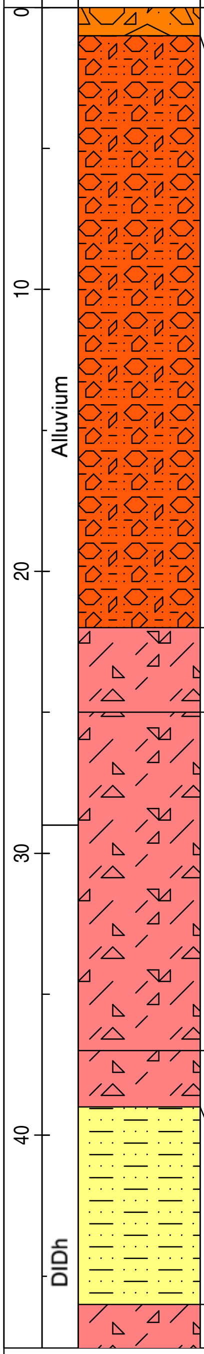
BOREHOLE:
DELTA OBS 2

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	101
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	41-101
DATE DRILLED	27-29 AUG 2011	**EASTING**	551237.26	**ELEVATION (mAHD)**	543.24
LOGGED BY	S BEAR	**NORTHING**	7552861.77	**WATER LEVEL (mBGL)**	40.61

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.44
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	30.4	**pH**	8.25

Depth (m) | **Geological Unit** | **Graphic Log**



Lithology

GRAVEL: red brown, fine to coarse grained, moderately sorted, angular to subangular, clay matrix 5%, dry, loose

CLAYEY GRAVEL: red brown, fine to coarse grained, poorly sorted, angular to subrounded, clay approximately 20%
Becomes gravelly clay/silt at 12m
Gravels finer at 14m, 1-2mm diameter and subangular to subrounded
Larger gravels up to 25mm from 15m
Becomes clayey/silty gravel at 18m, gravels 2-20mm diameter in clay matrix 30-40%, subangular to subrounded

GRAVELLY CLAY: red brown, subrounded to rounded, fine grained 1-5mm, pisoliths at 26m

GRAVELLY CLAY: red brown, subrounded to rounded, fine grained 1-5mm, pisoliths at 26m
From 29m dark red brown, fine grained gravels, 1-2mm pisoliths, rounded, some larger gravels of BIF up to 10mm diameter
Pisoliths become larger and more abundant at 34m >5mm diameter

GRAVELLY CLAY: dark red brown, moderately sorted, subangular to subrounded, coarse grained up to 50mm diameter

CLAYEY SILT: red brown, moist, cohesive, abundant pisoliths

GRAVELLY CLAY: red brown, pisoliths present
hard nodules of clay at 50m

Field Notes

RC hammer

6.15min/m

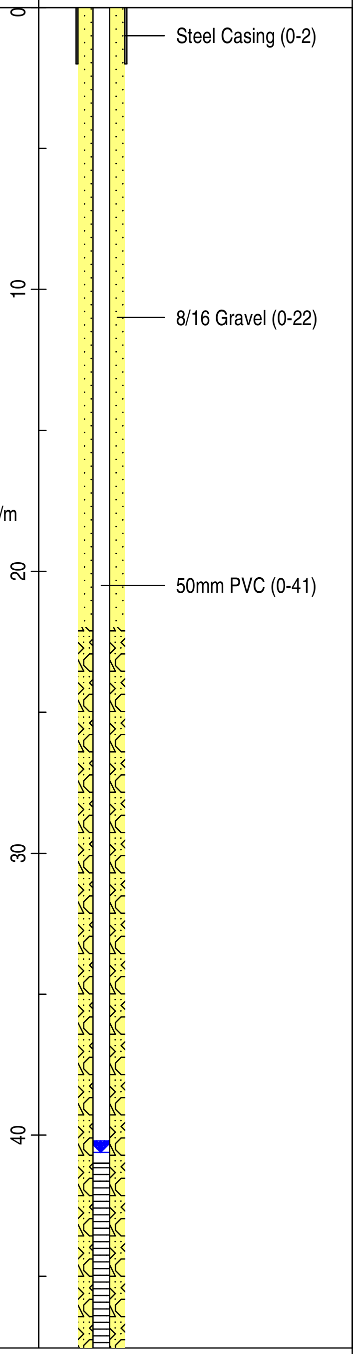
changed to air core at 18m | 20.0min/m

8.33min/m

11.67min/m

water added at 41m
3.33min/m

Bore Construction



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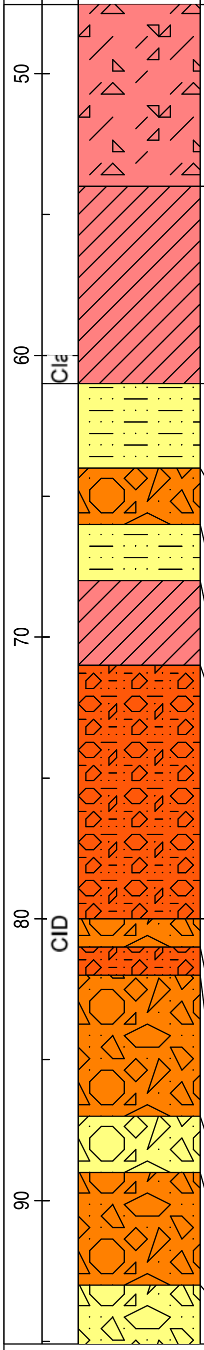
BOREHOLE:
DELTA OBS 2

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	101
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	41-101
DATE DRILLED	27-29 AUG 2011	**EASTING**	551237.26	**ELEVATION (mAHD)**	543.24
LOGGED BY	S BEAR	**NORTHING**	7552861.77	**WATER LEVEL (mBGL)**	40.61

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.44
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	30.4	**pH**	8.25

Depth (m) | **Geological Unit** | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



Lithology

CLAY: red brown, minor pisoliths, medium, stiff
From 60m yellow brown with pisoliths, stiff, minor gravels >50mm diameter, consolidated in places

SANDY CLAY: yellow brown, cemented in zones, vuggy, weathered
From 63m fine to coarse grained, yellow brown consolidated in places, clay matrix 5-10%

SANDY GRAVEL: dark brown grey, porous, vuggy cemented fragments, vitreous goethite and hematite, fine grained

CLAYEY SAND: yellow brown, coarse grained, cemented zones, vuggy

CLAY: grey with yellow mottling, becoming stiff at 68m with pisoliths 5-10mm diameter, yellow brown

CLAYEY GRAVEL: yellow brown, fine grained with clay lenses between 74 and 75m, consolidated fragments at 75m with ooids and peloids
Dark yellow brown clayey sand, coarse grained, with consolidated fragments
Increased clay content between 78 and 79m

SANDY GRAVEL: dark red brown, some clay, consolidated fragments with fibrous woody pieces, ooids, hematite rich

CLAYEY GRAVEL: brown white, gravels up to 10mm diameter

SANDY GRAVEL: grey red brown, fine to coarse grained, 2-10mm consolidated fragments
From 86m light red brown, fine grained 1-3mm clay 5%

GRAVELLY SAND: dark red brown, coarse grained, clay 5%

SANDY GRAVEL: yellow brown, fine to medium grained, minor clay 5%
From 91m red brown, fine grained 1-3mm

GRAVELLY SAND: dark brown, consolidated zones, ooids, coarse grained, clay 5%

Field Notes

tried airlift at 48m - no yield | 8.33min/m

tried airlift at 54m - no yield | 2.5min/m

0.46mS | 0.22ppt | pH8.09 | 28.7°C | 2.5min/m | 1L/s

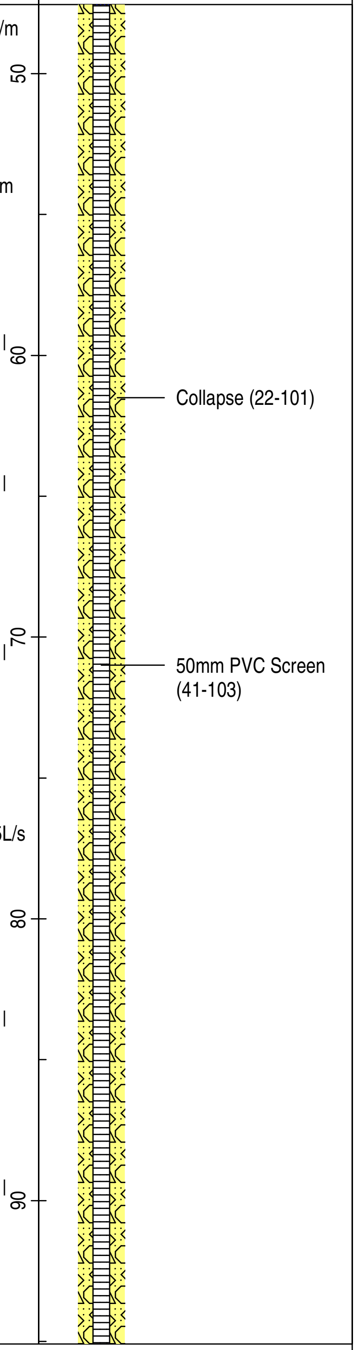
0.45mS | 0.22ppt | pH8.07 | 30.6°C | 9.0min/m | 2.5L/s

0.46mS | 0.23ppt | pH8.43 | 30.4°C | 3.33min/m | 4L/s

0.46mS | 0.23ppt | pH8.36 | 30.3°C | 5L/s

0.46mS | 0.23ppt | pH8.24 | 30.2°C | 5.77min/m | 5L/s

0.43mS | 0.23ppt | pH8.22 | 31.4°C | 4.17min/m | 6.7L/s



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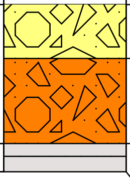
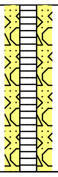
BOREHOLE:
DELTA OBS 2

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	101
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	41-101
DATE DRILLED	27-29 AUG 2011	**EASTING**	551237.26	**ELEVATION (mAHD)**	543.24
LOGGED BY	S BEAR	**NORTHING**	7552861.77	**WATER LEVEL (mBGL)**	40.61

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.44
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	30.4	**pH**	8.25

Depth (m)	Geological Unit	**Graphic Log**	**Lithology**	**Field Notes**	**Bore Construction**
				0.45mS | 0.22ppt | pH8.29 | 30.6°C | 2.5min/m | 6.7L/s	
			SANDY GRAVEL: yellow brown, fine grained 2-5mm, some larger fragments >10mm From 99m dark red brown, clay 5-10%, fine grained		
100	BIF		BIF: fresh, angular	100 0.47mS | 0.23ppt | pH8.35 | 30.2°C | 2min/m | 6.7L/s	Collapse (101-103)

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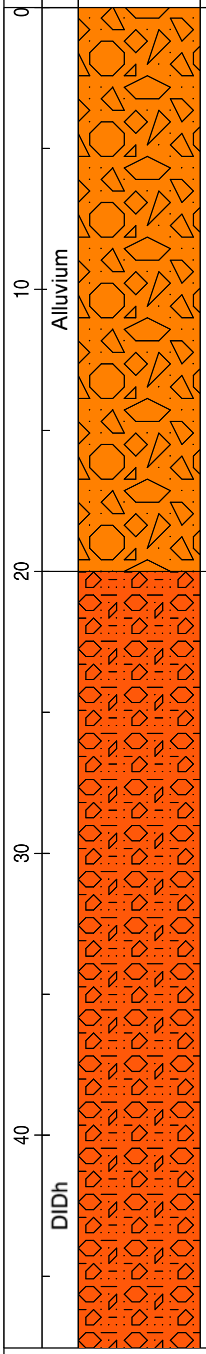
BOREHOLE:

DELTA-OBS-1

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	95
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	44-95
DATE DRILLED	25-27 AUG 2011	**EASTING**	550922.65	**ELEVATION (mAHD)**	548.40
LOGGED BY	S BEAR	**NORTHING**	7552536.89	**WATER LEVEL (mBGL)**	45.27

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	5	**Salinity (mS/cm)**	0.41
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	29.6	**pH**	7.91

Depth (m)	Geological Unit	**Graphic Log**	**Lithology**	**Field Notes**	**Bore Construction**



SANDY GRAVEL: dark red, with gravels of shale, chert and BIF up to 100mm diameter, increasing clay content with depth.

CLAYEY GRAVEL: dark red brown (30% clay), gravels of shale, chert and BIF up to 10mm diameter, subangular to subrounded, pisoliths 2mm diameter

From 29-31m, gravels coarse >20mm diameter

Predominantly pisoliths in clay matrix (30-40% clay)

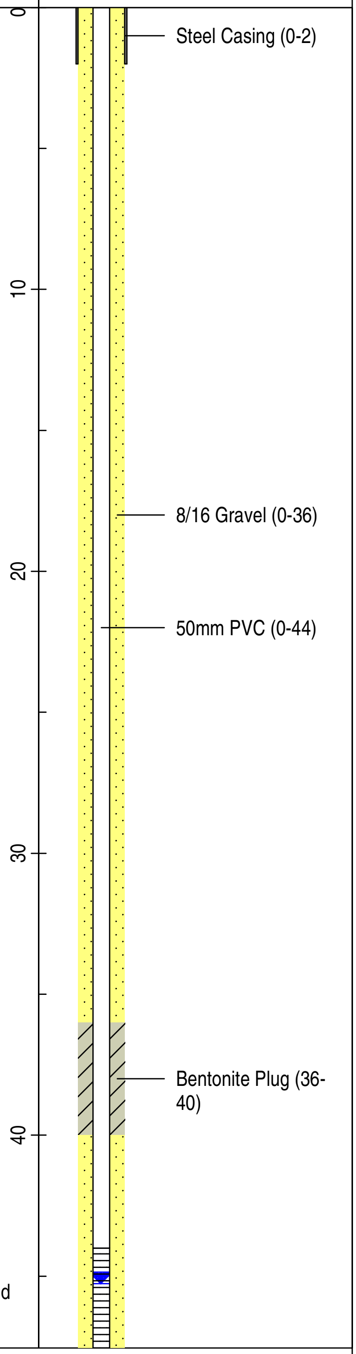
Gravels becoming coarse >20mm diameter, with less clay (15-20%) from 36m

Gravels coarse from 41m >30mm diameter, increasing clay content with depth

Foam added at 16m

6.67min/m

Hammer blocked at 46m cleaned and continued with air core | 3.33min/m

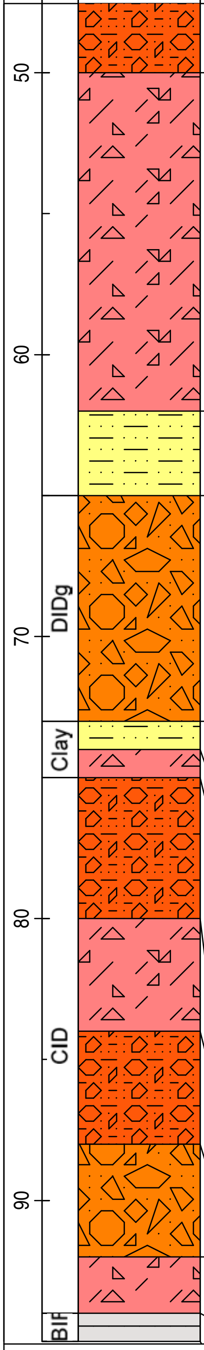


BOREHOLE:
DELTA-OBS-1

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	95
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	44-95
DATE DRILLED	25-27 AUG 2011	**EASTING**	550922.65	**ELEVATION (mAHD)**	548.40
LOGGED BY	S BEAR	**NORTHING**	7552536.89	**WATER LEVEL (mBGL)**	45.27

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	5	**Salinity (mS/cm)**	0.41
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	29.6	**pH**	7.91

Depth (m) | **Geological Unit** | **Graphic Log**



Lithology

GRAVELLY CLAY: red brown, predomintly pisoliths 2-5 mm diameter, 40% gravel, 60% clay

20% gravels/pisoliths, 80% clay at 54m

Clasts of yellow brown clay at 58m

Cemented pisoliths within deposit between 59-62m.

CLAYEY SAND: dark grey brown, contains cemented pisoliths

SANDY GRAVEL: dark grey brown, containing vitreous goethite fragments >60mm, some vuggy/brecciated, gravel is predominantly fine grained.

SANDY CLAY: yellow brown, goethite rich, gneiss of cemented clay and vitreous goethite.

GRAVELLY CLAY: yellow brown, goethite rich

CLAYEY GRAVEL: yellow brown, clay 20-30%

becoming a gravelly clay at 77-78m with cemented clay nodules

sandy gravel at 78-79m

red clayey gravel at 79-80m

GRAVELLY CLAY: red yellow brown, with partially cemented nodules of clay up to 60mm diameter.

CLAYEY GRAVEL: red brown, 20% clay, containing cemented clay and cemented ooids, peloids and fossilised wood.
Increasing clay at 85-86m to 50%

SANDY GRAVEL: brown, fine to coarse grained, contains cemented ooids and peloids/fossilised wood.

GRAVELLY CLAY: yellow brown, 10% gravel, gravels of chert and BIF.

BIF: fresh, angular

Field Notes

tried airlift at 54m - not enough water/yield

0.42mS | 0.21ppt | pH7.86 | 30.6°C | 1.4L/s

0.42mS | 0.21ppt | pH8.04 | 31.1°C | 2L/s

0.42mS | 0.21ppt | pH7.95 | 30.3°C | 2.86L/s

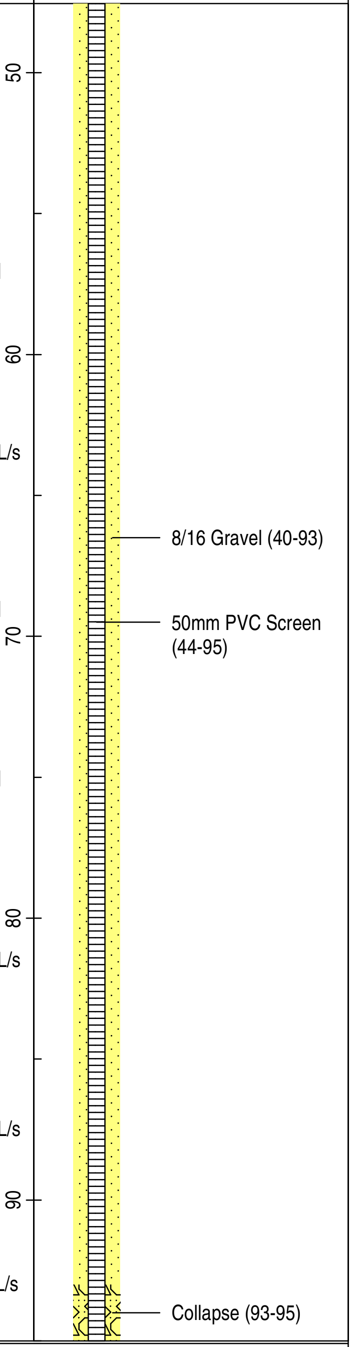
0.42mS | 0.21ppt | pH8.04 | 30.7°C | 3.3L/s

0.44mS | 0.21ppt | pH8.80 | 30.8°C | 4L/s

0.41mS | 0.21ppt | pH8.10 | 30.8°C | 5L/s

0.42mS | 0.21ppt | pH8.09 | 30.7°C |4L/s

Bore Construction



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Perth WA 6000
ABN 61001 279 812

BOREHOLE:
DELTA-OBS-1

CLIENT	FMS	**LOCATION**	DELTA	**TOTAL DEPTH (m)**	95
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	44-95
DATE DRILLED	25-27 AUG 2011	**EASTING**	550922.65	**ELEVATION (mAHD)**	548.40
LOGGED BY	S BEAR	**NORTHING**	7552536.89	**WATER LEVEL (mBGL)**	45.27

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	5	**Salinity (mS/cm)**	0.41
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (℃)**	29.6	**pH**	7.91

Depth (m)	Geological Unit	**Graphic Log**	**Lithology**	**Field Notes**	**Bore Construction**

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Perth WA 6000
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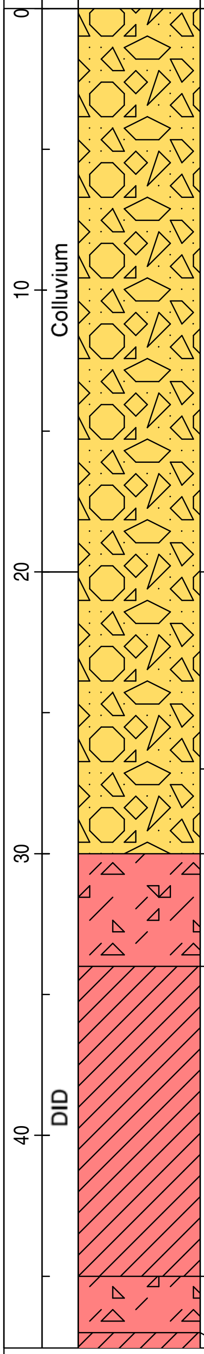
BOREHOLE:
CHAMP-PROD-01

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	110
PROJECT	PIOP	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	59.19-99.9
DATE DRILLED	12-18 NOV 2011	**EASTING**	546976.97	**ELEVATION (mAHD)**	548.51
LOGGED BY	R BAIRD	**NORTHING**	7556127.72	**WATER LEVEL (mBGL)**	33.63

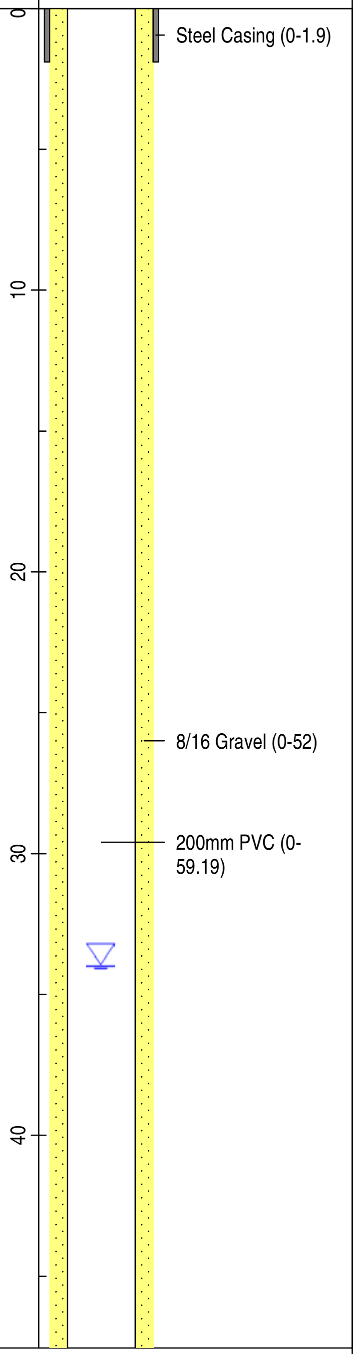
Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	22.5	**Salinity (mS/cm)**	0.31
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	30.0	**pH**	9.35

Depth (m) | **Geological Unit** | **Graphic Log**



Lithology	**Field Notes**
SILTY GRAVEL: red brown, gravels of BIF, chert and shale 30mm diameter, silt 10%, minor clay	
SILTY GRAVEL: red brown, gravels of BIF, pisoliths, metallic lustre, 20mm fragments, silt 5%, minor clay	
SILTY GRAVEL: red brown, increased percentage of BIF fragments and pisoliths	2.5min/m
GRAVELLY CLAY: as above, clay increasing	
CLAY: red, medium to high plasticity, sticky, minor lenses of BIF and chert gravels	3.33min/m
GRAVELLY CLAY: red brown, medium to high plasticity, gravel of BIF & chert up to 30%	5min/m

Bore Construction



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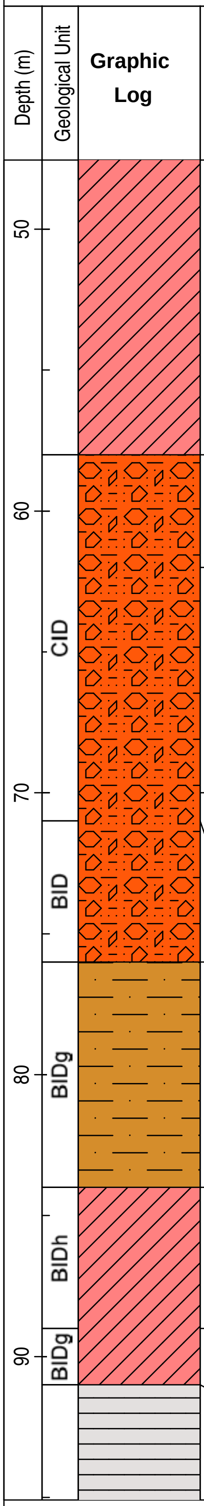
BOREHOLE:
CHAMP-PROD-01

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	110
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	59.19-99.9
DATE DRILLED	12-18 NOV 2011	**EASTING**	546976.97	**ELEVATION (mAHD)**	548.51
LOGGED BY	R BAIRD	**NORTHING**	7556127.72	**WATER LEVEL (mBGL)**	33.63

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	22.5	**Salinity (mS/cm)**	0.31
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	30.0	**pH**	9.35



Lithology

Clay: red, medium to high plasticity, sticky, minor lenses of BIF and chert gravels

CLAYEY GRAVEL: red brown yellow, gravels of BIF with abundant pisoliths, gravels up to 10mm diameter, poorly sorted, minor cementation

CLAYEY GRAVEL: yellow light grey, gravels of BIF & chert up to 10mm diameter, low plasticity clay

CLAYEY GRAVEL: increase in ooids and peloids in structure

CLAYEY GRAVEL: yellow brown red, goethite and hematite weathering, crystalline BIF, minor vugs & cavities, no ooids or peloids in structure therefore interpreted as BID

BID: banded iron formation altered to goethite ore, alternating layers of BIF and yellow claywith shale and chert, vuggy, porous

CLAY: red, hematite rich, weakly to moderately banded BIF and alternating hematite bands

CLAY: red, hematite rich, weakly to moderately banded BIF and alternating goethite bands

BIF: light grey, weathered, chert, shale with thin bands of light grey to grey clay

Field Notes

5min/m

5min/m

5.83min/m

Centralisers on screens 1, 3, 5, 7; 1m from top of screen

5.83min/m

4.17min/m

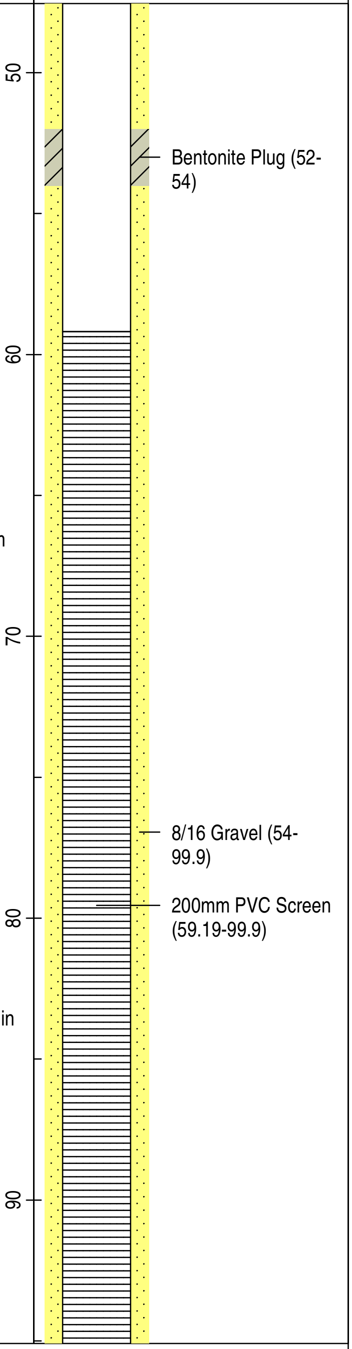
4.17min/m

Very hard at 84m; BIF sampling ~30min delay

11.67min/m

7.5min/m

Bore Construction



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SHEET:2 OF 3

Job Number 201012-00322

WorleyParsons
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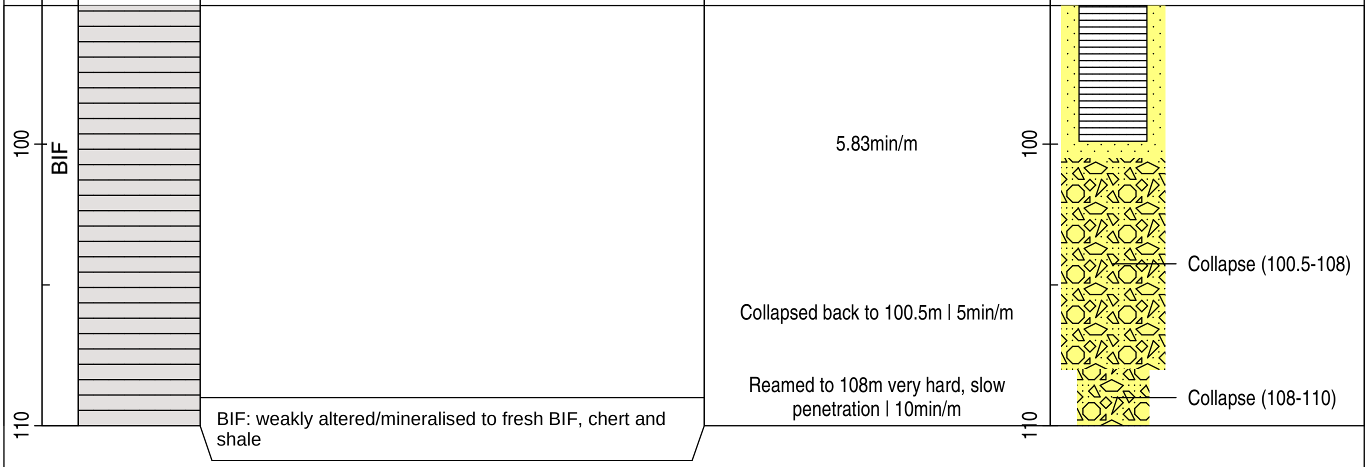
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
CHAMP-PROD-01

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	110
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	59.19-99.9
DATE DRILLED	12-18 NOV 2011	**EASTING**	546976.97	**ELEVATION (mAHD)**	548.51
LOGGED BY	R BAIRD	**NORTHING**	7556127.72	**WATER LEVEL (mBGL)**	33.63

Contractor	AUSTRAL	**Drill Bit**	12.25" Tricone	**Airlift (L/s)**	22.5	**Salinity (mS/cm)**	0.31
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	30.0	**pH**	9.35

Depth (m)	Geological Unit	**Graphic Log**	**Lithology**	**Field Notes**	**Bore Construction**



BIF: weakly altered/mineralised to fresh BIF, chert and shale

5.83min/m

Collapsed back to 100.5m | 5min/m

Reamed to 108m very hard, slow penetration | 10min/m

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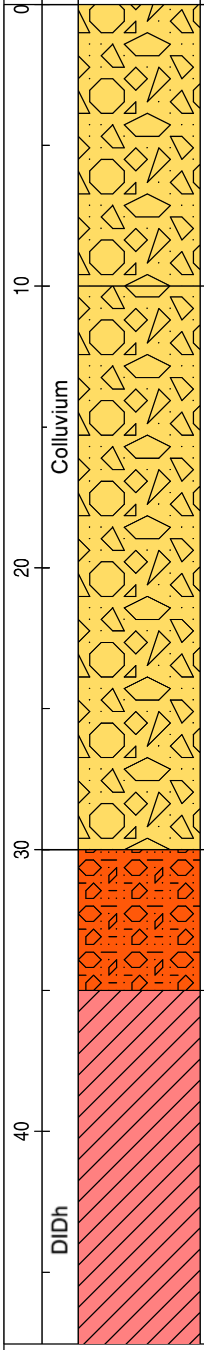
BOREHOLE:
CHAMP-OBS-4-NESTED

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	106
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	18-20 OCT 2011	**EASTING**	546969.66	**ELEVATION (mAHD)**	548.31
LOGGED BY	S BEAR	**NORTHING**	7556139.73	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5" Tricone	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



Lithology

SILTY GRAVEL: red brown, gravels of BIF, shale and chert, some quartz, angular, subrounded

SILTY GRAVEL: red brown, minor rounded hematite gravels at 10m, ooids becoming more predominant with depth

CLAYEY GRAVEL: red brown, gravels of BIF, shale and chert, increasing clay content up to 20%

CLAY: red brown with ooids up to 1mm

Field Notes

Bore A: Screened 59.69, WL 33.98 mAHD, 0.27 mS/cm,148 mg/L, 30.1 oC

Bore B: Screened 73-80, WL 33.98 mAHD, 0.34 mS/cm, 186 mg/L, 30.4 oC

Bore C: Screened 91-100, WL 33.98 mAHD, 0.48 mS/cm, 365 mg/L, 30.9 oC

2min/m

2.33min/m

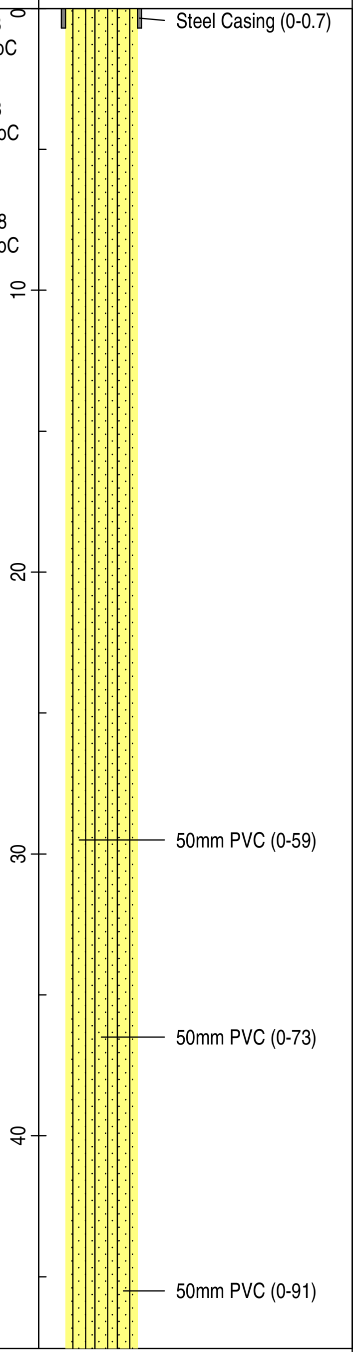
2.83min/m

2.5min/m

2.3min/m

3.67min/m

Bore Construction



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SHEET:1 OF 3

Job Number 201012-00322

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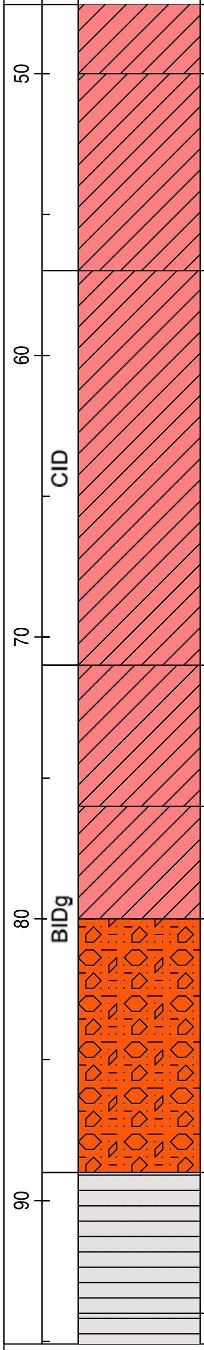
BOREHOLE:
CHAMP-OBS-4-NESTED

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	106
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	18-20 OCT 2011	**EASTING**	546969.66	**ELEVATION (mAHD)**	548.31
LOGGED BY	S BEAR	**NORTHING**	7556139.73	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5" Tricone	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (°C)**	see field notes	**pH**	see field notes

Depth (m) | Geological Unit | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



Lithology

CLAY: red brown

CLAY: yellow, cemented ooids with minor goethitic clay

CLAY: yellow, with vitrious goethite, BID, minor vugs and cavities

CLAY: yellow brown with minor gravels of BIF and shale

CLAYEY GRAVEL: yellow brown, weathered BIDg, 10-20% goethitic clay in matrix, hematite & vitrious goethite, banding visible

BIF: weathered BIF, increasing silica, some white clay present within BIF, shale and chert

BIF: weathered BIF, increasing silica, some white clay

Field Notes

2.83min/m

10.0min/m

7.33min/m

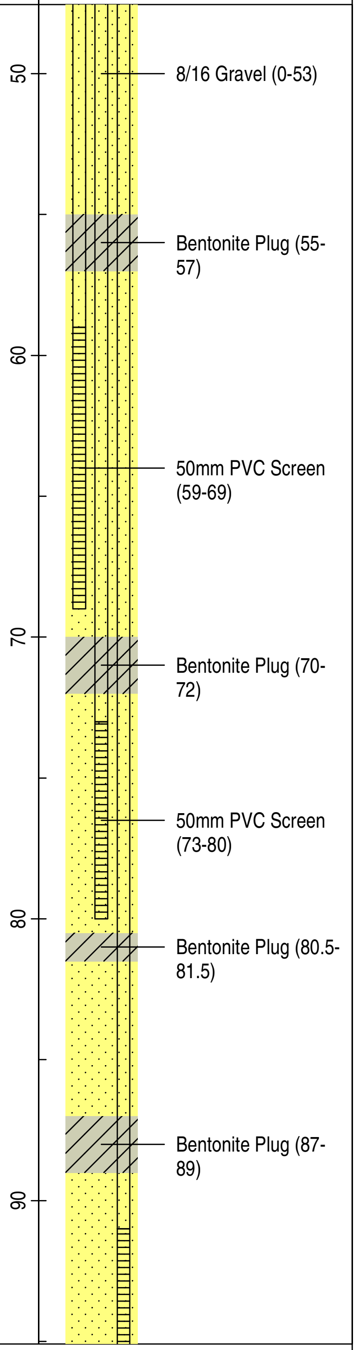
6.67min/m

4.67min/m

2.33min/m

9.67min/m

8.5min/m



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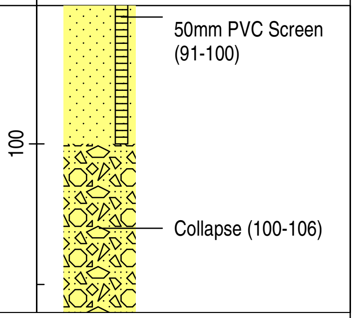
BOREHOLE:

CHAMP-OBS-4-NESTED

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	106
PROJECT	PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	see field notes
DATE DRILLED	18-20 OCT 2011	**EASTING**	546969.66	**ELEVATION (mAHD)**	548.31
LOGGED BY	S BEAR	**NORTHING**	7556139.73	**WATER LEVEL (mBGL)**	see field notes

Contractor	AUSTRAL	**Drill Bit**	8.5" Tricone	**Airlift (L/s)**	see field notes	**Salinity (mS/cm)**	see field notes
Rig Type	SCHRAMM T64	**Drill Fluid**	Mud Rotary	**Temperature (℃)**	see field notes	**pH**	see field notes

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction
	BIF	▤	present within BIF, shale and chert, red/yellow brown clay 20%		
		▤	BIF: light grey, weathered BIF, clay 30%		
100		▤	BIF: light grey, weathered BIF, clay 20%		



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Job Number 201012-00322

WorleyParsons
resources & energy

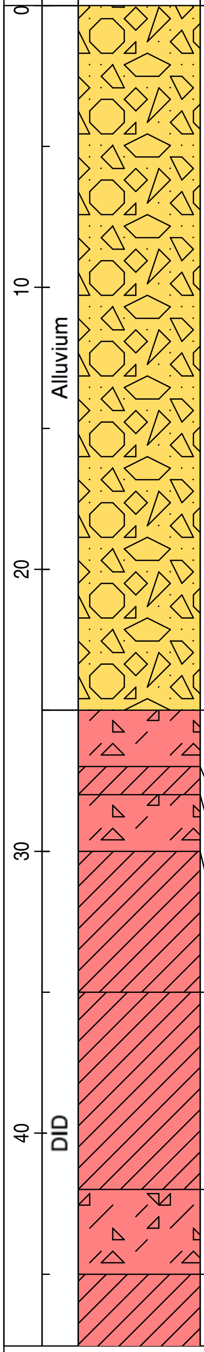
Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
CHAMP-OBS-3

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	84.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	56.5-84.5
DATE DRILLED	5 SEP 2011	**EASTING**	547145.74	**ELEVATION (mAHD)**	543.86
LOGGED BY	S BEAR	**NORTHING**	7556023.68	**WATER LEVEL (mBGL)**	28.95

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	5	**Salinity (mS/cm)**	0.30
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	29.3	**pH**	8.06

Depth (m) | Geological Unit | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



Lithology

SILTY GRAVEL: red brown, poorly sorted gravels of BIF and Chert, angular to subrounded, silt 20 - 30%, gravels becoming more rounded with depth
Dry and loose

GRAVELLY CLAY: dark red brown with gravels of BIF, subrounded to rounded, ooids and pisoliths, 50/50 gravels/clay, moist and cohesive

CLAY: dark red brown

GRAVELLY CLAY: red brown, pisoliths and ooids, gravels of BIF, subrounded to rounded, clay 80%

CLAY: dark red brown, cohesive, soft with pisoliths and gravels of BIF, subangular to subrounded

CLAY: dark red brown, rich in pisoliths, wet at 36m
less ooids at 38m with some gravels 10% of angular to subrounded BIF and Chert
ooids and pisoliths increasing at 40m, cohesive and moist

GRAVELLY CLAY: orange red brown, ooids, pisoliths, gravels of BIF, subangular to subrounded, dry, loose

CLAY: dark red brown, pisoliths, moist with minor gravels, cohesive
nodules of hard opaline silica clay at 48m green white

Field Notes

0

RC Hammer to 24m | 7.5min/m

10

1.5min/m

1.17min/m

20

1.67min/m

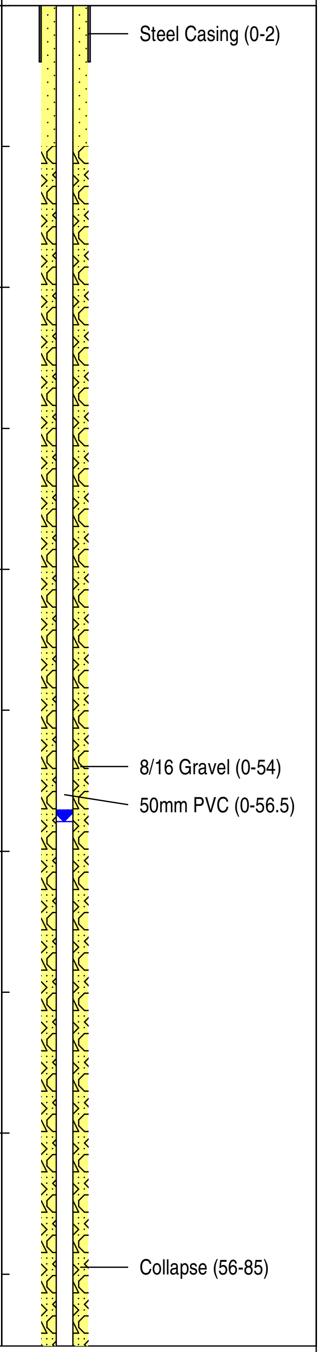
Moisture encountered, switch to Air Core | 1.67min/m

30

Wet | 0.83min/m

40

Moist | 0.66min/m | 0L/s



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SHEET:1 OF 2

Job Number 201012-00322

WorleyParsons
resources & energy

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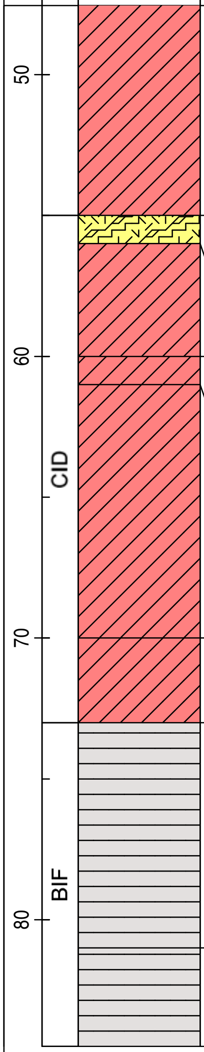
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
CHAMP-OBS-3

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	84.5
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	56.5-84.5
DATE DRILLED	5 SEP 2011	**EASTING**	547145.74	**ELEVATION (mAHD)**	543.86
LOGGED BY	S BEAR	**NORTHING**	7556023.68	**WATER LEVEL (mBGL)**	28.95

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	5	**Salinity (mS/cm)**	0.30
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	29.3	**pH**	8.06

Depth (m) | Geological Unit | **Graphic Log**



Lithology

hard nodules of red brown clay from 49m, >6mm diameter
nodules of hard yellow brown clay >15mm

GOETHITE MATRIX: yellow brown with cemented ooids in vitreous goethite matrix

CLAY: yellow brown, cemented with ooids & vitreous goethite in clay matrix

CLAY: white yellow, cemented hard with CID, intermixed 5%

CLAY: yellow brown, weathered/altered with some vugs/cavities but still containing cemented hard white clay
cemented ooids, hematite, goethitic clay at 64m yellow brown
vugs/cavities increasing with depth
very dense and hard, red brown/grey cemented ooids and woody fragments at 66m

CLAY: weathered shale chert, yellow brown with gravels becomes white yellow brown at 71m

BIF: red gravels
yellow brown from 74m
weathered BIF in clay matrix from 76m, white orange-brown.

