



## EL 30/2003 Near Bowry Creek

### Annual Report

**19 June 2014**

**to**

**18 June 2015**

Publication date May 2015

copies: (1) MRT  
(1) Grange Savage River

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**ABSTRACT:**

Exploration Completed on EL30-2003 during the Reporting Period (18 June 2014-18 June 2015) consisted of;

- a) Monitoring of water bores to enable water quality to be monitored distal to the planned mine active areas.
- b) Baseline water sampling was continued to establish the necessary tracks and infrastructure to enable safe access and the collection of regular high quality water samples for the development of a baseline of both water quality and water flow data. Water samples continue to be collected every two–three months during the period.
- c) Two monitoring gauge sites were surveyed by a hydrographer and stream profiles have been calculated allowing a flow gauging curves to be established for these sites. Gauging tables , data-loggers and probes were installed to allow frequent acquisition of water flow data for use in establishing water run-off and hydraulic balance on the site.
- d) A conceptual mine study , consisting of a whittle optimisation on North Zone, preliminary waste dump designs and analysis of viable material movement options including conveyor, road haulage and pipeline variants.
- e) Identification and preliminary evaluatuion of potential risks of the interaction of mine and waste dump on listed karst features located at Bowry creek.

During late 2014, the price of iron ore fell dramatically, requiring Grange to request from Mineral Resources Tasmania, an exemption from the conditions then pertaining to EL30-2003 from 7 January to 18 June 2015. The exemption was granted, permitting Grange to postpone much of the planned expenditure related to the continuation of the Long Plains Development Proposal and Environmental Management Plan .(LP-DPEMP)

The work planned for the next extension of term ( application accompanies this report) seeks to re-start the planned LP-DPEMP work for the next lease period which amounts to a planned expenditure of \$400,933 which is a reforecast of LP-DPEMP expenditure.

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## **INTRODUCTION**

### ***Exploration Rationale***

Grange's interest is focussed on the Long Plains magnetic anomaly for a potential future source of magnetite ore as a feed material for its Savage River concentrator. EL30/2003 now contains the entire strike length of the Long Plains magnetic anomaly (aka "Long Plains").

The following report summarises exploration activities completed at EL30/2003 Near Bowry Creek during the ninth year of tenure (2014/15). This document will report all activities using the GDA94 datum.

### ***Licence Details***

Exploration licence EL30\2003 "Near Bowry Creek"

Located at Bowry Creek, 10km south of Savage River Tasmania.

ID: 23550

Area: 38 sq km blocks

Status: Pending renewal

Reporting period: June 19 -2014 to June 18 -2015

Tenement Holder: Grange Resources (Tasmania) Pty Ltd

Product categories: Category 1 - Metallic Minerals, Atomic Substances, Category 5 - Industrial Minerals, Semi/Precious Stone.

### ***Location***

The Long Plains Prospect is located approximately 10km south by road of the Savage River Mine and concentrator. Savage River is located approximately 100km south west by sealed road from Burnie (Figure 2). The lease is accessed by the all-weather gravel road between Savage River and Corinna, and then by a bush track of approximately 2km.

Local topography surrounding the lease is rugged, with incised valleys and steep hills. The North and Central Zones of the anomaly is located on top of a prominent north-south trending ridge. The west flowing Bowry Creek is the main drainage in the area and runs past the northern boundary of the lease area before joining with Main Creek which drains much of the northern portion of the lease. The southern part of central zone is cut by a deeply incised tributary of main creek. The south zone continues on a prominent ridge south of the central zone.

Regional vegetation includes undisturbed rain forest, wet eucalypt, acacia and open heath land. The immediate area of the prospect has previously been logged extensively approximately 20 years ago, with almost no mature trees present in the working area. A bush fire not long after this time devastated the remaining vegetation, leaving the present vegetation as thick regrowth dominated by eucalypts with several rainforest species. Climate is wet temperate with an average annual rainfall of 1,950mm and mean monthly temperatures ranging from 3-19°C.



Figure 1 Savage River Project Location  
Tenure

Exploration Lease EL 30/2003 “Nine Mile Creek” was transferred to Goldamere Pty Ltd on 6<sup>th</sup> February 2008. Australian Bulk Minerals (ABM) was a wholly owned subsidiary of Goldamere and managed and conducted all exploration activities on this lease. ABM merged with Grange Resources Ltd (Grange) on the 1<sup>st</sup> January 2009 resulting in a name change for Goldamere to Grange Resources (Tasmania) Pty Ltd. Grange also manages the operation of the magnetite mine and concentrator at Savage River, and the pelletising plant and ship loading facilities at Port Latta on the North West coast. EL30/2003 was amalgamated with 2 other leases in 2010 and is now known as EL30/2003 Near Bowry Creek.

Grange’s Long Plains Prospect is held under an amalgamated lease EL30/2003 Near Bowry Creek as shown in figure 2 land tenure below.

EL30/2003 comprises an area of 38km<sup>2</sup>. The amalgamated lease EL30/2003 encompasses the entirety of the Long Plains magnetic anomaly and provides continuous leasehold connecting EL30/2003 and the Savage River Mine Lease 2M/2001.

Grange successfully applied to transfer EL30/2003 to Goldamere after negotiating with the holders, Gregory and Thorne. This transfer was granted on the 6<sup>th</sup> February 2008. It completes the coverage of the anomaly and incorporates ground adjacent to the anomaly necessary for extended exploration activities and potential mine infrastructure.