BIF: grey brown, weathered

Field Notes

Dry to Moist at 45m | 1.67min/m | 0L/s

2.5min/m | 0L/s

Foam added at 54m | 8.33min/m

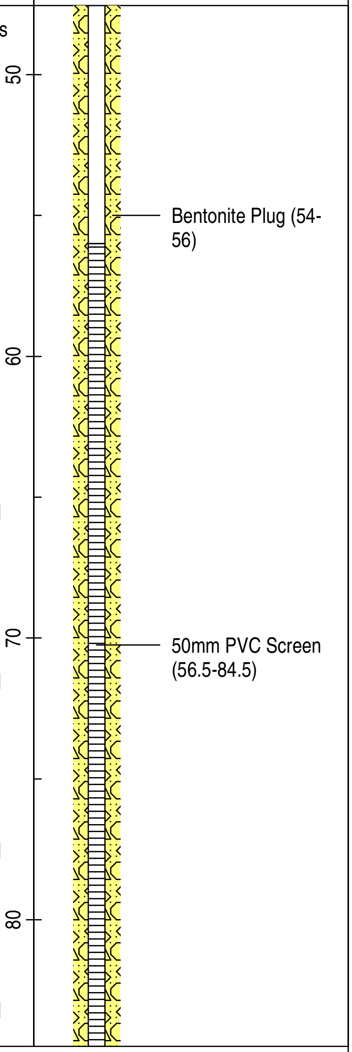
0.07mS | 0.14ppt | pH8.99 | 31.1°C | 21.67min/m | 0.06L/s

0.11mS | 0.22ppt | pH8.09 | 29.4°C | 3.33min/m | 0.9L/s

0.14mS | 0.28ppt | pH7.95 | 31.9°C | 1.00min/m | 5.0L/s

0.15mS | 0.24ppt | pH8.09 | 31.9°C | 3.33min/m | 4.0L/s

Bore Construction



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WorleyParsons
resources & energy

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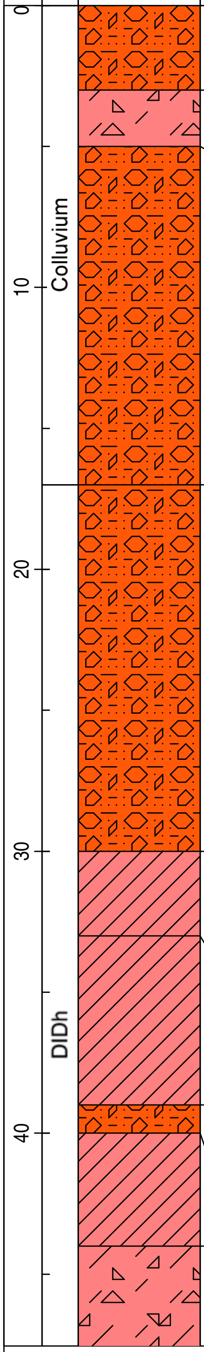
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
CHAMP-OBS-2

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	96
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	30-96
DATE DRILLED	3-5 SEP 2011	**EASTING**	546965.25	**ELEVATION (mAHD)**	548.05
LOGGED BY	S BEAR	**NORTHING**	7556117.32	**WATER LEVEL (mBGL)**	33.32

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.32
Rig Type	SCHRAMM T64	**Drill Fluid**	543.24	**Temperature (℃)**	29.0	**pH**	8.22

Depth (m) | Geological Unit | **Graphic Log** | **Lithology** | **Field Notes** | **Bore Construction**



CLAYEY GRAVEL: red brown, 30% clay, poorly sorted gravels of BIF, chert, quartz, shale, angular to subrounded, minor ooids and peloids

GRAVELLY CLAY: red brown, gravel up to 20mm diameter, angular to subrounded

CLAYEY GRAVEL: red brown, clay 20-30%, gravels of BIF and chert, angular to subrounded, poorly sorted, >30mm diameter, some rounded hematite

CLAYEY GRAVEL: red brown with ooids and pisoliths, gravels angular to subrounded, poorly sorted, colour changes to brown at 24m, clay 10-15%, piece of cemented DIDh at 29m

CLAY: red brown, some pisoliths, gravels approximately 20% >50mm diameter at 31m, and semi cemented friable clay gravels
becoming moist at 32m

CLAY: dark red brown, cohesive, ooid rich at 38m 1-2mm diameter, rounded gravels of hematite

CLAYEY GRAVEL: red borwn, ooids rich, 1-2mm diameter, well rounded and sorted, clay 20%

CLAY: dark red brown

GRAVELLY CLAY: red brown, 5mm diameter cemented gravels and clay
becoming more cemented between 49m and 50m
contains ooids and pisoliths

Air Core RC |4.17min/m

4.17min/m

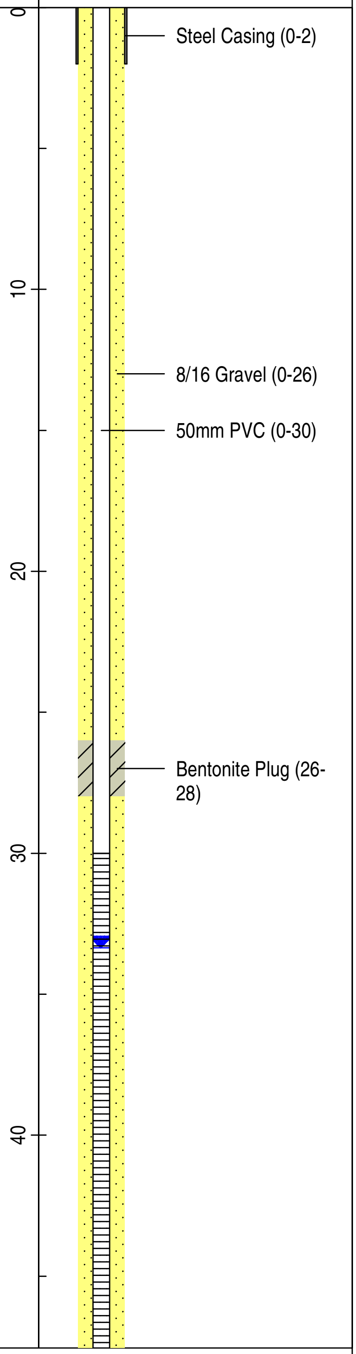
4.17min/m

5min/m

2.5min/m

Water added at 36m | 1.2min/m

Foam added at 41m | 1.83min/m



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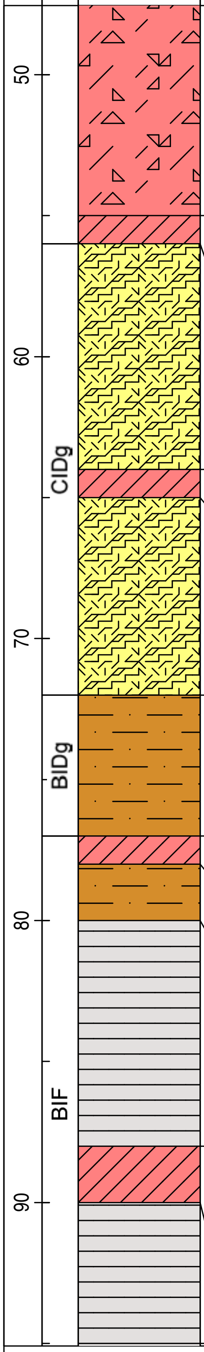
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
CHAMP-OBS-2

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	96
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	30-96
DATE DRILLED	3-5 SEP 2011	**EASTING**	546965.25	**ELEVATION (mAHD)**	548.05
LOGGED BY	S BEAR	**NORTHING**	7556117.32	**WATER LEVEL (mBGL)**	33.32

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.32
Rig Type	SCHRAMM T64	**Drill Fluid**	543.24	**Temperature (°C)**	29.0	**pH**	8.22

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



fragments of cemented CID

CLAY: red brown with hard cemented nodules of yellow brown green and grey clay

GOETHITE MATRIX: dark grey with red and yellow brown mottling, cemented ooids, rounded hematite in gothite matrix, very dense, hard and non porous, fine grained
minor vugs and pore spaces in fragments at 60m
becoming coarser grained at 62m, pisoliths >5mm and woody fragments with nodules of yellow brown clay

CLAY: white with yellow and red mottling, hard

GOETHITE MATRIX: cemented ooids, woody fragments and hematite in vitreous goethite matrix, vugs and cavities present, dark grey mottled yellow brown and red gravels of angular hematite in matrix at 71, basal conglomerate

BID: metallic grey with yellow brown goethite clay, vitreous goethite, hard with minor vugs and cavities, weathering
quartz in matrix at 74m
becoming more weathered at 76m

CLAY: yellow brown, minor BID gravels

BID: grey brown, weathered with abundant quartz, hematite, chert in yellow brown clayey sand matrix

BIF: grey, weathered with shale & chert

CLAY: reddish yellow brown, weathered shale, gravels of shale and chert
weathered BIF to clay with gravels, can see bedding in clay

BIF: grey, weathered with some clay in matrix ~10%

1.83min/m

0.16mS | 0.08ppt | pH8.04 | 30.2°C | 1min/m | 0.07L/s

Air core sample at 57m | 0.23mS | 0.11ppt | pH8.19 | 31.0°C | 21.67min/m | 0.9L/s

Air core sample at 64m | 0.23mS | 0.12ppt | pH8.22 | 29.5°C | 8.33min/m | 1.7L/s

Air core samples at 66m & 71m | 0.23mS | 0.11ppt | pH8.04 | 29.8°C | 6.67min/m | 1.7L/s

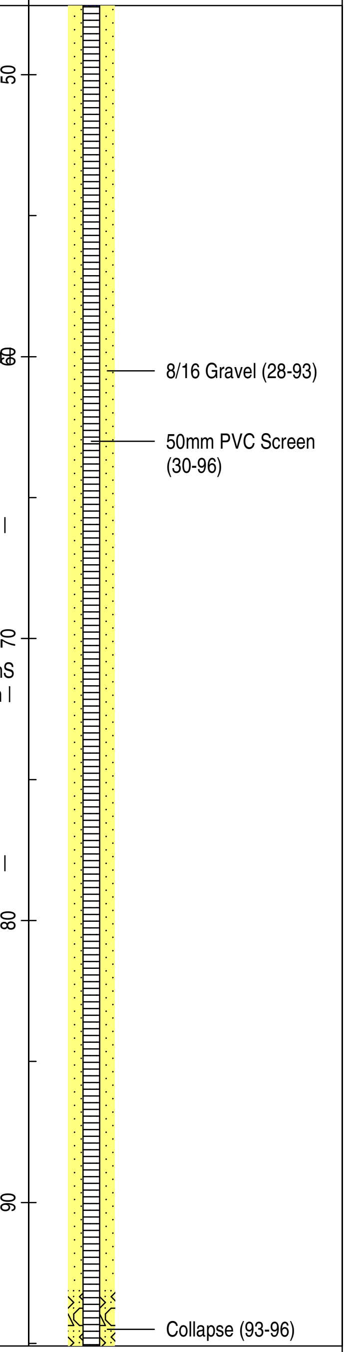
Air core sample at 72m | 0.32mS | 0.16ppt | pH8.07 | 29.6°C | 2.67min/m | 5.0L/s

0.30mS | 0.15ppt | pH8.11 | 29.2°C | 1min/m | 4.0L/s

0.44mS | 0.22ppt | pH8.09 | 21.4°C | 0.83min/m | 4.0L/s

1min/m

0.31mS | 0.15ppt | pH8.20 | 29.5°C |



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BOREHOLE:

CHAMP-OBS-2

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	96
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	30-96
DATE DRILLED	3-5 SEP 2011	**EASTING**	546965.25	**ELEVATION (mAHD)**	548.05
LOGGED BY	S BEAR	**NORTHING**	7556117.32	**WATER LEVEL (mBGL)**	33.32

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	7	**Salinity (mS/cm)**	0.32
Rig Type	SCHRAMM T64	**Drill Fluid**	543.24	**Temperature (℃)**	29.0	**pH**	8.22

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction
		▨	BIF: grey, bands of hematite and chert		

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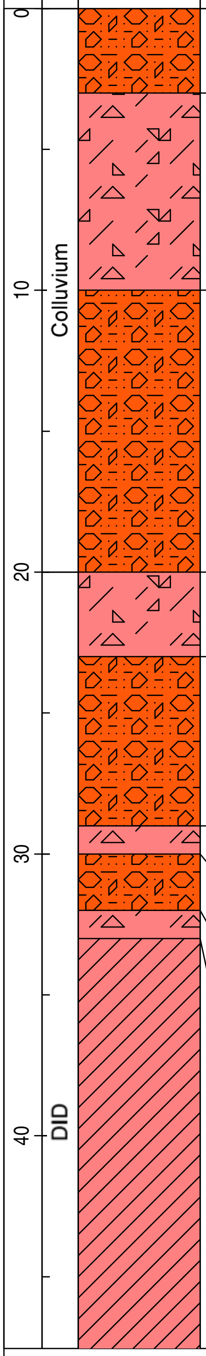
BOREHOLE:
CHAMP-OBS-1

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	90
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	30-90
DATE DRILLED	31 AUG - 02 SEP 2011	**EASTING**	546889.99	**ELEVATION (mAHD)**	551.65
LOGGED BY	S BEAR	**NORTHING**	7555876.47	**WATER LEVEL (mBGL)**	36.77

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	6	**Salinity (mS/cm)**	0.31
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	29.2	**pH**	8.55

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



CLAYEY GRAVEL: red brown, poorly sorted, angular to sub-rounded, BIF & chert, clay 20-30%

GRAVELLY CLAY: red brown, clay 70%

CLAYEY GRAVEL: red brown, poorly sorted, angular to sub-rounded, BIF & chert, clay 20%

GRAVELLY CLAY: red brown, ooids up to 2mm, poorly sorted BIF & chert

CLAYEY GRAVEL: red brown, ooids > 5mm, BIF & chert angular to sub-rounded >10mm, gravels > 60mm

GRAVELLY CLAY: red brown

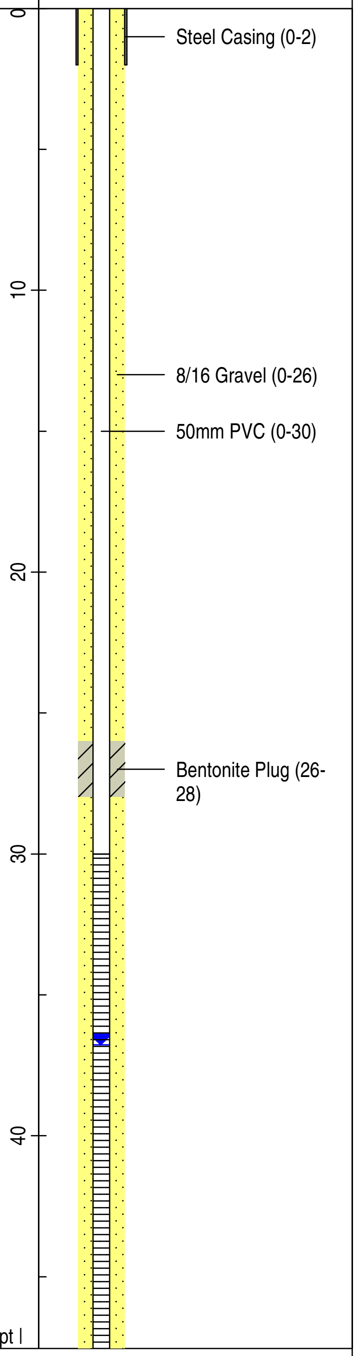
CLAYEY GRAVEL: dark red brown, ooids up to 2mm, gravels > 20mm, poorly sorted, dry and loose

GRAVELLY CLAY: dark red brown, 10% gravels, poorly sorted, sub angular to sub rounded, ooids 2-5mm

CLAY: red brown, moist, 5% gravels, cohesive at 35m with hard cemented clay >10mm, rounded, ooids 10% at 44m, 20% at 48m, and 40% at 50m

Moisture encountered

Water added at 42m | 0.15mS | 0.08ppt |



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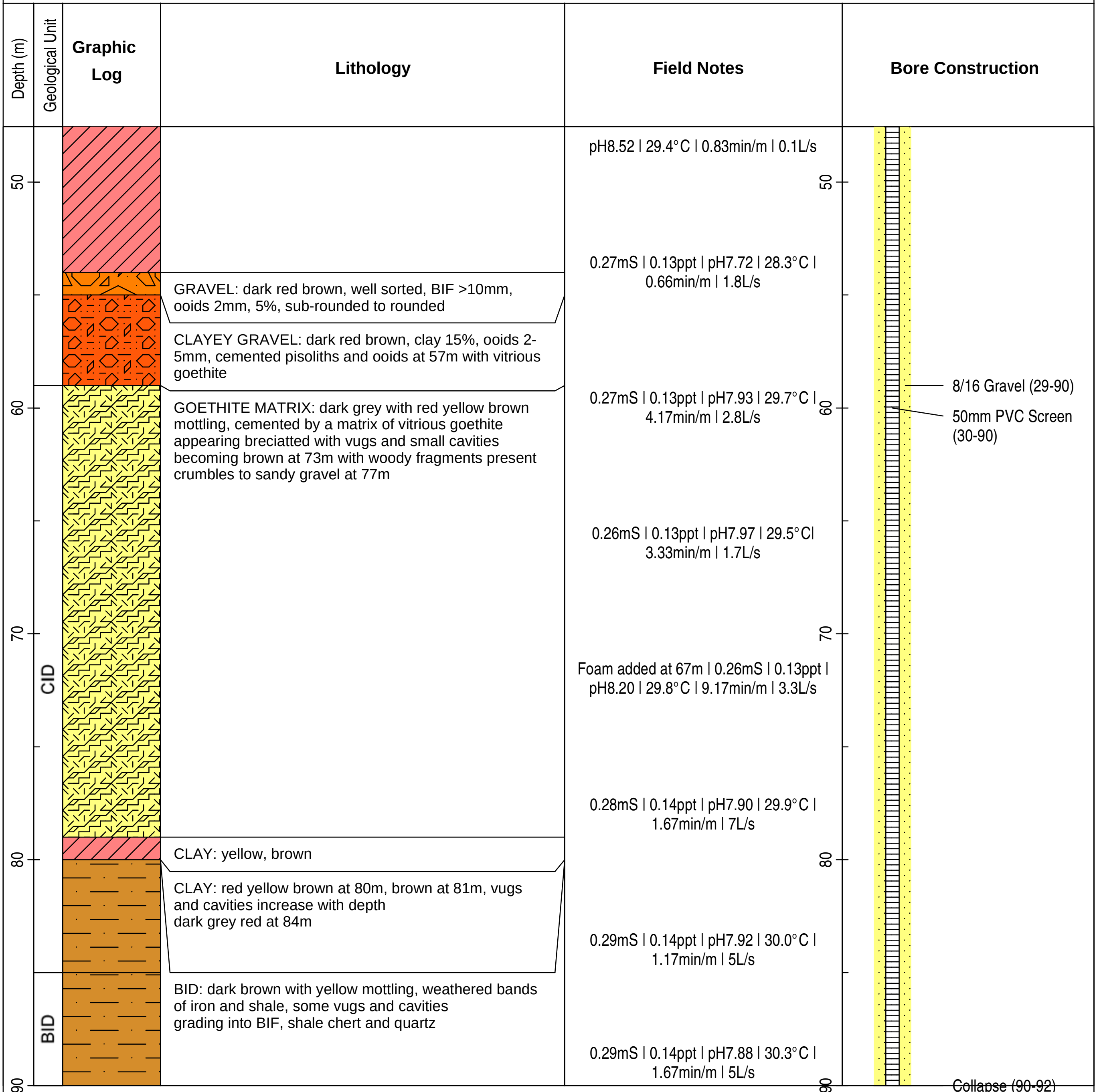
BOREHOLE:
CHAMP-OBS-1

CLIENT	FMS	**LOCATION**	CHAMPION	**TOTAL DEPTH (m)**	90
PROJECT	FLINDERS PI0P	**PROJECTION**	GDA94 MGA Zone 50	**SCREEN (mBGL)**	30-90
DATE DRILLED	31 AUG - 02 SEP 2011	**EASTING**	546889.99	**ELEVATION (mAHD)**	551.65
LOGGED BY	S BEAR	**NORTHING**	7555876.47	**WATER LEVEL (mBGL)**	36.77

Contractor	AUSTRAL	**Drill Bit**	5.5"	**Airlift (L/s)**	6	**Salinity (mS/cm)**	0.31
Rig Type	SCHRAMM T64	**Drill Fluid**	AirCore/RC Hammer	**Temperature (°C)**	29.2	**pH**	8.55



Lithology

GRAVEL: dark red brown, well sorted, BIF >10mm, ooids 2mm, 5%, sub-rounded to rounded

CLAYEY GRAVEL: dark red brown, clay 15%, ooids 2-5mm, cemented pisoliths and ooids at 57m with vitrious goethite

GOETHITE MATRIX: dark grey with red yellow brown mottling, cemented by a matrix of vitrious goethite appearing breciatted with vugs and small cavities becoming brown at 73m with woody fragments present crumbles to sandy gravel at 77m

CLAY: yellow, brown

CLAY: red yellow brown at 80m, brown at 81m, vugs and cavities increase with depth
dark grey red at 84m

BID: dark brown with yellow mottling, weathered bands of iron and shale, some vugs and cavities
grading into BIF, shale chert and quartz

Field Notes

pH8.52 | 29.4°C | 0.83min/m | 0.1L/s

0.27mS | 0.13ppt | pH7.72 | 28.3°C | 0.66min/m | 1.8L/s

0.27mS | 0.13ppt | pH7.93 | 29.7°C | 4.17min/m | 2.8L/s

0.26mS | 0.13ppt | pH7.97 | 29.5°C| 3.33min/m | 1.7L/s

Foam added at 67m | 0.26mS | 0.13ppt | pH8.20 | 29.8°C | 9.17min/m | 3.3L/s

0.28mS | 0.14ppt | pH7.90 | 29.9°C | 1.67min/m | 7L/s

0.29mS | 0.14ppt | pH7.92 | 30.0°C | 1.17min/m | 5L/s

0.29mS | 0.14ppt | pH7.88 | 30.3°C | 1.67min/m | 5L/s

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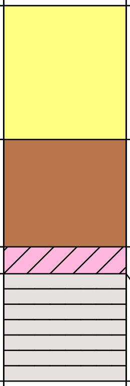
BOREHOLE:
HPRC5359

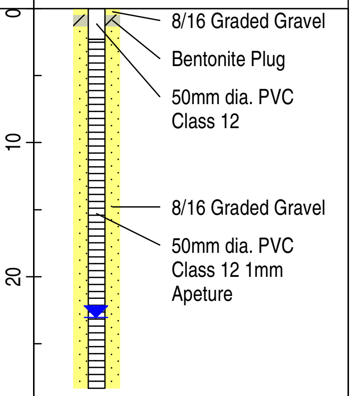
CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	28.3
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.30-28.30
DATE DRILLED	29OCT2011	**EASTING**	552705.171	**ELEVATION (mAHD)**	580.805
LOGGED BY		**NORTHING**	7551089.499	**WATER LEVEL (mBGL)**	23.03

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**		**Salinity (mS/cm)**
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes
0	ALL		ALL: Recent Alluvium	""
10	BIDg		BIDg: Bedded Iron Deposit - goethite dominant	
20	CL		CLY: Clay	
	BIF		BIF: Banded Iron Formation	
30				
40				
50				
60				
70				
80				
90				
100				



Bore Construction



SHEET:1 OF 1

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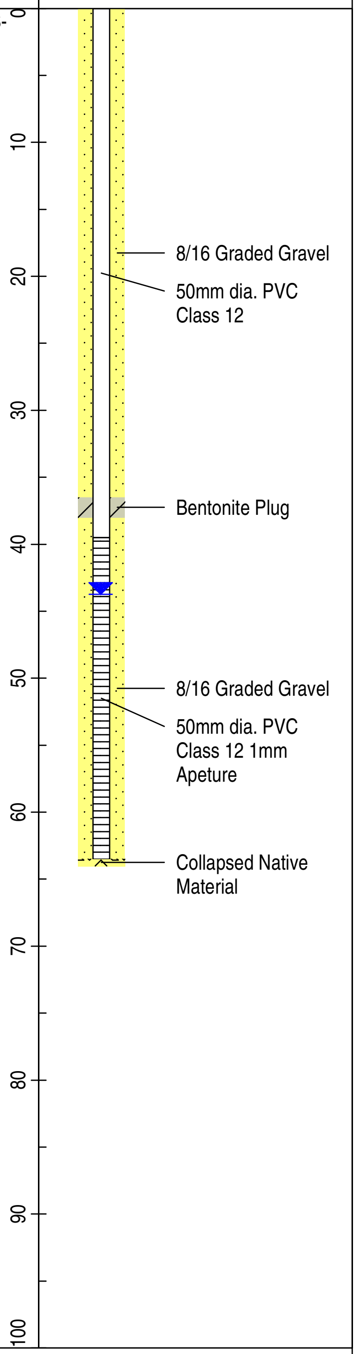
BOREHOLE:
HPRC5275

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	64
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	39.50-63.50
DATE DRILLED	30OCT2011	**EASTING**	551040.25	**ELEVATION (mAHD)**	546.289
LOGGED BY		**NORTHING**	7552890.839	**WATER LEVEL (mBGL)**	43.74

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.003	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes
0	ALL	🟨	ALL: Recent Alluvium	"Development Duration 10min; TDS-255ppm"
10	DIDh	🟧	DIDh: Detrital Iron Deposit - hematite dominant	
20				
30				
40	BIDh	🟫	BIDh: Bedded Iron Deposit - goethite with hematite	
50				
60	BIF	▤	BIF: Banded Iron Formation	
70				
80				
90				
100				

Bore Construction



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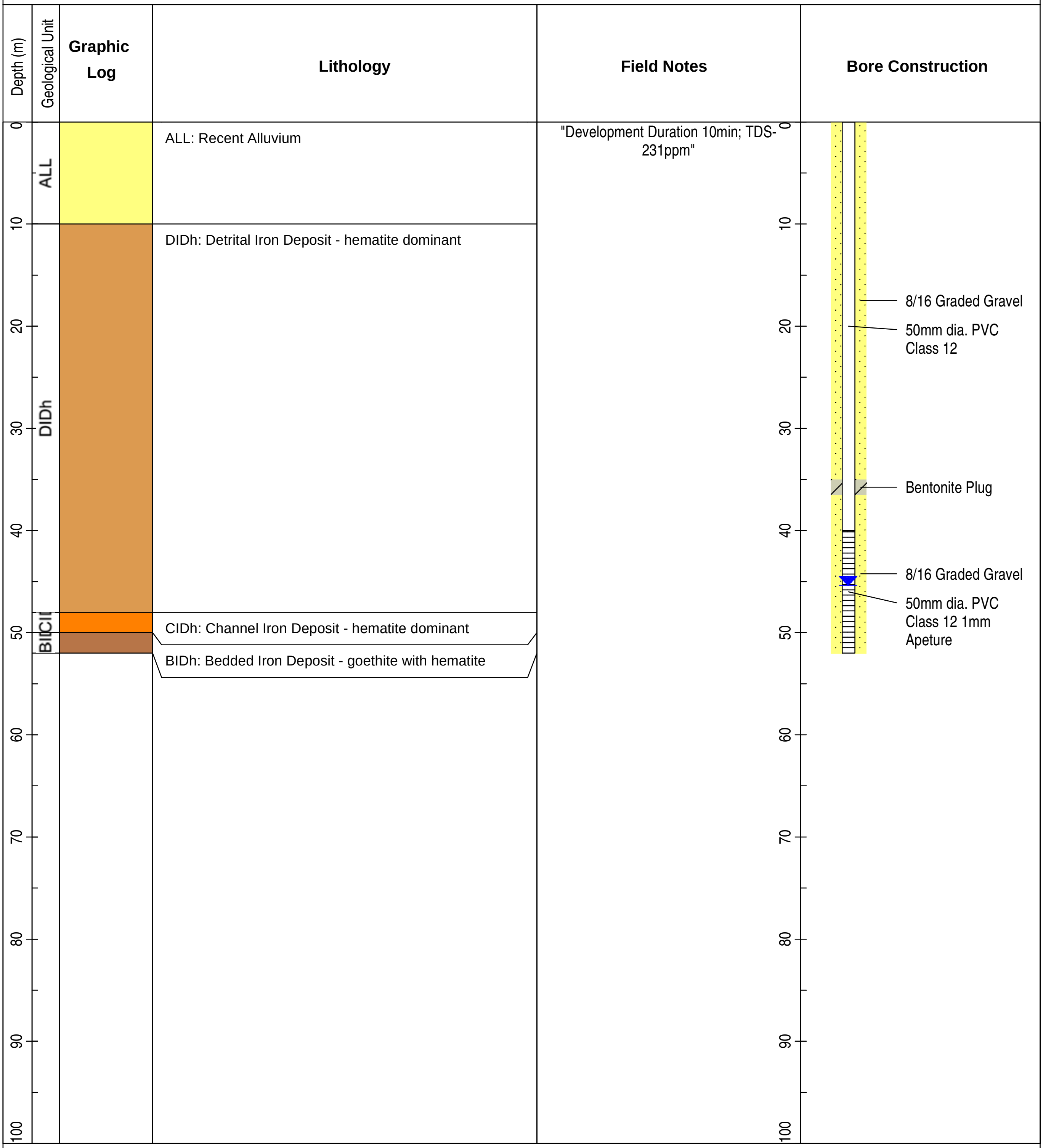
BOREHOLE:
HPRC5210

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	52
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	40.00-52.00
DATE DRILLED	30OCT2011	**EASTING**	551257.286	**ELEVATION (mAHD)**	549.785
LOGGED BY		**NORTHING**	7552281.918	**WATER LEVEL (mBGL)**	45.37

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.01	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



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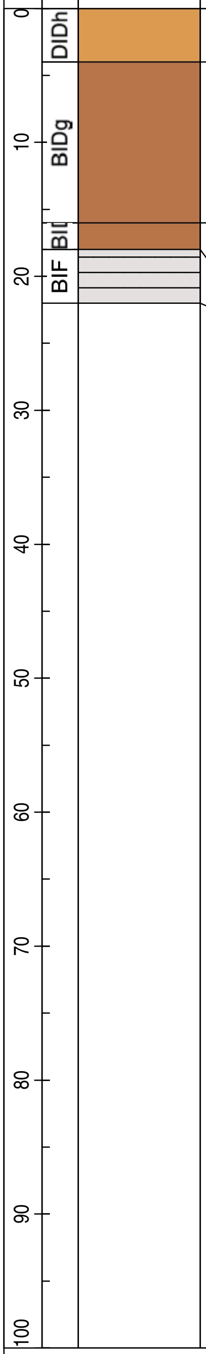
ABN 61001 279 812

BOREHOLE:
HPRC5034

CLIENT	FMS	**LOCATION**	DELTA	**DRILLED DEPTH (m)**	22
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	2.00-21.50
DATE DRILLED	31OCT2011	**EASTING**	551307.608	**ELEVATION (mAHD)**	576.863
LOGGED BY		**NORTHING**	7550982.172	**WATER LEVEL (mBGL)**	18.68

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	

Depth (m)	Geological Unit	Graphic Log	Lithology	Field Notes	Bore Construction



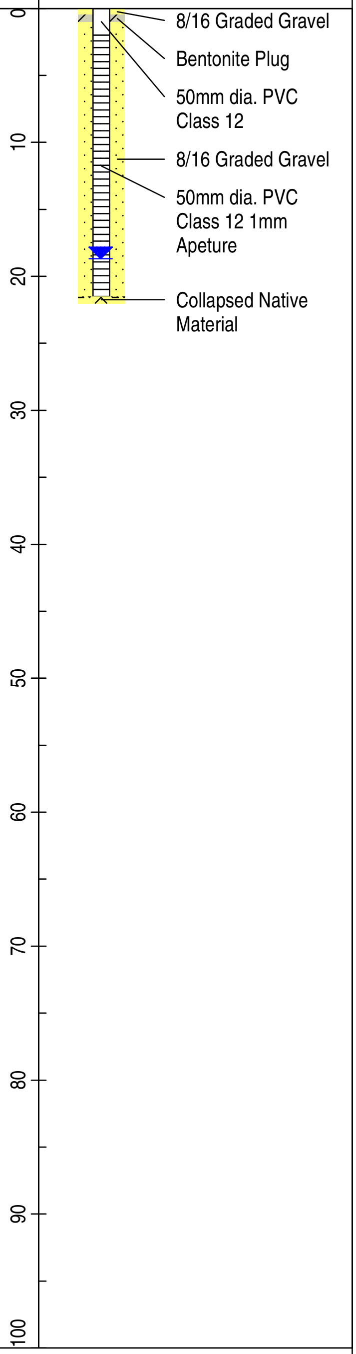
DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

BIDh: Bedded Iron Deposit - goethite with hematite

BIF: Banded Iron Formation

"Not enough water to airlift"



SHEET:1 OF 1

Job Number 201012-00322

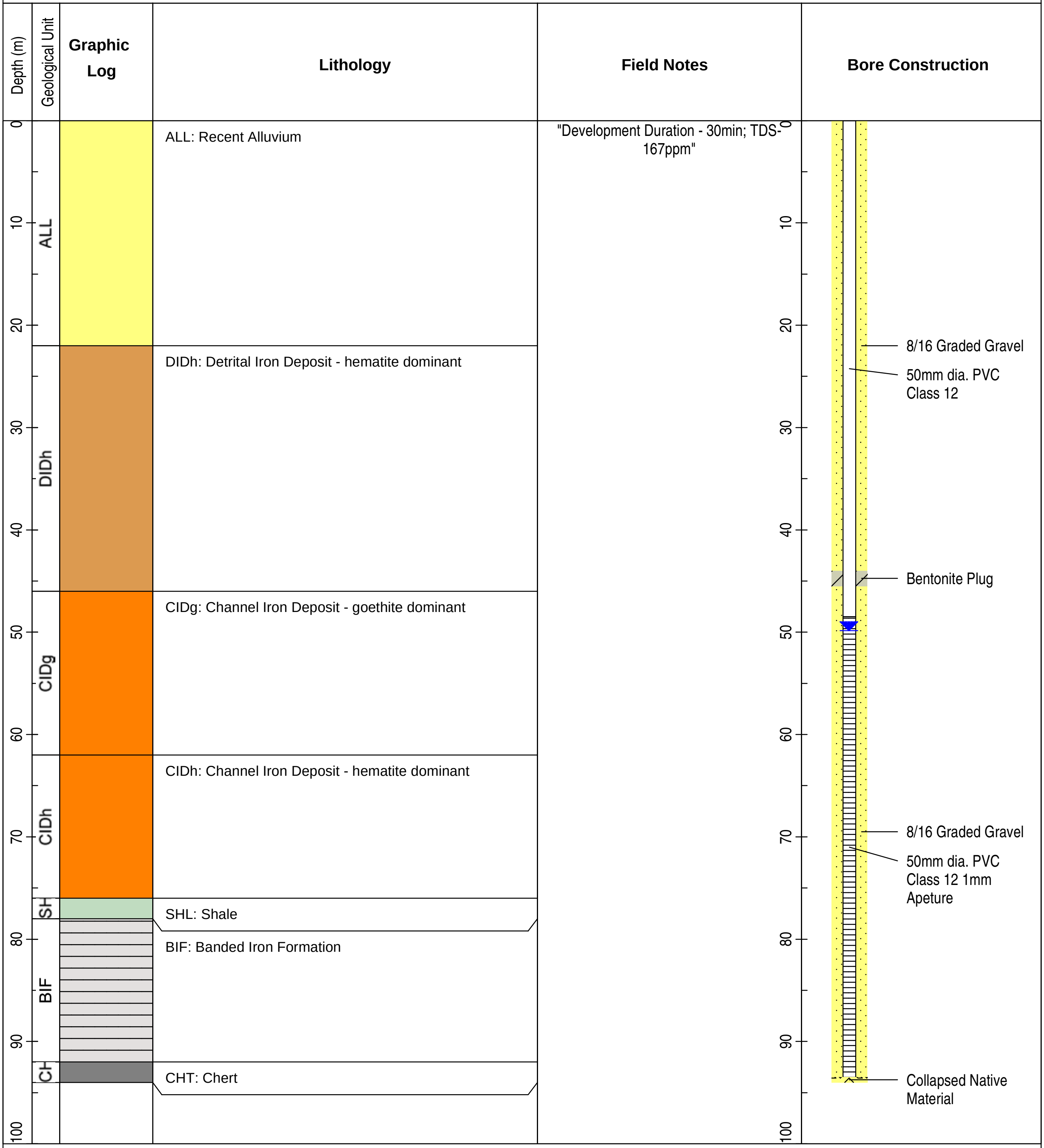
WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC4257

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	94
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	48.50-93.50
DATE DRILLED	27SEP2011	**EASTING**	550653.6	**ELEVATION (mAHD)**	591.405
LOGGED BY		**NORTHING**	7546813.049	**WATER LEVEL (mBGL)**	49.85

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	0.2	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



SHEET:1 OF 1

Job Number 201012-00322

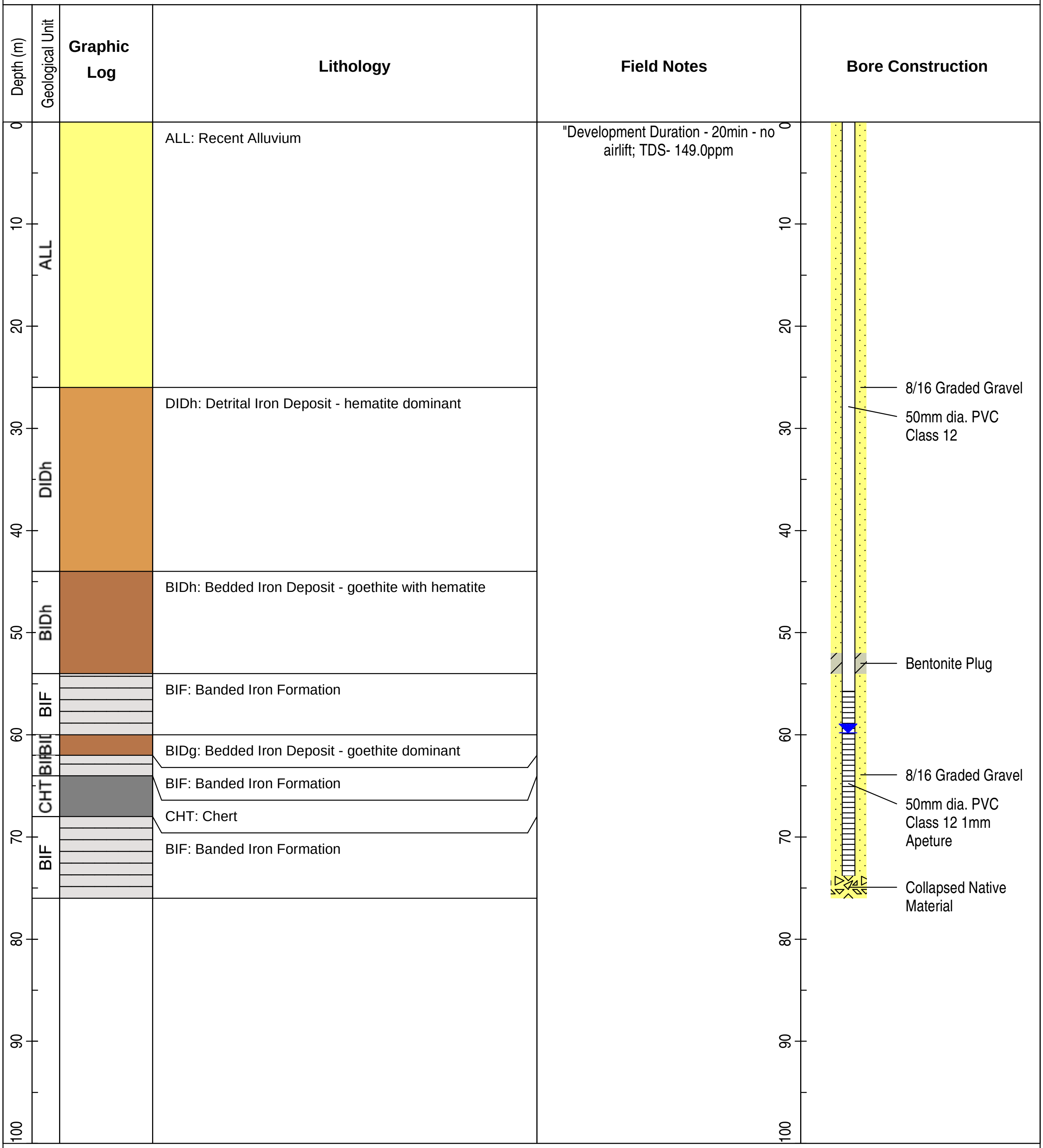
WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC4180

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	76
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	55.74-73.83
DATE DRILLED	17AUG2011	**EASTING**	549402.006	**ELEVATION (mAHD)**	603.024
LOGGED BY		**NORTHING**	7547290.758	**WATER LEVEL (mBGL)**	59.8

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	~0	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



Lithology

ALL: Recent Alluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDh: Bedded Iron Deposit - goethite with hematite

BIF: Banded Iron Formation

BIDg: Bedded Iron Deposit - goethite dominant

BIF: Banded Iron Formation

CHT: Chert

BIF: Banded Iron Formation

Field Notes

"Development Duration - 20min - no airlift; TDS- 149.0ppm

Bore Construction

SHEET:1 OF 1

Job Number 201012-00322

WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

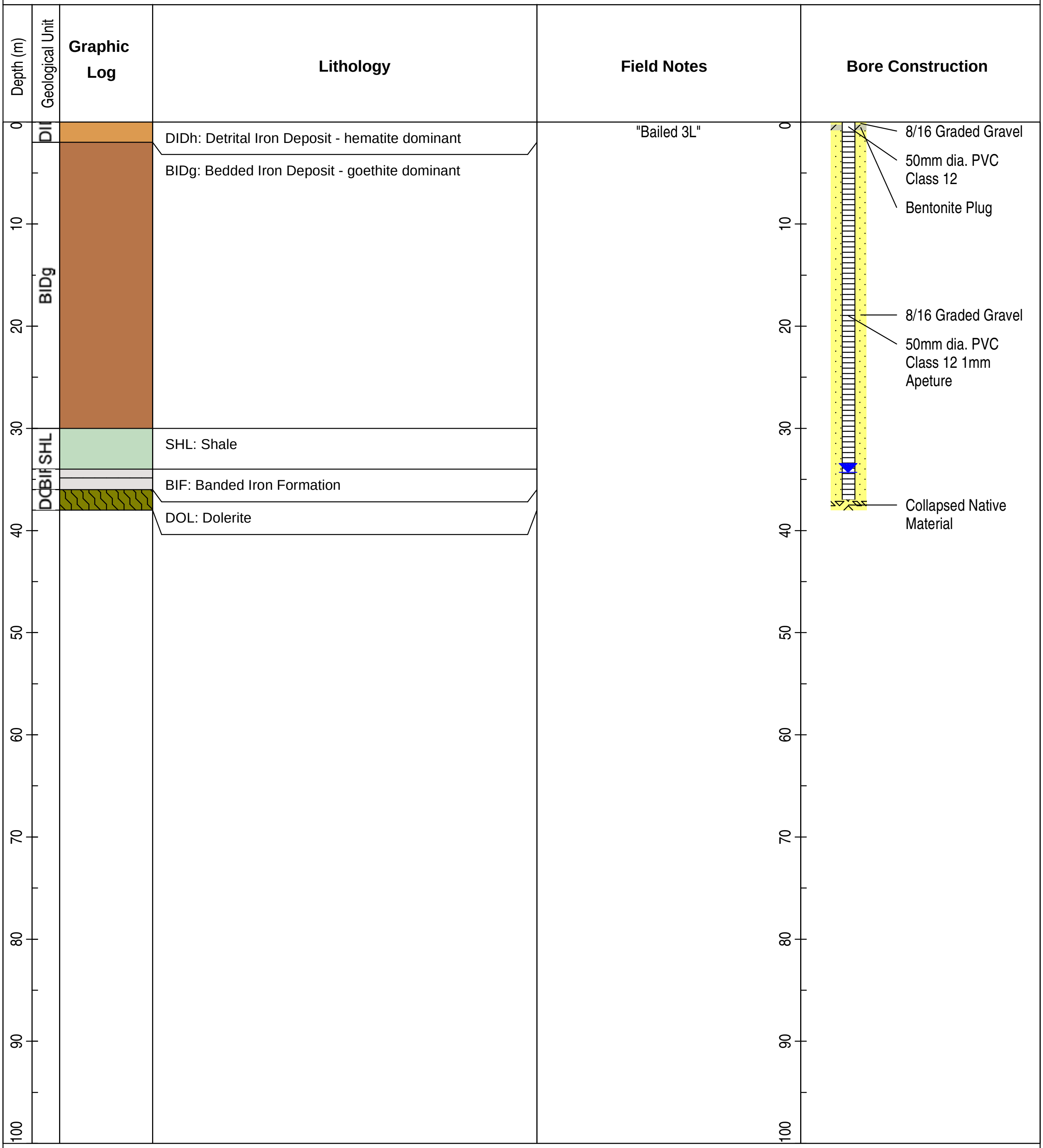
BOREHOLE:
HPRC4122

CLIENT FMS
PROJECT PIOP
DATE DRILLED 01NOV2011
LOGGED BY

LOCATION EAGLE
PROJECTION
EASTING 544946.124
NORTHING 7549663.393

DRILLED DEPTH (m) 38
SCREEN (mBGL) 1.00-37.00
ELEVATION (mAHD) 673.697
WATER LEVEL (mBGL) 34.3

Contractor
Rig Type AIR CORE RC
Drill Bit 5.5"
Drill Fluid A/W
Airlift (L/s)
Temperature (°C)
Salinity (mS/cm)
pH



DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

SHL: Shale

BIF: Banded Iron Formation

DOL: Dolerite

"Bailed 3L"

SHEET:1 OF 1

Job Number 201012-00322

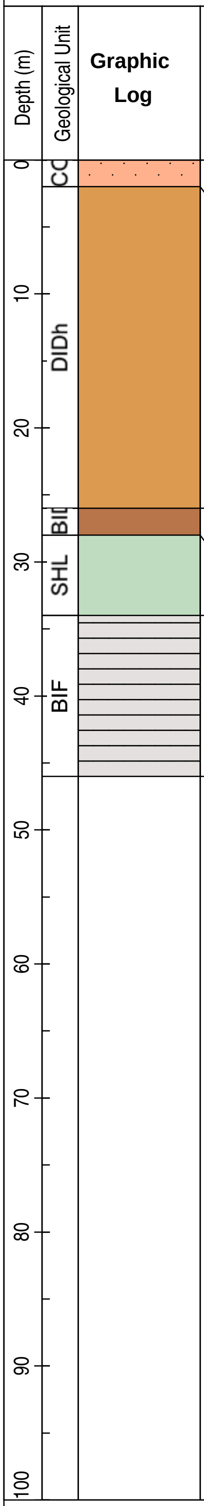
WorleyParsons
resources & energy

Level 7 | QV1 Building
250 St George's Terrace
Perth WA 6000
ABN 61001 279 812

BOREHOLE:
HPRC4118

CLIENT	FMS	**LOCATION**	EAGLE	**DRILLED DEPTH (m)**	46
PROJECT	PIOP	**PROJECTION**		**SCREEN (mBGL)**	3.00-25.50
DATE DRILLED	01NOV2011	**EASTING**	545177.968	**ELEVATION (mAHD)**	660.885
LOGGED BY		**NORTHING**	7549533.175	**WATER LEVEL (mBGL)**	Dry

Contractor		**Drill Bit**	5.5"	**Airlift (L/s)**	Dry	**Salinity (mS/cm)**	
Rig Type	AIR CORE RC	**Drill Fluid**	A/W	**Temperature (℃)**		**pH**	