In September of 2010 Grange requested an amalgamation of leases EL19/2005, EL46/2007 and EL 30\2003 into EL30\2003. This request was granted in February 2011.

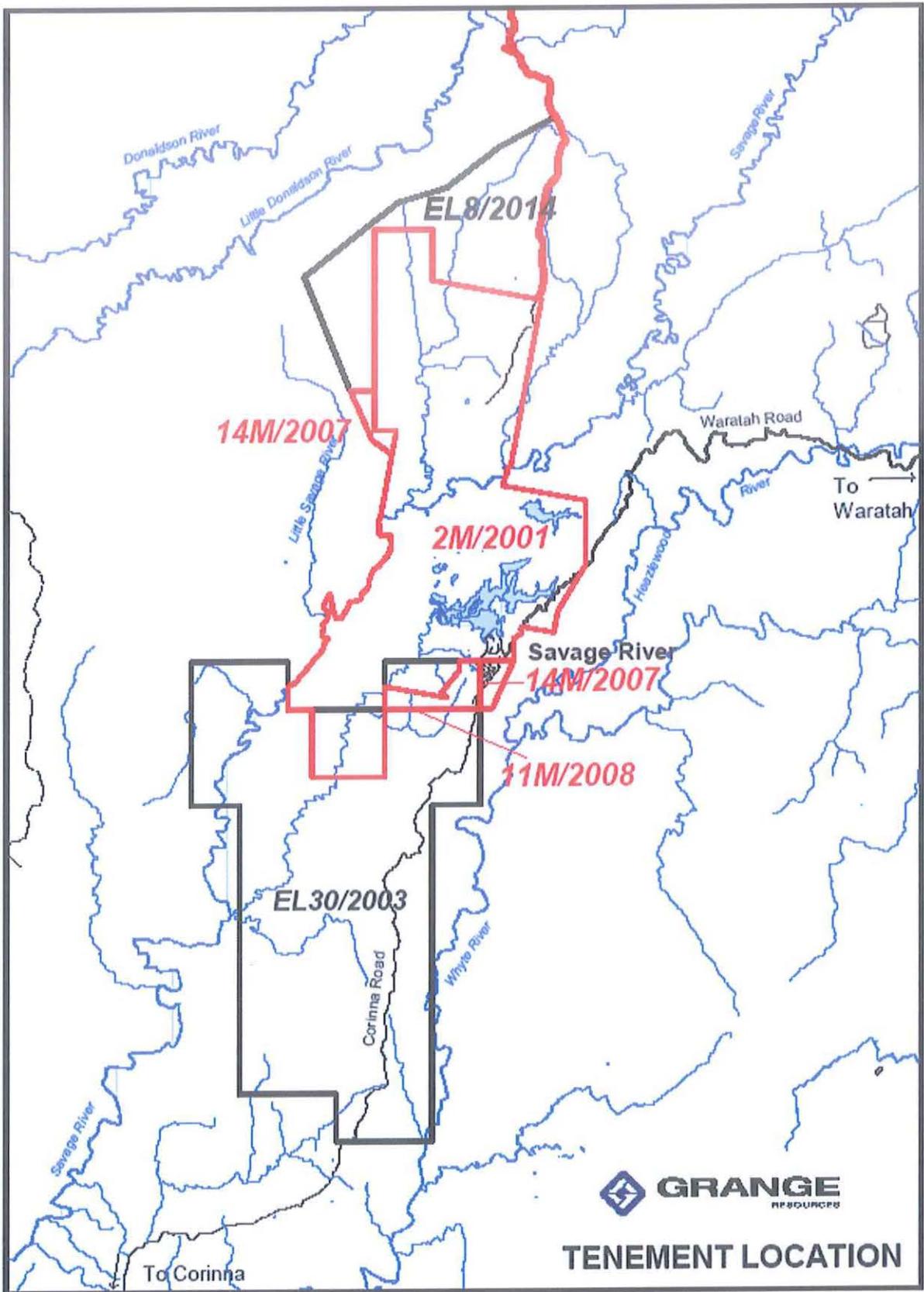


Figure 2 Land tenure as at May2015: EL30/2003, EL8-2014 and ML's 2M/2001 , 11M-2008 and 14M-2007

### Geology

The Long Plains magnetite deposit lies within and near the eastern margin of the Proterozoic Arthur Metamorphic Complex in north-western Tasmania. The complex is exposed along a northeast-southwest trending structural corridor, the Arthur Lineament, which separates Proterozoic sedimentary rocks to the northwest from a variety of Palaeozoic rocks to the southeast (Figure 3).

The magnetite deposits at Long Plains represent a series of elongate, discontinuous magnetite lenses that extend over a three kilometre strike length (Figure 4). The deposit has been separated into three distinct zones on the basis of total magnetic intensity termed the Northern, Central and Southern Zones. The oblique view of the total magnetic intensity in Figure 4 illustrates the broad geometry of the Zones.

The magnetite zones are sub-vertical to strongly east dipping and hosted within ultramafic and mafic schists. A suite of late metabasalt and metadolerite intrusive dykes occur sub-parallel to the ore zones. Vein magnesite is developed at the western magnetite boundary with the contact marked by the strong weathering and the development of surface clays (Griffith, 2000, Internal memorandum).

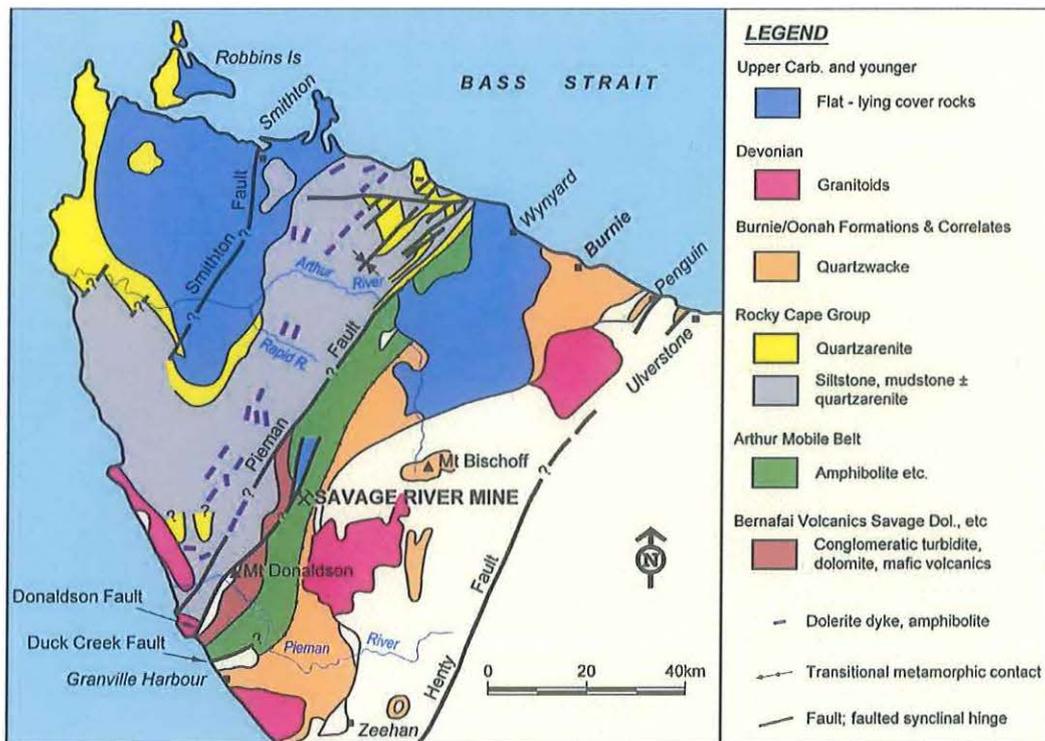


Figure 3 Regional Total Magnetic Intensity (TMI)

## REVIEW OF PREVIOUS WORK

### *Prior to Current Tenement*

Ironstone outcrops on the Savage River were first discovered by State Government surveyor C.P. Sprent in early 1877 during one of his exploration journeys through western Tasmania. The deposits were first reported as a possible source of iron ore in 1919. Modern, systematic exploration techniques were employed by the Australian Bureau of Mineral Resources during 1956 that included ground and airborne magnetic surveys. The largest magnetic anomaly was detected at Savage River with two smaller anomalies being detected at Long Plains and Rocky River further to the south.

The Long Plains magnetite anomaly was first investigated during the late 1950's by the Bureau of Mineral Resources (BMR), as part of a regional magnetic study of the Savage River area. A ground magnetics survey was completed in 1962 across the area (Eadie, 1962). The contour map produced for that report has been digitised and converted into AMG66 co-ordinates to be combined with other data.

Diamond drilling and ground magnetic surveys were undertaken by Rio Tinto Australia Exploration (RTAE) Pty Ltd during the early 1960's. One diamond drill hole RTAE-1 totalling 195.0 metres was drilled in the northern end of the deposit.

Ownership of the deposit was transferred to Industrial and Mining Investigations (IMI) Pty Ltd during the 1960's, who completed broadly spaced diamond drilling at Long Plains. A total of seven diamond drill holes (IMI28-30; IMI33-35 and IMI46) totalling 1,135.07 metres were drilled in the northern and southern areas of the deposit.

No further significant exploration was completed at the deposit until 1994 when Savage Resources Pty Ltd completed four diamond drill holes (LPDDH100-103) in the north of the deposit. The program totalling 525 metres was designed to provide a complete cross section through the deposit in an area of moderate grade magnetite development lying between drill holes RTAE 1 and IMI 29.

Some weak gold anomalies were identified on the lease by the Goldstream Mining/ Titan Resources JV during 1996/97. No further work was undertaken on these anomalies. Extensive historic gold workings are located in the north of the lease in the Golden Ridge area and on the adjacent mine lease 2M/2001.

An initial program in 2006 was devised to develop a geological model. This involved relogging historic core, costeaning across the mineralisation (1505 meters), logging the costeans and establishing survey control points

A follow-up program in 2007 completed 6 RC drill holes and 1 diamond hole, and completed a ground magnetic survey over part of the Northern Zone.

In 08/09, the work completed on lease EL 30/2003 included a review of historic data, review of Goldstream helimag data, a preliminary mining infrastructure plan, inspection of overgrown access tracks

- The program in 09/10 included a financial model or the potential impact of the deposit and detailed planning to develop a 5 year plan.
- In 2010 the amalgamation of lease EL30\2003 was submitted and granted in Feb 2011. The program in July10 -June 11 included the track cutting of proposed new track alignments, a follow-up fauna survey and cutting of gridlines in preparation for ground geophysics.
- During May-June of 2011, an exploration contractor hand cut 3.2 line km of proposed new track alignments and an additional 7.2 line km of 100m spaced grid lines in preparation for a ground magnetic geophysics survey that was completed In July of 2011.