Lithology

COL: Recent Colluvium

DIDh: Detrital Iron Deposit - hematite dominant

BIDg: Bedded Iron Deposit - goethite dominant

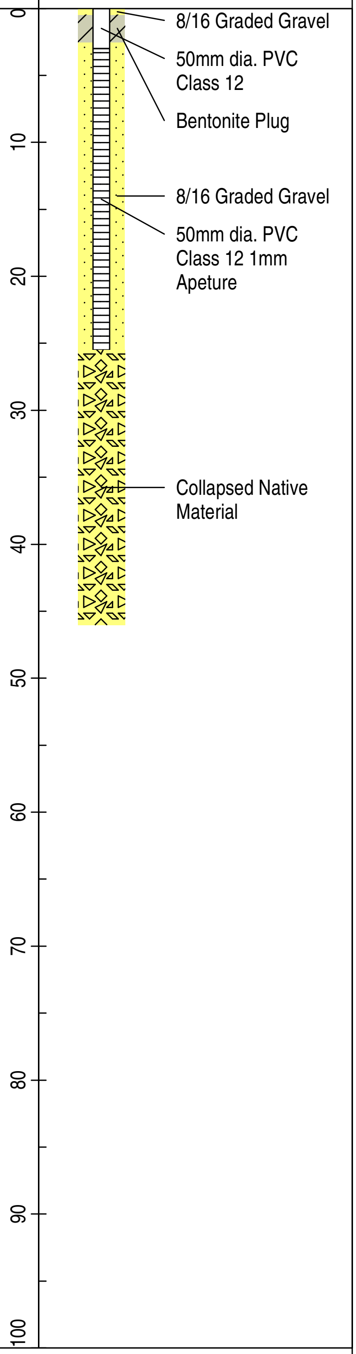
SHL: Shale

BIF: Banded Iron Formation

Field Notes

"Dry Bore"

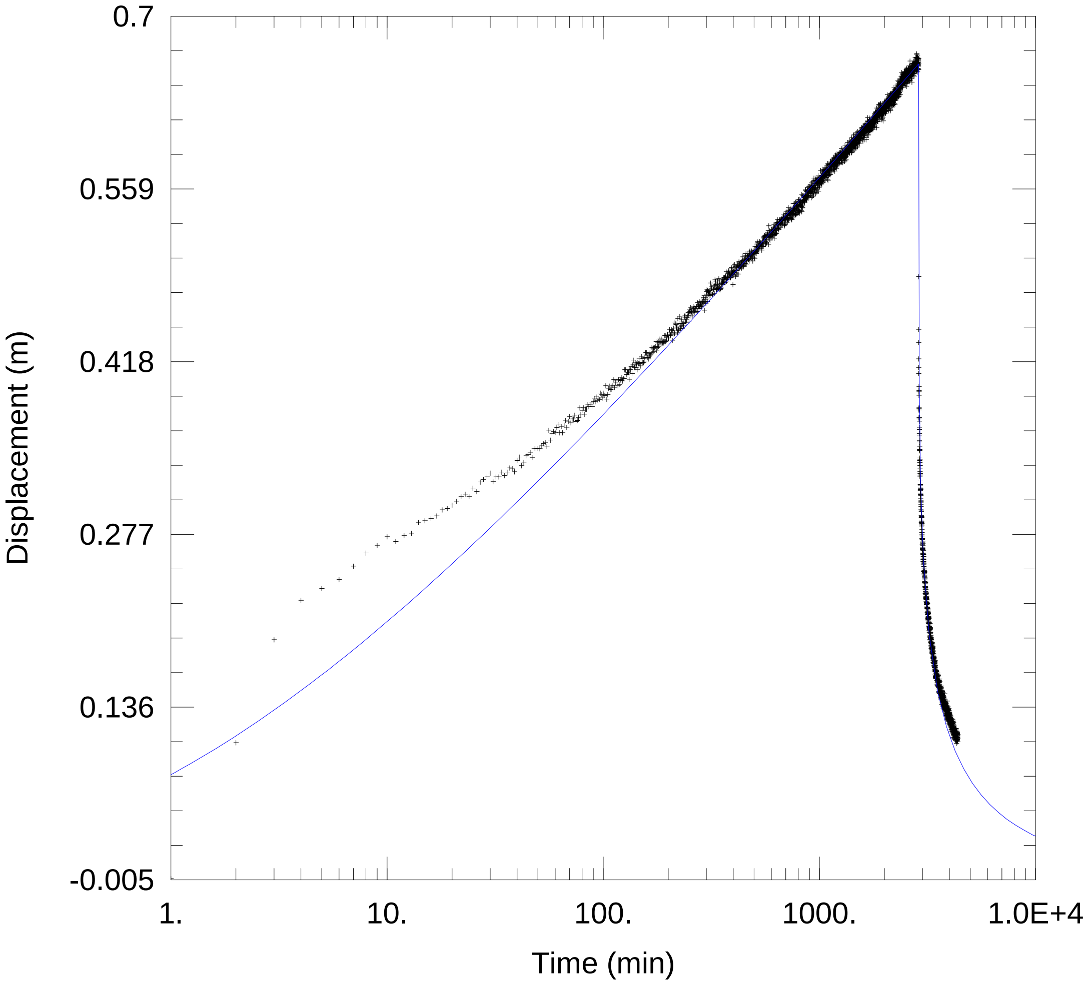
Bore Construction



SHEET:1 OF 1

Job Number 201012-00322

Appendix 4: Pump Test Results



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04m.aqt
Date: 02/20/12 Time: 16:46:51

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 1. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

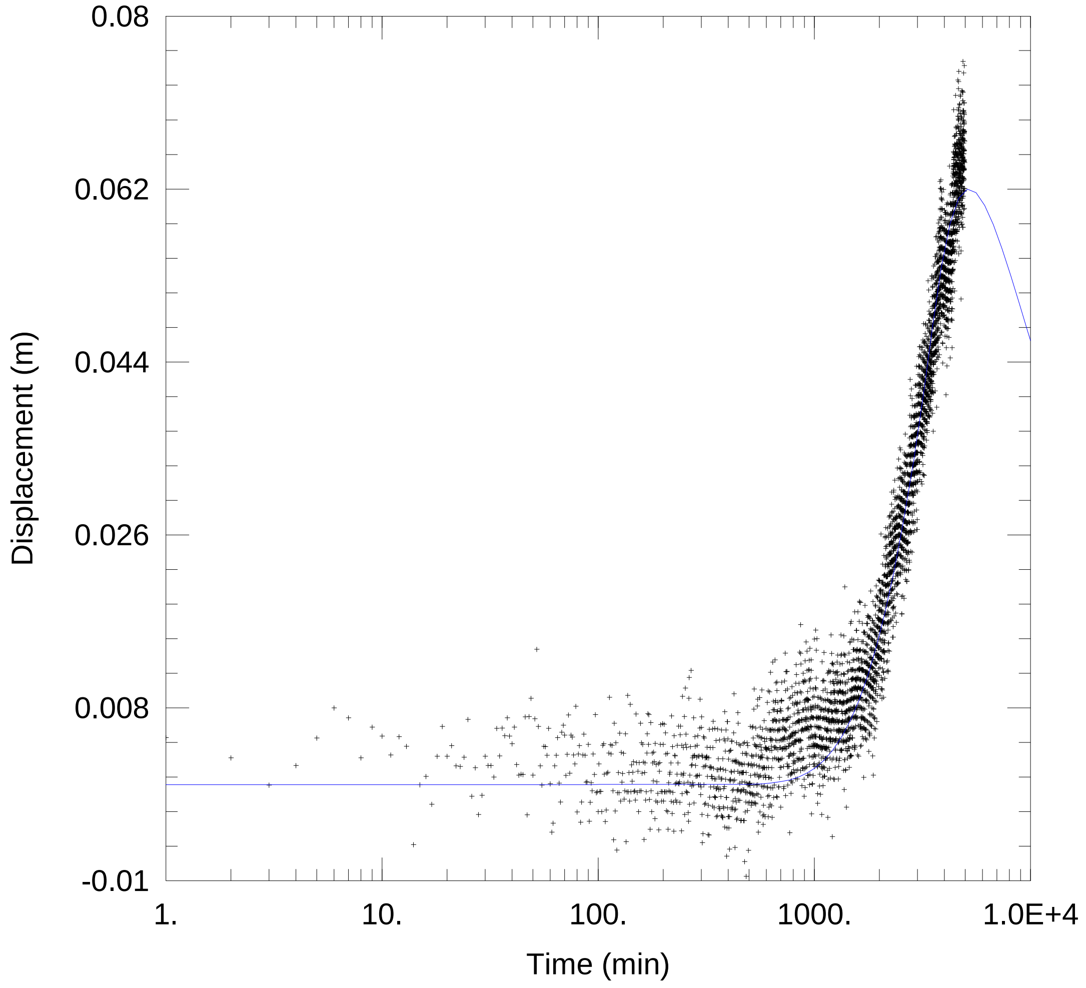
Observation Wells

Well Name	X (m)	Y (m)
+ O4m	13.9	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 1120.4 m^2/day
S = 2.568E-5
r/B' = 1.0E-5
ß' = 8.144
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eagle03.aqt
Date: 02/20/12
Time: 16:38:55

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

Observation Wells

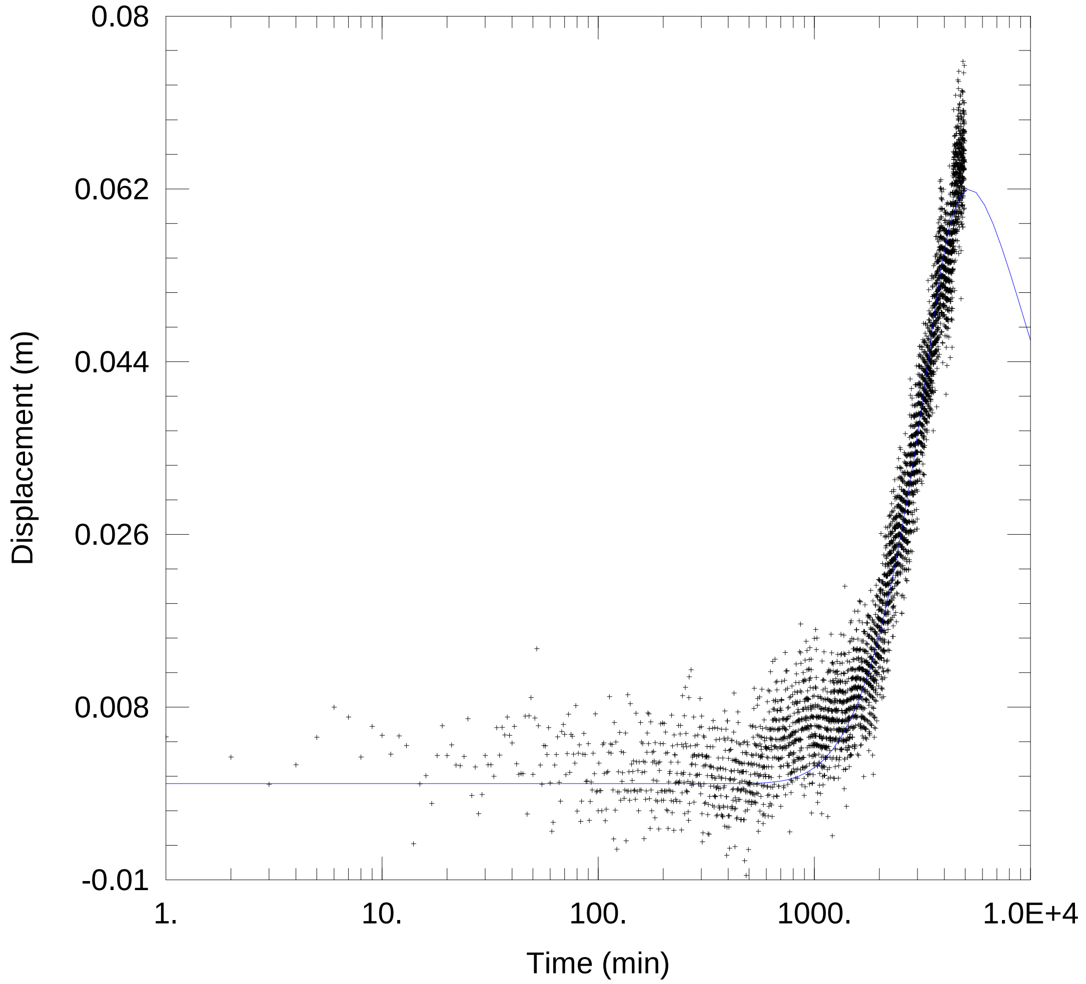
Well Name	X (m)	Y (m)
+ O3	807.93	0

SOLUTION

Aquifer Model: Confined

Solution Method: Theis

T = 1015.3 m^2/day
Kz/Kr = 1.
S = 0.01459
b = 58. m



WELL TEST ANALYSIS

Data Set: I:\...\Eagle03.aqt
Date: 02/20/12 Time: 16:48:00

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 1. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

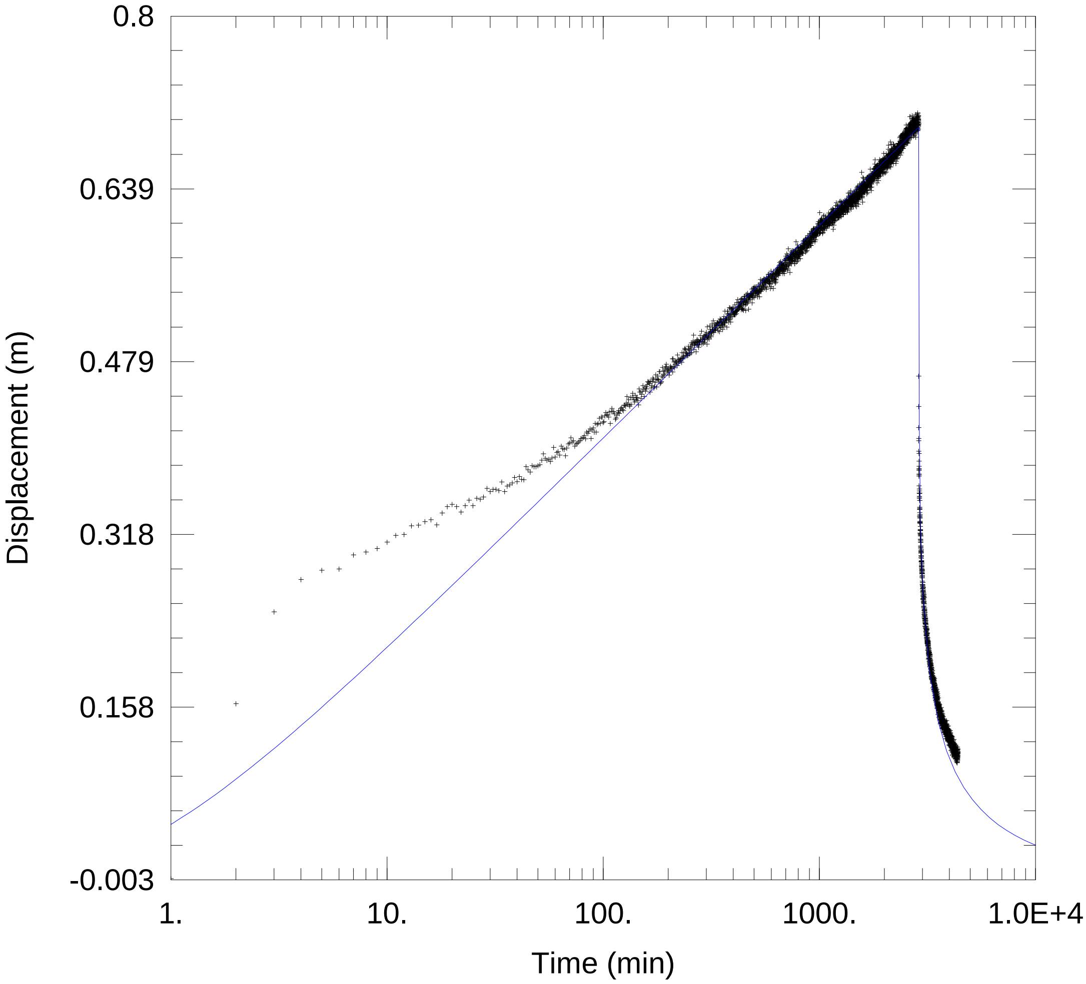
Observation Wells

Well Name	X (m)	Y (m)
+ O3	807.93	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 1015.3 m^2/day
S = 0.01459
r/B' = 1.0E-5
ß' = 1.0E-5
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eagle02.aqt
Date: 02/20/12 Time: 16:40:20

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

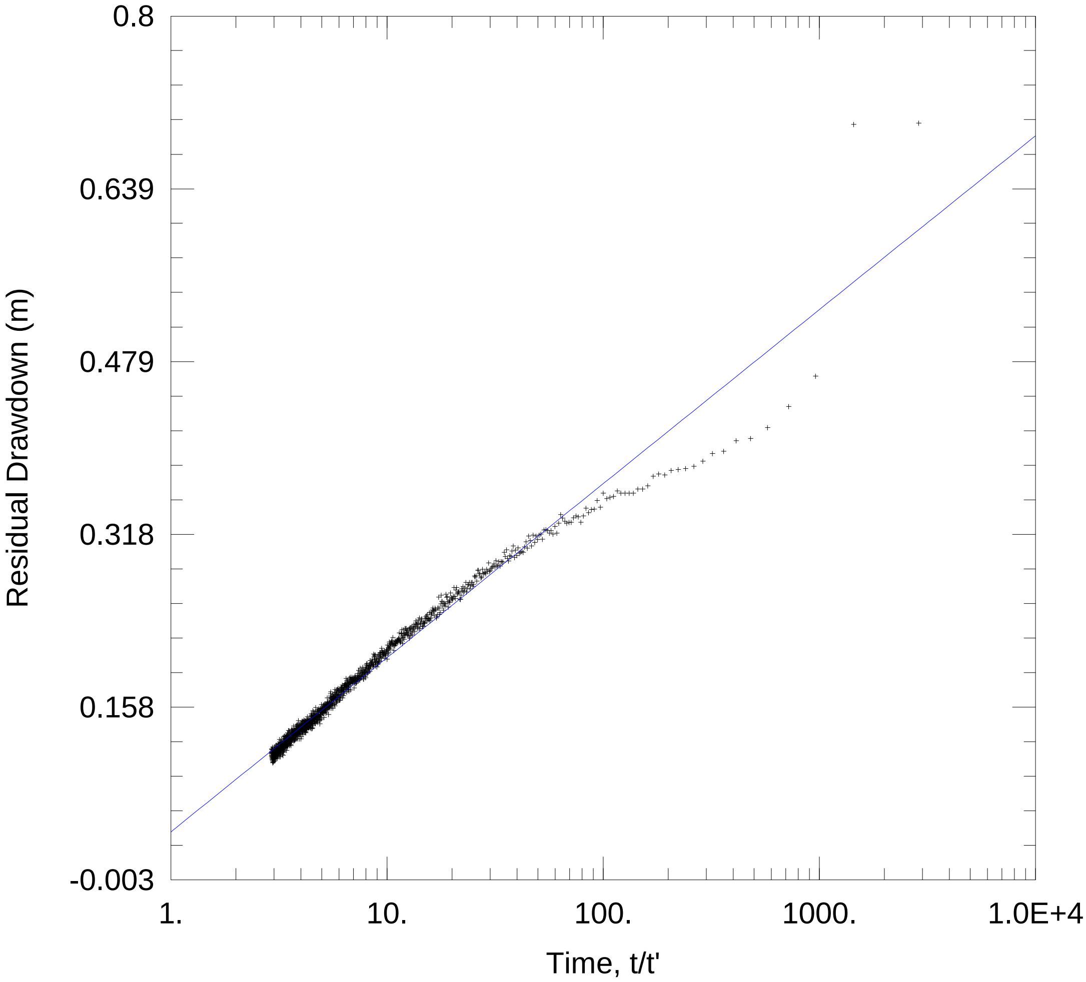
Observation Wells

Well Name	X (m)	Y (m)
+ O2	18.35	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 2395.4 m^2/day
S = 0.009837
Kz/Kr = 1.
b = 58. m



WELL TEST ANALYSIS

Data Set: I:\...\Eagle02.aqt
Date: 02/20/12
Time: 16:42:58

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

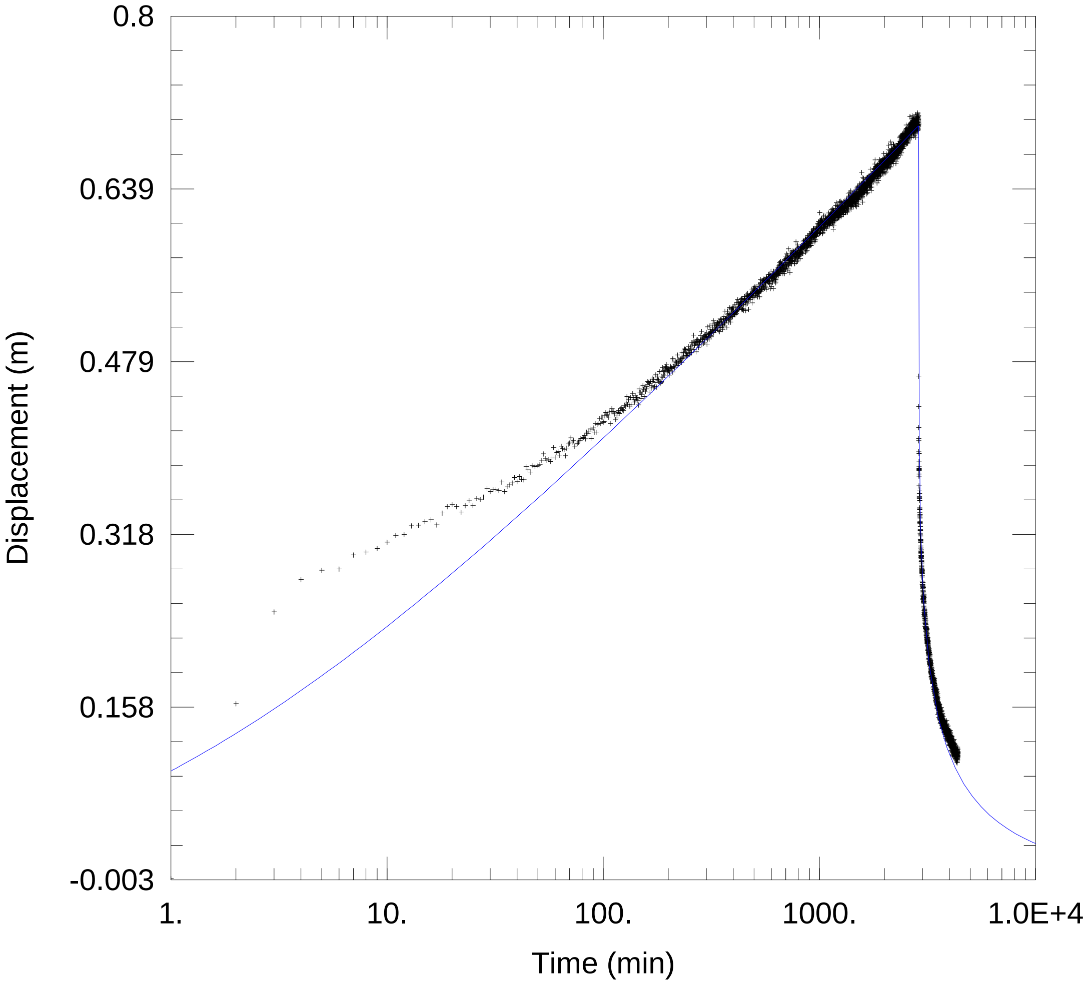
Observation Wells

Well Name	X (m)	Y (m)
+ O2	18.35	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 2935.4 m^2/day
S/S' = 0.5553



WELL TEST ANALYSIS

Data Set: I:\...\Eagle02.aqt
Date: 02/20/12
Time: 16:49:20

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 1. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

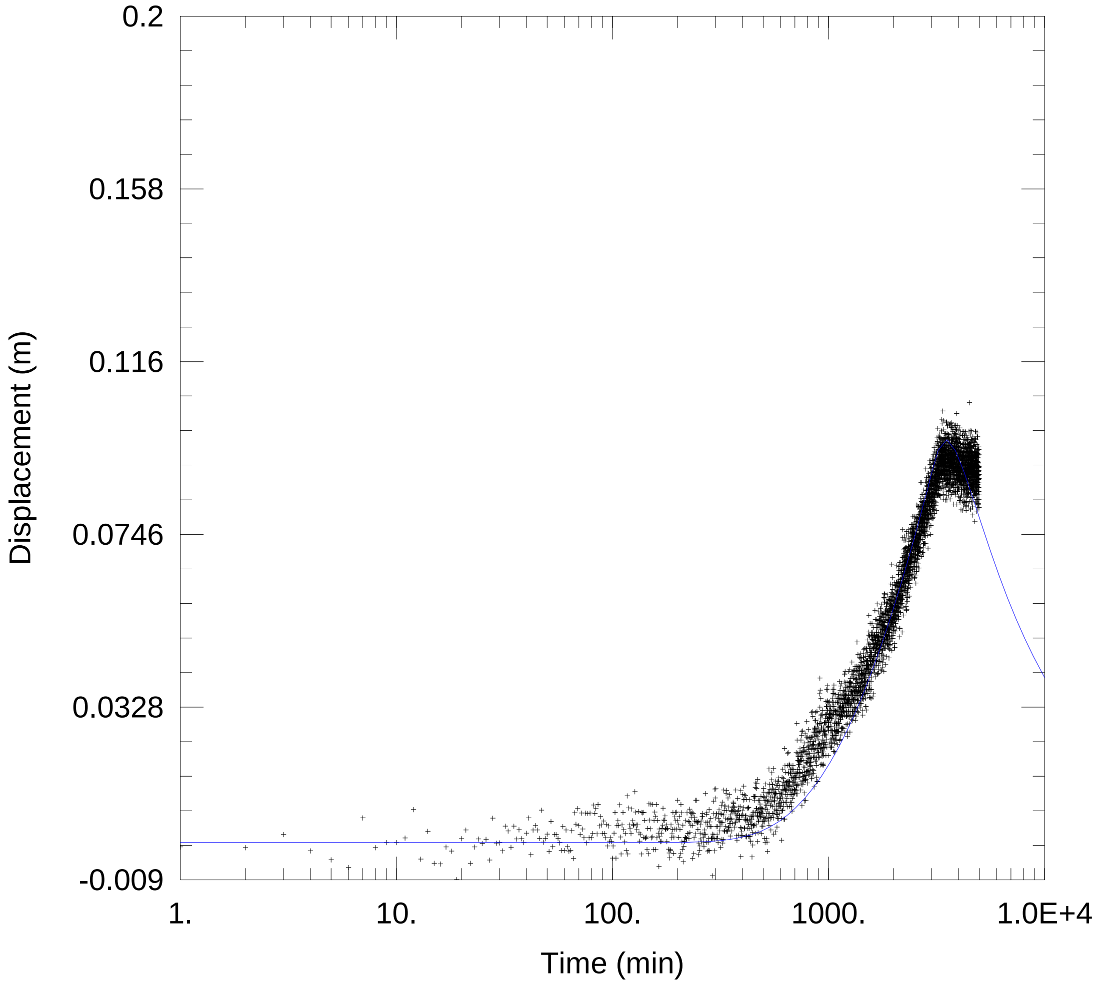
Observation Wells

Well Name	X (m)	Y (m)
+ O2	18.35	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 1117. m^2/day
S = 1.893E-5
r/B' = 1.0E-5
ß' = 5.899
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eagle01.aqt
Date: 02/20/12 Time: 16:40:44

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

Observation Wells

Well Name	X (m)	Y (m)
+ O1	1152.75	0

SOLUTION

Aquifer Model: Confined

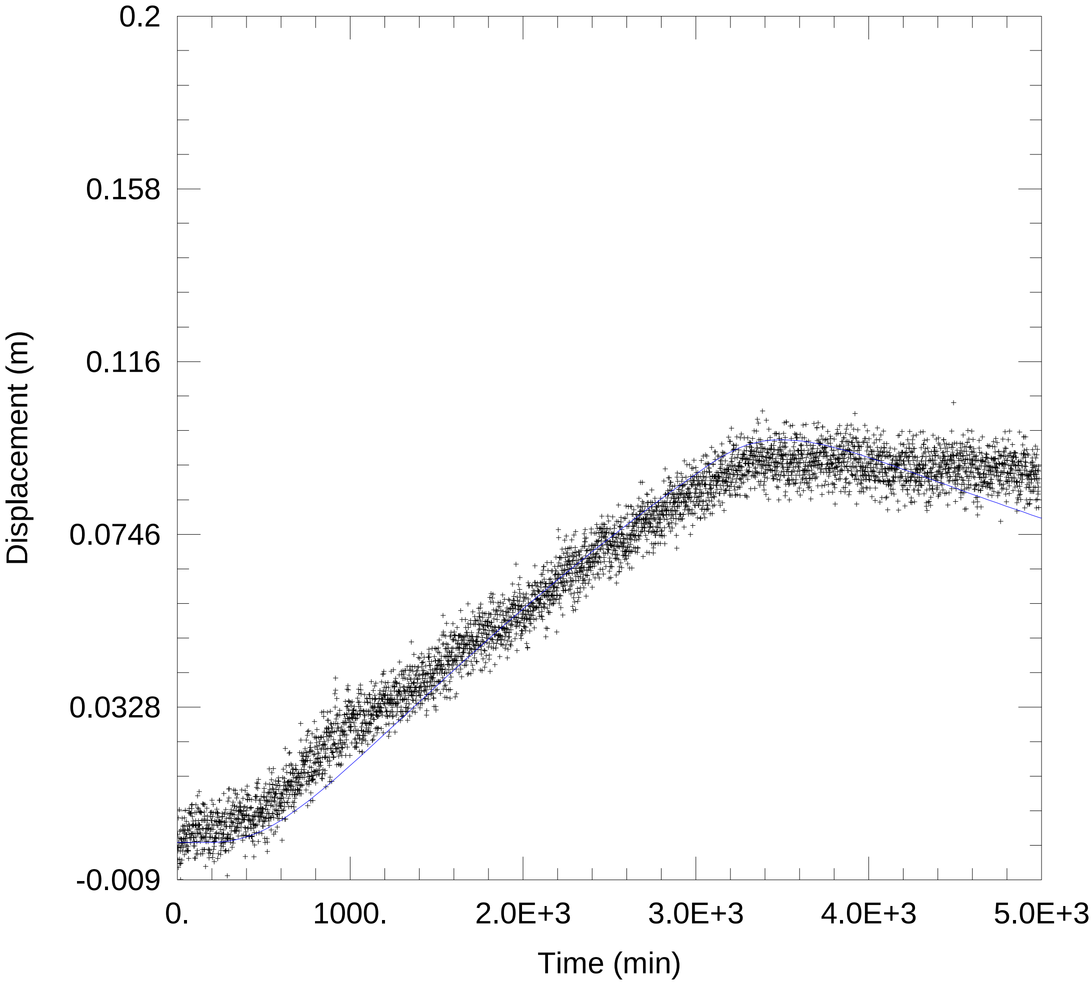
Solution Method: Theis

T = 1500.9 m^2/day

Kz/Kr = 1.

S = 0.004083

b = 58. m



WELL TEST ANALYSIS

Data Set: I:\...\Eagle01.aqt

Date: 02/20/12 Time: 16:50:01

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 1. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

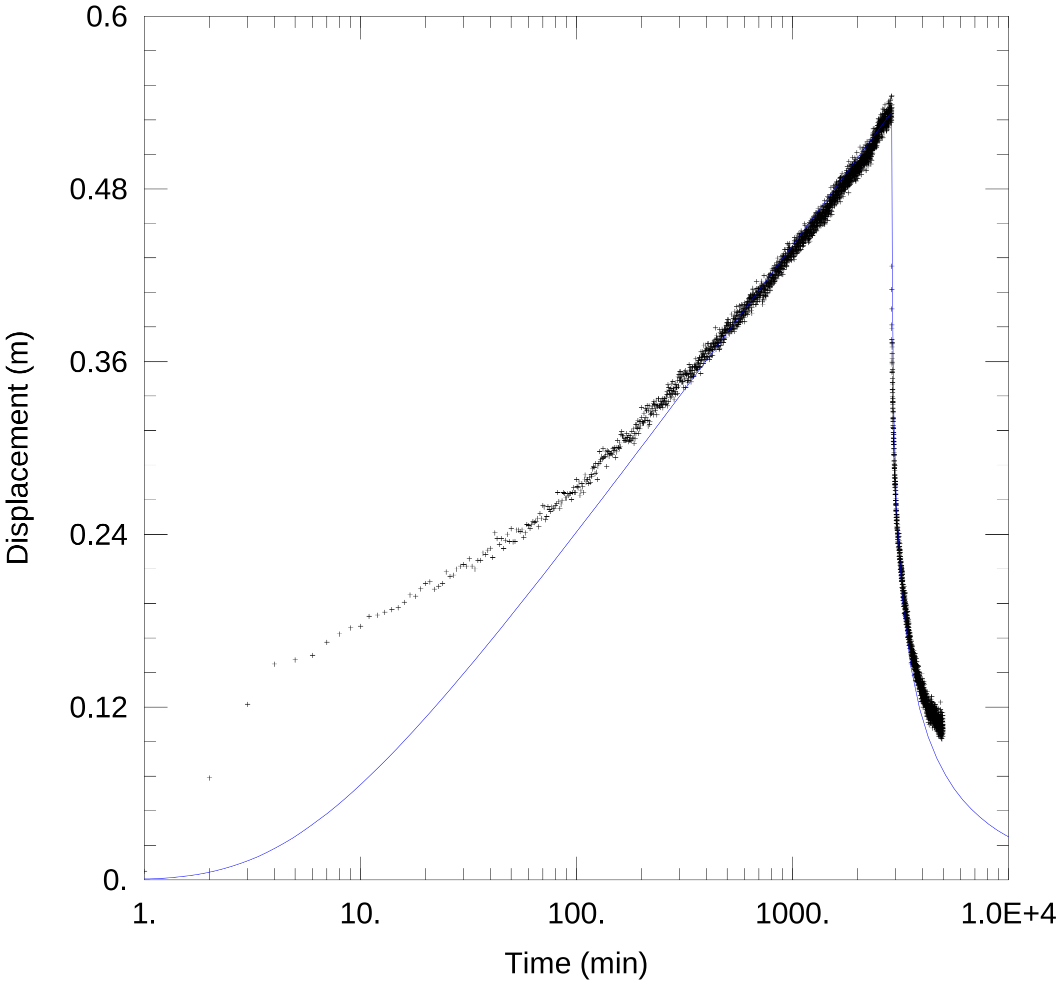
Observation Wells

Well Name	X (m)	Y (m)
+ O1	1152.75	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 1500.7 m^2/day
S = 0.004083
r/B' = 1.0E-5
ß' = 1.0E-5
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eag04d.aqt
Date: 02/20/12
Time: 16:41:05

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

Observation Wells

Well Name	X (m)	Y (m)
+ O4d	13.9	0

SOLUTION

Aquifer Model: Confined

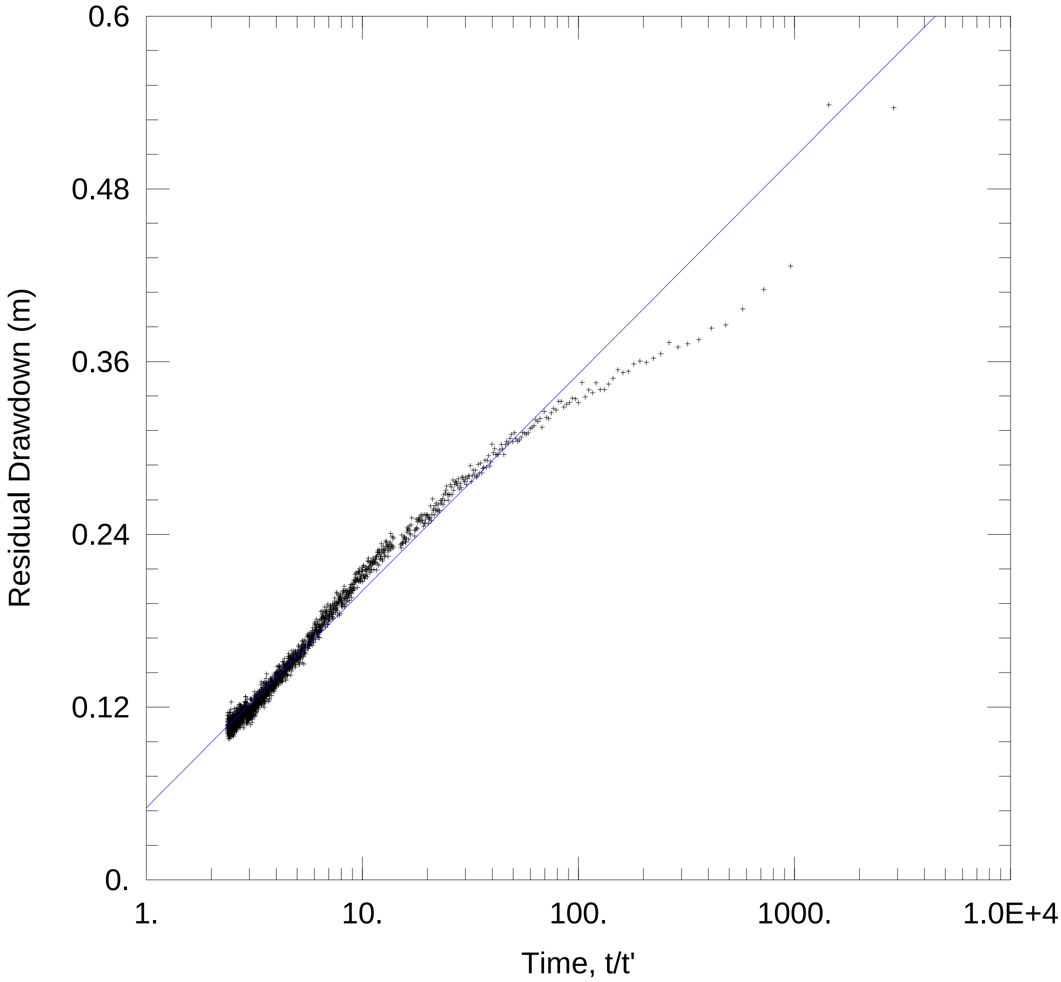
Solution Method: Theis

T = 2349.8 m^2/day

S = 0.1261

Kz/Kr = 1.

b = 58. m



WELL TEST ANALYSIS

Data Set: I:\...\Eag04d.aqt

Date: 02/20/12 Time: 16:43:17

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

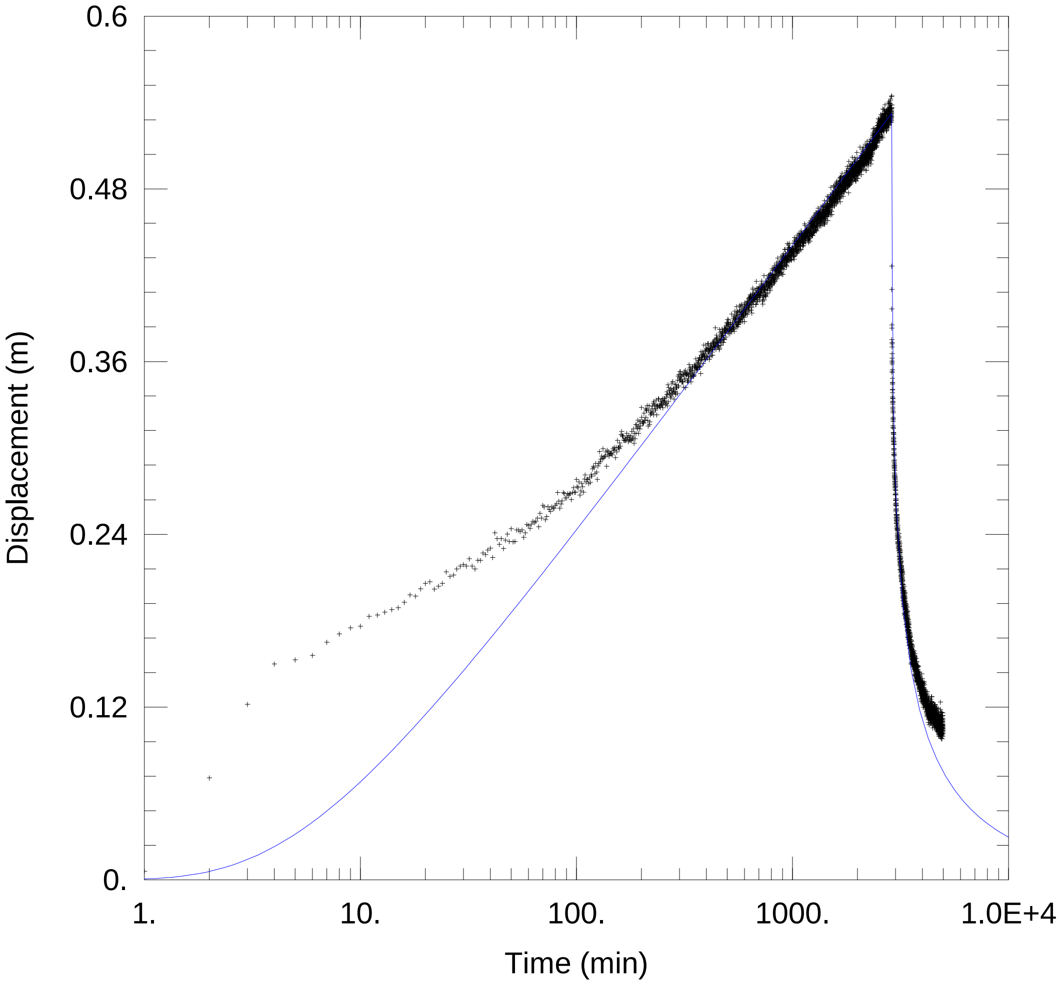
Observation Wells

Well Name	X (m)	Y (m)
+ O4d	13.9	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 3153.7 m^2/day S/S' = 0.4668



WELL TEST ANALYSIS

Data Set: I:\...\Eag04d.aqt
Date: 02/20/12
Time: 16:51:04

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Aquitard Thickness (b'): 1. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

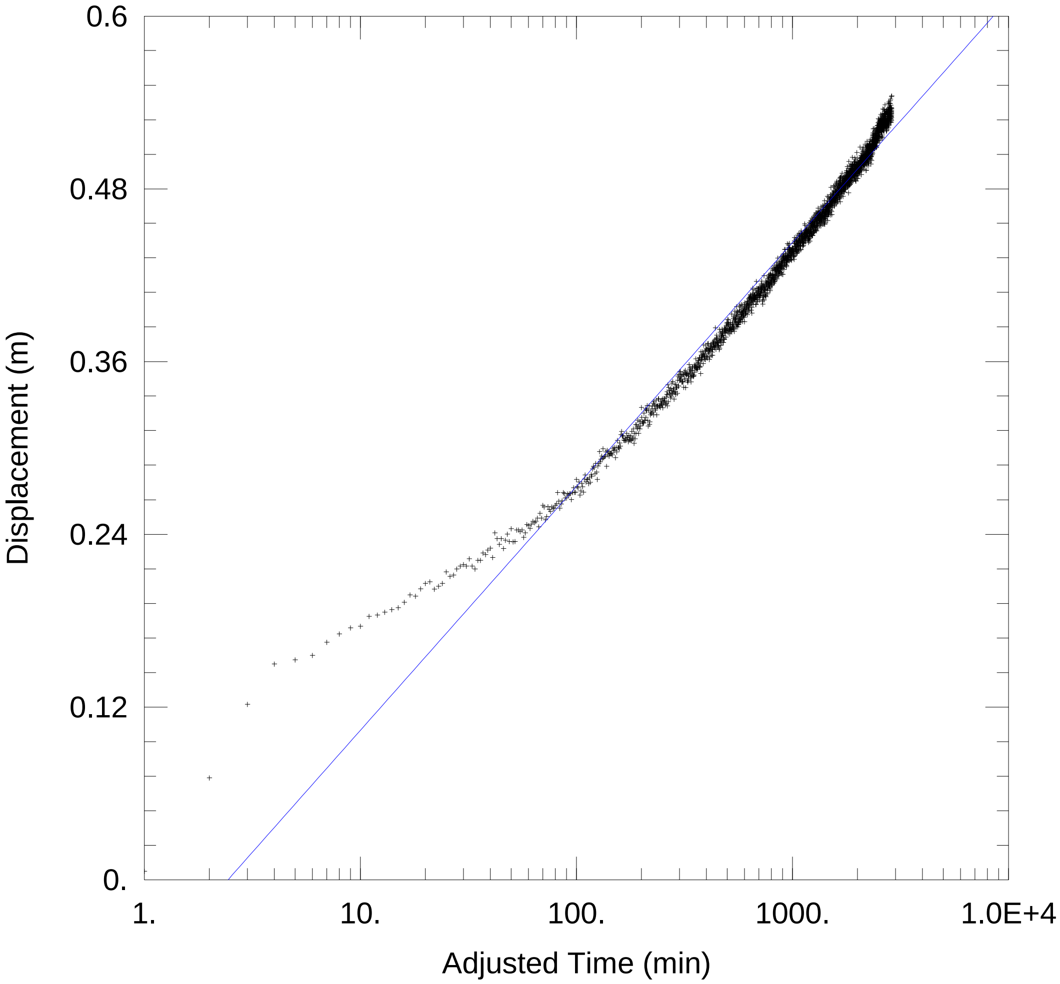
Observation Wells

Well Name	X (m)	Y (m)
+ O4d	13.9	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 2369.2 m^2/day
r/B' = 1.0E-5
r/B" = 0.
S = 0.1218
ß' = 1.0E-5
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eag04d.aqt
Date: 02/20/12
Time: 16:51:38

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

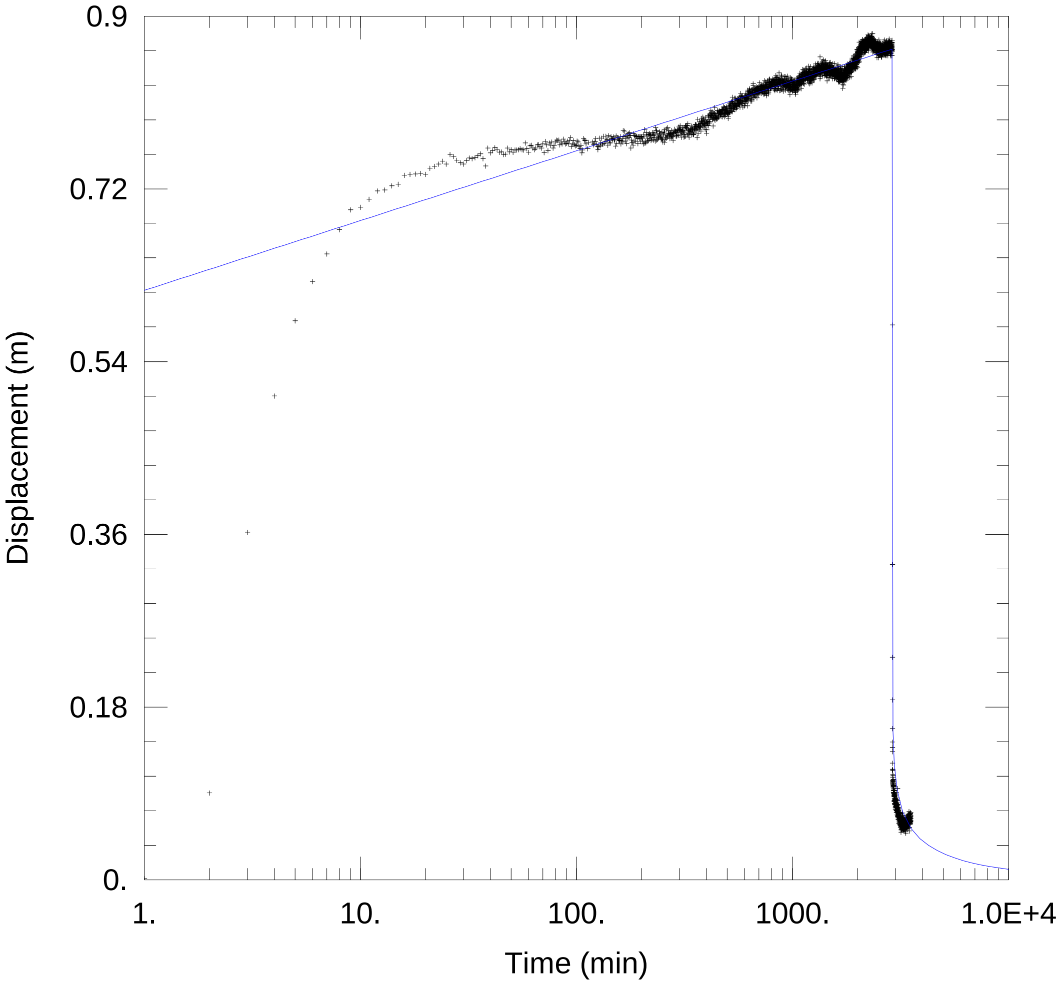
Observation Wells

Well Name	X (m)	Y (m)
+ O4d	13.9	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 2803. m^2/day
S = 0.05541



WELL TEST ANALYSIS

Data Set: I:\...\Delta04s.aqt

Date: 02/20/12 Time: 16:06:20

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-04-shl	15.46	0

SOLUTION

Aquifer Model: Confined

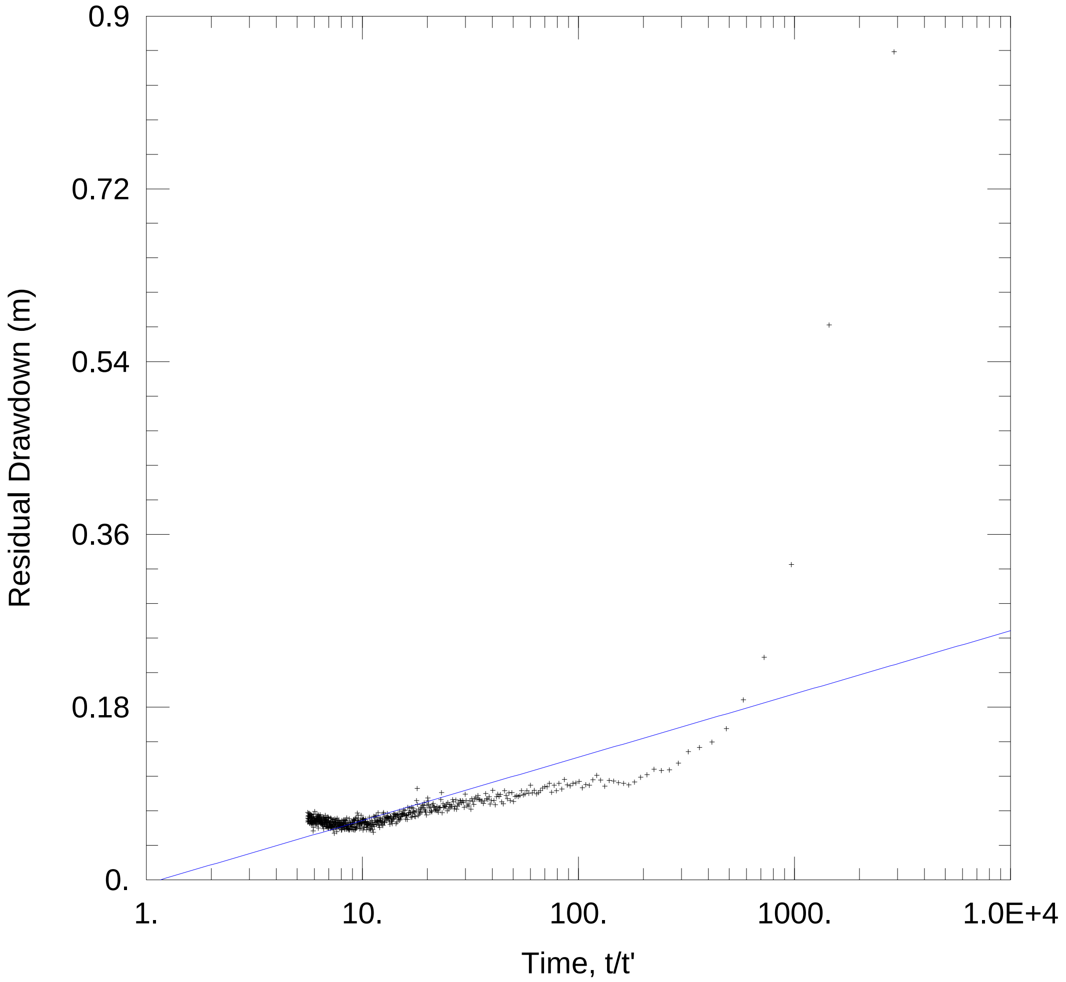
Solution Method: Theis

T = 4358.8 m^2/day

Kz/Kr = 1.