Processing and reporting of the ground magnetic survey by Contactor Gap Geo was completed in 2011 as well as 2.15km of track construction and rehabilitation to enable the commencement of the drilling campaign in October 2011

Project drilling started 24<sup>th</sup> October 2011 with reverse circulation drilling and the last diamond –tail hole was completed on Thurs May 3<sup>rd</sup> 2012.

In total, 5,029m were drilled between July 2011-June 12 comprised of:

- 2,485m Diamond only
- 2,053m Reverse circulation
- 491.3m Diamond tails

A total of 5,029m were drilled vs 6,239m planned, with 4 of the planned holes in CZ (totalling 1,200m) were deferred to the next years ( 2012-2103) program.

June19 2012-June 18 2013

In October of 2012 funding of \$1,837,920 over 12 months was approved by Grange Resources Tasmania Pty Ltd for the exploration of Long Plains during the tenure period to 18 June 2013.

The Exploration programme on EL30/2003 between 19 June 2012 and 18 June 2013 consisted of:

1. Geological mapping compilation at 1:10,000 scale of the entire EL30-2003 lease area
2. Construction of 450m of new tracks in North zone and 450m of new track in Central Zone.
3. Drilling of 12 new holes in North zone totalling 3,196.5m to convert as much as possible of the inferred resource to an indicated resource.
4. Drilling of 5 new holes in Central zone totalling 1,421.1m to establish an inferred resource at central zone based on the magnetic anomaly there.
5. Assaying and waste characterisation work to enable a revised resource estimate and conceptual mine planning.
6. Resource estimation in August 2012 based on the 2011-12 drilling to establish a maiden resource estimate for the entire Long Plains resource. Preliminary conceptual mine planning to evaluate the potential contribution of Long Plains to the life of mine plan (LOMP) for the Savage River operation.

Environment Activities :

In October of 2012 funding of \$1,324,890 over 5 yrs was approved by Grange for studies, investigations and works at Long Plains between January 2013 and January 2017 to provide the following:

- Baseline environmental surveys/studies.
- Referral to SEWPaC under the EPBC Act.
- Development and submission of a Notice of Intent to the Tasmanian EPA
- Technical studies into the impacts of a mining and ore beneficiation operation at Long Plains and management of those impacts
- Preparation and submission of a DPEMP to the Tasmanian EPA and the Waratah Wynyard Council.

June19 2013-June 18 2014

During the lease period (18 June 2013-18 June 2014), the following works were completed;

Water Bores:

Six water bores were monitored to enable water quality to be determined distal to the planned mine active areas.

Water Sampling:

A program of baseline water sampling (scoping) was completed with the following objectives:

- a) establish the necessary analytes and parameters.
- b) establish the necessary tracks and infrastructure to enable safe access to enable;
  - a. the collection of regular high quality water samples for the development of a baseline of both water quality and water flow data.

Water samples were collected every two months during the period.

Water Flow Gauging:

Two monitoring gauge sites were surveyed by a hydrographer from Entura ( Hydro Tasmania). Stream profiles were calculated allowing a flow gauging curve to be established for each of site NF and Freeman Creeks at Long Plains. At these sites a gauging table , data-logger and probes have been installed which will allow the frequent acquisition of water flow data for use in establishing water run-off and hydraulic balance on the site.

Preliminary Groundwater modelling:

The findings of the preliminary set of groundwater investigations are summarised below:

- Rock mass with a very high fracture density was encountered in some holes, with permeabilities around  $5\text{E-}06$  m/s and above.
- Zones of high to medium density of fractures has permeabilities ranging between  $1.1\text{E-}06$  and  $4.7\text{E-}06$  m/s, whilst the fresher rock has permeabilities around  $5.7\text{E-}07$  m/s and below.
- The weathered profile down to around 50 mBGL has permeabilities around  $6.8\text{E-}07$  m/s, but as low as  $1\text{E-}09$  m/s.
- Water levels recorded with the instruments installed at depth are substantially different from the water level recorded before the start of the testing program. Mining One understand that VWPs which are now grouted in are recording water levels in the actual response zones as opposed to the combined aquifers.
- At this stage of the investigations, it is likely that three separate aquifers can be distinguished at the site.

The development of a specific testing program to confirm these findings is recommended.

Ongoing monitoring should be set up to confirm the range of groundwater level variation associated with the proposed pit water level over wet seasons to confirm the water level range and potential variations.

A Conceptual Site Model (CSM) should be developed to better define the number of aquifers and their respective hydraulic properties and water levels, and determine their interrelationship. The model should also establish the zones of high conductivities associated with fracturing and identify high conductance areas to enable the assessment of the expected mine inflows based on the current and future anticipated hydraulic gradients (Mining One proposal 37693).

## **Exploration Completed during the Reporting Period**

*Regional Exploration Activities; None*

*Prospect-Based Exploration Activities.*

During the lease period (18 June 2014-18 June 2015), the following works have been completed;

### ***Water Bores:***

Six water bores were monitored to enable water quality to be monitored distal to the planned mine active areas.

### ***Water Sampling:***

A program of baseline water sampling (scoping) was continued to establish the necessary tracks and infrastructure to enable safe access and the collection of regular high quality water samples for the development of a baseline of both water quality and water flow data. Water samples continue to be collected every two–three months during the period. The water chemistry baseline data is given in the images below.

### ***Water Flow Gauging:***

Two monitoring gauge sites have been surveyed by a hydrographer from Entura ( Hydro Tasmania) and stream profiles have been calculated allowing a flow gauging curve to be established for each of site NF and Freeman Creeks at Long Plains. ( see maps fig 7 and 8) .