S = 1.0E-10

b = 40. m



WELL TEST ANALYSIS

Data Set: I:\...\Delta04s.aqt
Date: 02/20/12 Time: 16:08:39

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

AQUIFER DATA

Saturated Thickness: 40. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

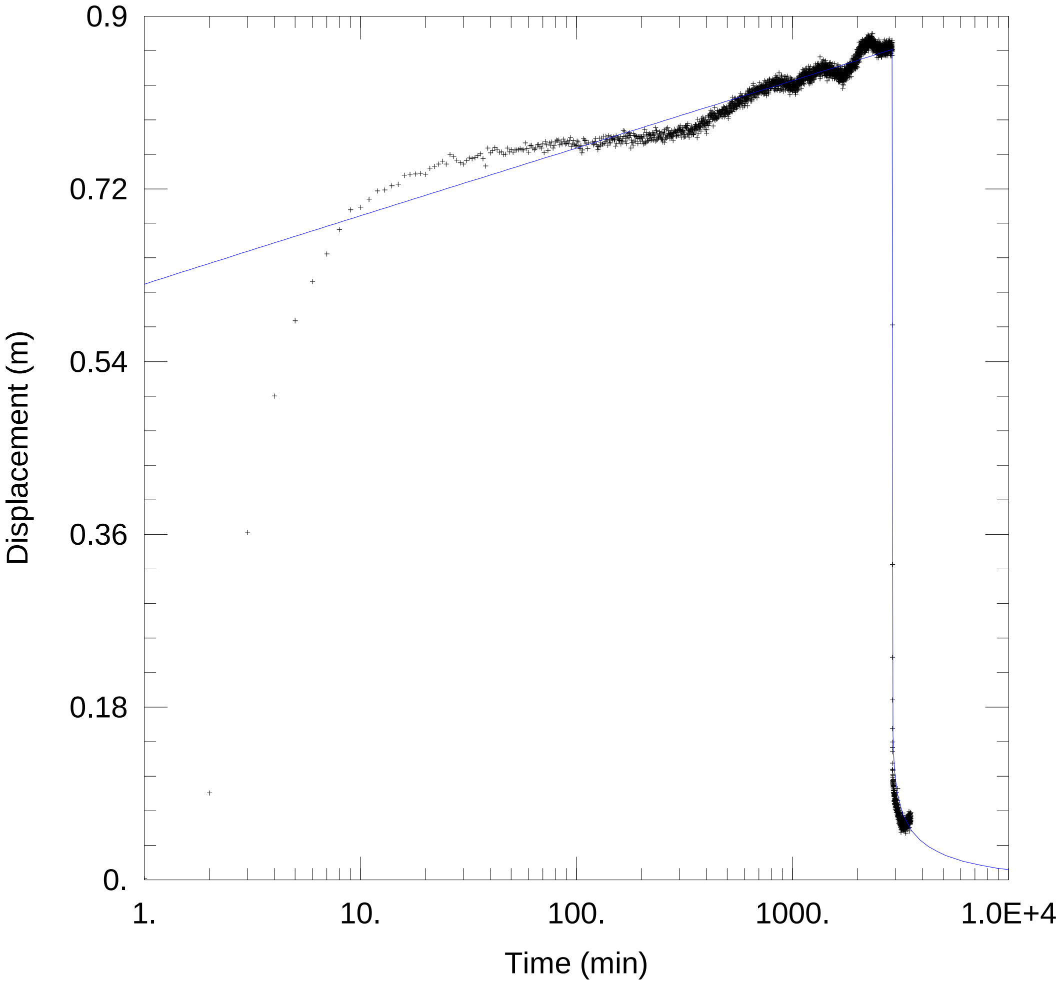
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-04-shl	15.46	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 4801.6 m^2/day
S/S' = 1.165



WELL TEST ANALYSIS

Data Set: I:\...\Delta04s.aqt
Date: 02/20/12
Time: 16:53:28

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

AQUIFER DATA

Saturated Thickness: 40. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b''): 30. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

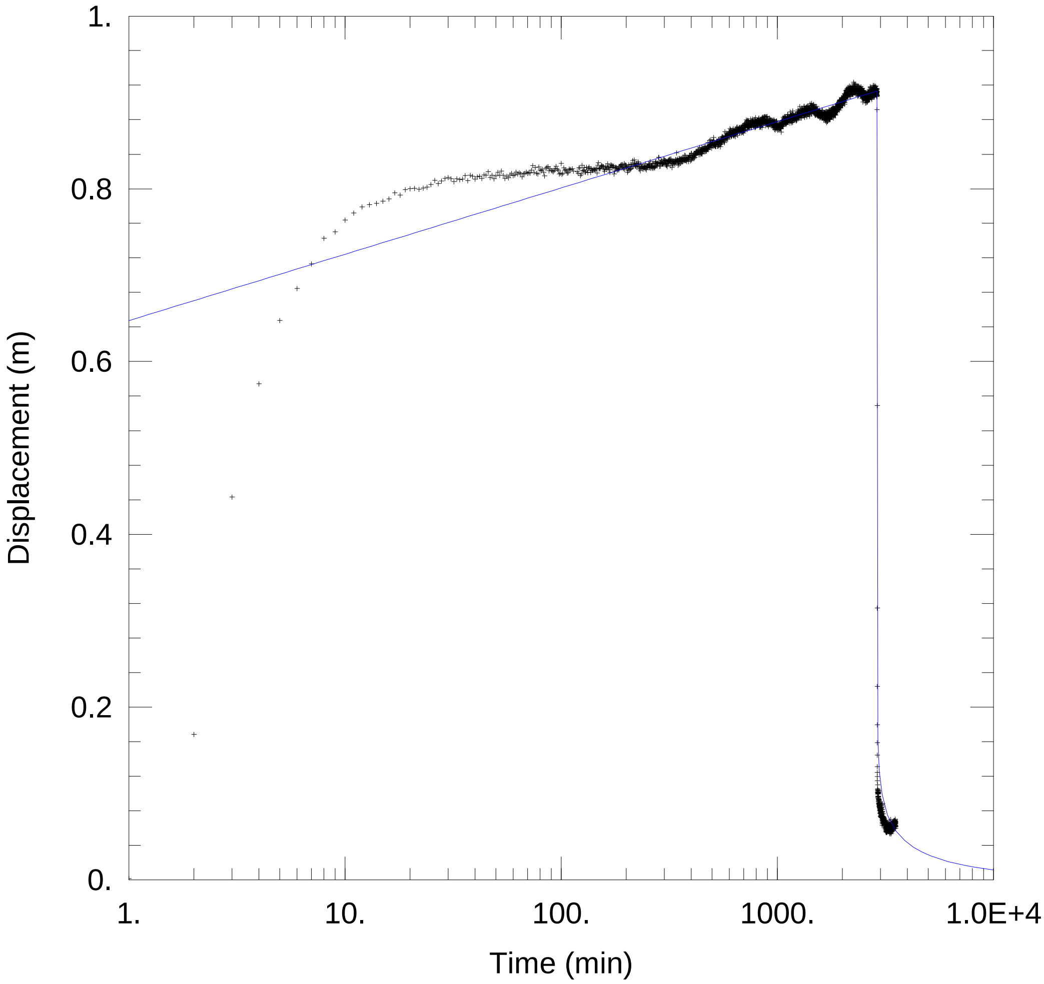
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-04-shl	15.46	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 2255.6 m^2/day
S = 1.839E-8
r/B' = 1.0E-5
ß' = 0.009288
r/B'' = 0.
ß'' = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Delta04d.aqt
Date: 02/20/12 Time: 16:06:47

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

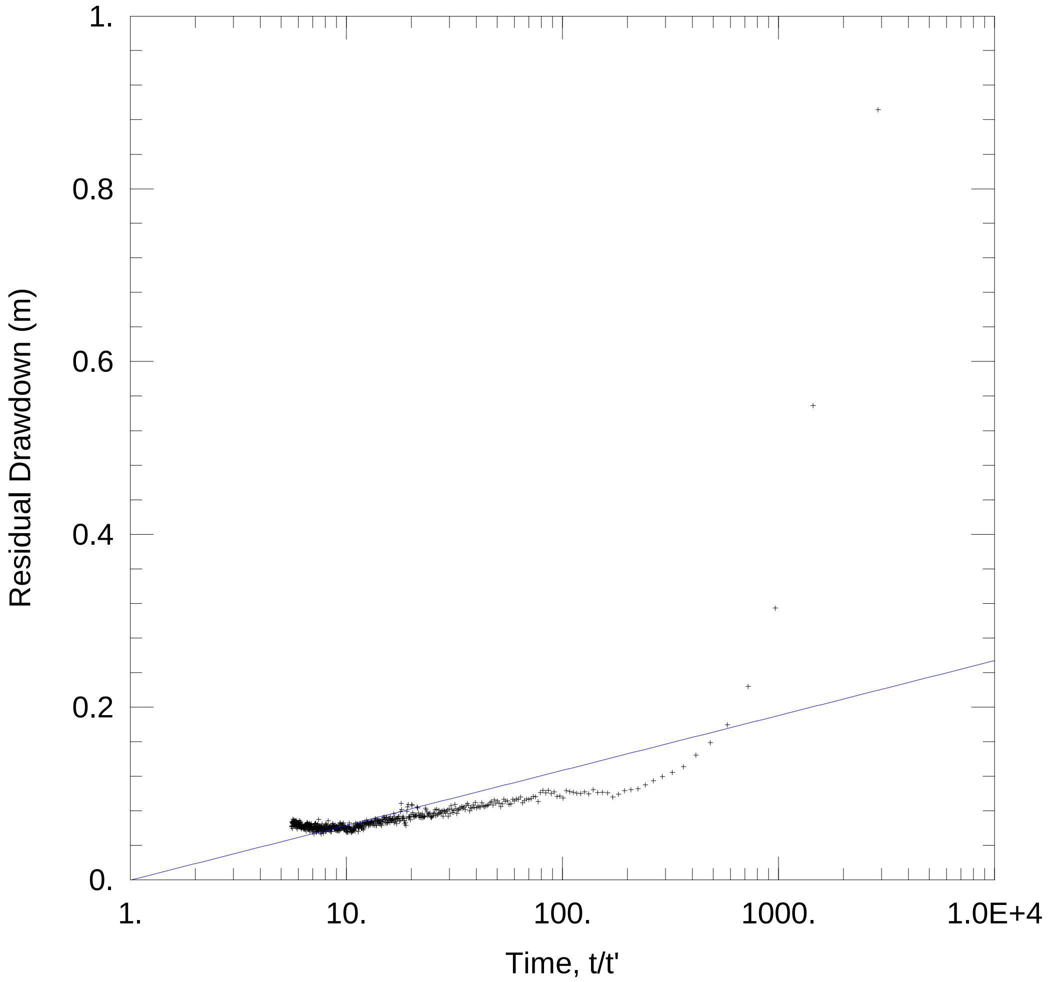
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-04-dp	15.46	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 4123.4 m^2/day
Kz/Kr = 1.
S = 1.0E-10
b = 40. m



WELL TEST ANALYSIS

Data Set: I:\...\Delta04d.aqt

Date: 02/20/12 Time: 16:09:09

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

AQUIFER DATA

Saturated Thickness: 40. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

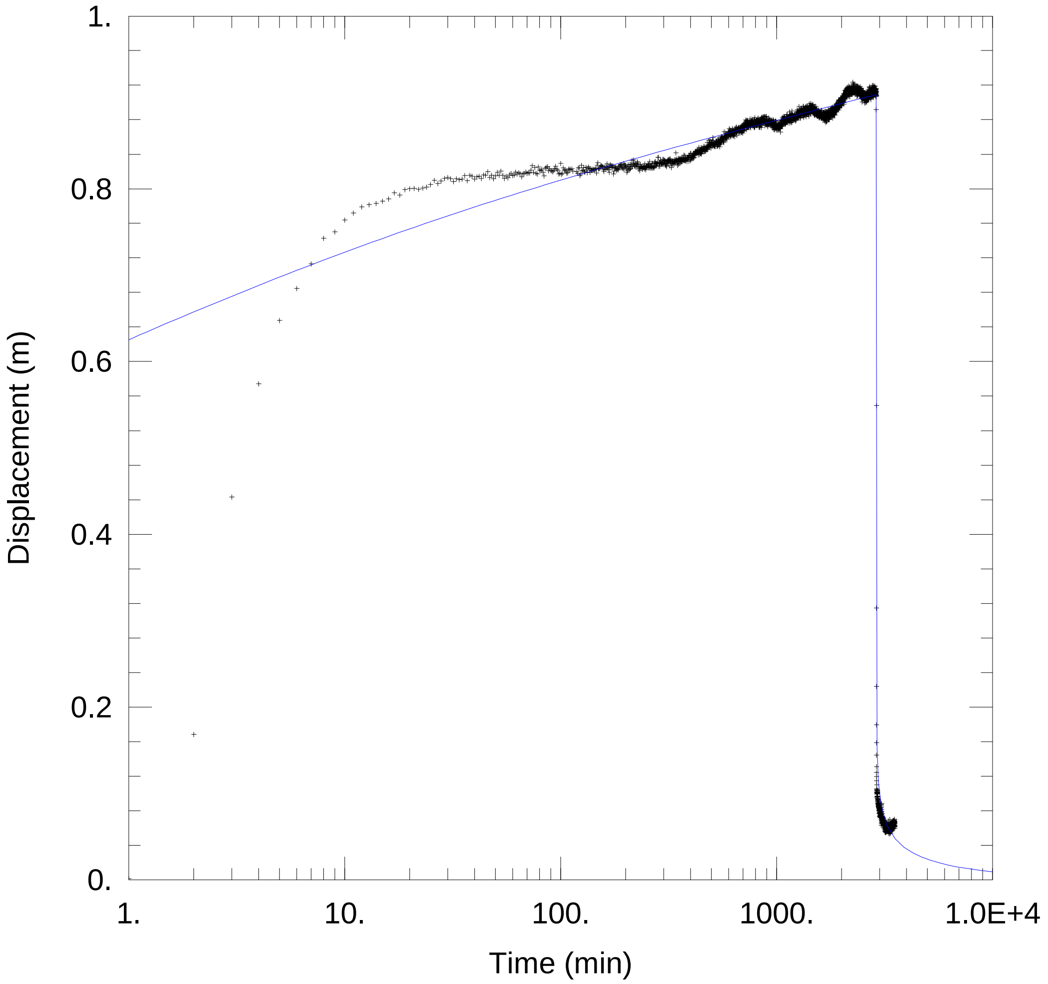
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-04-dp	15.46	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 4984.9 m^2/day S/S' = 1.019



WELL TEST ANALYSIS

Data Set: I:\...\Delta04d.aqt
Date: 02/20/12
Time: 16:54:02

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

AQUIFER DATA

Saturated Thickness: 40. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b"): 30. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

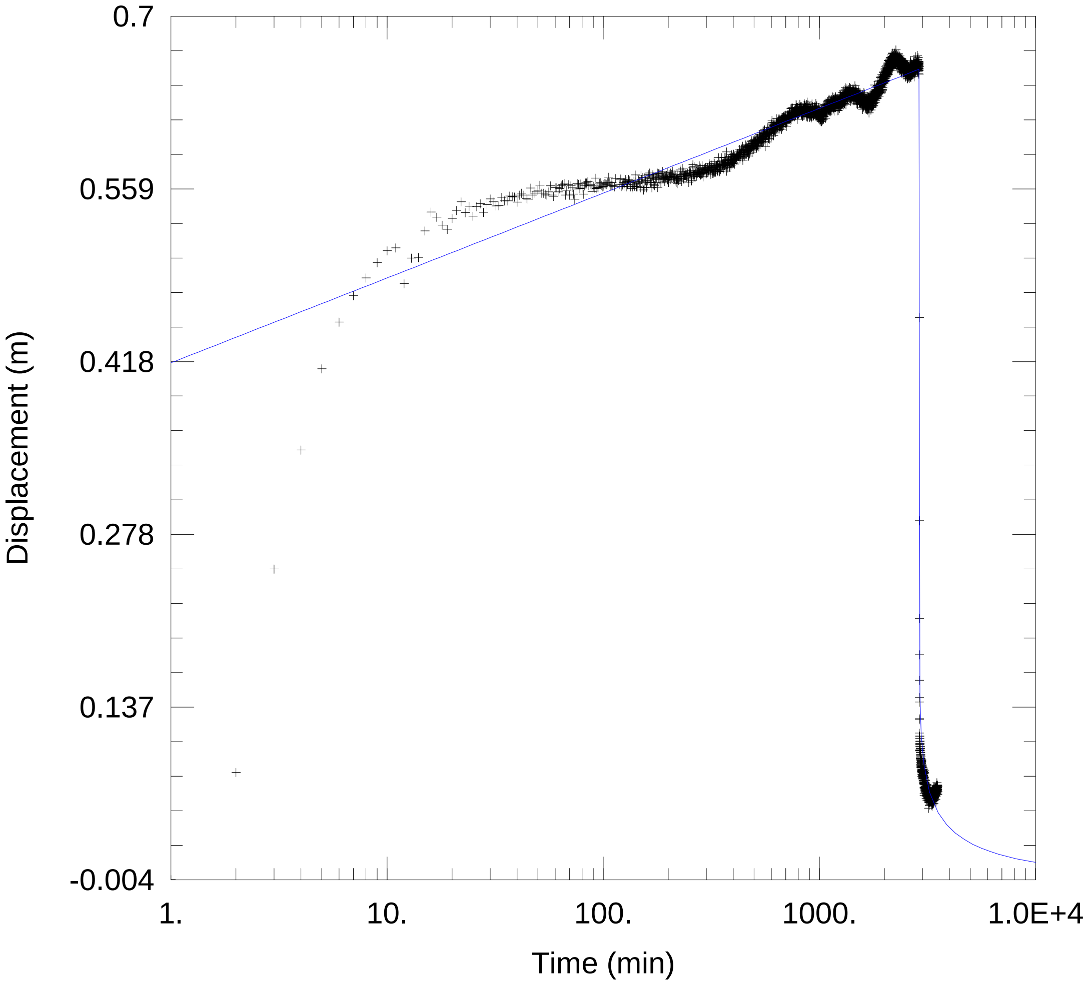
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-04-dp	15.46	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 2628.6 m^2/day
S = 8.905E-8
r/B' = 1.0E-5
ß' = 0.0001796
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Delta03.aqt
Date: 02/20/12 Time: 16:07:26

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

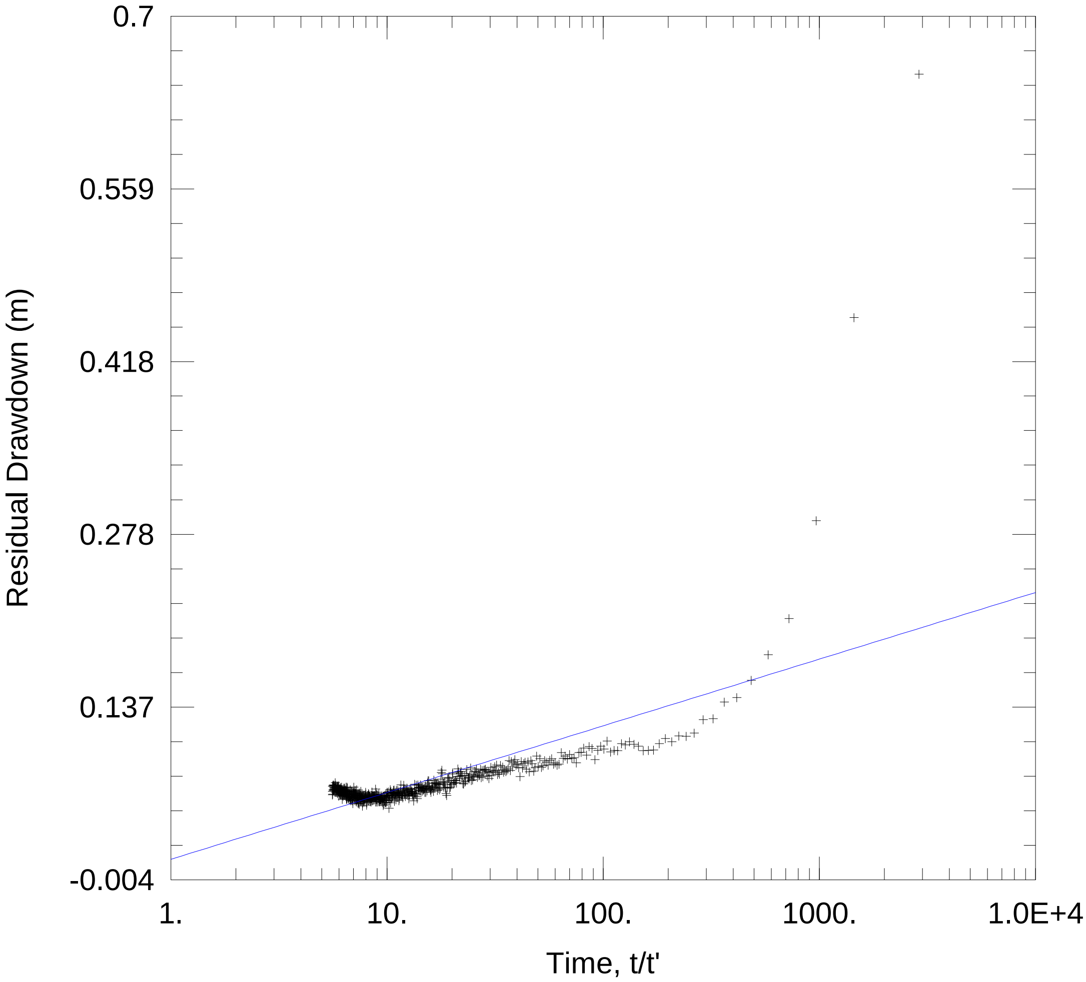
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-03-cor	16.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 4579.5 m^2/day
Kz/Kr = 1.
S = 2.363E-8
b = 40. m



WELL TEST ANALYSIS

Data Set: I:\...\Delta03.aqt
Date: 02/20/12
Time: 16:09:25

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

AQUIFER DATA

Saturated Thickness: 40. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

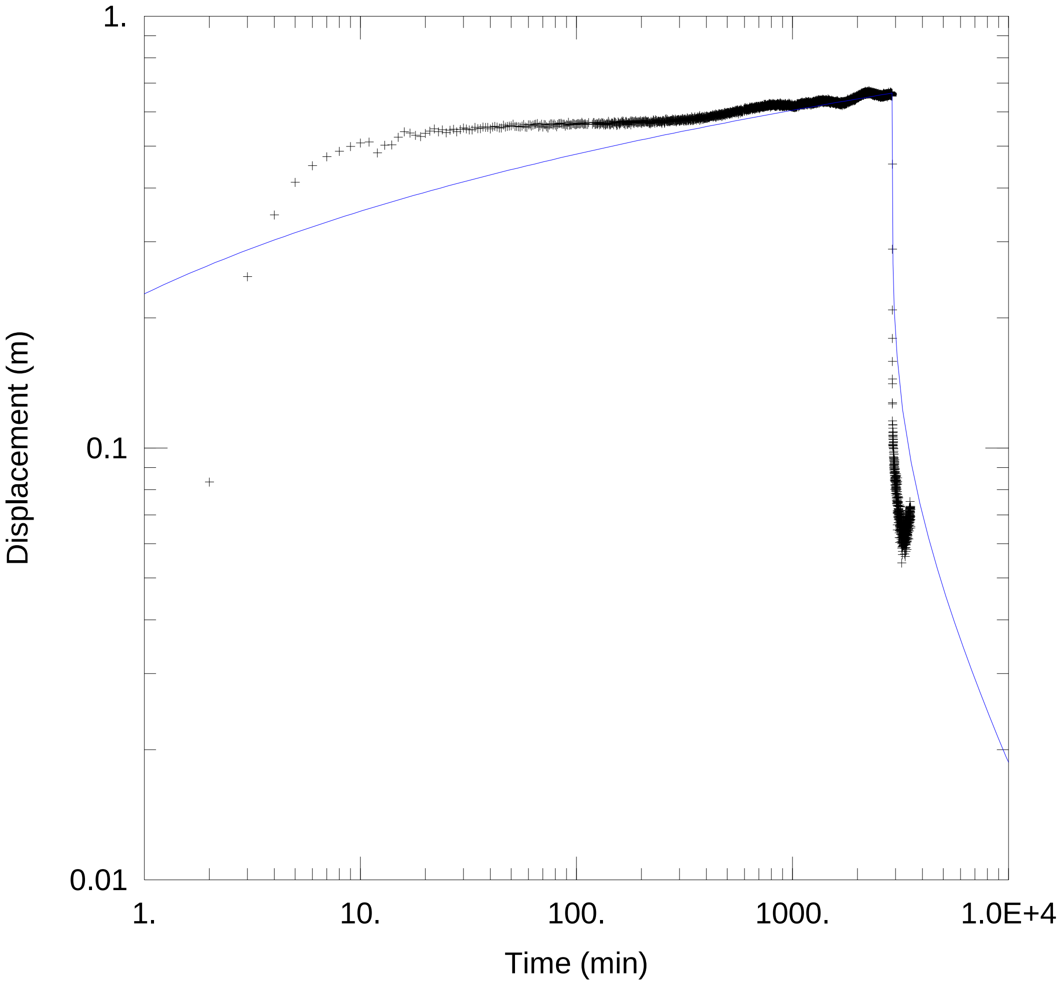
Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-03-cor	16.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 5824.8 m^2/day
S/S' = 0.5857



WELL TEST ANALYSIS

Data Set: I:\...\Delta03.aqt
Date: 02/20/12 Time: 16:55:48

PROJECT INFORMATION

Company: WP
Client: FMS
Location: Delta
Test Well: Delta Production

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Dlt-Prod	0	0

Observation Wells

Well Name	X (m)	Y (m)
+ Dlt-Obs-03-cor	16.7	0

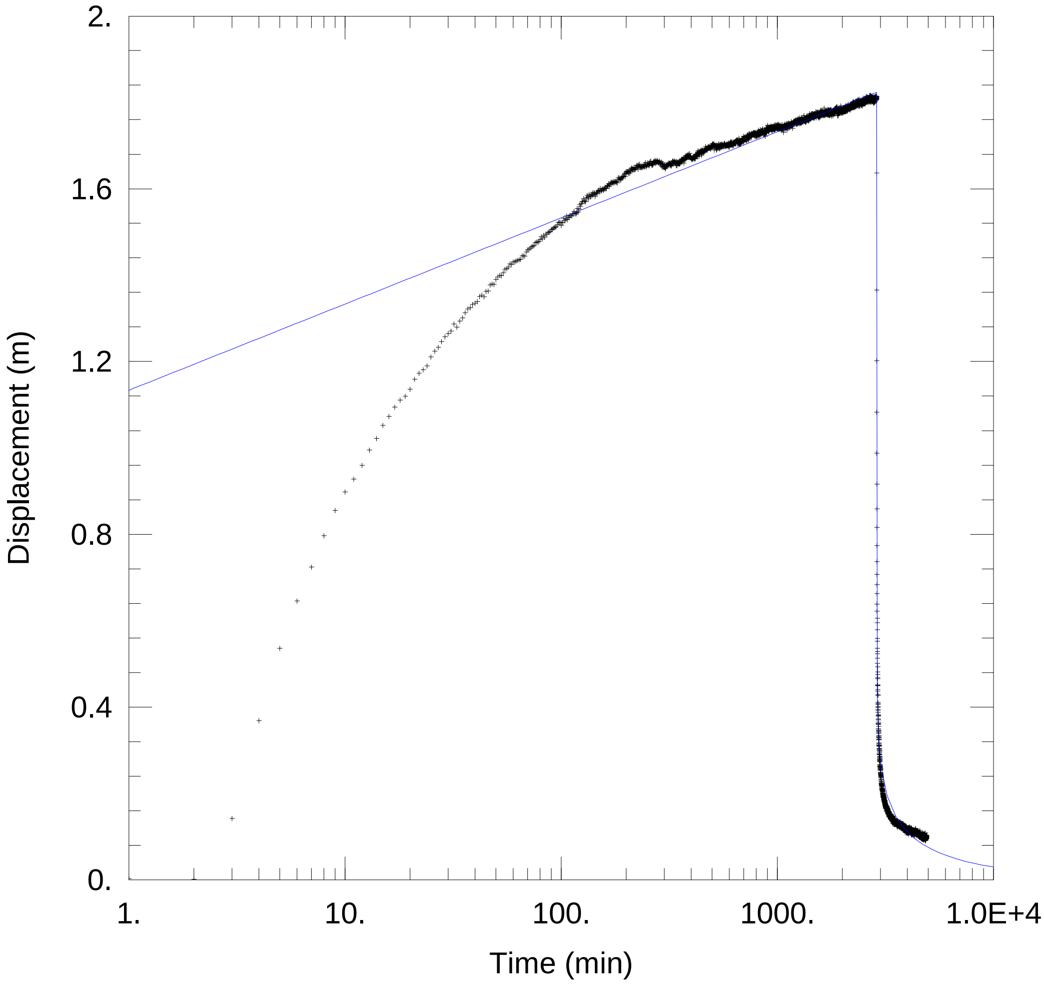
SOLUTION

Aquifer Model: Confined

Solution Method: Theis

T = 2513.2 m^2/day
Kz/Kr = 1.

S = 0.0002226
b = 40. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp04s.aqt
Date: 02/20/12 Time: 16:00:39

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

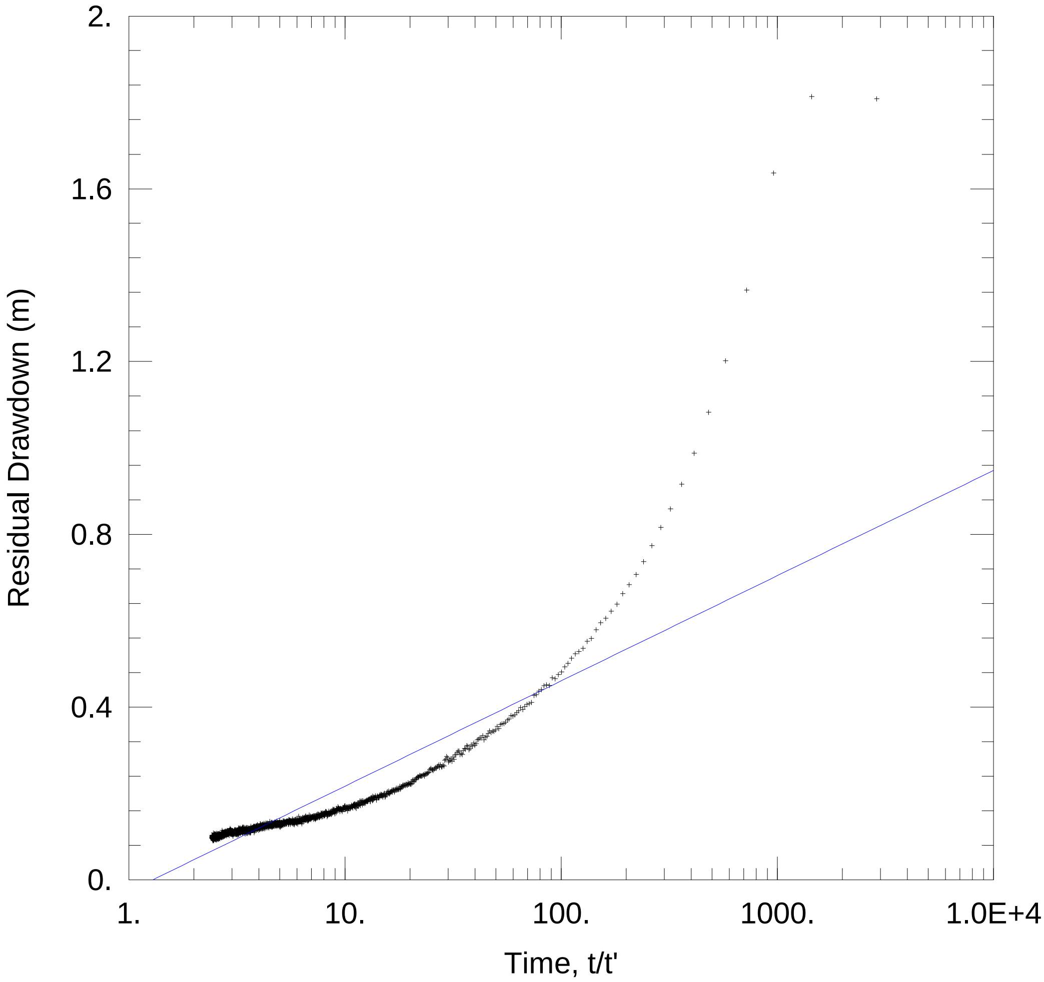
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04s	14.06	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 2221.7 m^2/day
S = 3.662E-8
Kz/Kr = 1.
b = 52. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp04s.aqt
Date: 02/20/12 Time: 16:03:24

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

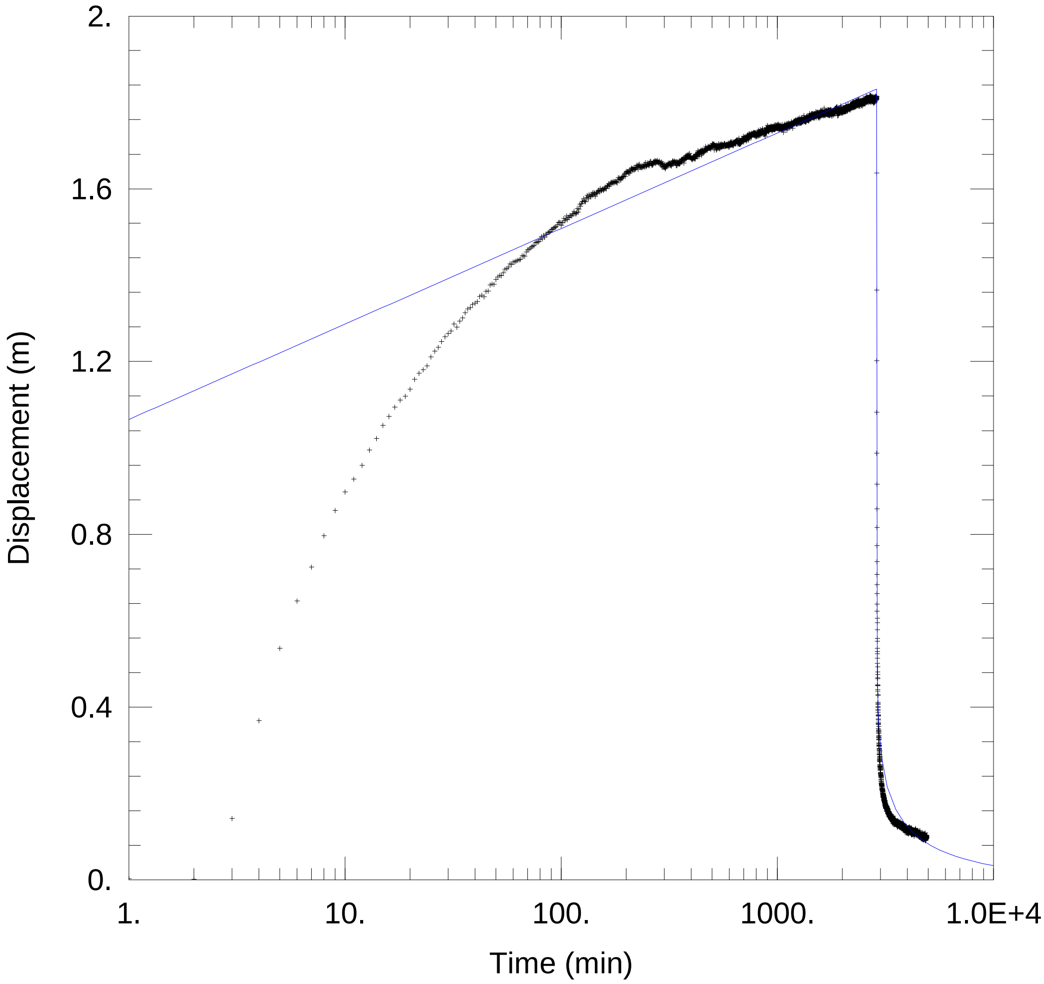
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04s	14.06	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 1818.9 m^2/day
S/S' = 1.295



WELL TEST ANALYSIS

Data Set: I:\...\Chp04s.aqt
Date: 02/20/12
Time: 16:57:29

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

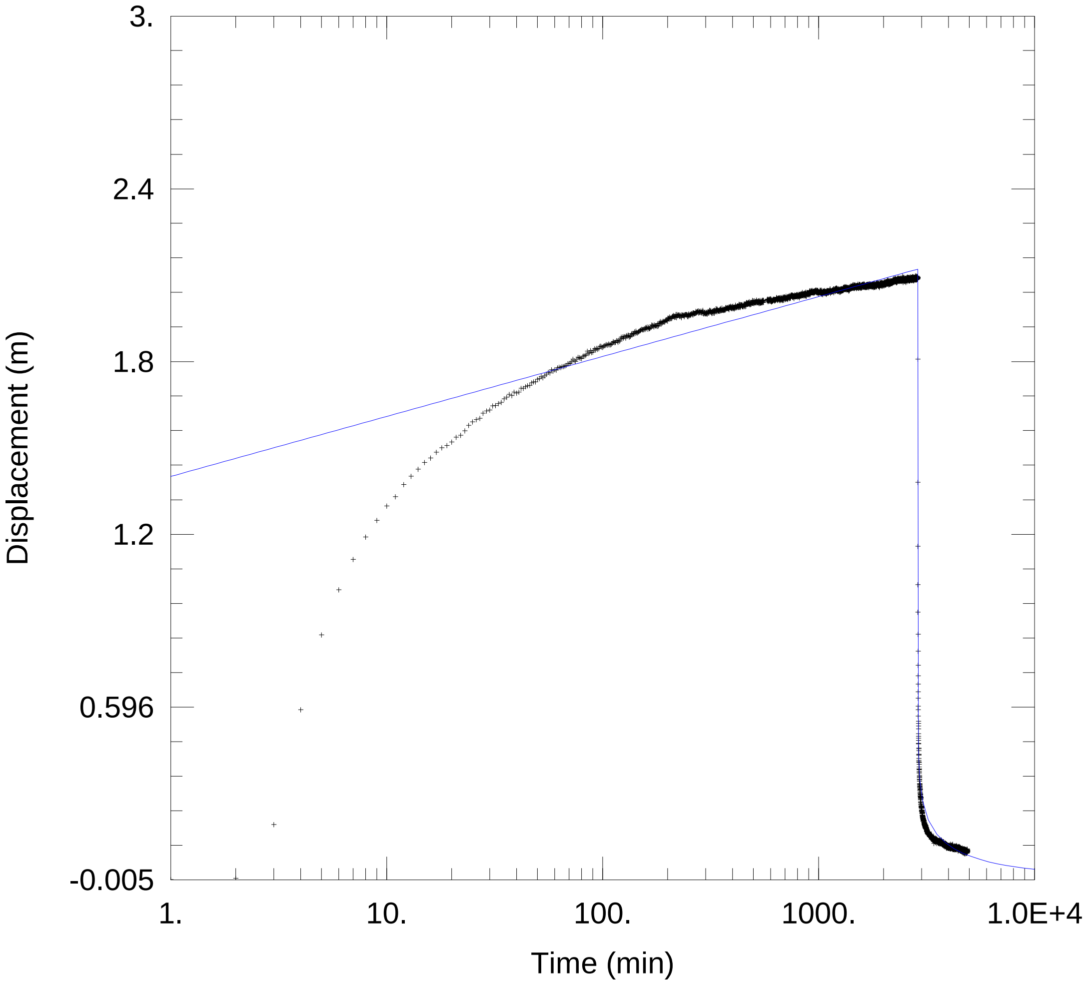
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04s	14.06	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 1000.4 m^2/day
S = 3.662E-8
r/B' = 0.0005644
ß' = 0.5166
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Chp04m.aqt
Date: 02/20/12 Time: 16:01:04