At these sites a gauging table , data-logger and probes have been installed which allow the frequent acquisition of water flow data for use in establishing water run-off and hydraulic balance on the site.

### ***Mining Study:***

A conceptual mine study , consisting of a whittle optimisation on North Zone, preliminary waste dump designs and analysis of viable material movement options including conveyor, road haulage and pipeline variants.

### ***Karst Evaluation:***

Identification and preliminary evaluation of potential risks of the interaction of mine and waste dump on listed karst features located at Bowry creek.

Fig 1: Long Plains All Sample Sites (1:20000 GDA 94 UTM/UPS)

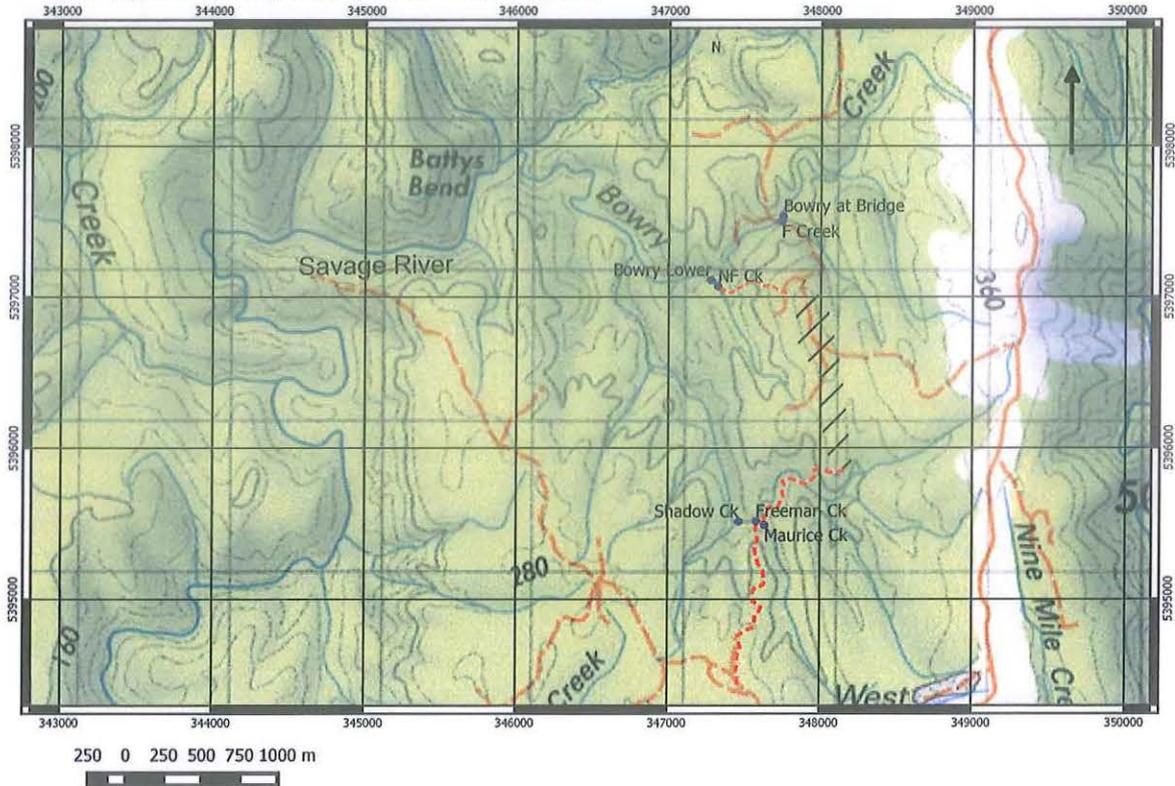


Figure 4 Water Sampling Sites All

The water sampling sites in the north include ; Bowry Lower, Bowry Upper and F Creek with a flow gauging installation at NF creek and new drilled water monitoring bores at sites Env A, EnvB and Env F ( previous report). The sampling sites were selected to capture data of the entire watershed running off of the northern end of the Long Plains ore body. (Fig 7)

**Karst:**

This section deals with the identification and preliminary evaluation of potential risks of the interaction of mine and waste dump on listed karst features located at Main Rivulet / Bowry creek. Sample sites were located so as to capture hydrologic data from known karst features at Bowry Creek (Fig 6) including analysing the Magnesium and Calcium load in the run-off waters. This data may be used to evaluate whether karst systems are active . (ie: to determine whether karst is true palaeokarst or relict karst and the degree of current karts activity. Ref )

**Natural Values Geoconservation sites Listed: Karst**

There are two Geoconservation sites listed in the project area on the Tasmanian Natural Values Atlas;

Code	Name	Type	Status	Significance	Sensitivity
PIE01	Arthur Lineament	site record	Listed	Australia	10
PIE15	Main Rivulet - Bowry Creek Magnesite Karst	site record	Listed	Australia	3

Sensitivity	Definition	Example
3	Values sensitive to damage by scientific or hobby collecting or sampling, or by deliberate vandalism or theft	Some fossil and mineral sites; speleothems
10	Special cases	Values which would only be destroyed by erosion caused by sea-level rise from humanly-induced greenhouse warming, or by catastrophic events such as meteorite impacts; Large regions whose geoconservation values reside essentially in their large scale form; (eg: very large structural landforms) will commonly have a sensitivity of 10.