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

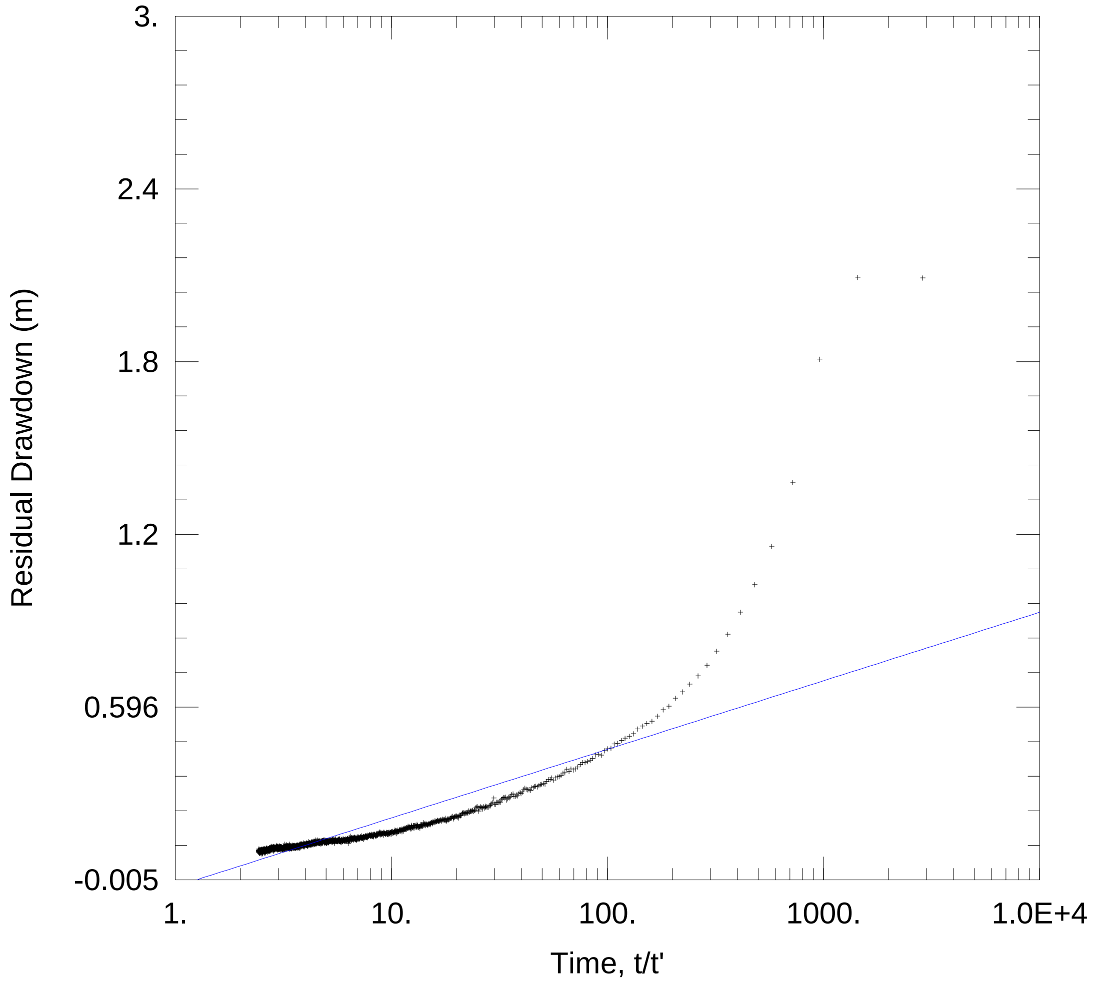
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04m	14.06	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 2125.5 m^2/day
S = 3.318E-9
Kz/Kr = 1.
b = 52. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp04m.aqt
Date: 02/20/12 Time: 16:03:49

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

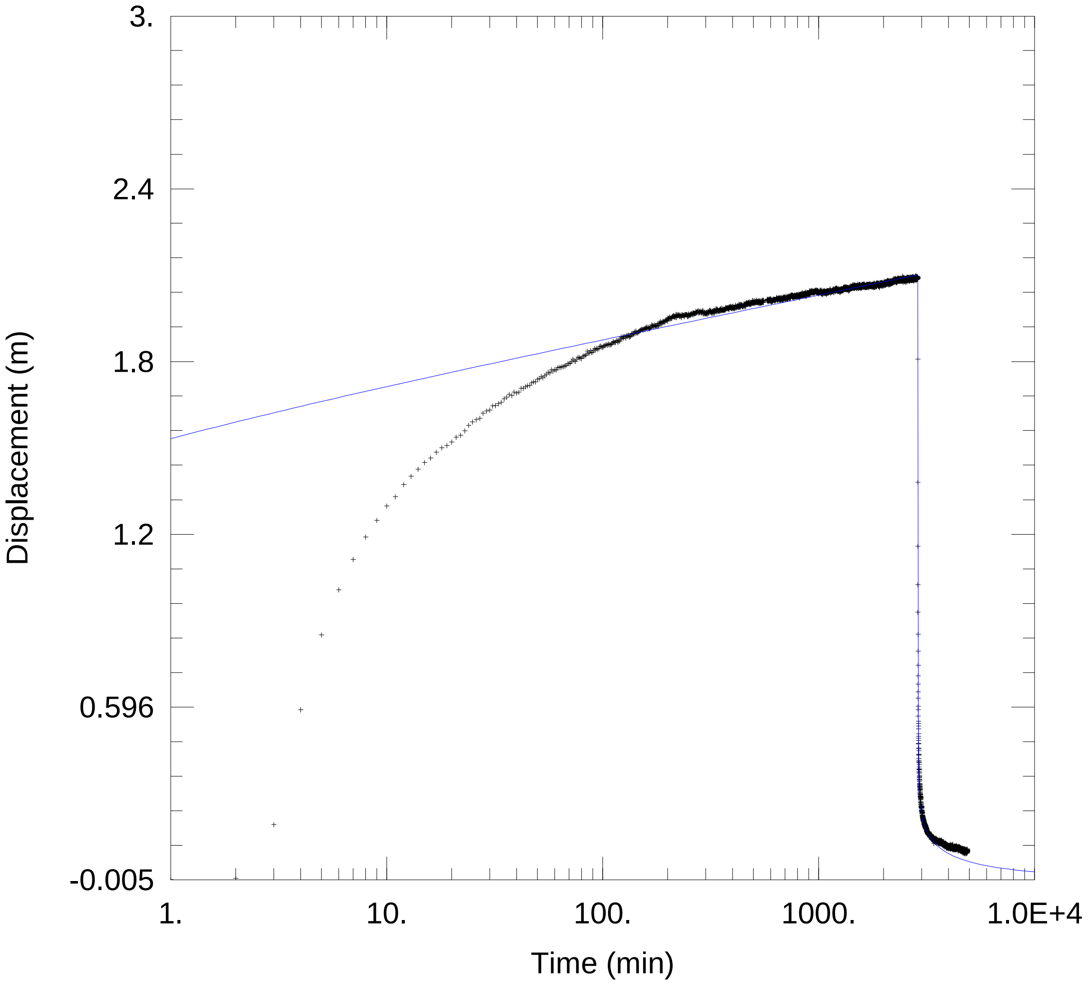
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04m	14.06	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 1858. m^2/day S/S' = 1.323



WELL TEST ANALYSIS

Data Set: I:\...\Chp04m.aqt
Date: 02/20/12
Time: 16:58:33

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

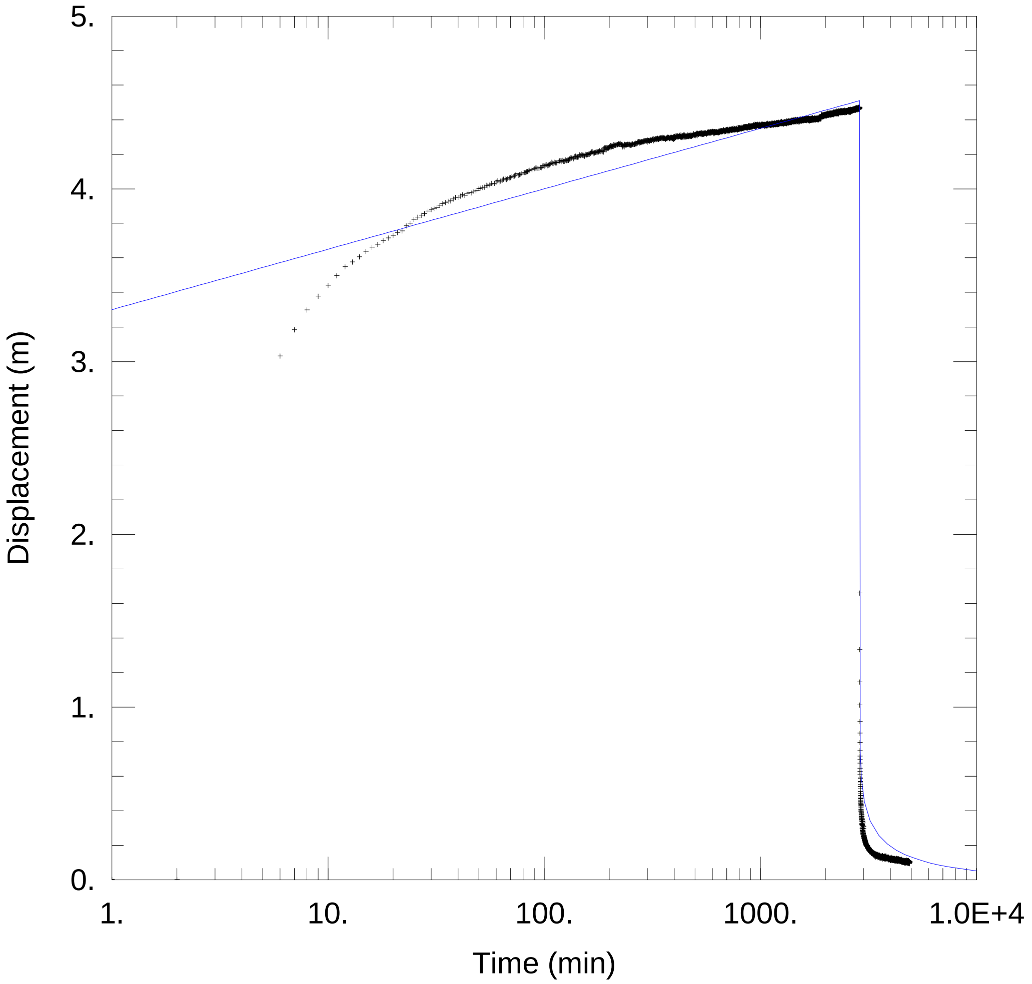
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04m	14.06	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 1449.9 m^2/day
S = 3.662E-8
r/B' = 1.0E-5
ß' = 0.001136
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Chp04d.aqt
Date: 02/20/12
Time: 16:01:21

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

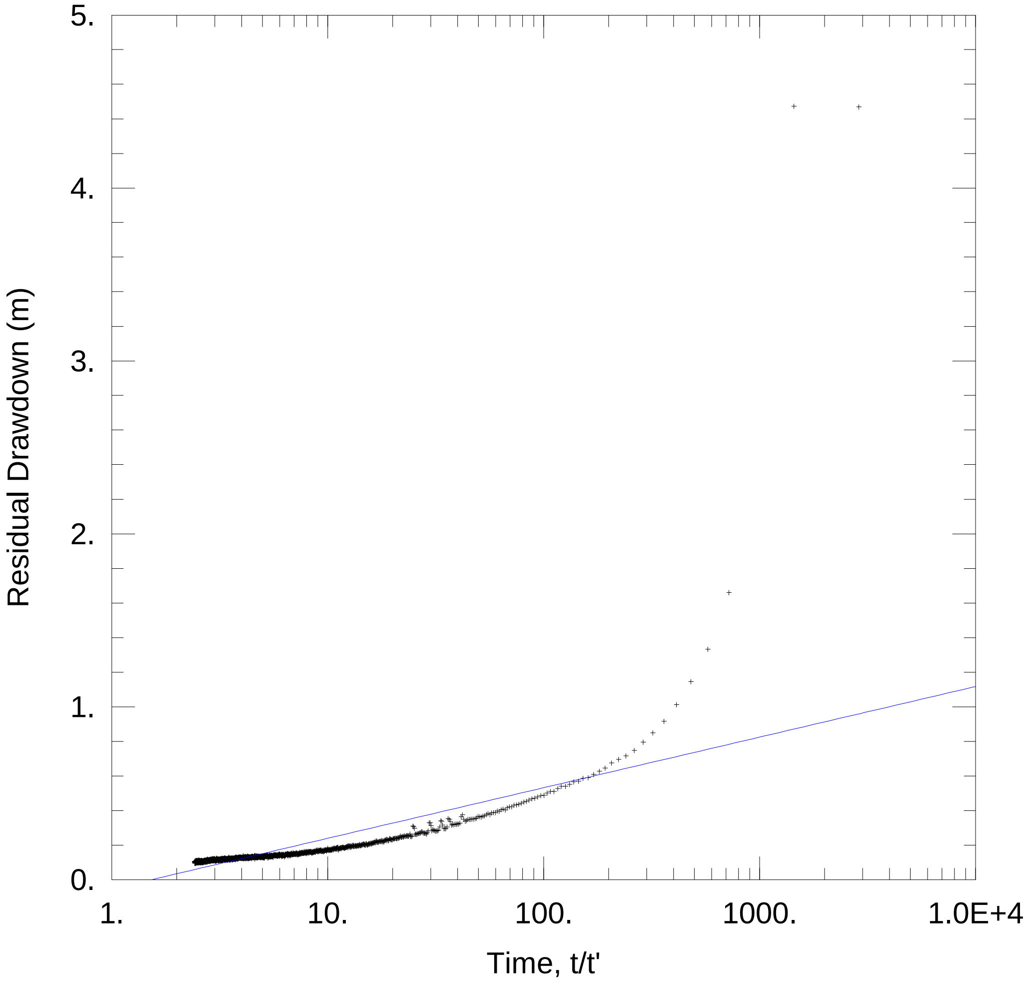
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04d	14.06	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1267.6 m^2/day
S = 3.662E-12
Kz/Kr = 1.
b = 52. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp04d.aqt
Date: 02/20/12
Time: 16:04:03

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

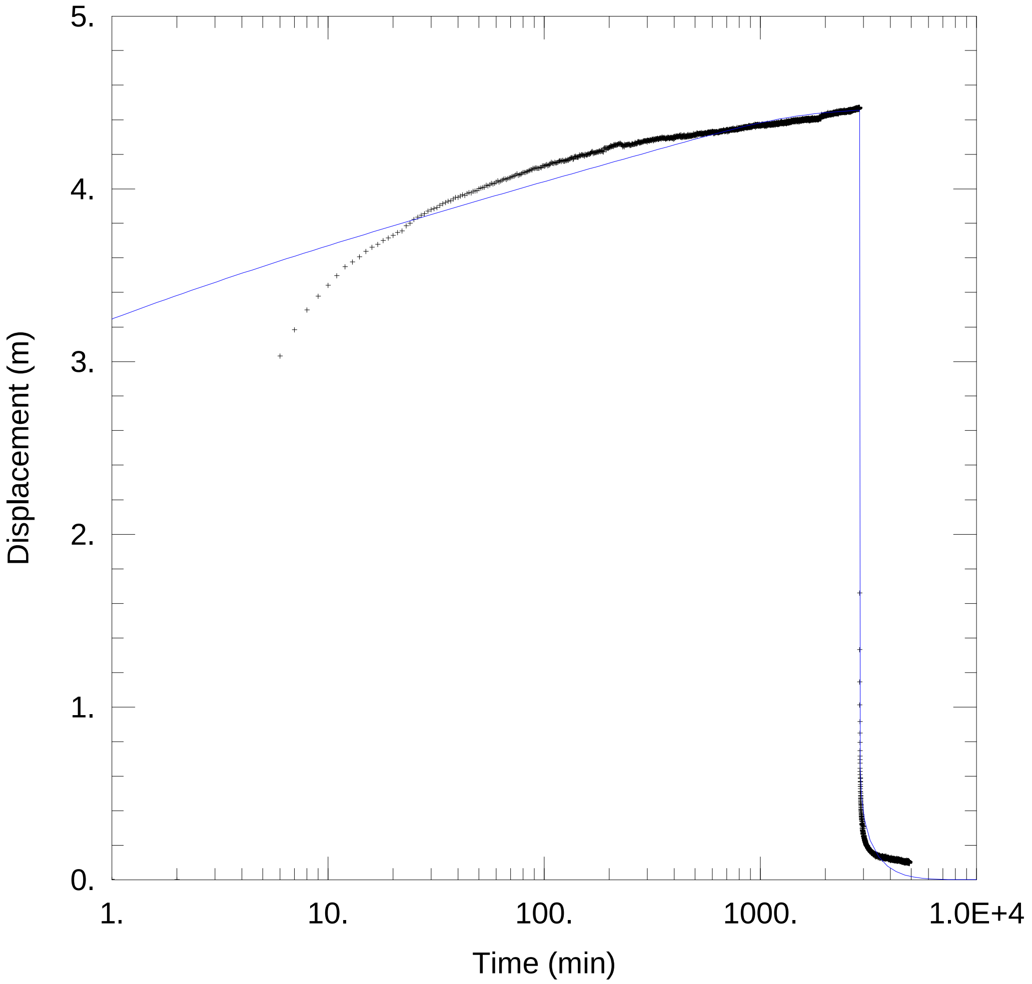
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04d	14.06	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 1514.8 m^2/day
S/S' = 1.534



WELL TEST ANALYSIS

Data Set: I:\...\Chp04d.aqt
Date: 02/20/12 Time: 16:59:46

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

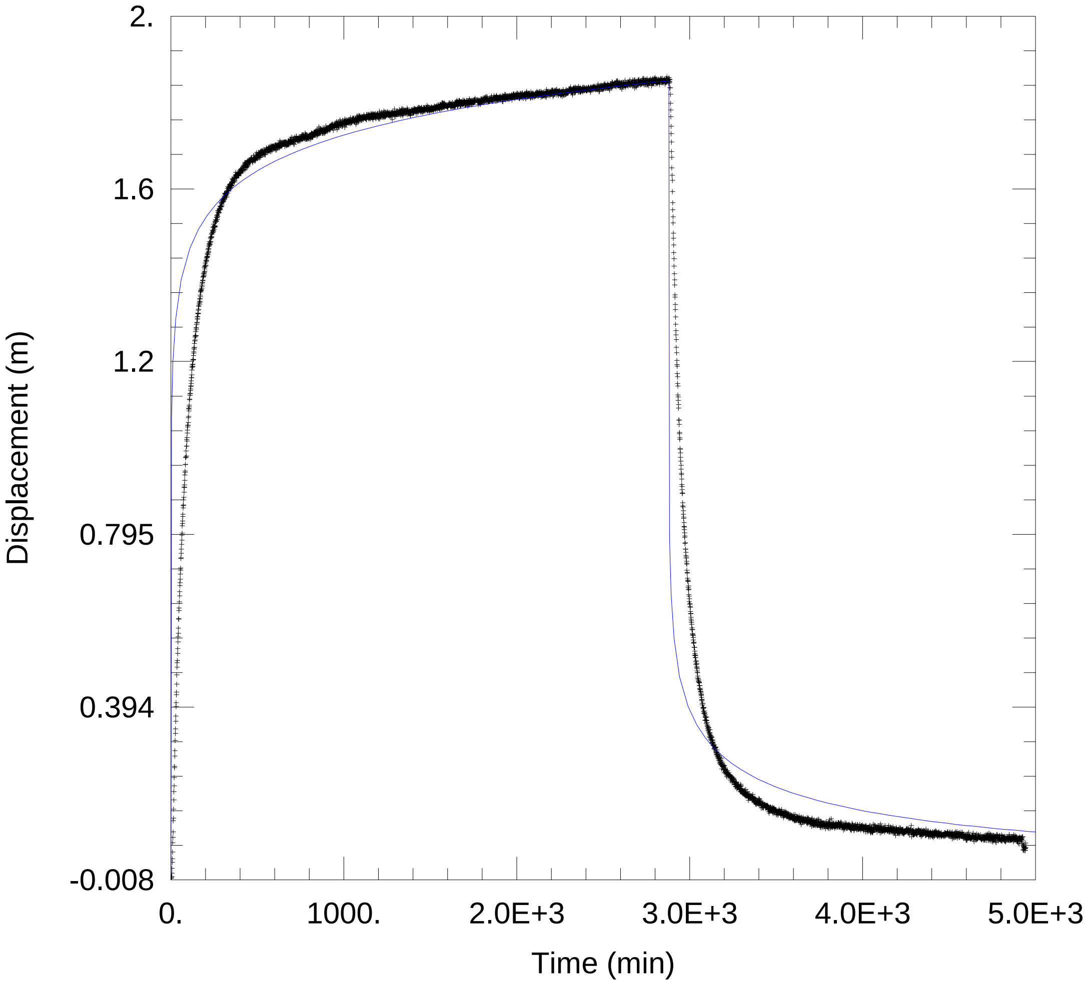
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-04d	14.06	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 647.6 m^2/day
S = 3.662E-8
r/B' = 0.0006181
ß' = 0.001253
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Chp03.aqt
Date: 02/20/12 Time: 16:01:34

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

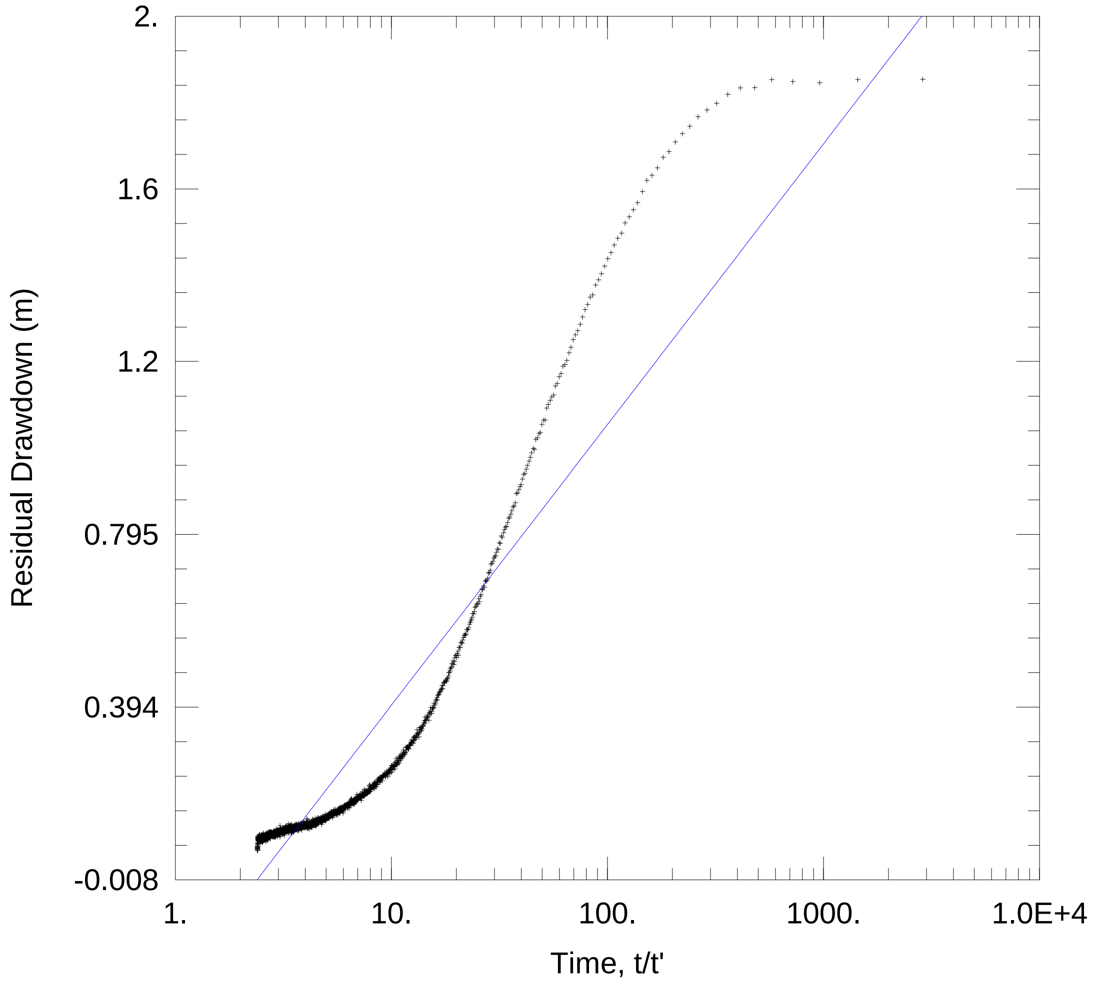
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-03	198.26	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1605.5 m^2/day
S = 3.662E-8
Kz/Kr = 1.
b = 52. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp03.aqt
Date: 02/20/12 Time: 16:04:19

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

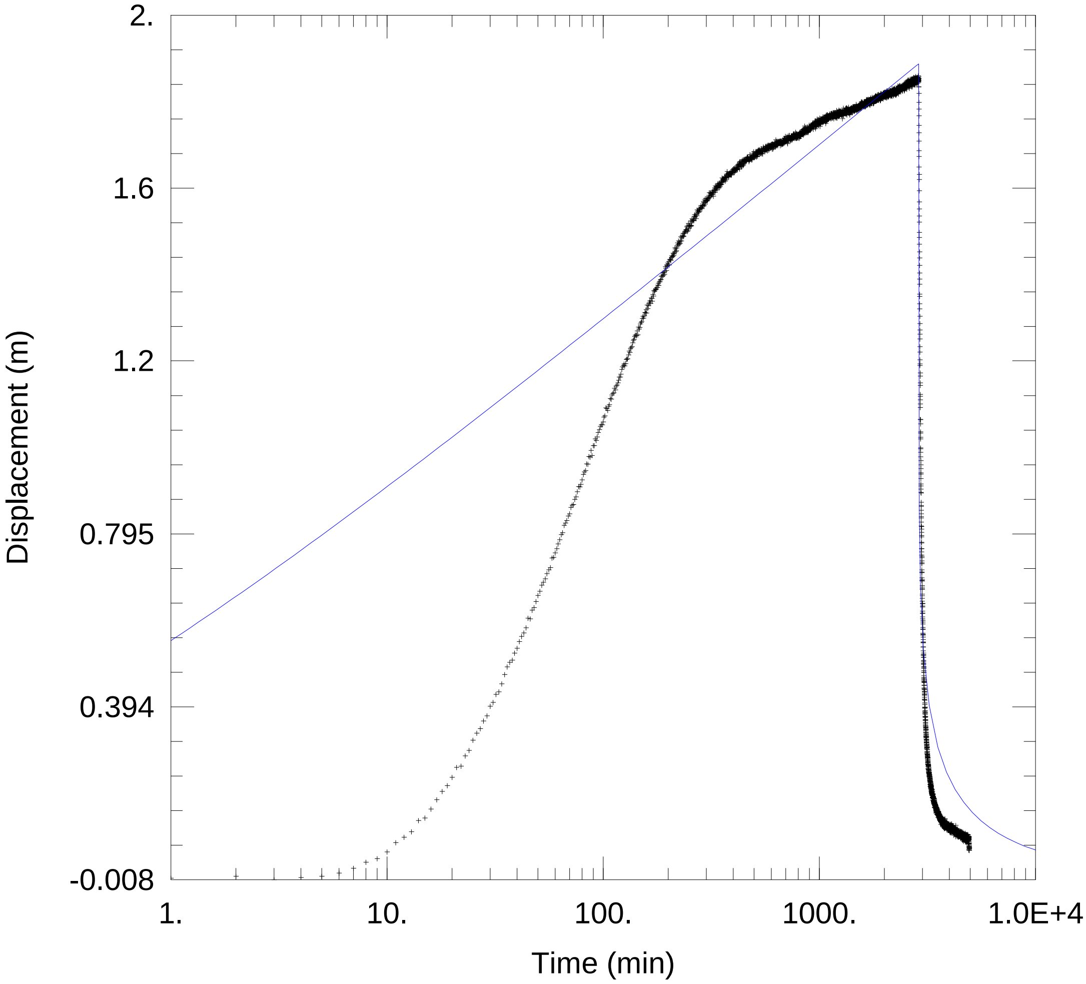
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-03	198.26	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 679.4 m^2/day S/S' = 2.466



WELL TEST ANALYSIS

Data Set: I:\...\Chp03.aqt
Date: 02/20/12 Time: 17:00:39

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

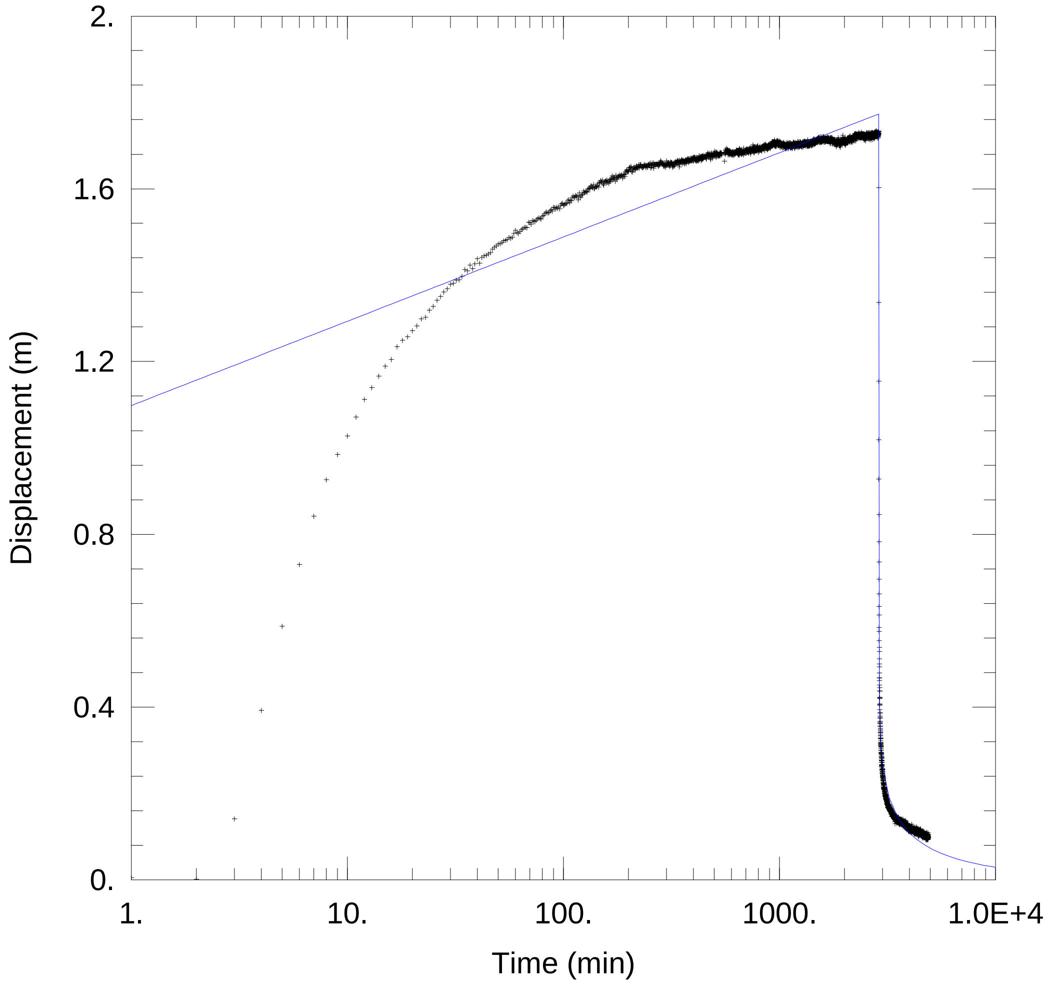
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-03	198.26	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 535.8 m^2/day
S = 3.662E-8
r/B' = 1.0E-5
ß' = 1.923
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Chp02.aqt
Date: 02/20/12
Time: 16:01:48

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

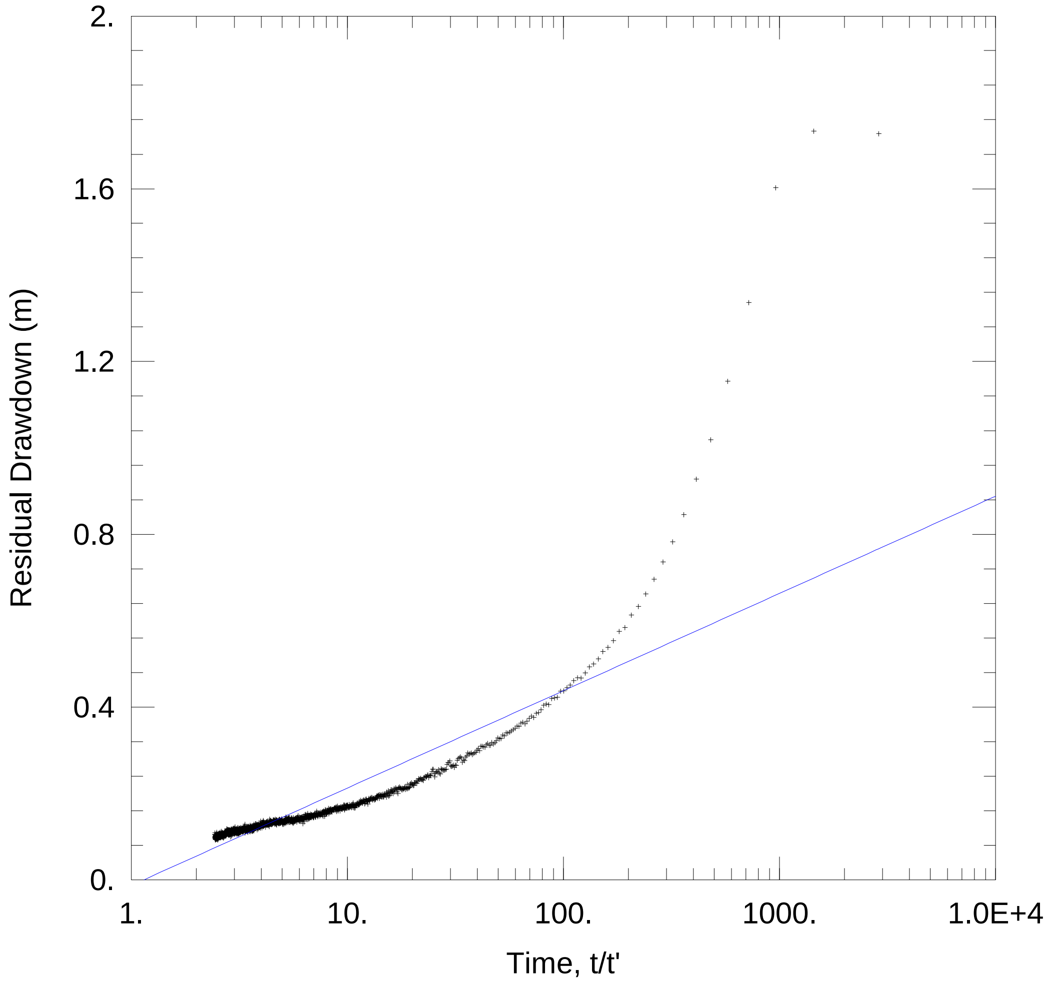
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-02	15.67	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 2271.1 m^2/day
S = 3.424E-8
Kz/Kr = 1.
b = 52. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp02.aqt
Date: 02/20/12 Time: 16:04:34

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

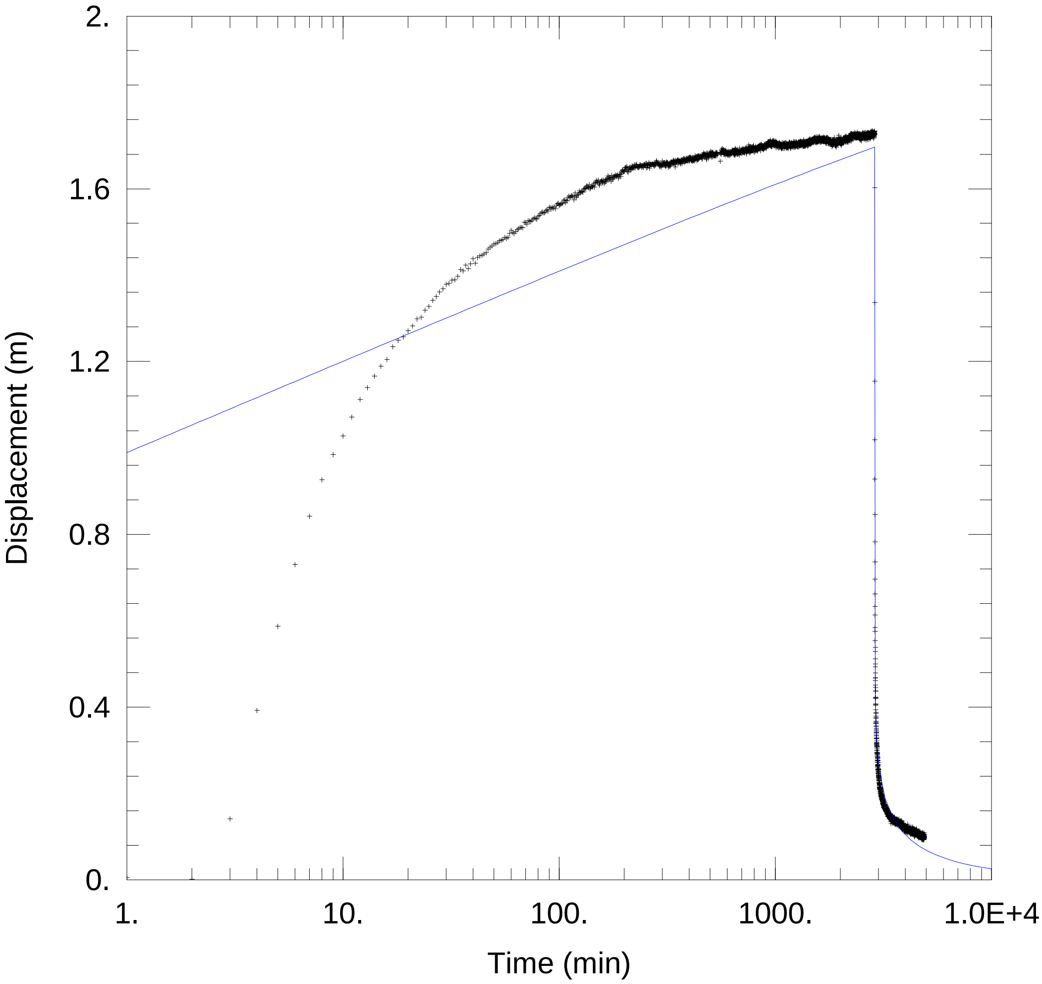
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-02	15.67	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 1967.5 m^2/day
S/S' = 1.147



WELL TEST ANALYSIS

Data Set: I:\...\Chp02.aqt
Date: 02/20/12
Time: 17:04:34

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 30. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

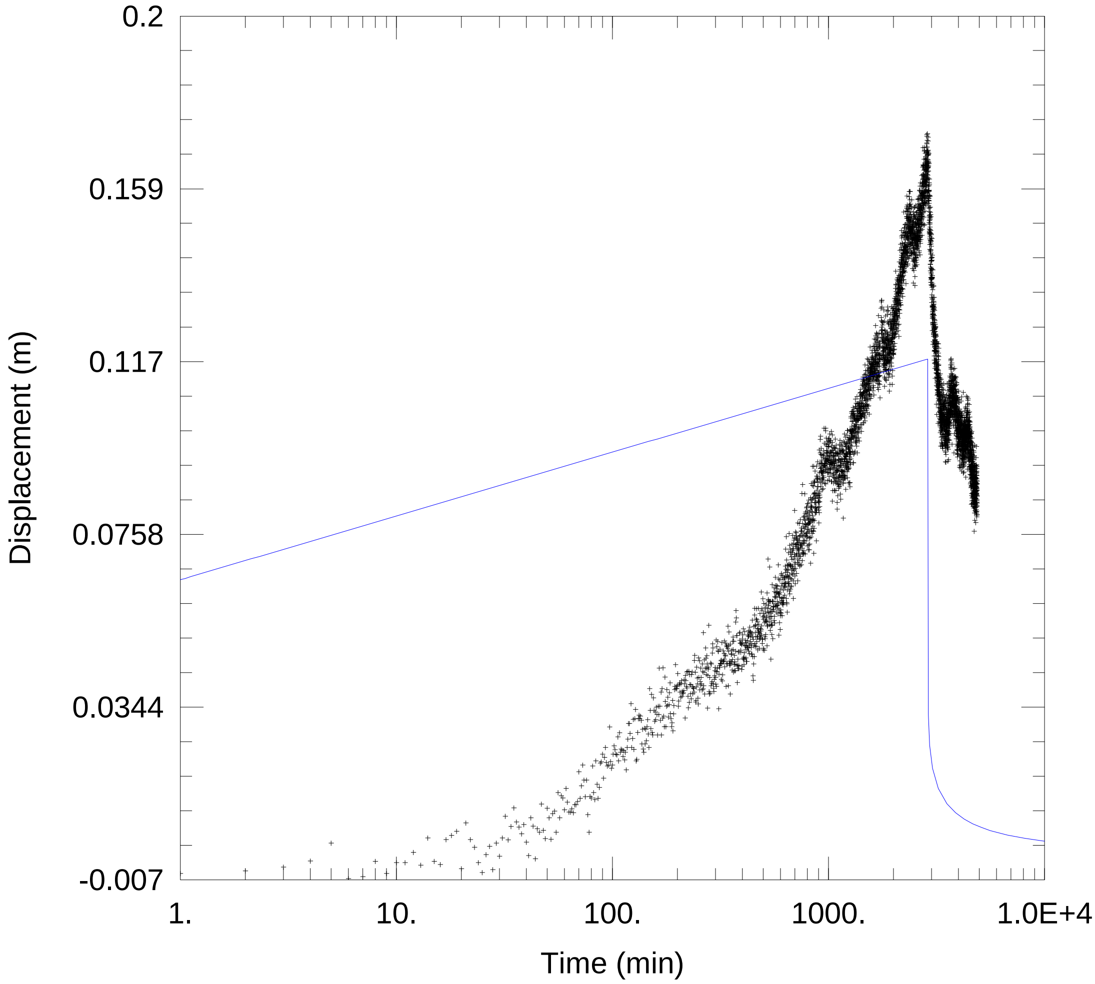
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-02	15.67	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 2085.8 m^2/day
S = 2.924E-7
r/B' = 1.18E-5
ß' = 1.0E-5
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Chp01.aqt
Date: 02/20/12 Time: 16:02:12

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

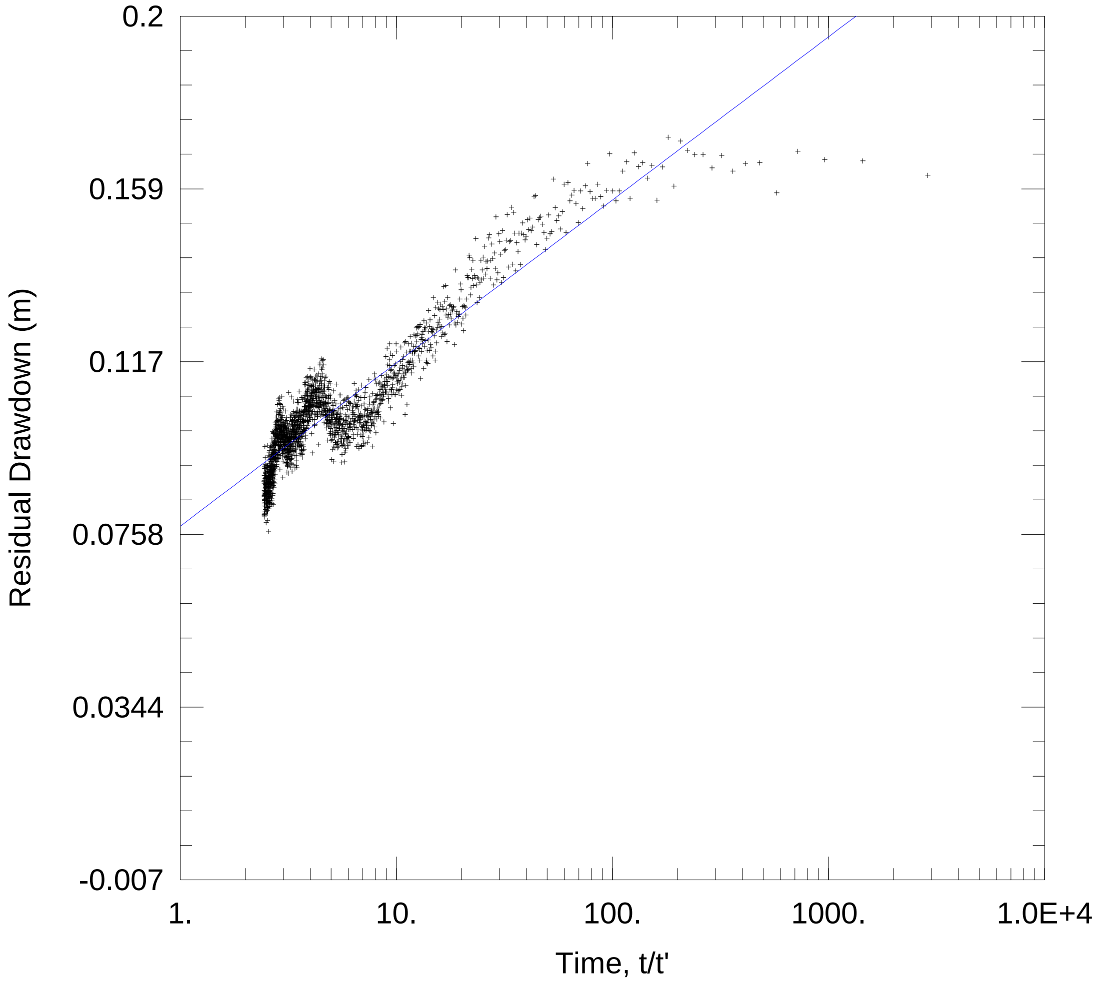
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-01	265.88	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 2.899E+4 m^2/day
S = 3.662E-8
Kz/Kr = 1.
b = 52. m



WELL TEST ANALYSIS

Data Set: I:\...\Chp01.aqt
Date: 02/20/12 Time: 16:04:55

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

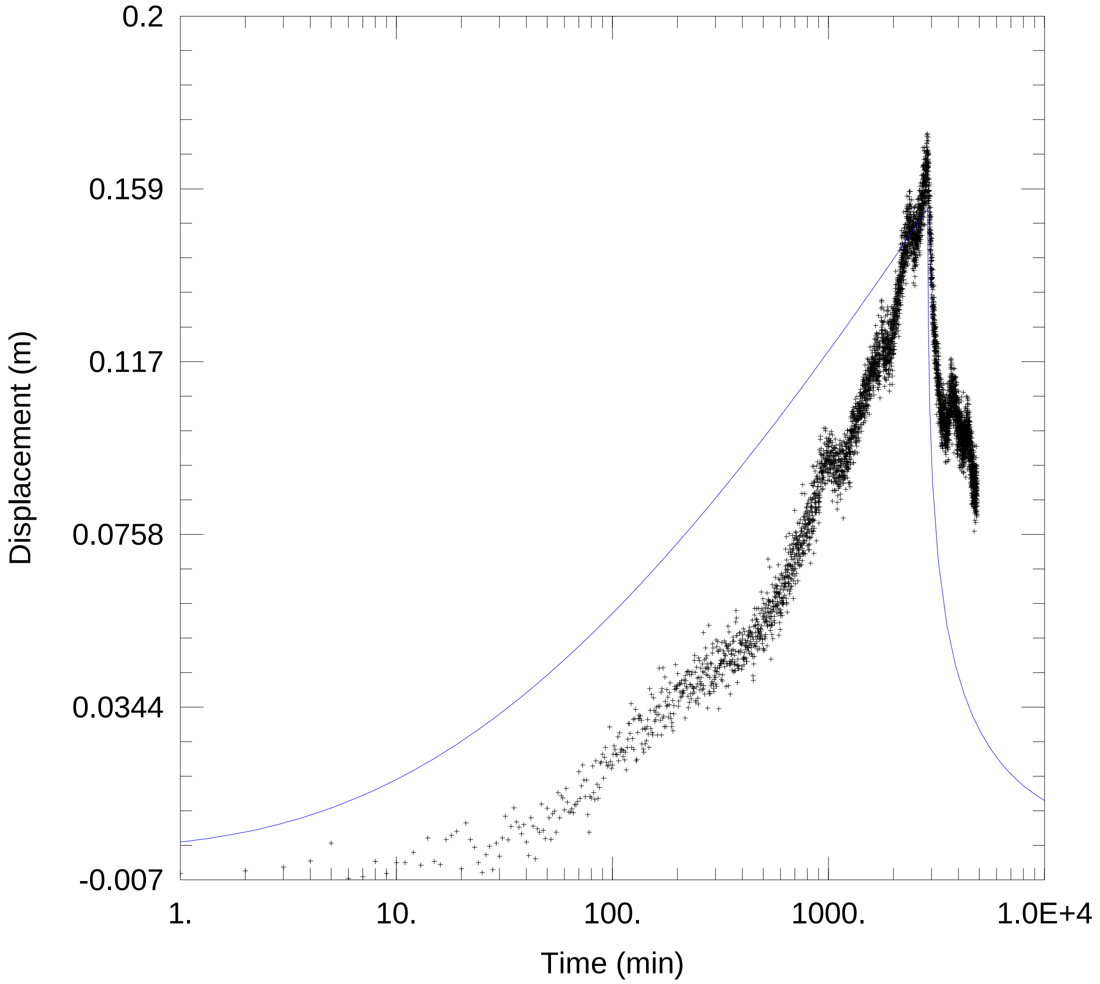
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-01	265.88	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 1.135E+4 m^2/day S/S' = 0.01026



WELL TEST ANALYSIS

Data Set: I:\...\Chp01.aqt
Date: 02/20/12
Time: 17:07:55

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: Champion
Test Well: Champion Production
Test Date: 28/11/2011

AQUIFER DATA

Saturated Thickness: 52. m
Aquitard Thickness (b'): 30. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Champion Production	0	0

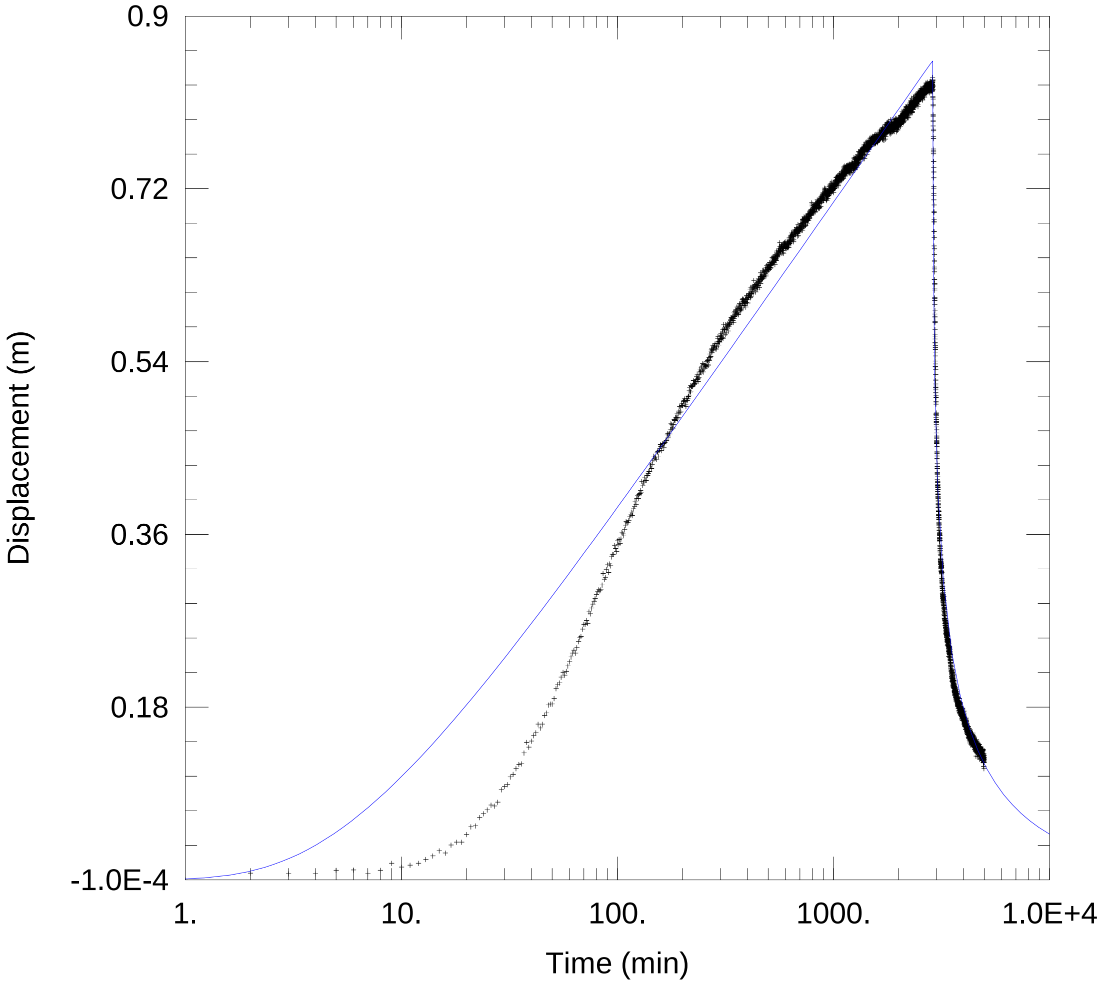
Observation Wells

Well Name	X (m)	Y (m)
+ Chp-01	265.88	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 2483.2 m^2/day
r/B' = 1.0E-5
r/B" = 0.
S = 3.346E-6
ß' = 10.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04s.aqt

Date: 02/20/12 Time: 16:38:14

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

Observation Wells

Well Name	X (m)	Y (m)
+ O4s	13.9	0

SOLUTION

Aquifer Model: Confined

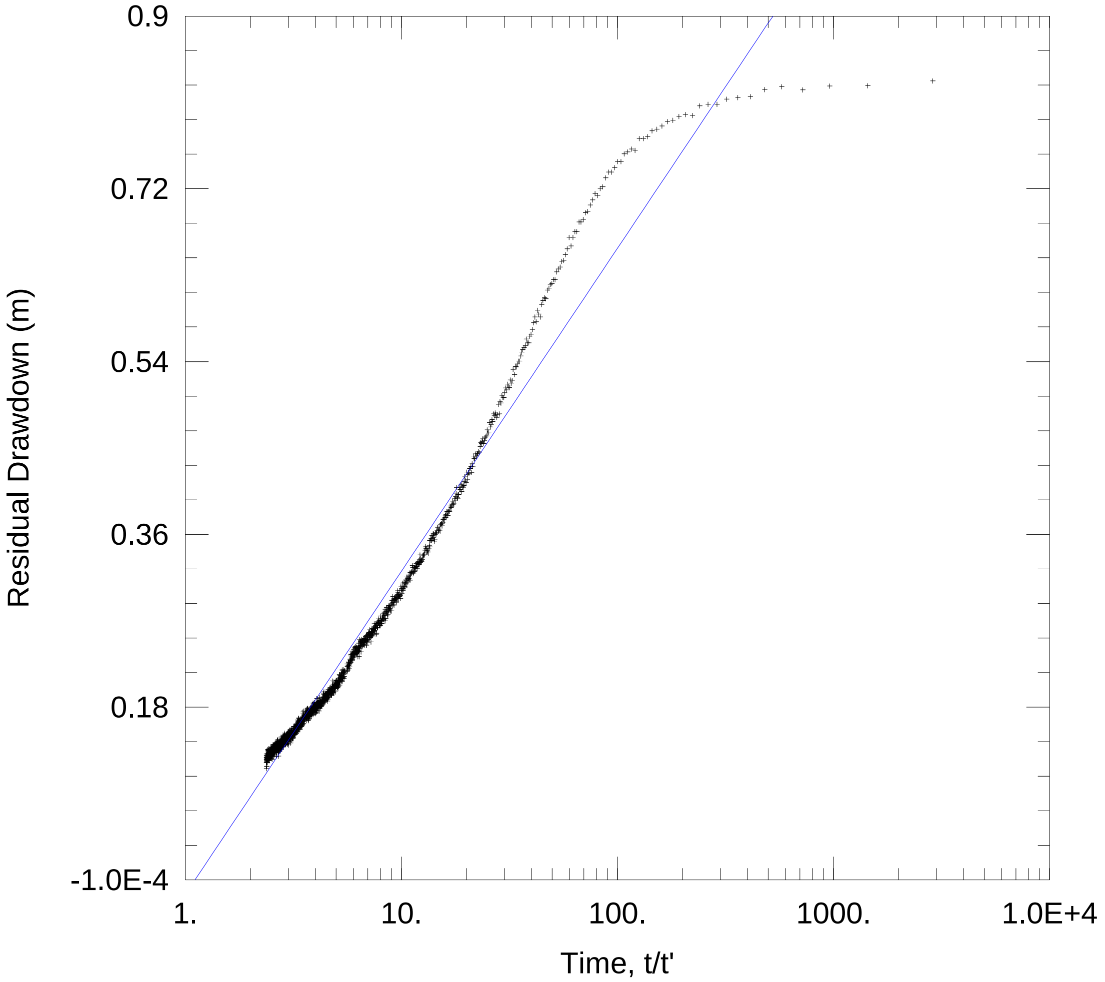
Solution Method: Theis

T = 1472.9 m^2/day

S = 0.07742

Kz/Kr = 1.

b = 58. m



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04s.aqt
Date: 02/20/12 Time: 16:42:09

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

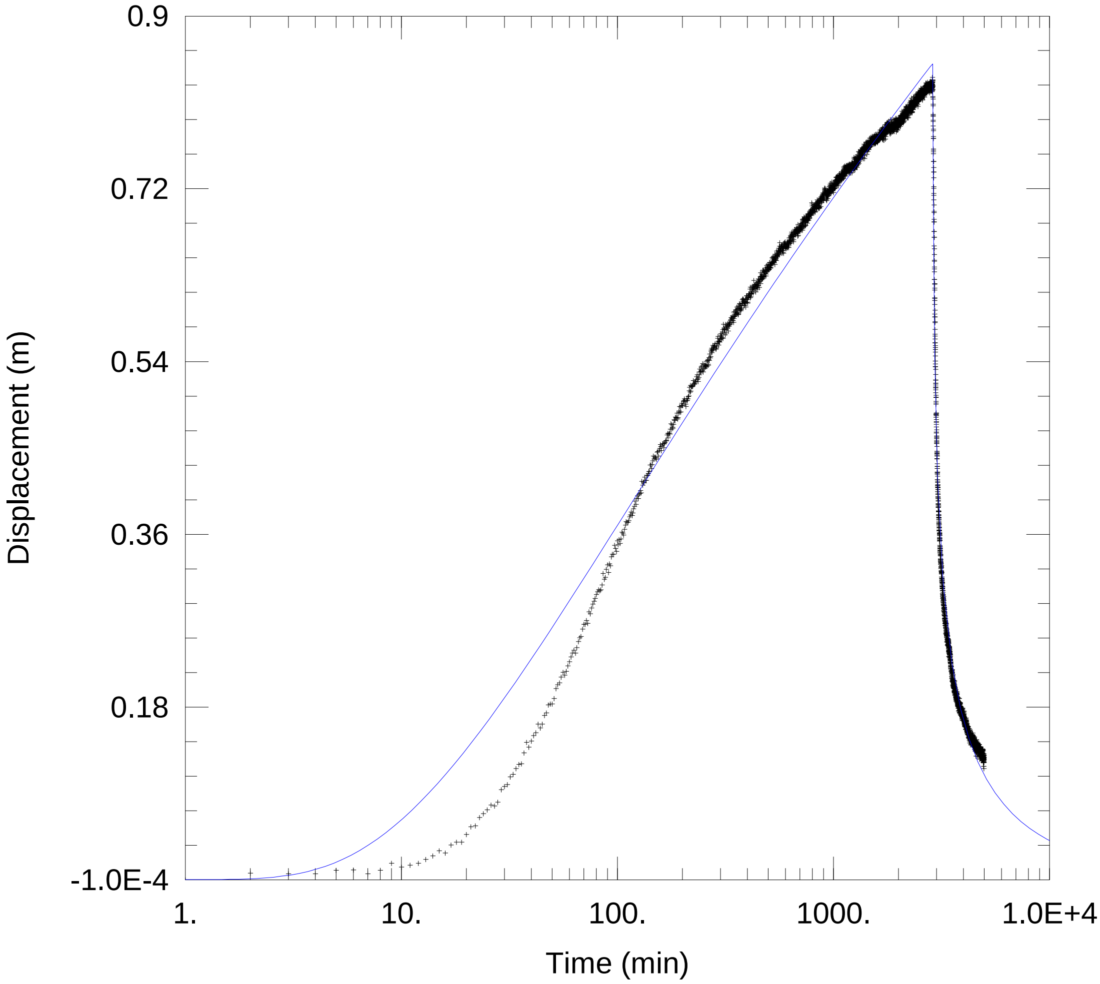
Observation Wells

Well Name	X (m)	Y (m)
+ O4s	13.9	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 1411.3 m^2/day
S/S' = 1.113



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04s.aqt

Date: 02/20/12 Time: 16:45:35

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b'): 1. m
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

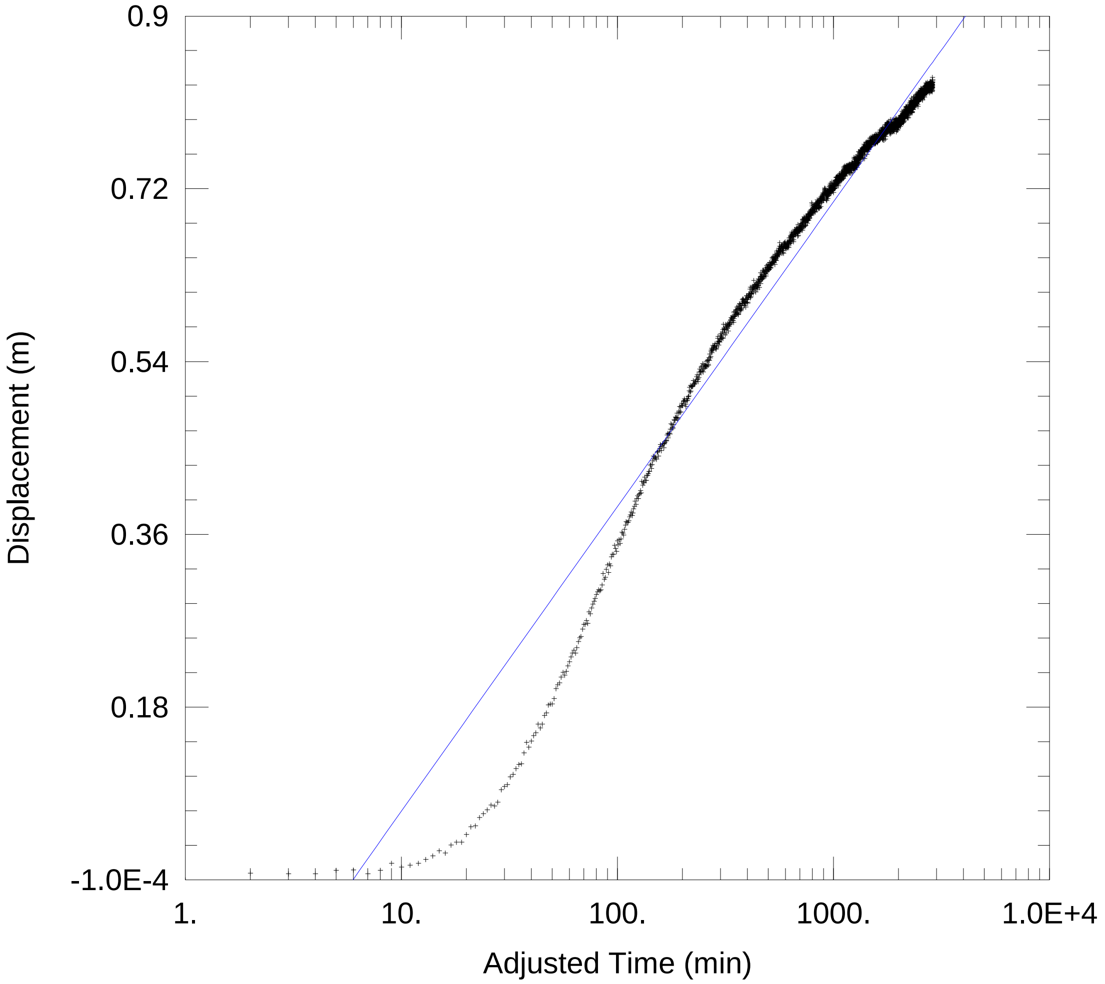
Observation Wells

Well Name	X (m)	Y (m)
+ O4s	13.9	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 948.3 m^2/day
S = 0.1038
r/B' = 1.0E-5
ß' = 0.06866
r/B" = 0.
ß" = 0.



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04s.aqt
Date: 02/20/12 Time: 16:44:42

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

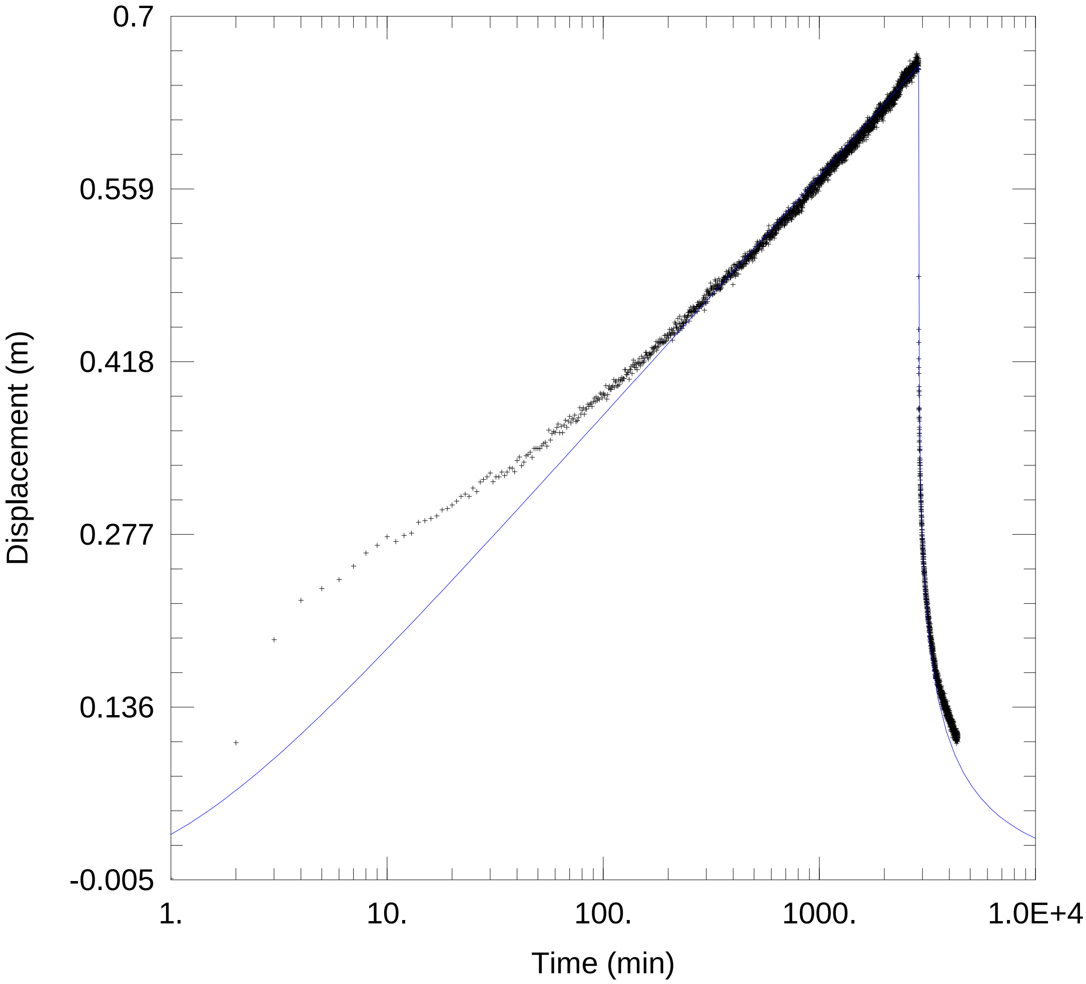
Observation Wells

Well Name	X (m)	Y (m)
+ O4s	13.9	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 1495.8 m^2/day S = 0.07223



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04m.aqt
Date: 02/20/12 Time: 16:38:33

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

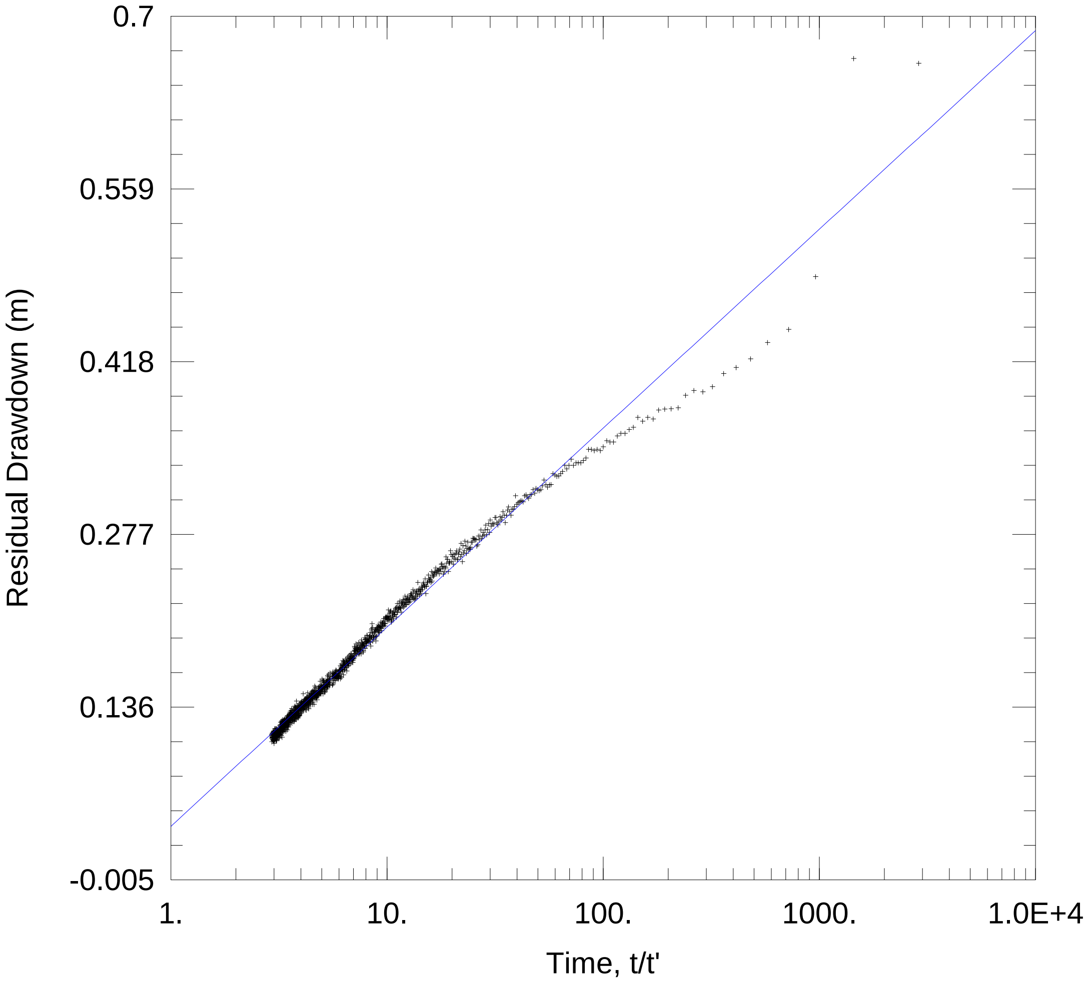
Observation Wells

Well Name	X (m)	Y (m)
+ O4m	13.9	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 2424.3 m^2/day
S = 0.02433
Kz/Kr = 1.
b = 58. m



WELL TEST ANALYSIS

Data Set: I:\...\Eagle04m.aqt

Date: 02/20/12

Time: 16:42:29

PROJECT INFORMATION

Company: WP
Client: FMS
Project: 201012-00322
Location: EAGLE
Test Well: EAGLE
Test Date: 28NOV2011

AQUIFER DATA

Saturated Thickness: 58. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Eagle Production	0	0

Observation Wells

Well Name	X (m)	Y (m)
+ O4m	13.9	0

SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 2924.5 m^2/day

S/S' = 0.5797

Appendix 5: Water Levels

Measured Water Levels

Deposit	Hole-ID	Northing	Easting	Date	RL (Height of GL)/ToC	SWL (mbgl)	RWL	EOH
DELTA	HPRC0203	7551864.5	551737.1	8/9/2008	556.1	50.00	506.14	
DELTA	HPRC0204	7552035.5	551624.2	11/9/2008	554.3	52.00	502.33	
DELTA	HPRC0205	7552199.1	551515.2	13/9/2008	551.0	30.00	520.96	
DELTA	HPRC0206	7552360.1	551403.7	13/9/2008	548.3	30.00	518.26	
DELTA	HPRC0208	7552693.1	551184.1	14/9/2008	545.4	40.00	505.41	
DELTA	HPRC0240	7551476.5	550185.3	10/10/2008	575.3	46.00	529.26	
DELTA	HPRC0216	7552257.5	550278.3	5/12/2008	557.0	32.00	525.03	
DELTA	HPRC0209	7552865.5	551070.9	7/12/2008	544.9	48.00	496.85	
DELTA	HPDD0007	7552862.6	551073.2	7/9/2009	544.8	40.40	504.44	
DELTA	HPDD0008	7553436.7	550669.7	7/9/2009	561.4	52.80	508.64	
DELTA	HPRC0205	7552199.1	551515.2	Jul-09	551.0	44.97	505.99	
DELTA	HPRC0208	7552693.1	551184.1	Jul-09	545.4	38.70	506.71	
DELTA	HPRC0208A	7552695.4	551169.5	Jul-09	545.4	43.70	501.68	
DELTA	HPRC0209	7552865.5	551070.9	Jul-09	544.9	42.00	502.85	
DELTA	HPRC0211	7553184.7	550842.8	Jul-09	557.4	54.94	502.50	
DELTA	HPRC0216	7552257.5	550278.3	Jul-09	557.0	50.24	506.79	
DELTA	HPRC0219	7550656.7	550147.7	Jul-09	581.4	39.51	541.93	
DELTA	HPRC0222	7551856.0	549342.1	Jul-09	572.1	53.64	518.45	
DELTA	HPRC0224	7551534.9	551422.2	Jul-09	565.0	46.91	518.05	
DELTA	HPRC0226	7552191.1	550979.4	Jul-09	554.4	49.58	504.84	
DELTA	HPRC0227	7552517.5	550746.3	Jul-09	551.0	47.70	503.33	
DELTA	HPRC0232	7552051.3	549777.7	Jul-09	564.7	51.24	513.43	
DELTA	HPRC0234	7551703.7	548842.3	Jul-09	580.9	40.59	540.36	
DELTA	HPRC0238	7551151.9	550391.8	Jul-09	571.2	38.57	532.61	
DELTA	HPRC0240	7551476.5	550185.3	Jul-09	575.3	44.69	530.57	
DELTA	HPRC0242	7550311.3	549806.0	Jul-09	592.3	17.87	574.41	
DELTA	HPRC0243	7550490.4	549698.6	Jul-09	588.1	21.46	566.66	
DELTA	HPRC0247	7551930.5	551138.7	Jul-09	555.0	49.32	505.73	
DELTA	HPRC0248	7552030.8	551093.6	Jul-09	554.2	49.04	505.19	
DELTA	HPRC0249A	7552089.5	551045.8	Jul-09	554.0	26.57	527.41	
DELTA	HPRC0250	7552322.2	550848.1	Jul-09	551.3	47.12	504.15	
DELTA	HPRC0251	7552667.6	550639.3	Jul-09	551.1	47.94	503.16	
DELTA	HPRC0252	7550410.7	549757.8	Jul-09	589.1	22.42	566.73	
DELTA	HPRC0254	7551085.1	550446.7	Jul-09	571.9	34.09	537.79	
DELTA	HPRC0255	7551249.0	550354.6	Jul-09	570.5	32.94	537.60	
DELTA	HPRC0256	7551638.9	550738.4	Jul-09	561.9	42.69	519.18	
DELTA	HPRC0258	7551627.6	548913.2	Jul-09	580.9	39.81	541.08	
DELTA	HPRC0264	7551974.9	549831.3	Jul-09	564.3	41.56	522.74	
DELTA	HPRC0266	7552367.7	550244.9	Jul-09	558.9	52.74	506.18	
DELTA	HPRC0267	7552501.9	550120.0	Jul-09	561.4	56.98	504.42	
Delta	HPRC0257	7551785.8	550626.0	14/04/2011	560.9	36.01	524.88	
Delta	HPRC2050	7552578.4	550349.8	14/04/2011	556.6	57.82	498.75	
DELTA	HPRC2054	7553025.0	550651.9	14/04/2011	557.8	14.39	543.43	
Delta	HPRC2151	7552609.4	550795.4	14/04/2011	549.7	47.39	502.32	
Delta	HPRC2174	7553294.2	551060.2	14/04/2011	549.1	47.44	501.68	
DELTA	HPRC2183	7552558.7	551566.5	14/04/2011	547.5	45.24	502.25	
DELTA	HPRC2184	7552635.0	551533.0	14/04/2011	545.7	43.74	501.99	
Delta	HPRC2186	7552797.8	551419.7	14/04/2011	543.6	34.65	508.95	
DELTA	HPRC2187	7552894.1	551350.9	14/04/2011	542.1	40.00	502.10	
Delta	HPRC2194	7552884.2	551181.2	14/04/2011	542.6	41.09	501.51	
Delta	HPRC2238	7552444.6	551053.6	15/04/2011	548.4	46.18	502.26	
DELTA	HPRC3039	7551538.1	551687.6	15/04/2011	565.6	35.45	530.14	
Delta	HPRC0216	550278.2	7552257.5	Nov-11	557.0	29.70	527.34	
Delta	HPRC0269	551507.9	7553095.9	Nov-11	539.6	Dry	Dry	
Delta	HPRC0285	550088.9	7550744.5	Nov-11	579.9	40.22	539.69	
Delta	HPRC2084	548542.3	7551893.9	Nov-11	591.8	64.79	526.99	
Delta	HPRC2094	7552214.0	550764.0	Nov-11	552.3	Dry	Dry	39
Delta	HPRC2118	549487.2	7551828.3	Nov-11	569.9	51.18	518.67	
Delta	HPRC2119	7551888.9	549449.4	Nov-11	570.2	Dry	Dry	54
Delta	HPRC2144	550103.0	7552277.0	Nov-11	559.4	46.82	512.55	
Delta	HPRC2174	551059.2	7553294.1	Nov-11	549.1	47.12	502.00	
Delta	HPRC2240	7552278.5	551168.8	Nov-11	550.8	44.14	506.62	48
Delta	HPRC2242	7552117.4	551280.7	Nov-11	552.4	Dry	Dry	45
Delta	HPRC2249	550720.2	7551836.5	Nov-11	558.0	43.61	514.39	
Delta	HPRC2267	7551540.5	550467.9	Nov-11	564.9	Dry	Dry	14
Delta	HPRC2276	7551390.9	550411.6	Nov-11	567.9	Dry	Dry	15.8
Delta	HPRC2302	550189.6	7550852.4	Nov-11	577.5	23.46	554.00	
Delta	HPRC3019	552339.7	7551490.4	Nov-11	568.5	57.99	510.51	77.5
Delta	HPRC3029	551731.5	7551693.9	Nov-11	561.5	51.99	509.53	
Delta	HPRC3128	7551793.0	549454.0	Nov-11	570.5	Dry	Dry	52
Delta	HPRC3129	7551833.0	549428.0	Nov-11	570.8	Dry	Dry	50

Delta	HPRC3442	7551314.7	550386.6	Nov-11	569.2	Dry	Dry	35
Delta	HPRC3442A	7551309.0	550379.0	Nov-11	569.2	Dry	Dry	38
Delta	HPRC5034	551307.6	7550982.2	Nov-11	577.0	18.68	558.29	
Delta	HPRC5069	7552174.9	550784.7	Nov-11	553.6	Dry	Dry	46
Delta	HPRC5070	7552250.5	550723.1	Nov-11	551.3	57.70	493.64	47.165
Delta	HPRC5203A	7551697.0	551648.0	Nov-11	551.3	Dry	Dry	51
Delta	HPRC5210	551257.3	7552281.9	Nov-11	549.8	45.37	504.40	
Delta	HPRC5225	7551731.7	551706.7	Nov-11	560.2	Dry	Dry	32.4
Delta	HPRC5275	551040.3	7552890.8	Nov-11	546.4	43.74	502.62	
Delta	HPRC5320A	7551638.0	552085.0	Nov-11		Dry	Dry	46
Delta	HPRC5359	552705.3	7551089.4	Nov-11	590.0	23.03	566.97	
Delta	HPRC5366	7551383.0	552494.0	Nov-11	580.0	Dry	Dry	40
Delta	HPRC5376	7551127.0	552753.0	Nov-11	580.0	Dry	Dry	26
Delta	HPRC5377	7551206.0	552696.0	Nov-11	589.0	Dry	Dry	40
Delta	HPRC5384	7551235.0	552747.0	Nov-11	589.0	Dry	Dry	40
Delta	HPRC5386	7551331.0	552685.0	Nov-11	581.0	43.35	537.65	46
Delta	HPRC5387	7551363.0	552661.0	Nov-11	579.0	Dry	Dry	52
Delta	HPRC5394	7551270.0	552786.0	Nov-11	587.0	27.20	559.80	28
Delta	HPRC5395	7551357.0	552729.0	Nov-11	577.0	Dry	Dry	40
Delta	HPRC5396	7551440.0	552678.0	Nov-11	576.0	Dry	Dry	52
Delta	HPRC5397	7551537.0	552619.0	Nov-11	580.0	Dry	Dry	34
Delta	HPRC5398	7551603.0	552558.0	Nov-11	573.0	Dry	Dry	28
Delta	DELTA PROD 1	551424.9	7553228.2	17/11/2011	540.5	39.23	501.30	
Delta	HPRC2118	549487.2	7551828.3	17/11/2011	569.9	51.99	517.86	
Delta	HPRC3019	552339.7	7551490.4	17/11/2011	568.5	58.80	509.70	
Delta	HPRC5034	551307.6	7550982.2	17/11/2011	577.0	52.75	524.22	
Delta	DELTA OBS 1	550922.6	7552536.9	23/11/2011	548.4	45.90	502.49	
Delta	DELTA OBS 2	551237.3	7552861.8	23/11/2011	543.2	41.43	501.81	
Delta	DELTA OBS 3	551411.9	7553238.6	23/11/2011	540.8	39.83	500.99	
Delta	Delta-Obs-4-Deep	551418.4	7553214.2	23/11/2011	540.7	39.34	501.31	
Delta	Delta-Obs-4-Shallow	551418.4	7553214.2	23/11/2011	540.7	39.34	501.31	
Delta	HPRC0216	550278.2	7552257.5	23/11/2011	557.0	Dry	Dry	
Delta	HPRC0269	551507.9	7553095.9	23/11/2011	539.6	27.92	511.66	
Delta	HPRC0284	7551415.2	550227.1	23/11/2011	575.0	65.34	509.71	
Delta	HPRC0285	550088.9	7550744.5	23/11/2011	579.9	41.16	538.76	
Delta	HPRC2144	550103.0	7552277.0	23/11/2011	559.4	48.37	511.00	
Delta	HPRC2174	551059.2	7553294.1	23/11/2011	549.1	48.02	501.10	
Delta	HPRC2249	550720.2	7551836.5	23/11/2011	558.0	44.35	513.64	
Delta	HPRC2302	550189.6	7550852.4	23/11/2011	577.5	26.38	551.08	
Delta	HPRC3029	551731.5	7551693.9	23/11/2011	561.5	52.80	508.72	
Delta	HPRC5210	551257.3	7552281.9	23/11/2011	549.8	20.66	529.11	
Delta	HPRC5275	551040.3	7552890.8	23/11/2011	546.4	46.09	500.27	
Delta	HPRC5359	552705.3	7551089.4	23/11/2011	590.0	44.59	545.42	
Eagle	HPWB0001	39641.0	7548807.6	551499.173	599.9290161	34.00	565.93	37
Eagle	HPRC0004	39650.0	7548198.6	551380.136	588.3519897	39.80	548.55	25.5
Eagle	HPRC0002	39658.0	7547397.6	551391.889	584.6049805	44.90	539.70	71.4
Eagle	HPRC0003	39659.0	7547804.0	551393.828	584.5499878	41.50	543.05	60.5
Eagle	HPRC0008	39661.0	7547403.9	550928.821	589.0689697	48.10	540.97	51.5
Eagle	HPRC0001	39663.0	7546995.3	551396.071	584.1359863	44.00	540.14	83.2
Eagle	HPRC0011	39679.0	7547800.7	550395.621	592.802002	47.00	545.80	74.4
Eagle	HPRC0012	39680.0	7547626.4	550426.547	593.6190186	52.80	540.82	62.5
Eagle	HPRC0013	39683.0	7547396.7	550388.981	593.7589722	57.00	536.76	93.5
Eagle	HPRC0014	39684.0	7547227.8	550426.398	593.4290161	60.00	533.43	74.8
Eagle	HPRC0025	39689.0	7546999.2	548396.201	613.3469849	39.04	574.30	43.5
Eagle	HPRC0026	39690.0	7547185.4	548382.775	613.6309814	37.54	576.09	44.3
Eagle	HPRC0036	39936.0	7548868.1	546781.578	634.960022	47.00	587.96	61.2
Eagle	HPRC0037	39936.0	7549071.2	546858.693	637.0819702	39.70	597.38	98
Eagle	HPRC0040	39936.0	7549368.2	545897.155	648.6450195	28.88	619.77	108
Eagle	HPRC0072	39936.0	7548868.0	547334.655	633.9780273	46.65	587.33	26
Eagle	HPRC0079	39936.0	7549697.2	546591.747	659.8779907	23.20	636.68	106
Eagle	HPRC0080	39936.0	7549320.6	545335.522	659.3270264	52.20	607.13	120
Eagle	HPRC0081	39936.0	7549406.1	545386.982	656.8480225	45.25	611.60	108
Eagle	HPRC0084	39936.0	7549059.7	546317.889	641.940979	43.63	598.31	113
Eagle	HPRC0090	39936.0	7549199.1	545830.373	650.2069702	48.30	601.91	126
Eagle	HPRC0091	39936.0	7549277.7	545880.8	648.5430298	40.55	607.99	54
Eagle	HPRC0095	39936.0	7549333.2	546994.789	644.9229736	35.80	609.12	66
Eagle	HPRC0096	39936.0	7549514.6	547086.79	650.4550171	31.40	619.06	54
Eagle	HPRC0098	39936.0	7548718.1	547225.253	630.9180298	60.55	570.37	66
Eagle	HPRC0019	39937.0	7547212.1	549378.116	602.9110107	56.70	546.21	120
Eagle	HPRC0020	39937.0	7547395.1	549386.672	603.1699829	59.95	543.22	72
Eagle	HPRC0021	39937.0	7547599.4	549399.538	602.3359985	59.85	542.49	48
Eagle	HPRC0025	39937.0	7546999.2	548396.201	613.3469849	40.00	573.35	36
Eagle	HPRC0026	39937.0	7547185.4	548382.775	613.6309814	38.45	575.18	24
Eagle	HPRC0029	39937.0	7547797.8	548399.47	613.1710205	41.00	572.17	66
Eagle	HPRC0035	39937.0	7548996.2	548398.993	647.0629883	48.85	598.21	66

Eagle	HPRC0059	39937.0	7546996.4	549897.343	598.1110229	54.70	543.41	42
Eagle	HPRC0060	39937.0	7547199.4	549891.478	598.3640137	56.05	542.31	90
Eagle	HPRC0061	39937.0	7547399.9	549895.985	598.4689941	56.80	541.67	90
Eagle	HPRC0062	39937.0	7547605.5	549892.76	597.5900269	56.40	541.19	24
Eagle	HPRC0063	39937.0	7547795.4	549907.13	600.8029785	59.70	541.10	30
Eagle	HPRC0064	39937.0	7547997.0	549893.821	605.1409912	64.05	541.09	48
Eagle	HPRC0066	39937.0	7547004.2	548886.944	607.8759766	46.85	561.03	42
Eagle	HPRC0068	39937.0	7547396.1	548901.969	607.7180176	59.50	548.22	54
Eagle	HPRC0069	39937.0	7547599.6	548890.72	608.0629883	63.20	544.86	48
Eagle	HPRC0105	39937.0	7547683.4	548392.24	612.6339722	40.40	572.23	54
Eagle	HPRC0107	39937.0	7547998.2	548385.949	617.8959961	42.05	575.85	42
Eagle	HPRC0108	39937.0	7548102.5	548395.584	620.0159912	54.55	565.47	36
Eagle	HPRC0112	39937.0	7548681.2	548395.453	634.6309814	41.25	593.38	30
Eagle	HPRC0011	39938.0	7547800.7	550395.621	592.802002	51.95	540.85	18
Eagle	HPRC0012	39938.0	7547626.4	550426.547	593.6190186	52.65	540.97	102
Eagle	HPRC0013	39938.0	7547396.7	550388.981	593.7589722	51.10	542.66	96
Eagle	HPRC0014	39938.0	7547227.8	550426.398	593.4290161	52.95	540.48	60
Eagle	HPRC0015	39938.0	7546999.2	550400.602	592.1640015	50.00	542.16	90
Eagle	HPRC0016	39938.0	7548202.9	550395.498	599.1350098	39.00	560.14	90
Eagle	HPRC0017A	39938.0	7548033.7	550415.344	595.6959839	54.45	541.25	90
Eagle	HPRC0042	39938.0	7546996.2	551400.831	584.1069946	43.45	540.66	54
Eagle	HPRC0043	39938.0	7547234.3	551389.371	584.117981	43.80	540.32	66
Eagle	HPRC0044	39938.0	7547640.7	551390.098	584.0219727	41.90	542.12	76
Eagle	HPRC0045	39938.0	7547798.4	551398.657	584.4869995	42.10	542.39	78
Eagle	HPRC0047	39938.0	7548196.2	551398.124	588.4439697	40.20	548.24	54
Eagle	HPRC0049	39938.0	7548598.2	551395.612	595.0079956	34.90	560.11	36
Eagle	HPRC0050	39938.0	7546999.3	550902.733	588.1610107	45.40	542.76	30
Eagle	HPRC0051	39938.0	7547250.3	550920.039	588.0040283	44.20	543.80	36
Eagle	HPRC0052	39938.0	7547398.3	550929.667	589.065979	48.30	540.77	20
Eagle	HPRC0053	39938.0	7547647.7	550881.958	589.0180054	48.35	540.67	76
Eagle	HPRC0056	39938.0	7548200.2	550896.744	597.5200195	35.50	562.02	66
Eagle	HPRC0058	39938.0	7548604.3	550907.704	600.7880249	41.85	558.94	96
Eagle	HPRC0102	39938.0	7547093.2	548377.355	613.2349854	36.50	576.73	72
Eagle	HPRC0103	39938.0	7547293.1	548414.819	612.8770142	42.00	570.88	
Eagle	HPRC0113	39938.0	7547102.9	550389.789	593.5130005	52.30	541.21	78
Eagle	HPRC0011	39996.0	7547800.7	550395.621	592.802002	56.66	536.14	
Eagle	HPRC0012	39996.0	7547626.4	550426.547	593.6190186	54.43	539.19	
Eagle	HPRC0013	39996.0	7547396.7	550388.981	593.7589722	53.07	540.69	
Eagle	HPRC0014	39996.0	7547227.8	550426.398	593.4290161	51.75	541.68	
Eagle	HPRC0015	39996.0	7546999.2	550400.602	592.1640015	48.50	543.66	
Eagle	HPRC0018	39996.0	7547002.7	549401.81	602.6339722	44.60	558.03	
Eagle	HPRC0019	39996.0	7547212.1	549378.116	602.9110107	55.89	547.02	
Eagle	HPRC0020	39996.0	7547395.1	549386.672	603.1699829	59.49	543.68	
Eagle	HPRC0021	39996.0	7547599.4	549399.538	602.3359985	59.54	542.80	
Eagle	HPRC0023	39996.0	7548196.1	549396.816	612.9550171	35.62	577.34	
Eagle	HPRC0025	39996.0	7546999.2	548396.201	613.3469849	39.26	574.08	
Eagle	HPRC0026	39996.0	7547185.4	548382.775	613.6309814	37.56	576.08	
Eagle	HPRC0028	39996.0	7547590.0	548392.269	611.8140259	43.35	568.46	
Eagle	HPRC0029	39996.0	7547797.8	548399.47	613.1710205	39.88	573.29	
Eagle	HPRC0034	39996.0	7548792.1	548415.884	638.3380127	42.61	595.73	
Eagle	HPRC0035	39996.0	7548996.2	548398.993	647.0629883	48.56	598.50	
Eagle	HPRC0036	39996.0	7548868.1	546781.578	634.960022	45.90	589.06	
Eagle	HPRC0037	39996.0	7549071.2	546858.693	637.0819702	51.08	586.00	
Eagle	HPRC0040	39996.0	7549368.2	545897.155	648.6450195	28.49	620.16	
Eagle	HPRC0042	39996.0	7546996.2	551400.831	584.1069946	43.22	540.89	
Eagle	HPRC0043	39996.0	7547234.3	551389.371	584.117981	43.81	540.31	
Eagle	HPRC0044	39996.0	7547640.7	551390.098	584.0219727	37.84	546.18	
Eagle	HPRC0045	39996.0	7547798.4	551398.657	584.4869995	41.49	543.00	
Eagle	HPRC0047	39996.0	7548196.2	551398.124	588.4439697	39.42	549.03	
Eagle	HPRC0048	39996.0	7548428.1	551378.093	591.3599854	35.84	555.52	
Eagle	HPRC0049	39996.0	7548598.2	551395.612	595.0079956	34.14	560.87	
Eagle	HPRC0050	39996.0	7546999.3	550902.733	588.1610107	45.35	542.81	
Eagle	HPRC0051	39996.0	7547250.3	550920.039	588.0040283	53.35	534.66	
Eagle	HPRC0052	39996.0	7547398.3	550929.667	589.065979	48.13	540.94	
Eagle	HPRC0053	39996.0	7547647.7	550881.958	589.0180054	48.20	540.82	
Eagle	HPRC0056	39996.0	7548200.2	550896.744	597.5200195	35.52	562.00	
Eagle	HPRC0058	39996.0	7548604.3	550907.704	600.7880249	35.42	565.36	
Eagle	HPRC0059	39996.0	7546996.4	549897.343	598.1110229	54.11	544.00	
Eagle	HPRC0060	39996.0	7547199.4	549891.478	598.3640137	55.70	542.66	
Eagle	HPRC0061	39996.0	7547399.9	549895.985	598.4689941	56.45	542.02	
Eagle	HPRC0062	39996.0	7547605.5	549892.76	597.5900269	56.09	541.50	
Eagle	HPRC0063	39996.0	7547795.4	549907.13	600.8029785	59.47	541.33	
Eagle	HPRC0064	39996.0	7547997.0	549893.821	605.1409912	63.89	541.25	
Eagle	HPRC0066	39996.0	7547004.2	548886.944	607.8759766	45.55	562.33	
Eagle	HPRC0067	39996.0	7547200.5	548887.048	608.40802	34.27	574.14	
Eagle	HPRC0068	39996.0	7547396.1	548901.969	607.7180176	51.72	556.00	