Source :“DPIWE Natural Values Atlas”

The following are references describe the significance and processes in the Bowry Cave and Bowry creek magnesite karst systems;

*“The occurrence in the Main Creek-Bowry Creek area of karst landforms of national significance is reported by Sharples (1996) in his review of landforms and geological sites of geoconservation significance in this region. The comment is made that the: main karst assemblage at Main Rivulet (is) in good condition: other features not assessed.*

*In work undertaken for Savage Resources Ltd, Shannon (1993) pointed out that the magnesite karst in the Savage River area is a very rare formation on a global scale.*

*In the Statement of Significance for the Tarkine Wilderness Area, the AHC noted that (AHC, undated):*

*“Genuine karst features, albeit on a small scale, including residual pinnacles with undercuts, short streamway caves and springs occur in some of the outcrops of magnesite rock associated with some incised streambeds in the Main Creek - Bowry Creek magnesite area generally. These features are of enhanced scientific interest in view of the extremely rare status of the magnesite karst.”*

*The locations of the various surface karst features noted by Shannon (1993) are shown in Figure 3.2 of the following report; Golden Triangle Resources NL 872/11F2/R15/9R” In the Main Rivulet/Bowry Creek area cavities up to 20 m across were encountered, some open (water filled?) but most filled with reddish ochres, muds and rubble. Some of the drillholes recorded flows of water or evidence of flows such as iron oxide deposits. Two holes intersected substantial flows of up to 400 litres/ min. One of these could not be capped; it is a hydrothermal flow containing substantial amounts of dissolved sulphate and carbonate. Many deep sinkhole fills were encountered near the surface. Again, this indicates the likelihood of a well developed Tertiary relict/palaeokarst, now buried, with the major ongoing cave forming processes linked to deep hydrothermal flows.*

#### **Sites of geoconservation significance;**

Candidates for significance assessments include Bowry Cave, shallow karst hydrology at Bowry cave.

Proposed further work ( proposed by Household, Calver and Sharpe) included;

- characterisation and assessment and planning for the management of the physical, chemical and biological aspects of deep, hydrothermal groundwater systems.
- planning for management of cave and sinkhole fills, and associated groundwater flows, particularly if mining proceeds ( nb: they were referring to the Main Creek magnesite mine proposal ( 1999) at the time).
- assessment of special rehabilitation strategies necessary for mines in these karst systems,
- investigation of the age and palaeoecological information contained in sinkhole and cavity fills and nearby basalt flows, and their potential for reconstructing regional environmental history.<sup>1</sup>

#### **Karst Hydrology;**

Karst hydrology in magnesite has developed on a comparable scale to many dolomite and limestone karsts. Many features are either relict or 'fossilised'; landforms essentially developed in early- mid Tertiary times then buried under extensive Tertiary fluvial deposits and basalts, and which are only now being exhumed. Relict

<sup>1</sup> HouseholdCalverSharples1999\_MagnesiteKarstNWTas pp.12

karsts are those removed from the situation in which they were developed, although they remain exposed to and slowly modified by processes operating in the present system. Palaeokarsts are, by definition, fossilised and completely de-coupled from the present hydrogeochemical system. They are generally buried beneath thick, impermeable layers of rock (Ford & Williams 1989). The Northwest Tasmanian magnesites contain elements of both relict and palaeokarst features.