Eagle	HPRC0069	39996.0	7547599.6	548890.72	608.0629883	61.83	546.23	
Eagle	HPRC0072	39996.0	7548868.0	547334.655	633.9780273	46.17	587.81	
Eagle	HPRC0079	39996.0	7549697.2	546591.747	659.8779907	25.18	634.70	
Eagle	HPRC0080	39996.0	7549320.6	545335.522	659.3270264	51.81	607.52	
Eagle	HPRC0084	39996.0	7549059.7	546317.889	641.940979	42.84	599.10	
Eagle	HPRC0090	39996.0	7549199.1	545830.373	650.2069702	47.29	602.92	
Eagle	HPRC0091	39996.0	7549277.7	545880.8	648.5430298	40.13	608.41	
Eagle	HPRC0094	39996.0	7549160.2	546905.643	639.5629883	48.47	591.09	
Eagle	HPRC0095	39996.0	7549333.2	546994.789	644.9229736	38.50	606.42	
Eagle	HPRC0096	39996.0	7549514.6	547086.79	650.4550171	30.92	619.54	
Eagle	HPRC0099	39996.0	7548789.9	547281.046	632.3499756	53.96	578.39	
Eagle	HPRC0102	39996.0	7547093.2	548377.355	613.2349854	24.15	589.08	
Eagle	HPRC0103	39996.0	7547293.1	548414.819	612.8770142	41.50	571.38	
Eagle	HPRC0104	39996.0	7547498.0	548398.86	612.1820068	41.50	570.68	
Eagle	HPRC0105	39996.0	7547683.4	548392.24	612.6339722	37.10	575.53	
Eagle	HPRC0106	39996.0	7547894.1	548397.022	615.3280029	44.20	571.13	
Eagle	HPRC0107	39996.0	7547998.2	548385.949	617.8959961	19.50	598.40	
Eagle	HPRC0108	39996.0	7548102.5	548395.584	620.0159912	59.80	560.22	
Eagle	HPRC0113	39996.0	7547102.9	550389.789	593.5130005	52.14	541.37	
Eagle	HPRC4222	40647.0	7546997.0	551405.00	623.00	42.8	580.20	74
Eagle	HPRC0008	40648.0	7547403.9	550928.82	589.07	48.52	540.55	30
Eagle	HPRC0018	40648.0	7547002.7	549401.81	602.63	48.33	554.30	66
Eagle	HPRC0028	40648.0	7547590.0	548392.27	611.81	53.28	558.53	60
Eagle	HPRC0046	40648.0	7548031.1	551386.75	586.00	39.51	546.49	72
Eagle	HPRC0102	40648.0	7547093.2	548377.36	613.23	24.49	588.74	70
Eagle	HPRC4006	40648.0	7548674.3	551391.70	596.50	33.80	562.70	24
Eagle	HPRC4185	40648.0	7547385.0	549279.00	606.00	61.56	544.44	48
Eagle	HPRC4122	40848.0	544946.1	7549663.393	673.86	34.395	639.462	30
Eagle	HPRC4118	40848.0	545178.0	7549533.175	661.01	Dry	-	12
Eagle	HPRC0098	40848.0	547225.3	7548717.863	630.92	61.6	569.31803	36
Eagle	HPRC0108	40848.0	548395.6	7548102.472	620.02	54.5	565.515991	48
Eagle	HPRC0035	40848.0	548399.0	7548996.028	647.06	47.406	599.656988	42
Eagle	HPRC0068	40848.0	548902.0	7547396.143	607.72	61.2	546.518018	24
Eagle	HPRC4180	40848.0	549402.0	7547290.758	602.95	59.8	543.15	26
Eagle	HPRC4029	40848.0	550653.1	7548792.622	610.97	49.8	561.165	54
Eagle	HPRC4257	40848.0	550653.6	7546813.049	-	49.85	-	48
Eagle	HPRC0052	40848.0	550929.5	7547398.306	589.07	48.4	540.665979	30
Eagle	HPRC4052	40848.0	551272.7	7548503.04	592.82	Dry	-	18
Eagle	HPRC4053	40848.0	551286.0	7548613.494	594.42	32.6	561.821	54
Eagle	HPRC0004	40848.0	551380.3	7548198.296	588.35	38.3	550.05199	48
Eagle	HPRC0002	40848.0	7547397.6	551391.889	584.60	blocked	-	24
Eagle	HPRC0008	40848.0	7547403.9	550928.821	589.07	48.4	540.66897	18
Eagle	HPRC0010	40848.0	7548196.6	550901.341	597.32	dry	-	24
Eagle	HPRC0011	40848.0	7547800.7	550395.621	592.80	51.95	540.852002	30
Eagle	HPRC0012	40848.0	7547626.4	550426.547	593.62	52.65	540.969019	54
Eagle	HPRC0013	40848.0	7547396.7	550388.981	593.76	51.1	542.658972	42
Eagle	HPRC0014	40848.0	7547227.8	550426.398	593.43	52.95	540.479016	24
Eagle	HPRC0015	40848.0	7546999.2	550400.602	592.16	50	542.164001	57
Eagle	HPRC0016	40848.0	7548202.9	550395.498	599.14	39	560.13501	54
Eagle	HPRC0017A	40848.0	7548033.7	550415.344	595.70	54.45	541.245984	42
Eagle	HPRC0018	40848.0	7547002.7	549401.81	602.63	46.1	556.533972	42
Eagle	HPRC0019	40848.0	7547212.1	549378.116	602.91	56.7	546.211011	24
Eagle	HPRC0020	40848.0	7547395.1	549386.672	603.17	59.95	543.219983	56
Eagle	HPRC0021	40848.0	7547599.4	549399.538	602.34	59.85	542.485999	26
Eagle	HPRC0022	40848.0	7547793.8	549402.227	606.34	dry	-	18
Eagle	HPRC0023	40848.0	7548196.1	549396.816	612.96	dry	-	60
Eagle	HPRC0024	40848.0	7548385.4	549397.481	622.75	dry	-	48
Eagle	HPRC0025	40848.0	7546999.2	548396.201	613.35	40	573.346985	42
Eagle	HPRC0026	40848.0	7547185.4	548382.775	613.63	38.5	575.130981	54
Eagle	HPRC0027	40848.0	7547400.7	548401.042	612.39	42.35	570.03501	78
Eagle	HPRC0028	40848.0	7547590.0	548392.269	611.81	46.7	565.114026	78
Eagle	HPRC0029	40848.0	7547797.8	548399.47	613.17	41	572.171021	56
Eagle	HPRC0030	40848.0	7547996.8	548392.923	618.07	dry	-	36
Eagle	HPRC0031	40848.0	7548198.8	548395.46	622.10	dry	-	30
Eagle	HPRC0032A	40848.0	7548391.1	548384.667		dry	-	42
Eagle	HPRC0033	40848.0	7548599.3	548400.753	631.88	dry	-	90
Eagle	HPRC0034	40848.0	7548792.1	548415.884	638.34	dry	-	18
Eagle	HPRC0036	40848.0	7548868.1	546781.578	634.96	47	587.960022	
Eagle	HPRC0037	40848.0	7549071.2	546858.693	637.08	39.7	597.38197	
Eagle	HPRC0038	40848.0	7549245.7	546952.41	642.34	dry	-	
Eagle	HPRC0039	40848.0	7549426.5	547022.964	647.63	dry	-	
Eagle	HPRC0040	40848.0	7549368.2	545897.155	648.65	28.88	619.76502	
Eagle	HPRC0041	40848.0	7549559.5	545978.546	657.04	dry	-	
Eagle	HPRC0042	40848.0	7546996.2	551400.831	584.11	43.45	540.656995	
Eagle	HPRC0043	40848.0	7547234.3	551389.371	584.12	43.8	540.317981	
Eagle	HPRC0044	40848.0	7547640.7	551390.098	584.02	41.9	542.121973	

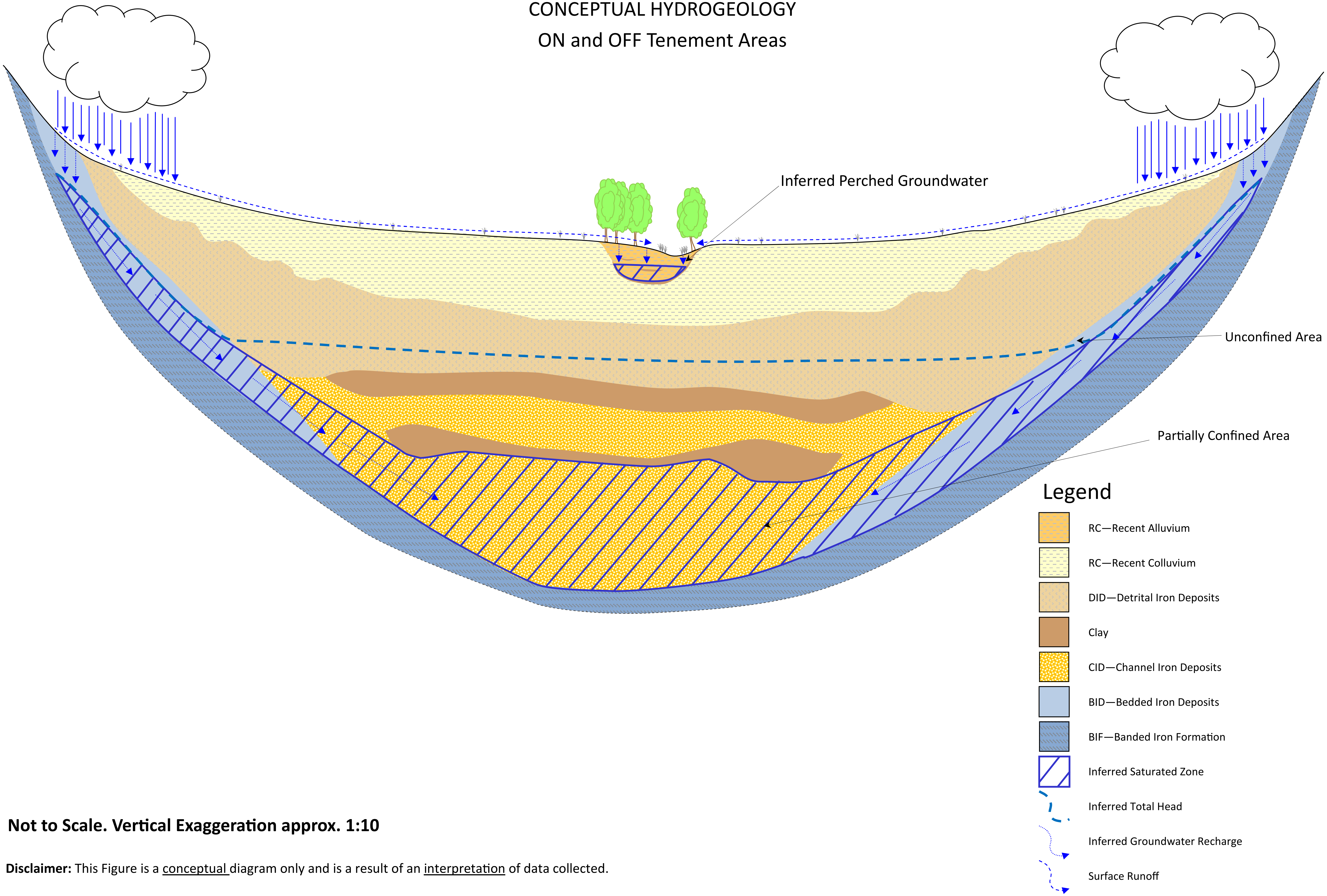
Eagle	HPRC0045	40848.0	7547798.4	551398.657	584.49	42.1	542.387	
Eagle	HPRC0046	40848.0	7548031.1	551386.751	586.00	blocked	-	
Eagle	HPRC0047	40848.0	7548196.2	551398.124	588.44	40.2	548.24397	
Eagle	HPRC0048	40848.0	7548428.1	551378.093	591.36	blocked	-	
Eagle	HPRC0049	40848.0	7548598.2	551395.612	595.01	34.9	560.107996	
Eagle	HPRC0050	40848.0	7546999.3	550902.733	588.16	45.4	542.761011	
Eagle	HPRC0051	40848.0	7547250.3	550920.039	588.00	44.2	543.804028	
Eagle	HPRC0053	40848.0	7547647.7	550881.958	589.02	48.35	540.668005	
Eagle	HPRC0054	40848.0	7547802.5	550907.083	588.67	dry	-	
Eagle	HPRC0055	40848.0	7548040.5	550916.018	593.36	dry	-	
Eagle	HPRC0056	40848.0	7548200.2	550896.744	597.52	35.5	562.02002	
Eagle	HPRC0057	40848.0	7548523.3	550910.303	599.63	dry	-	
Eagle	HPRC0058	40848.0	7548604.3	550907.704	600.79	41.85	558.938025	
Eagle	HPRC0059	40848.0	7546996.4	549897.343	598.11	54.7	543.411023	
Eagle	HPRC0060	40848.0	7547199.4	549891.478	598.36	56.05	542.314014	
Eagle	HPRC0061	40848.0	7547399.9	549895.985	598.47	56.8	541.668994	
Eagle	HPRC0062	40848.0	7547605.5	549892.76	597.59	56.4	541.190027	
Eagle	HPRC0063	40848.0	7547795.4	549907.13	600.80	59.7	541.102979	
Eagle	HPRC0064	40848.0	7547997.0	549893.821	605.14	64.05	541.090991	
Eagle	HPRC0065	40848.0	7548197.4	549898.265	608.72	dry	-	
Eagle	HPRC0066	40848.0	7547004.2	548886.944	607.88	46.85	561.025977	
Eagle	HPRC0067	40848.0	7547200.5	548887.048	608.41	blocked	-	
Eagle	HPRC0069	40848.0	7547599.6	548890.72	608.06	63.2	544.862988	
Eagle	HPRC0070	40848.0	7547801.9	548908.578	610.10	dry	-	
Eagle	HPRC0071	40848.0	7547979.7	548883.022	616.09	dry	-	
Eagle	HPRC0072	40848.0	7548868.0	547334.655	633.98	46.65	587.328027	
Eagle	HPRC0073	40848.0	7549050.9	547426.974	637.34	dry	-	
Eagle	HPRC0074	40848.0	7549229.4	547507.01	642.09	dry	-	
Eagle	HPRC0075	40848.0	7548970.2	546255.846	646.21	dry	-	
Eagle	HPRC0076	40848.0	7549149.6	546338.119	641.76	dry	-	
Eagle	HPRC0077	40848.0	7549334.9	546414.088	644.34	dry	-	
Eagle	HPRC0078	40848.0	7549507.7	546514.188	652.34	dry	-	
Eagle	HPRC0079	40848.0	7549697.2	546591.747	659.88	23.2	636.677991	
Eagle	HPRC0080	40848.0	7549320.6	545335.522	659.33	52.2	607.127026	
Eagle	HPRC0081	40848.0	7549406.1	545386.982	656.85	45.25	611.598022	
Eagle	HPRC0082	40848.0	7549497.7	545434.658	658.50	dry	-	
Eagle	HPRC0083	40848.0	7549654.8	545490.821	670.65	dry	-	
Eagle	HPRC0084	40848.0	7549059.7	546317.889	641.94	43.63	598.310979	
Eagle	HPRC0085	40848.0	7549246.3	546367.191	641.76	dry	-	
Eagle	HPRC0086	40848.0	7549430.7	546443.574	647.76	dry	-	
Eagle	HPRC0087	40848.0	7549612.0	546571.08	657.71	dry	-	
Eagle	HPRC0088	40848.0	7549003.5	545727.267	656.91	blocked	-	
Eagle	HPRC0089	40848.0	7549108.7	545793.131	653.27	dry	-	
Eagle	HPRC0090	40848.0	7549199.1	545830.373	650.21	48.3	601.90697	
Eagle	HPRC0091	40848.0	7549277.7	545880.8	648.54	40.55	607.99303	
Eagle	HPRC0092	40848.0	7549448.4	545926.596	651.47	dry	-	
Eagle	HPRC0093	40848.0	7548972.7	546821.937	634.79	dry	-	
Eagle	HPRC0094	40848.0	7549160.2	546905.643	639.56	dry	-	
Eagle	HPRC0095	40848.0	7549333.2	546994.789	644.92	35.8	609.122974	
Eagle	HPRC0096	40848.0	7549514.6	547086.79	650.46	31.4	619.055017	
Eagle	HPRC0097	40848.0	7549609.0	547123.709	653.99	dry	-	
Eagle	HPRC0099	40848.0	7548789.9	547281.046	632.35	66.65	565.699976	
Eagle	HPRC0100	40848.0	7548971.0	547382.326	637.03	dry	-	
Eagle	HPRC0101	40848.0	7549165.4	547472.615	639.68	dry	-	
Eagle	HPRC0102	40848.0	7547093.2	548377.355	613.23	36.5	576.734985	
Eagle	HPRC0103	40848.0	7547293.1	548414.819	612.88	42	570.877014	
Eagle	HPRC0104	40848.0	7547498.0	548398.86	612.18	dry	-	
Eagle	HPRC0105	40848.0	7547683.4	548392.24	612.63	40.4	572.233972	
Eagle	HPRC0106	40848.0	7547894.1	548397.022	615.33	blocked	-	
Eagle	HPRC0107	40848.0	7547998.2	548385.949	617.90	42.65	575.245996	
Eagle	HPRC0109	40848.0	7548196.3	548391.018	622.02	dry	-	
Eagle	HPRC0110	40848.0	7548293.9	548391.941	624.43	dry	-	
Eagle	HPRC0111	40848.0	7548507.3	548396.629	629.61	dry	-	
Eagle	HPRC0112	40848.0	7548681.2	548395.453	634.63	41.25	593.380981	
Eagle	HPRC0113	40848.0	7547102.9	550389.789	593.51	52.3	541.213	
Eagle	HPRC0114	40848.0	7548069.7	549387.009	611.36	dry	dry	
Eagle	EAGLE OBS 4 s	40874.0	551407.0	7547011.000	**584.733**	44.01	540.723	
Eagle	EAGLE OBS 4 m	40874.0	551407.0	7547011.000	**584.733**	44.029	540.704	
Eagle	EAGLE OBS 4 d	40874.0	551407.0	7547011.000	**584.733**	43.96	540.773	
Eagle	EAGLE PROD 1	40874.0	551396.2	7547002.153	**584.554**	43.72	540.834	
Eagle	HPRC0004	40874.0	551380.3	7548198.296	**589.141**	39.245	549.896	
Eagle	HPRC0052	40874.0	550929.5	7547398.306	**589.815**	49.092	540.723	
Eagle	HPRC0121	40874.0	549899.4	7547696.095	**600.765**	59.7	541.065	
Eagle	HPRC4257	40874.0	550653.6	7546813.049	**592.180**	50.387	541.793	
Eagle	EAGLE OBS 2	40875.0	551403.5	7546985.324	**584.531**	43.79	540.741	
Eagle	EAGLE OBS 3	40875.0	551373.0	7547809.750	**585.331**	44.385	540.946	

Eagle	HPRC0068	40875.0	548902.0	7547396.143	**608.381**	49.055	559.326	
Eagle	HPRC0098	40875.0	547225.3	7548717.863	**631.616**		631.616	
Eagle	HPRC4029	40875.0	550653.1	7548792.622	**611.735**	50.935	560.800	
Eagle	HPRC4052	40875.0	551272.7	7548503.040	**593.558**	35.55	558.008	
Eagle	HPRC4053	40875.0	551286.0	7548613.494	**595.048**	33.762	561.286	
Eagle	HPRC4118	40875.0	545178.0	7549533.175	**661.670**		661.670	
Eagle	HPRC4122	40875.0	544946.1	7549663.393	**674.512**		674.512	
Eagle	EAGLE OBS 1	40876.0	550278.4	7547283.521	**595.353**	54.29	541.063	
Eagle	HPRC0035	40876.0	548399.0	7548996.028	**647.744**	48.225	599.519	
Eagle	HPRC0108	40876.0	548395.6	7548102.472	**620.782**	55.782	565.000	
Eagle	HPRC4180	40876.0	549402.0	7547290.758	**603.814**	60.557	543.257	
Champion	HPRC0689	Nov-11	544663.444	7554588.262	592.522	25.4	567.132	32
Champion	HPRC0531	Nov-11	545490.472	7553341.661	577.1619873	36.1	541.026987	41.8
Champion	HPRC0352	Nov-11	545564.959	7553282.635	577.210022	Dry	-	30
Champion	HPRC0766	Nov-11	545920.967	7554368.005	568.5	39.9	528.63	56.5
Champion	HPRC0919	Nov-11	546259.945	7553639.857	568.58	38.1	530.45	59
Champion	HPRC0641	Nov-11	546441.869	7554919.119	567.028	49.6	517.403	70.7
Champion	HPRC0321	Nov-11	546581.314	7554467.782	559.2509766	31.0	528.275977	34.64
Champion	HPRC0395	Nov-11	546661.13	7555504.01	555.1970215	39.8	515.397021	52
Champion	HPRC0631	Nov-11	546893.535	7555104.519	552.87	35.5	517.33	48.5
Champion	HPRC0792	Nov-11	546895.888	7553541.338	574.91	Dry	-	38
Champion	HPRC0672	Nov-11	547008.045	7553444.277	577.446	47.2	530.276	55.75
Champion	HPRC0549	Nov-11	547642.192	7555493.228	554.019	30.5	523.564	60
Champion	HPRC1026	Nov-11	547882.973	7553186.708	598	16.5	581.545	24
Champion	HPRC0973	Nov-11	548034.734	7555166.046	570	22.9	547.07	52
Champion	HPRC0581	Nov-11	547234.092	7555967.636	545.135	28.4	516.735	54.9
Champion	HPRC0615	Nov-11	547089.013	7555464.768	548.838	31.3	517.538	58
Champion	HPRC0614	Nov-11	547022.506	7555503.721	548.918	31.4	517.478	40.7
Champion	HPRC0399	Nov-11	546481.564	7553933.501	565.2420044	36.0	529.242004	40
Champion	HPRC0787	Nov-11	546462.01	7553778	565.74	36.4	529.375	64
Champion	HPRC0786	Nov-11	546382.54	7553824.92	565.96	36.4	529.54	39.8
Champion	HPRC0905	Nov-11	546482.65	7553637.1	567.65	38.1	529.55	46
Champion	HPRC0788	Nov-11	546553.95	7553729	567.67	38.3	529.41	49.7
Champion	HPRC0920	Nov-11	546346.07	7553588.92	569.57	39.1	530.5	50.5
Champion	HPRC0345	Nov-11	545410.727	7553985.441	575.7000122	42.8	532.950012	53.5
Champion	HPRC0329	Nov-11	546226.945	7554081.688	564.9719849	Dry	-	24.5
Champion	HPRC0530	Nov-11	545668.687	7553255.864	576.2230225	Dry	-	31
Champion	HPRC0685	Nov-11	544584.093	7554851.044	597.776	Dry	-	31
Champion	HPRC0707	Nov-11	545408.974	7554290.976	575.548	Dry	-	34.55
Champion	HPRC0768	Nov-11	546094	7554278	565.13	Dry	-	36
Champion	HPRC0904	Nov-11	546390.88	7553676.43	567.17	dry	-	52.6
Champion	HPRC0906	Nov-11	546561.67	7553582.8	568.43	dry	-	40
Champion	HPRC0918	Nov-11	546172.41	7553678.21	569.2	Dry	-	40.2
Champion	CHAMP OBS 1	1/12/2001	546889.991	7555876.47	**552.433**	37.3	515.128	
Champion	CHAMP OBS 2	2/12/2001	546965.249	7556117.324	**548.85**	34.0	514.823	
Champion	CHAMP OBS 3	2/12/2001	547145.737	7556023.679	**544.574**	31.2	513.329	
Champion	CHAMP OBS 4shallow	2/12/2001	546969.662	7556139.732	**548.997**	34.1	514.887	
Champion	CHAMP OBS4 m	2/12/2001	546969.662	7556139.732	**548.997**	34.1	514.902	
Champion	CHAMP OBS 4d	2/12/2001	546969.662	7556139.732	**548.997**	34.0	514.985	
Champion	CHAMP PROD 01	2/12/2001	546976.97	7556127.717	**548.937**			
Champion	HPRC0321	1/12/2001	546581.314	7554467.782	**560.01**	31.8	528.25	
Champion	HPRC0352	1/12/2001	545564.959	7553282.635	**577.954**	dry	dry	
Champion	HPRC0395	1/12/2001	546661.13	7555504.01	**555.915**	40.7	515.185	
Champion	HPRC0531	1/12/2001	545490.472	7553341.661	**577.857**	36.9	540.997	
Champion	HPRC0549	1/12/2001	547642.192	7555493.228	**554.684**	31.2	523.439	
Champion	HPRC0631	1/12/2001	546893.535	7555104.519	**553.578**	36.4	517.198	
Champion	HPRC0641	1/12/2001	546441.869	7554919.119	**567.759**	50.5	517.274	
Champion	HPRC0672	1/12/2001	547008.045	7553444.277	**578.162**	48.0	530.192	
Champion	HPRC0689	1/12/2001	544663.444	7554588.262	**593.17**	26.5	566.66	
Champion	HPRC0766	1/12/2001	545920.967	7554368.005	**569.156**			
Champion	HPRC0792	1/12/2001	546895.888	7553541.338	**575.687**	dry	dry	38
Champion	HPRC0919	1/12/2001	546259.945	7553639.857	**569.387**	39.0	530.387	
Champion	HPRC0973	1/12/2001	548034.734	7555166.046	**563.608**	23.8	539.828	
Champion	HPRC1026	1/12/2001	547882.973	7553186.708	**596.526**	17.3	579.196	
Champion	HPRC0301	Jul-09	7555821.594	547246.719	546.80	24.5	522.34	
Champion	HPRC0302	Jul-09	7555412.502	546940.08	549.52	25.6	523.90	
Champion	HPRC0303	Jul-09	7555275.988	547140.621	550.43	27.8	522.66	
Champion	HPRC0304	Jul-09	7555354.173	547032.984	549.66	28.0	521.71	
Champion	HPRC0306	Jul-09	7555504.04	546774.172	551.28	31.7	519.55	
Champion	HPRC0307	Jul-09	7555579.244	546580.695	552.61	30.2	522.44	
Champion	HPRC0308	Jul-09	7554897.654	546743.386	554.59	33.2	521.35	
Champion	HPRC0309	Jul-09	7554878.184	546833.513	554.51	32.7	521.85	
Champion	HPRC0310	Jul-09	7554826.952	546918.623	555.64	32.3	523.38	
Champion	HPRC0311	Jul-09	7555656.226	547605.096	551.64	26.4	525.29	
Champion	HPRC0312	Jul-09	7555730.022	547421.641	549.38	17.8	531.60	

Champion	HPRC0314	Jul-09	7556005.687	546883.697	545.98	26.6	519.35	
Champion	HPRC0315	Jul-09	7556098.455	546715.041	546.72	27.5	519.21	
Champion	HPRC0316	Jul-09	7555270.834	547225.639	553.26	29.5	523.73	
Champion	HPRC0318	Jul-09	7554992.794	546547.732	567.35	46.1	521.27	
Champion	HPRC0319	Jul-09	7555089.677	546381.416	567.46	46.9	520.56	
Champion	HPRC0321	Jul-09	7554467.722	546581.464	559.25	29.4	529.83	
Champion	HPRC0322	Jul-09	7554573.518	546383.069	560.41	20.7	539.74	
Champion	HPRC0323	Jul-09	7554633.138	546204.821	562.02	33.3	528.75	
Champion	HPRC0324	Jul-09	7553587.162	547102.021	578.39	42.0	536.39	
Champion	HPRC0326	Jul-09	7553791.7	546752	570.20	39.0	531.17	
Champion	HPRC0327	Jul-09	7553889.672	546580.82	567.14	36.2	530.99	
Champion	HPRC0328	Jul-09	7553984.613	546392.458	564.61	33.9	530.74	
Champion	HPRC0329	Jul-09	7554081.688	546226.945	564.97	34.2	530.82	
Champion	HPRC0330	Jul-09	7554140.361	546018.947	565.87	32.2	533.67	
Champion	HPRC0331	Jul-09	7554251.056	545861.95	568.55	46.8	521.72	
Champion	HPRC0332	Jul-09	7554345.81	545678.945	572.45	32.2	540.23	
Champion	HPRC0333	Jul-09	7554460.855	545522.28	575.84	43.8	532.09	
Champion	HPRC0334	Jul-09	7554557.732	545331.676	579.60	38.6	540.99	
Champion	HPRC0336	Jul-09	7554740.213	544988.8	587.53	31.5	556.06	
Champion	HPRC0341	Jul-09	7553584.332	546098.573	570.81	37.8	533.01	
Champion	HPRC0342	Jul-09	7553676.056	545906.258	570.94	37.0	533.92	
Champion	HPRC0343	Jul-09	7553768.769	545744.504	571.12	37.0	534.07	
Champion	HPRC0344	Jul-09	7553861.836	545556.083	571.25	37.1	534.15	
Champion	HPRC0345	Jul-09	7553985.441	545410.727	575.70	19.1	556.60	
Champion	HPRC0346	Jul-09	7554058.903	545212.408	580.68	47.0	533.68	
Champion	HPRC0358	15/04/2011	7552630.83	545793.89	585.60	37.8	547.77	
Champion	HPRC0559	15/04/2011	7555216.53	547948.66	561.04	22.0	539.07	
Champion	HPRC0578	15/04/2011	7556303.00	546702.00	548.33	32.8	515.56	
Champion	HPRC0580	14/04/2011	7556019.00	547129.00	544.20	26.0	518.20	
Champion	HPRC0581	15/04/2011	7555969.00	547238.00	545.14	28.5	516.66	
Champion	HPRC0582	15/04/2011	7555921.95	547319.69	546.74	28.5	518.28	
Champion	HPRC0591	14/04/2011	7555784.00	547047.00	545.84	27.9	517.90	
Champion	HPRC0592	14/04/2011	547134.77	7555731.25	546.60	28.7	517.89	
Champion	HPRC0593	15/04/2011	7555683.13	547221.12	547.01	27.0	520.05	
Champion	HPRC0624	15/04/2011	7555206.56	546945.05	551.81	34.2	517.61	
Champion	HPRC0631	15/04/2011	7555104.45	546893.23	552.87	35.2	517.69	
Champion	HPRC0690	15/04/2011	7554502.57	544635.37	593.47	15.9	577.59	
Champion	HPRC0707	14/04/2011	7554276.00	545333.00	575.55	34.4	541.19	
Champion	HPRC0919	14/04/2011	7553316.00	546261.00	571.00	38.0	532.98	

Appendix 6: Conceptual Cross Sections

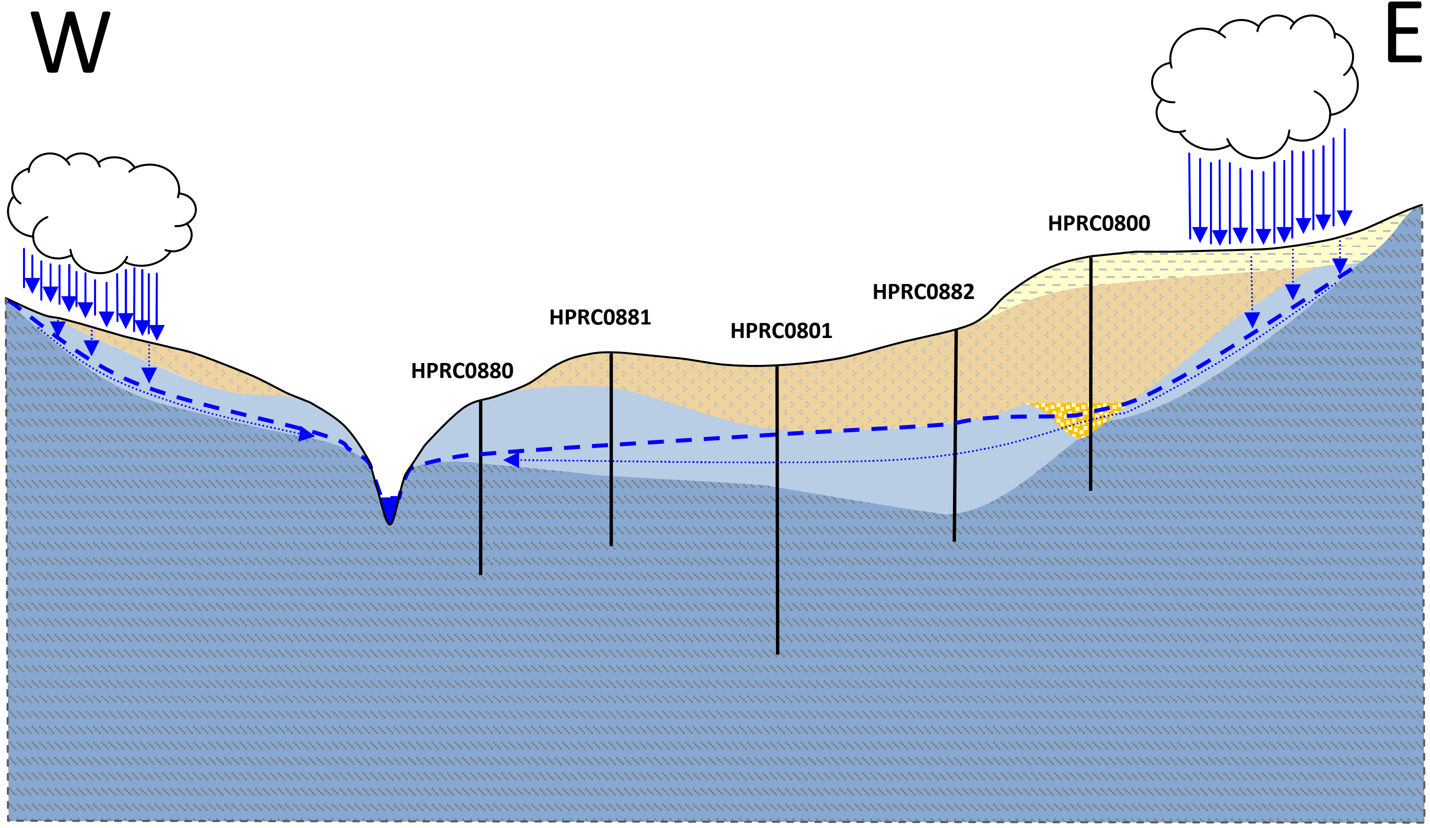
CONCEPTUAL HYDROGEOLOGY
ON and OFF Tenement Areas



Not to Scale. Vertical Exaggeration approx. 1:10

Disclaimer: This Figure is a conceptual diagram only and is a result of an interpretation of data collected.

AJAX - Lower Valley Section

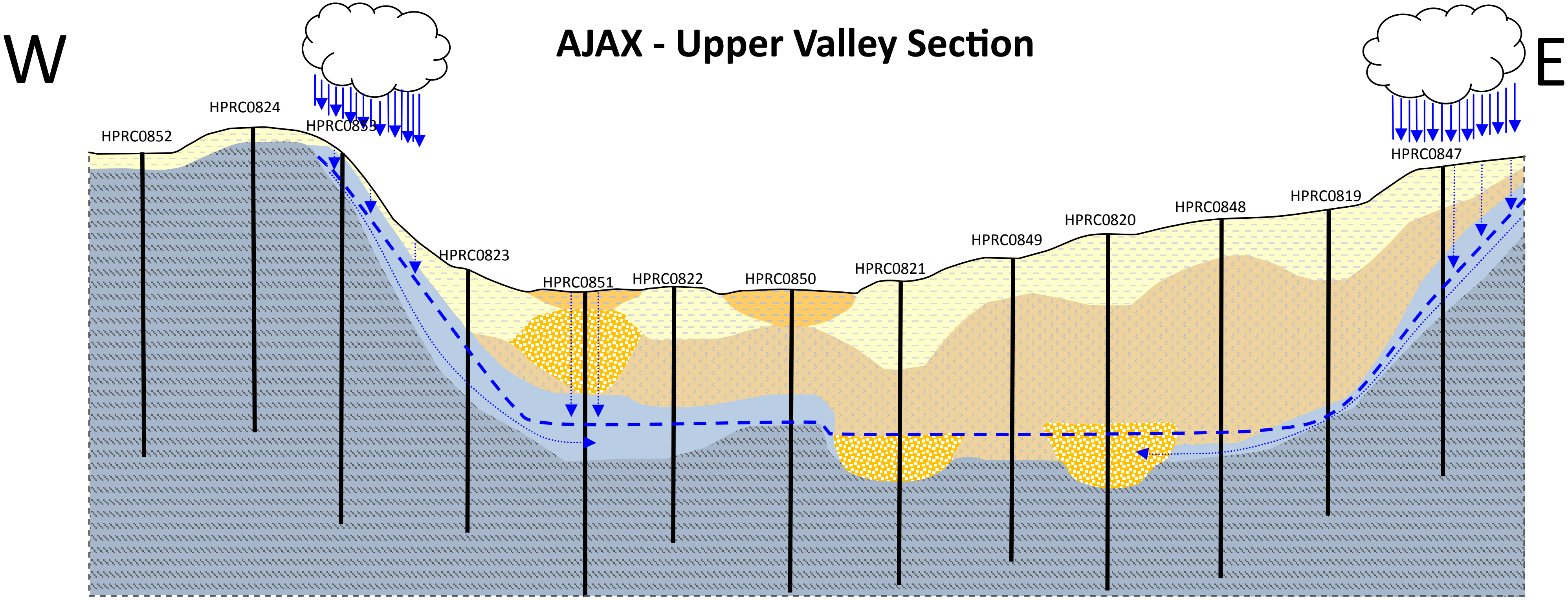


Legend

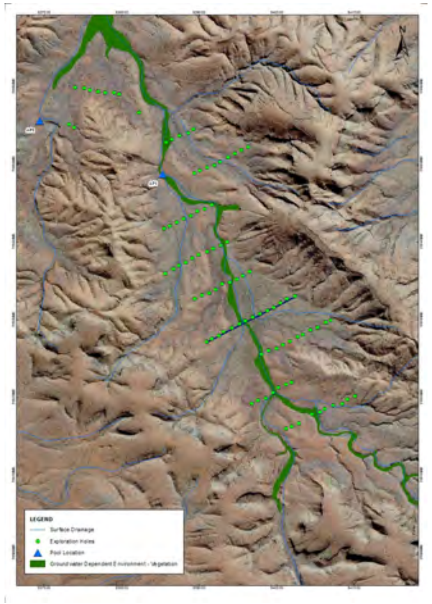
- ▨ RC—Recent Colluvium
- ▨ RC—Recent Alluvium
- ▨ DID—Detrital Iron Deposits
- ▨ CID—Channel Iron Deposits
- ▨ BID—Bedded Iron Deposits
- ▨ BIF—Banded Iron Formation
- Inferred Total Head

Approximately 10x Vertical exaggeration

AJAX - Upper Valley Section



Approximately 9x Vertical exaggeration



Legend

🟧 RC—Recent Alluvium

🟨 RC—Recent Colluvium

▨ DID—Detrital Iron Deposits

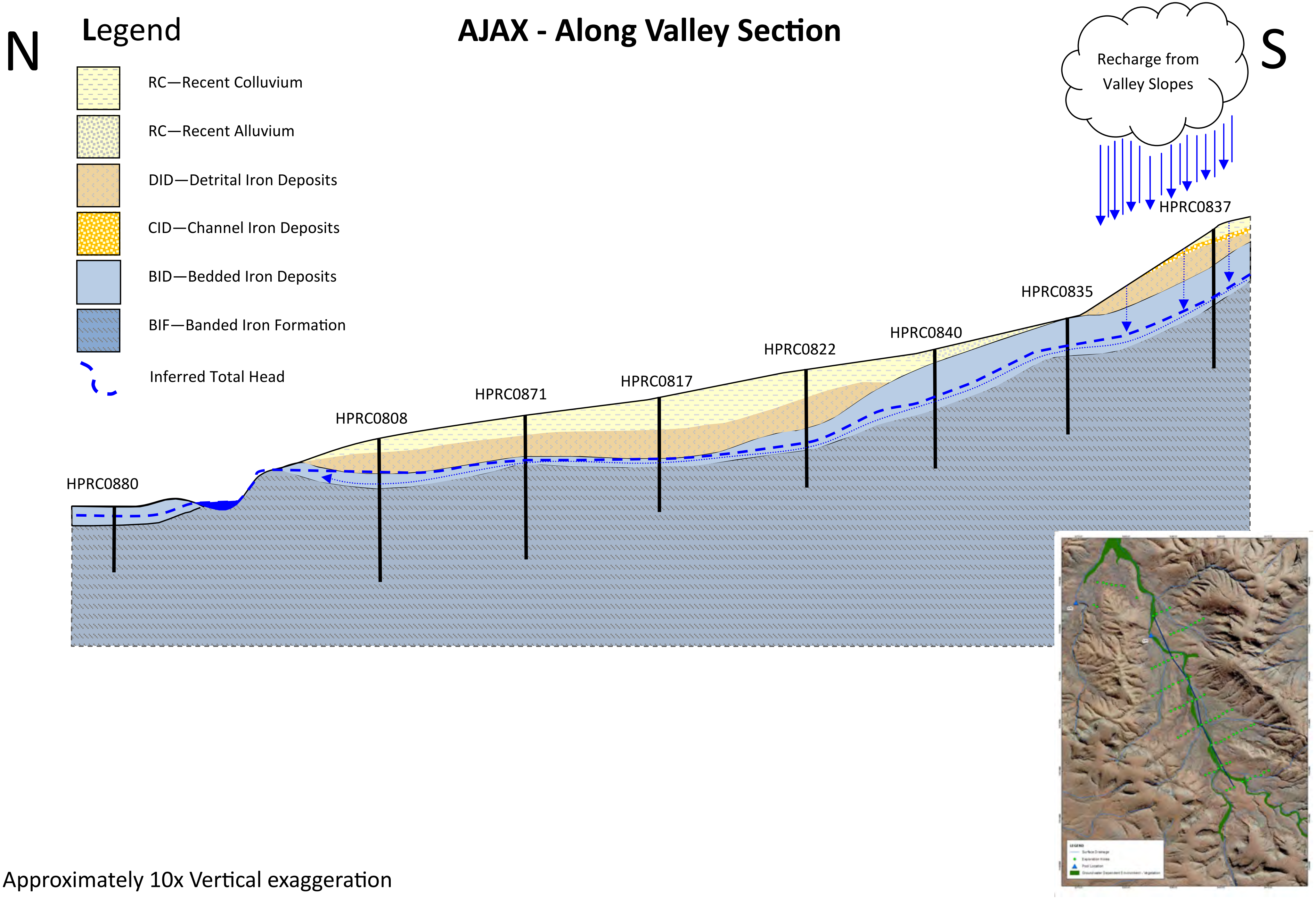
▦ CID—Channel Iron Deposits

🟦 BID—Bedded Iron Deposits

▩ BIF—Banded Iron Formation

╌ Inferred Total Head

AJAX - Along Valley Section



Legend

- ▨ RC—Recent Colluvium
- ▨ RC—Recent Alluvium
- ▨ DID—Detrital Iron Deposits
- ▨ CID—Channel Iron Deposits
- ▨ BID—Bedded Iron Deposits
- ▨ BIF—Banded Iron Formation
- - - Inferred Total Head

Approximately 10x Vertical exaggeration

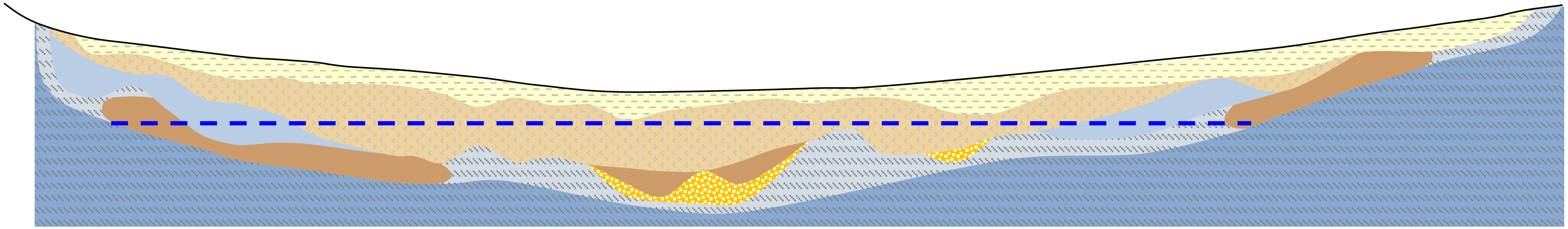
A’

CHAMPION - Section A

A

E

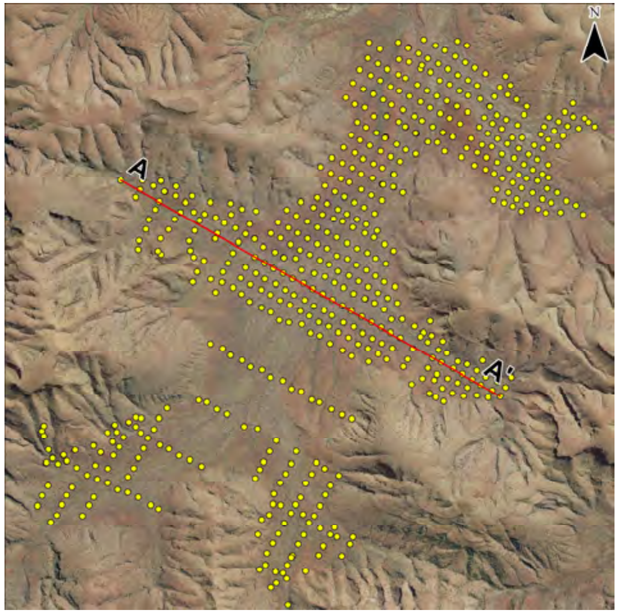
W



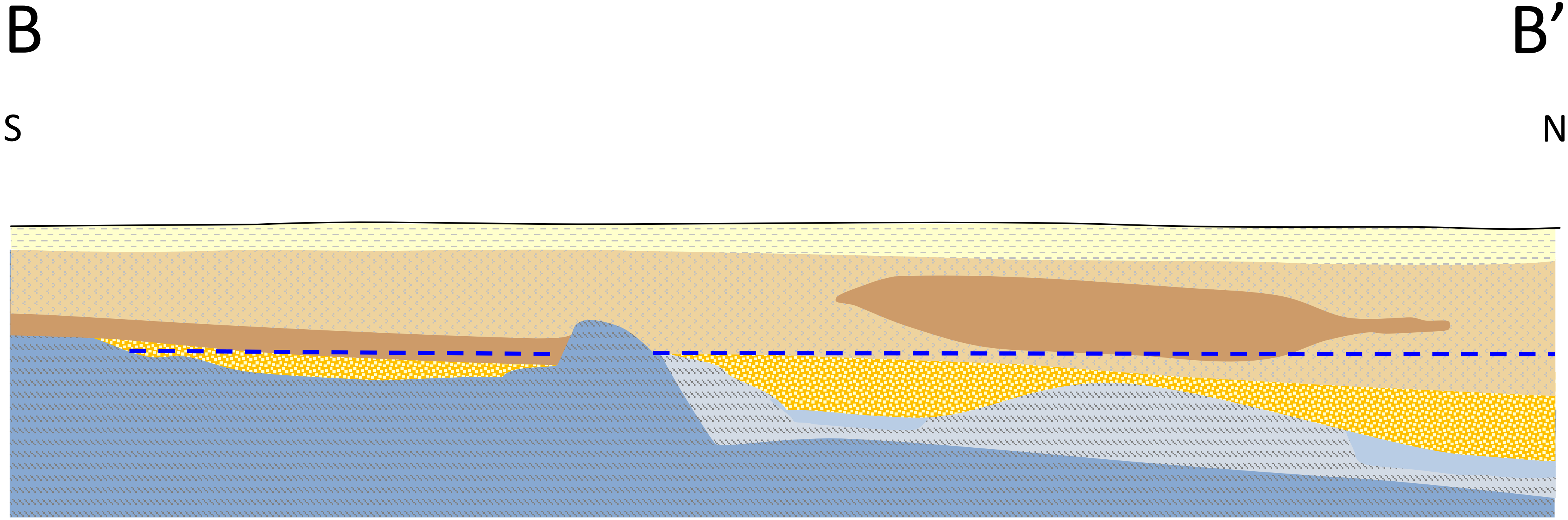
Legend

- ▨ RC—Recent Alluvium/Colluvium
- ▨ DID—Detrital Iron Deposits
- 🟫 Clay
- ▨ CID—Channel Iron Deposits
- 🟦 BID—Bedded Iron Deposits
- ▨ WBIF—Weathered Banded Iron Formation
- ▨ BIF—Banded Iron Formation
- ╌ Inferred Total Head

3x Vertical exaggeration



CHAMPION - Section B



Legend

▤ RC—Recent Alluvium/Colluvium

▨ DID—Detrital Iron Deposits

■ Clay

▩ CID—Channel Iron Deposits

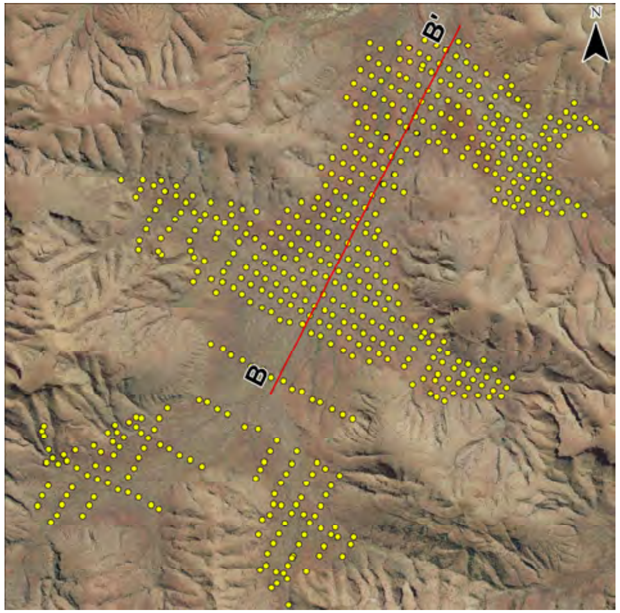
■ BID—Bedded Iron Deposits

▧ WBIF—Weathered Banded Iron Formation

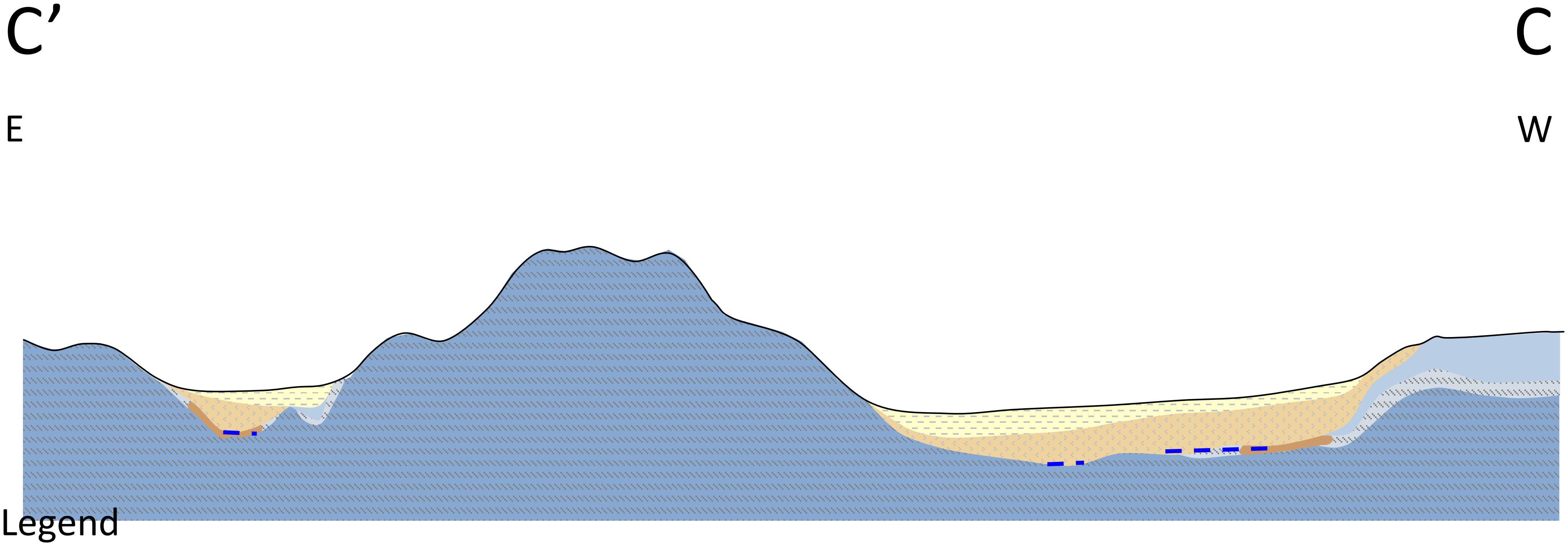
▧ BIF—Banded Iron Formation

╌ Inferred Total Head

Not to Scale



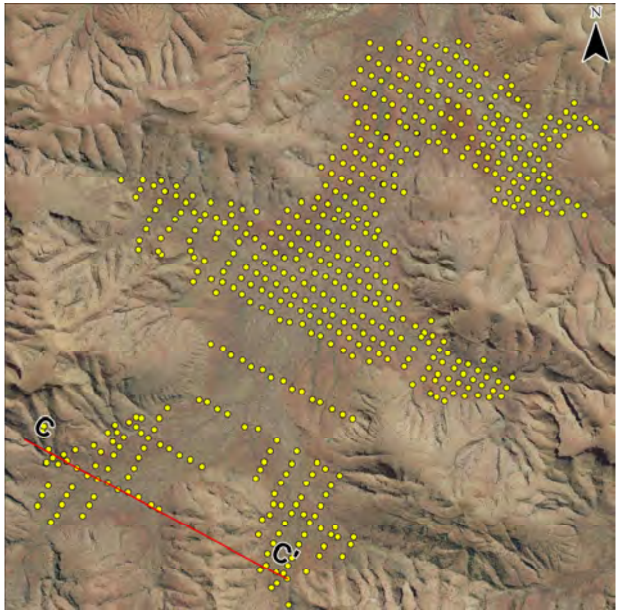
CHAMPION - Section C



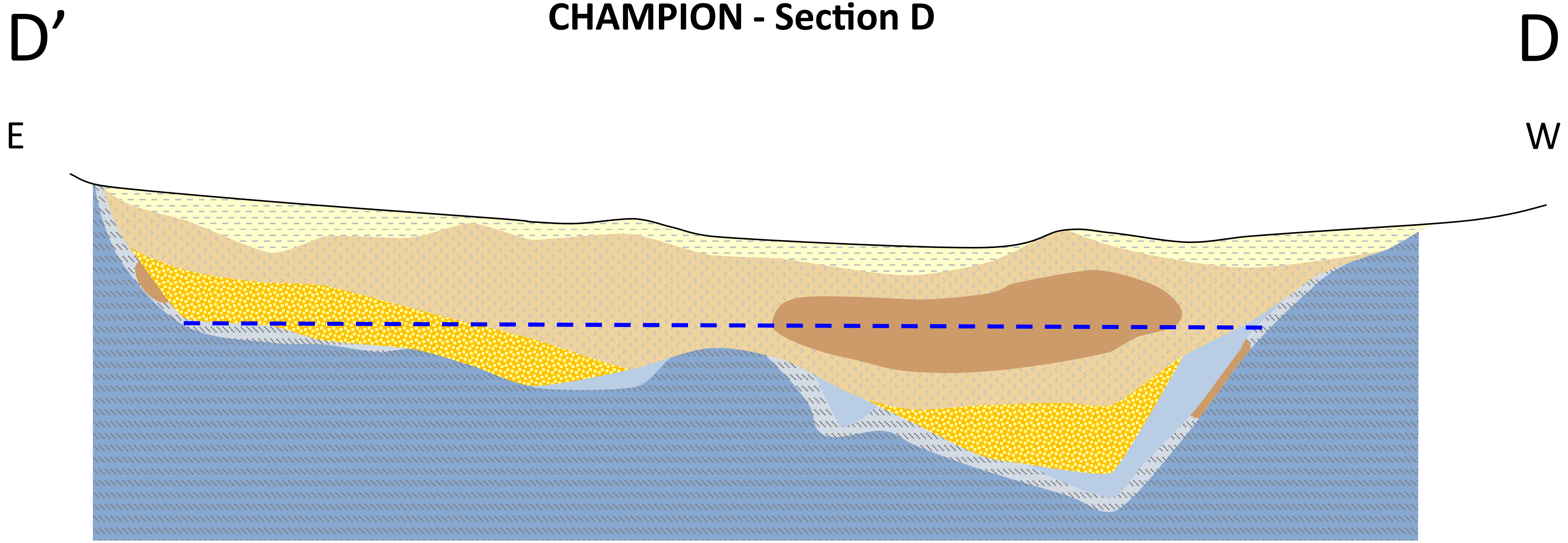
Legend

- RC—Recent Alluvium/Colluvium
- DID—Detrital Iron Deposits
- Clay
- CID—Channel Iron Deposits
- BID—Bedded Iron Deposits
- WBIF—Weathered Banded Iron Formation
- BIF—Banded Iron Formation
- Inferred Total Head

3x Vertical exaggeration



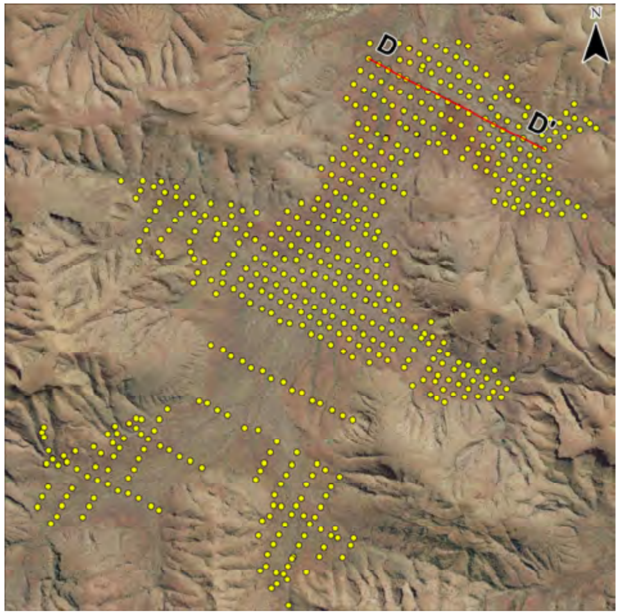
CHAMPION - Section D



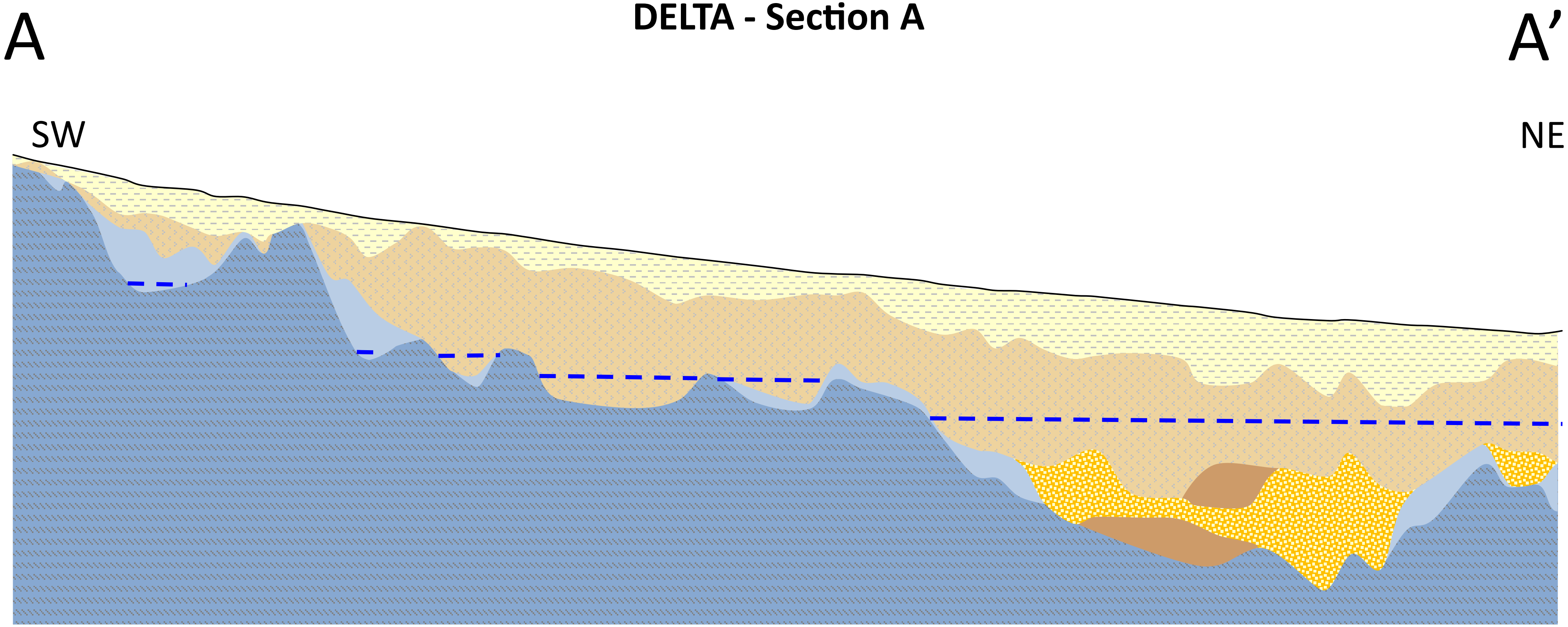
Legend

- ▤ RC—Recent Alluvium/Colluvium
- ▨ DID—Detrital Iron Deposits
- ■ Clay
- ▦ CID—Channel Iron Deposits
- □ BID—Bedded Iron Deposits
- ▧ WBIF—Weathered Banded Iron For-
- ▧ BIF—Banded Iron Formation
- ╌ Inferred Total Head

3x Vertical exaggeration



DELTA - Section A



Legend

▨ RC—Recent Alluvium/Colluvium

▨ DID—Detrital Iron Deposits

■ Clay

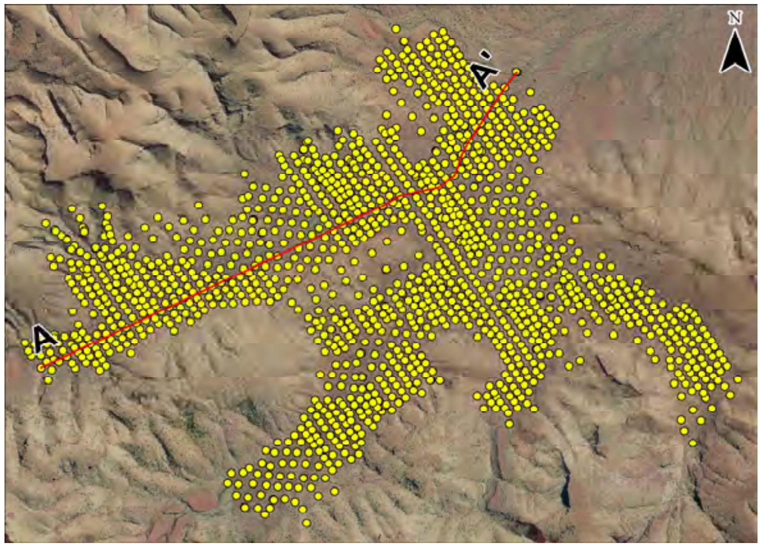
▨ CID—Channel Iron Deposits

■ BID—Bedded Iron Deposits

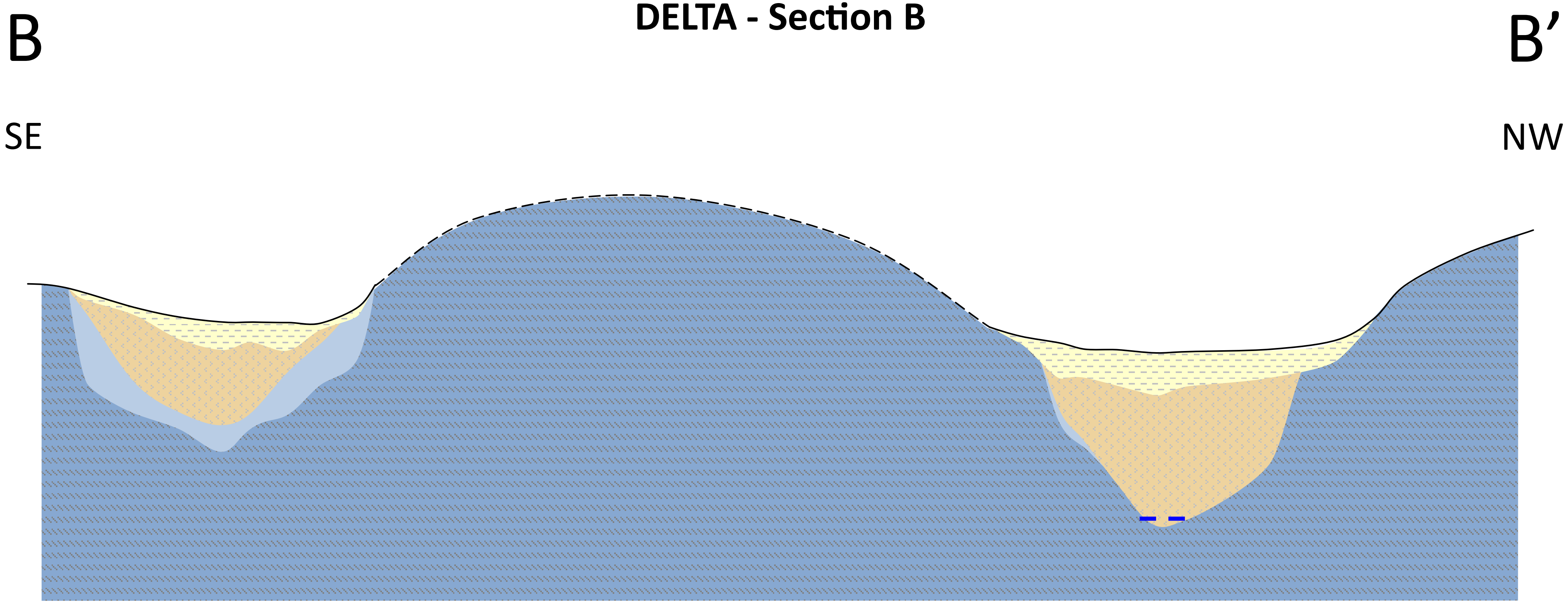
▨ BIF—Banded Iron Formation

╌ Inferred Total Head

3x Vertical exaggeration



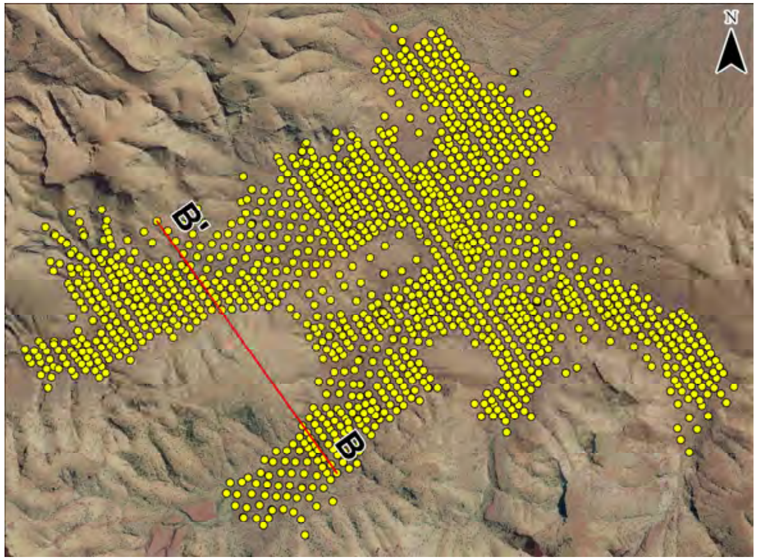
DELTA - Section B



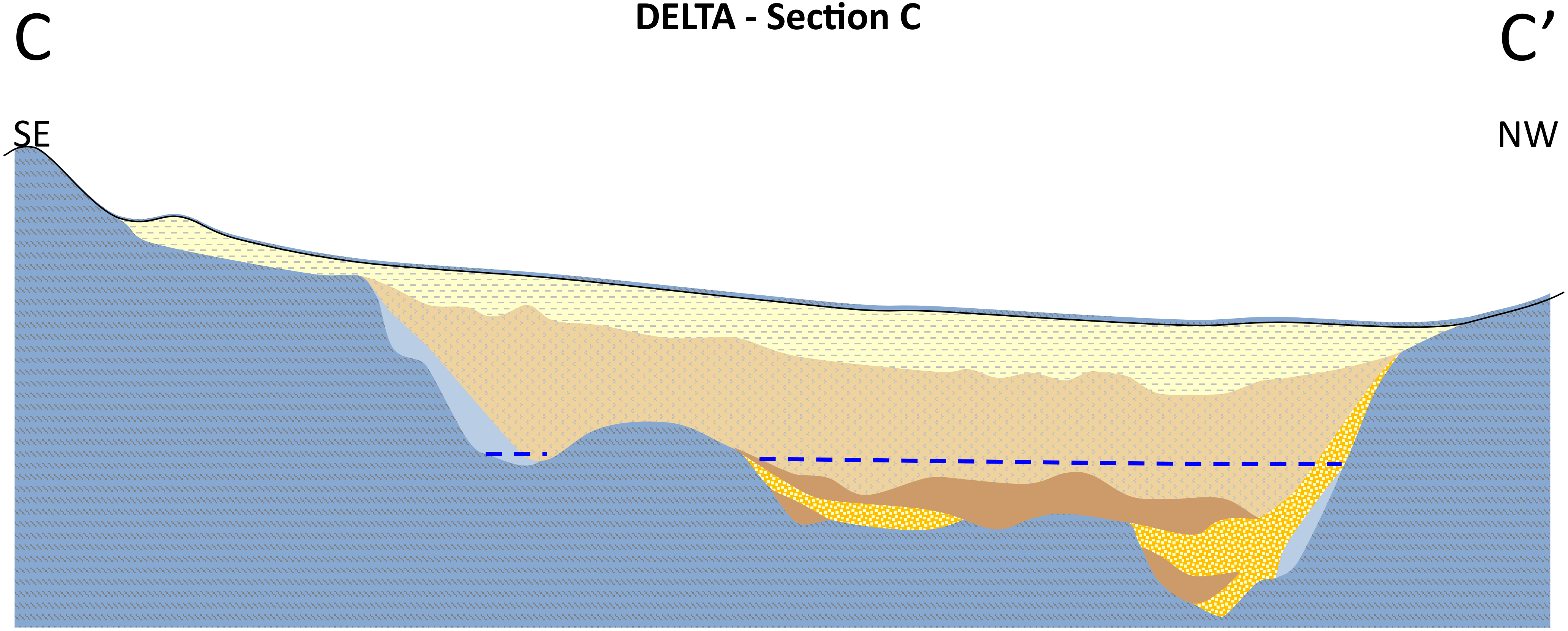
Legend

- ▨ RC—Recent Alluvium/Colluvium
- ▨ DID—Detrital Iron Deposits
- ▨ Clay
- ▨ CID—Channel Iron Deposits
- ▨ BID—Bedded Iron Deposits
- ▨ BIF—Banded Iron Formation
- ◌ Inferred Total Head

3x Vertical exaggeration



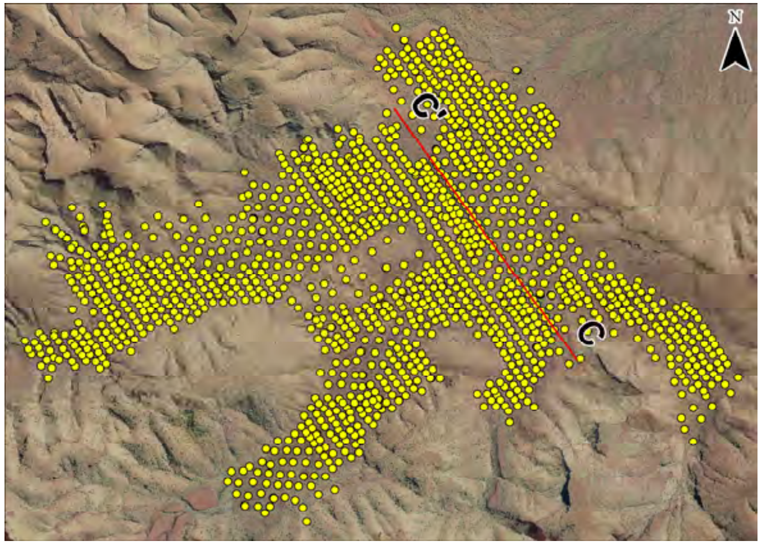
DELTA - Section C



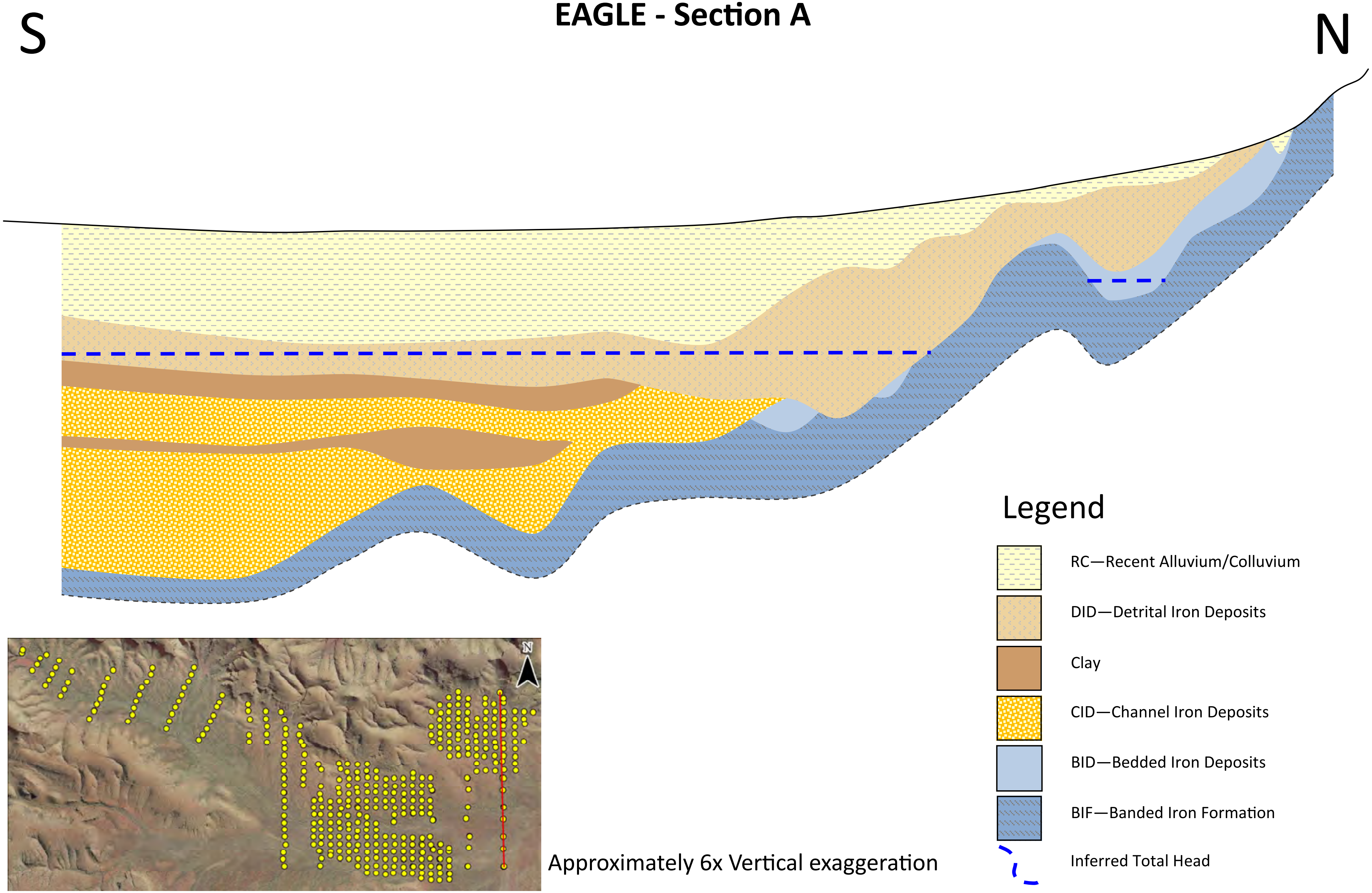
Legend

- ▨ RC—Recent Alluvium/Colluvium
- ▨ DID—Detrital Iron Deposits
- ■ Clay
- ▨ CID—Channel Iron Deposits
- ■ BID—Bedded Iron Deposits
- ▨ BIF—Banded Iron Formation
- ‐ ‐ Inferred Total Head

3x Vertical exaggeration

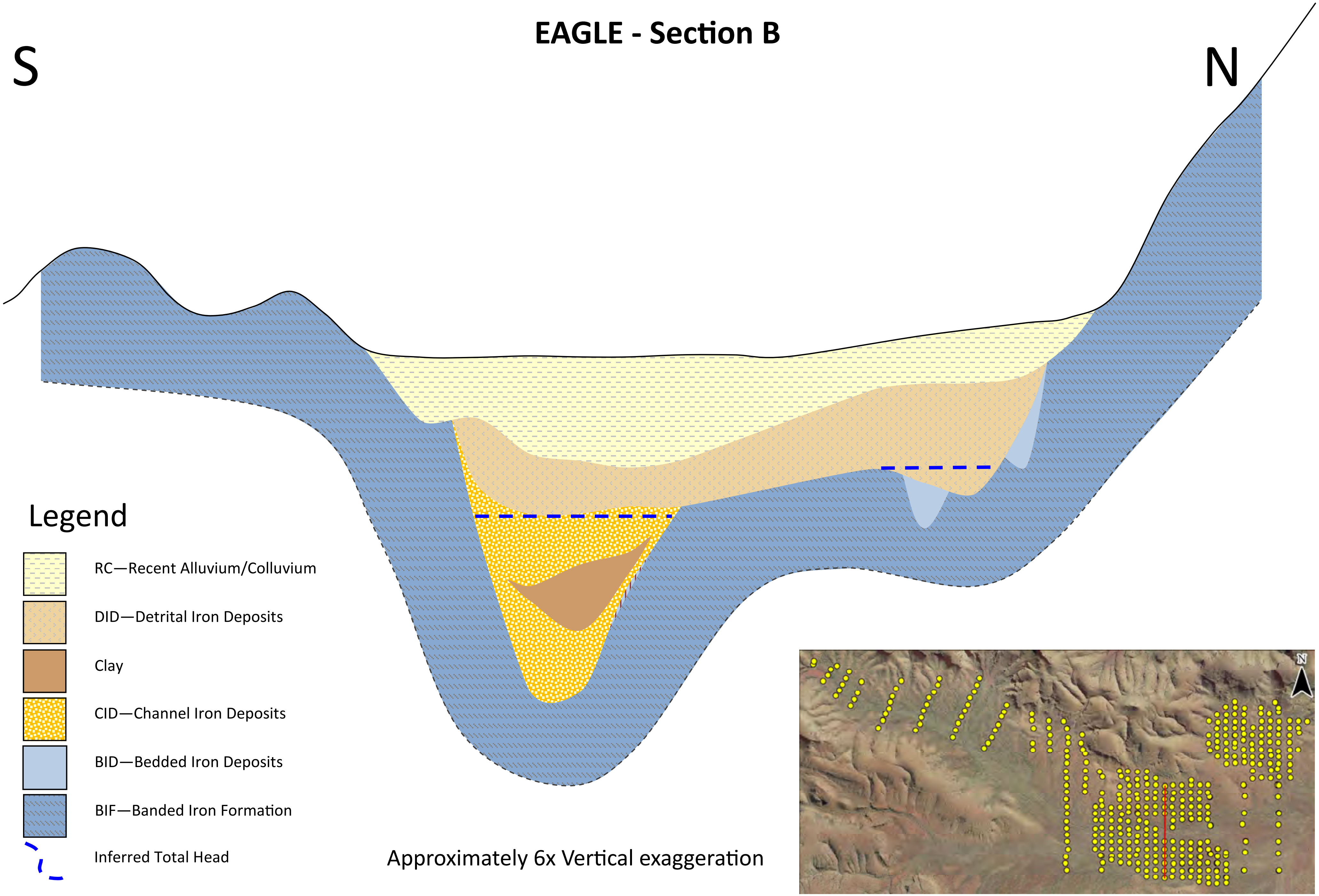


EAGLE - Section A

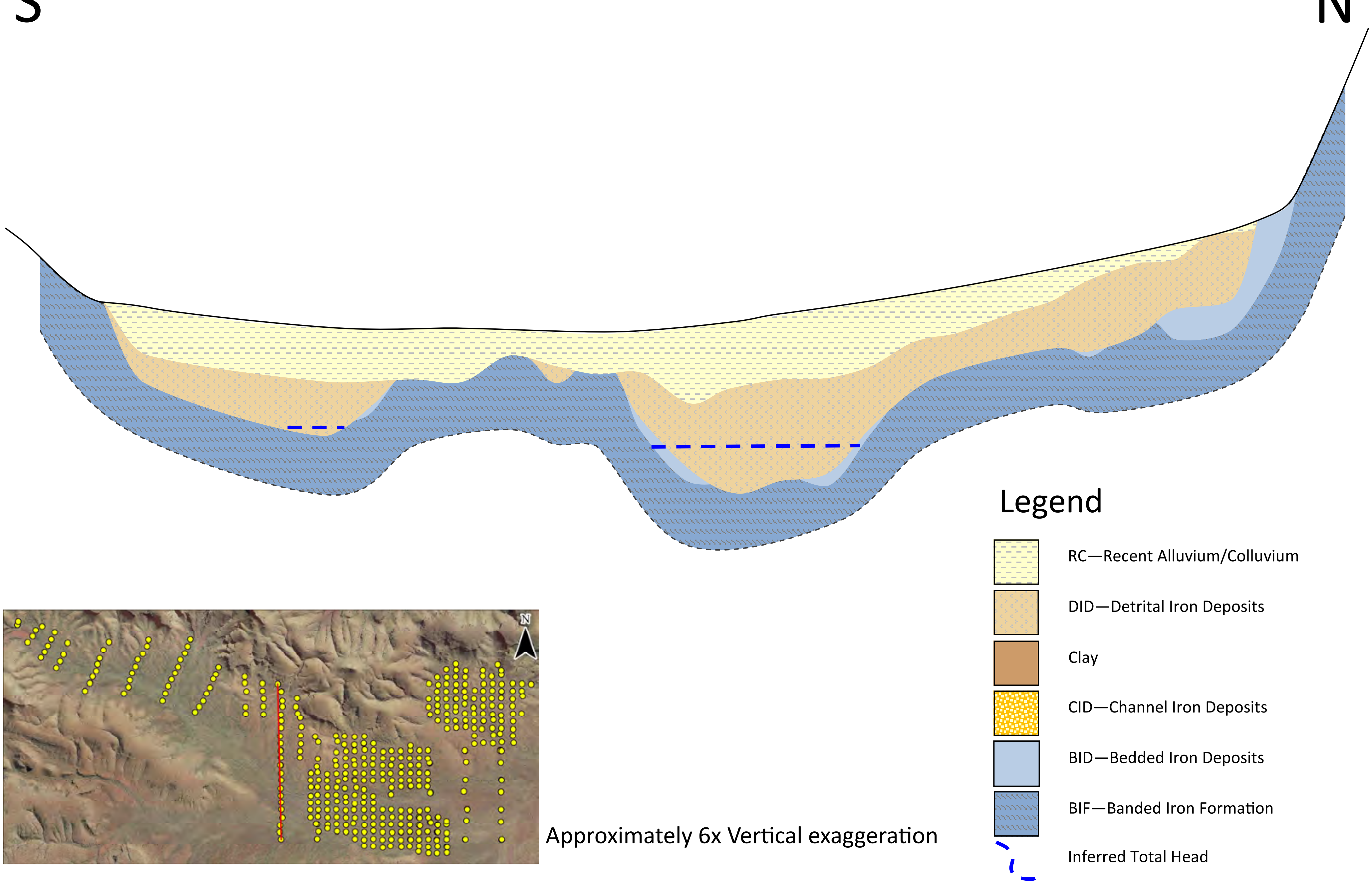


Approximately 6x Vertical exaggeration

EAGLE - Section B

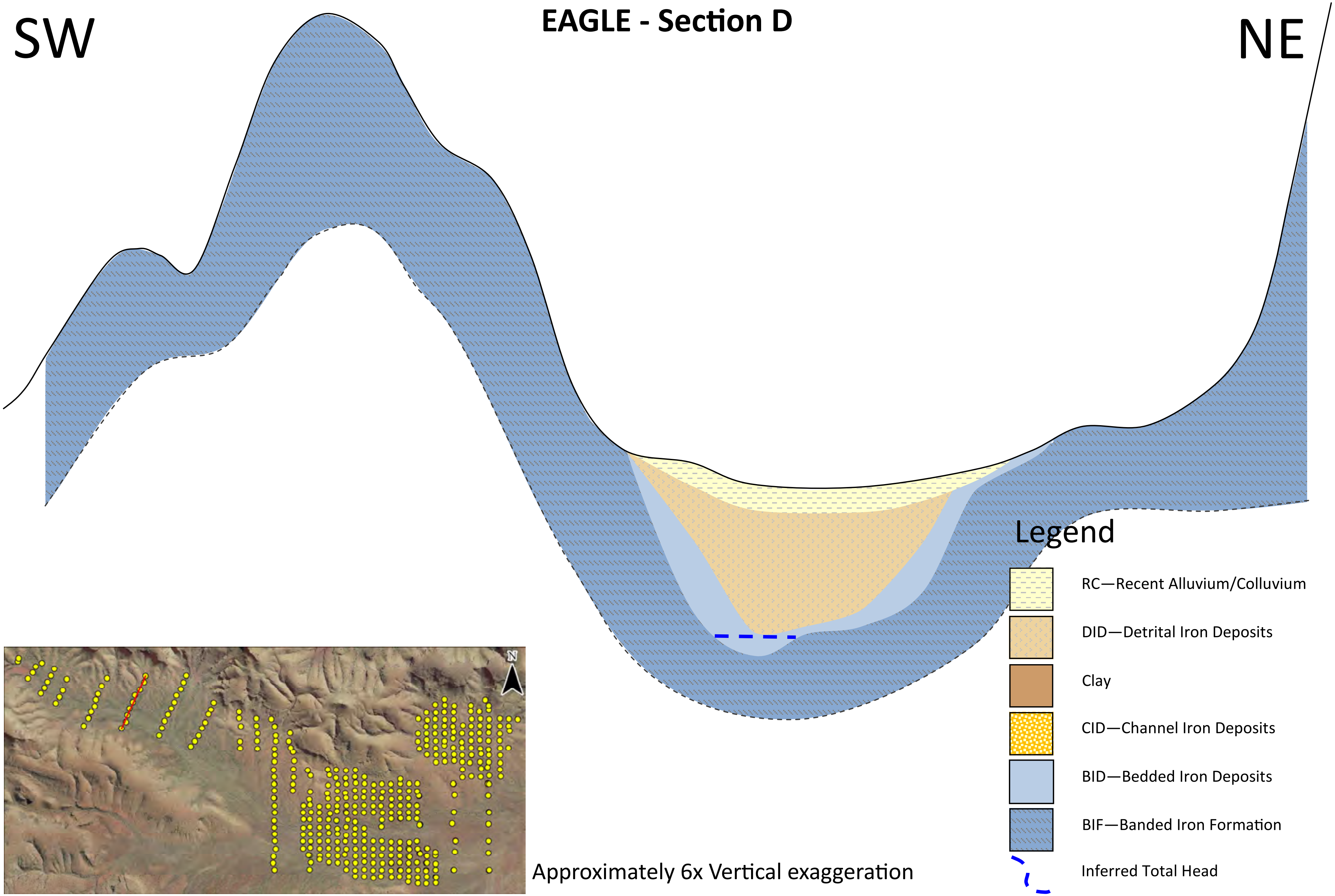


EAGLE - Section C



Approximately 6x Vertical exaggeration

EAGLE - Section D



Approximately 6x Vertical exaggeration

Appendix 7: Recharge Estimates

Flinders PIOP
Recharge Calculations
25th Feb 2012

CATCHMENT NAME	**Total Catchment Area (m^2)**	**Total Catchment Area (km^2)**	**% of the Millstream area**	**Estimated Recharge to Millstream based on catchment area (GL/yr)**	**Estimated Catchment Recharge to Local Aquifers Assuming 5% (GL/yr)**
Ajax	35662277	36	0.7%	0.18	0.8
Blackjack	11340884	11	0.2%	0.06	0.3
Champion	30970726	31	0.6%	0.16	0.7
Delta	18790218	19	0.3%	0.09	0.4
Eagle	27400164	27	0.5%	0.14	0.6
Serenity	203329847	203	3.7%	1.03	4.6
Entire Millstream Catchment *	**5480000000**	5480	**100.0%**	**27.7**	**125**

* Based on the 27.7 GL/yr average annual recharge at Millstream presented in:
Source: Barnett and Davidson, 1985. Hydrogeology of the Western Fortescue Valley, Pilbara Region, WA, Geological Survey 1985.

Annual Rainfall at Wittenoom (mm/yr) **457**

Recharge Estimates taken from Barnett and Davidson (1985)

Catchment	**Recharge Estimates (m3/a)**	**% of total**
Hamersley Range-Mount Flora	2600000	9.4%
Hamersley Range-Mount Pyrton	1400000	5.1%
Caliwingina Creek	7700000	27.8%
Weelumurra Creek	16000000	57.8%
Total	**27,700,000**	**m3/a**
	27.7	**GL/a**

Appendix 8: Area and Volume Calculations

Flinders PIOP
Approximate aquifer volume and areas
25/02/2012

	Approximate Values Derived from Available Data *								
Location	**Volume of Aquifer (m^3)**	**Porosity**	**Volume of Water in Aquifer (m^3)**	**Volume of Water in Aquifer (GL)**	**Volume of Aquifer Impacted (m3)**	**Volume of Aquifer Impacted (GL)**	**% Impacted**	**Maximum reduction in saturated aquifer thickness (m)**	**Maximum Drawdown in Total Head (m)**
Eagle	54,590,000	0.15	8,188,500	8.2	8,188,500	8.2	100%	60	70
Delta	43,850,000	0.15	6,577,500	6.6	6,577,500	6.6	100%	48	70
Champion	35,750,000	0.15	5,362,500	5.4	5,362,500	5.4	100%	66	66
Blackjack	1,297,500	0.15	194,625	0.2	194,625	0.2	100%	Insufficient data available	Insufficient data available
Ajax	6,376,250	0.15	956,438	1.0	956,438	1.0	100%	Insufficient data available	Insufficient data available
Off-Tenement at Serenity (at Eagle and Delta)	760,995,503	0.15	114,149,326	114.1	-	0.0	0%	0	9.5
Off-Tenement at Champion	72,834,234	0.15	10,925,135	10.9	3,899,647	3.9	36%	40	40
Total	**975,693,487**	**0.15**	**146,354,023**	**146.4**	**25,179,210**	**25.2**	**17%**	**N/A**	**N/A**

	Approximate Values Derived from Available Data *		
Location	**Area of Aquifer (m^2)**	**Area of Aquifer Impacted (m^2)**	**% Impacted**
Eagle	7,939,973	7,939,973	100%
Delta	6,847,489	6,847,489	100%
Champion	7,244,153	7,244,153	100%
Blackjack	1,575,252	1,575,252	100%
Ajax	3,941,913	3,941,913	100%
Off-Tenement at Serenity (at Eagle and Delta)	46,632,552	-	0%
Off-Tenement at Champion	4,310,723	2,305,900	53%
Total	**78,492,055**	**29,854,680**	**38%**
Total considering CID aquifer within Caliwigina Creek and Weelumurra Creek catchments	**165,672,000**	**29,854,680**	**18%**
Total estimated aquifer within Caliwigina Creek and Weelumurra Creek catchments	**292,640,460**	**29,854,680**	**10%**

* The calculations and modelling for off-tenement areas has been based on little or no available off tenement data. The data collected for on tenement areas at Eagle, Champion and Delta has been extrapolated to off-tenement areas, and is assumed to be representative. The estimates for Ajax and Blackjack are also based on limited available groundwater data. Additional data is needed for off-tenement areas as well as at Ajax and Blackjack to confirm these calculated values.

Assumptions:

1) The off tenement impacts at Ajax and Blackjack are assumed to be negligible because it is assumed that all mine dewater will be returned to the aquifer.

2) The results reflect the net impact of pumping 1.33GL/a from Delta, Eagle and Champion to meet the project water demands (4GL/a in total). It has been assumed that all excess mine dewater is returned to the aquifer.

3) The volume of aquifer impacted is defined here as the volume of the aquifer that has been dried out due to dewatering. The area of aquifer impacted is the corresponding extent of the aquifer that has been dried out due to dewatering. This assumes that the saturated thickness must be reduced to dry portions of the aquifer (ie. dewatering must lower the total head in the aquifer to a level below the Clay Layer located at the top of the CID/BID aquifer).