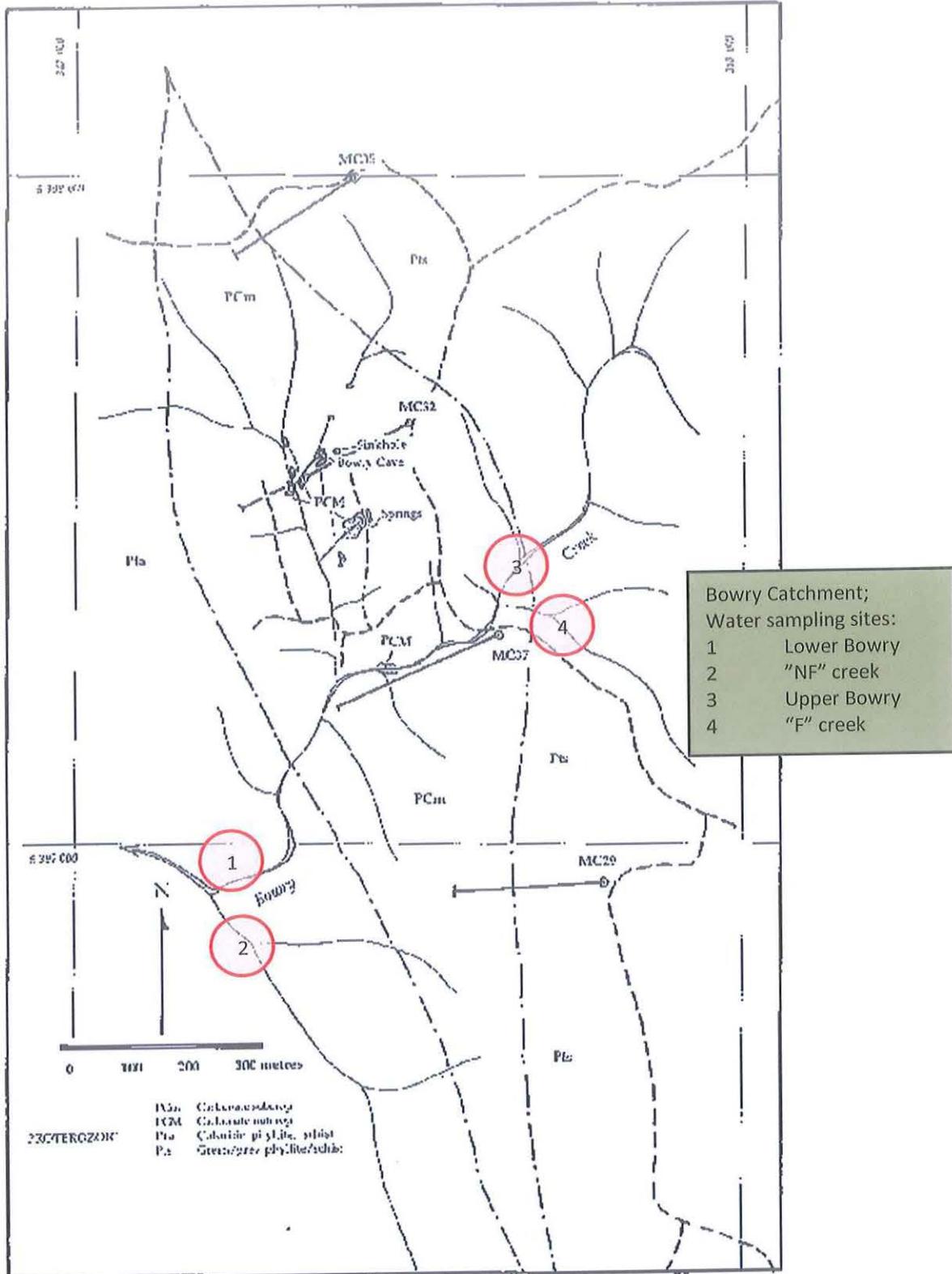


Figure 6 Bowry Creek Karst Features ( Household,Calver,Sharpe 1998)

**Mine Design: North Zone Resource**

Updated JORC 2012 Mineral Resource for Long Plains includes 107 million tonnes of magnetite iron resource at Long Plains.

25% of this resource tonnage is in the Indicated Resource category, all in North Zone.

The Mineralisation grades and widths are very robust and continuous at various cut-off grades.

- Estimated depth of mineralisation is variable and generally greater than 300 metres
- Ore outcrops on a prominent ridge, with very low planned strip ratios
- Deposit contains abundant alkaline waste rocks and low amounts of sulphide waste rock

The north zone (NZ) has a distinct magnesite ( carbonate) sequence immediately to the west of the main host assemblage. The main host assemblage is comprised of variably altered mafic schists and the thin discreet magnetite lenses which commence and terminate parallel to the regional foliation suggesting a shear control on mineralisation and incomplete remobilisation of original (diagenetic?) magnetite.

**Conceptual Mine Study:**

Based on the resource block model and the waste rock model, a conceptual open cut mine study was completed by Grange mine planning engineering staff in April of 2015. The Conceptual Level Mine Study evaluated a pit focussing on the indicated and inferred resource outlined in the North Zone of the Long Plains prospect. Geotechnical pit parameters were adopted from the South Deposit geotechnical model and assigned to the Long Plains waste rock model. A financial sensitivity model was completed which demonstrates a viable project given conceptual levels risks and assumptions. The data is confidential at time of writing.

The project was evaluated on the basis of a satellite operation that would supplement ( or augment) the concentrate profile during the last 15-20 years of the Savage River mine life, so as provide another ore source to mine whilst other ore sources are developed during waste stripping stages for example.

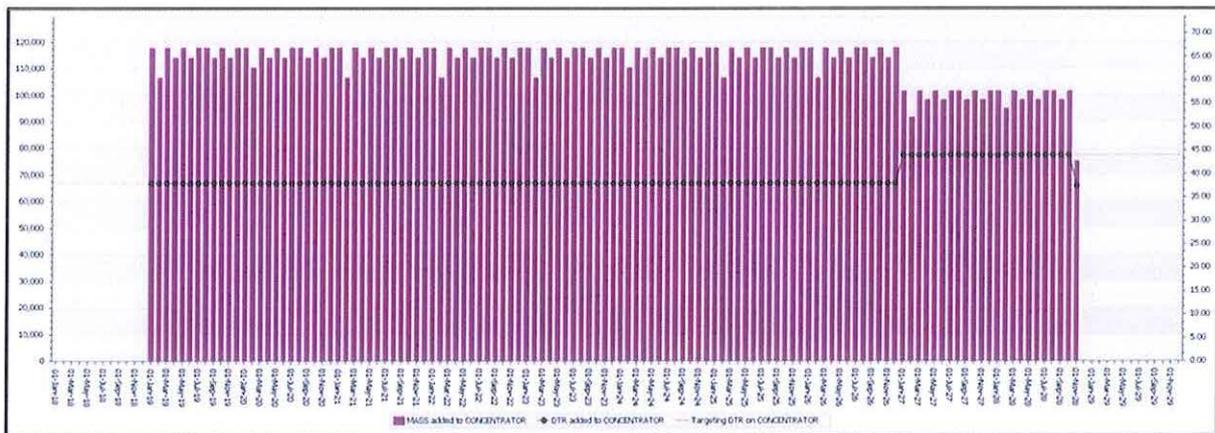


Figure 5-Long Plains Conceptual Concentrate and feed grade profile

Financial analysis of this mine design uses confidential proprietary financial dimensions related to the magnetite pellet business. It demonstrates a robustly positive NPV but only if processed while the main Savage River site is in production.

The window of opportunity for Long Plains development therefore is between 2019 and 2032.

The project has the potential to generate additional magnetite concentrate at the rate of 500,000 tonnes per year for a ten (10) year period.

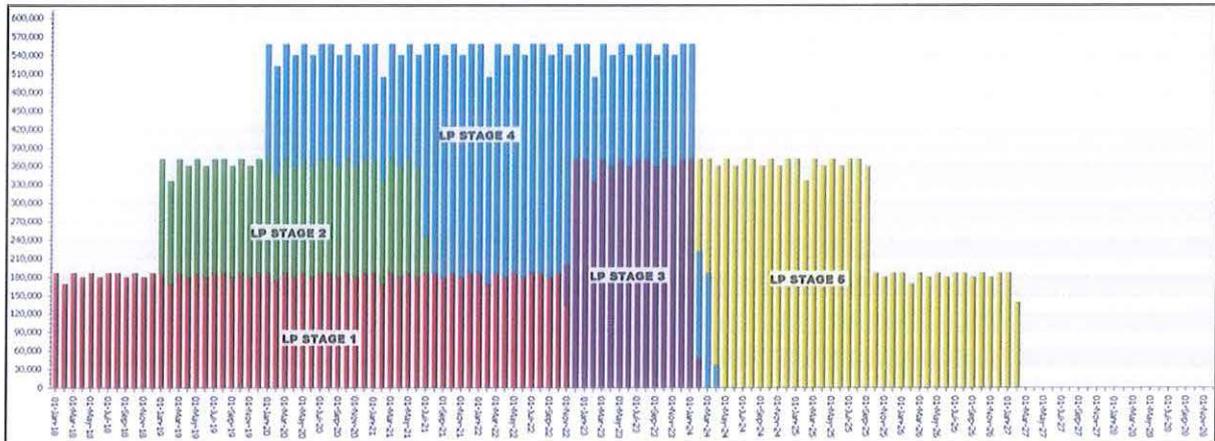


Figure 6 Long Plains Mine Material Schedule

In the conceptual schedule, Mining is setup to start in Jan18. For the first year the mining rate is 6k bcm/day. The fleet expands to 12k bcm/day in year 2 and to 18k bcm/day in year 3. After year 6 the fleet drops back to 12k bcm/day and then back to 6k bcm/day near the end of year 8.

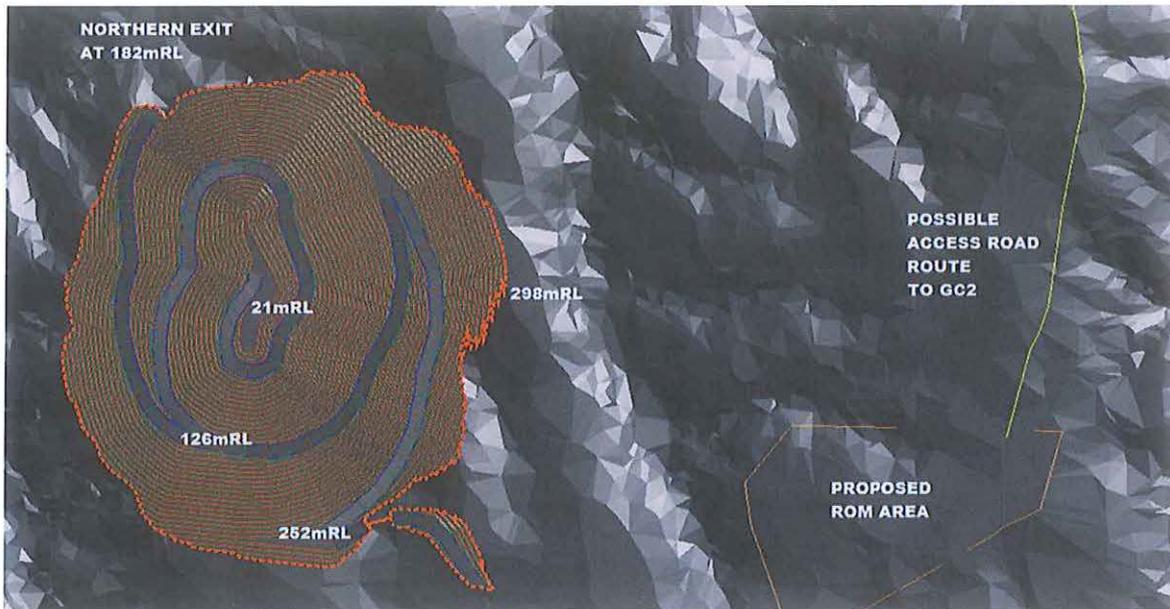


Figure 7 Mine Design -Conceptual

The total pit delivers 14.3Mt @ 39.2% DTR. At 95% recovery this is 5.3Mt of contained concentrate. The total material is 43.8M bcm. The strip ratio (w:o tonnes/tonnes) is around 7.6:1

**Haulage:**

The conceptual study evaluated several means of material movement over the ten year mine life at the rates required to deliver 500,000t of concentrate annually in the period. The only viable transport means was determined to be haul trucks using a dedicated ( ie: separate) single lane haul road parallel to the Corrinna Road for much of the distance between Long Plains and the Concentrator.

Two options to locate the haul road are proposed either to;

- a) link to the South Deposit haul road network at the South Deposit tailings Storage Facility (SDTSF), or
- b) link to the mine access road , south west of the Savage River Town site.

These detailed proposals would be covered in a draft DPEMP due next year.

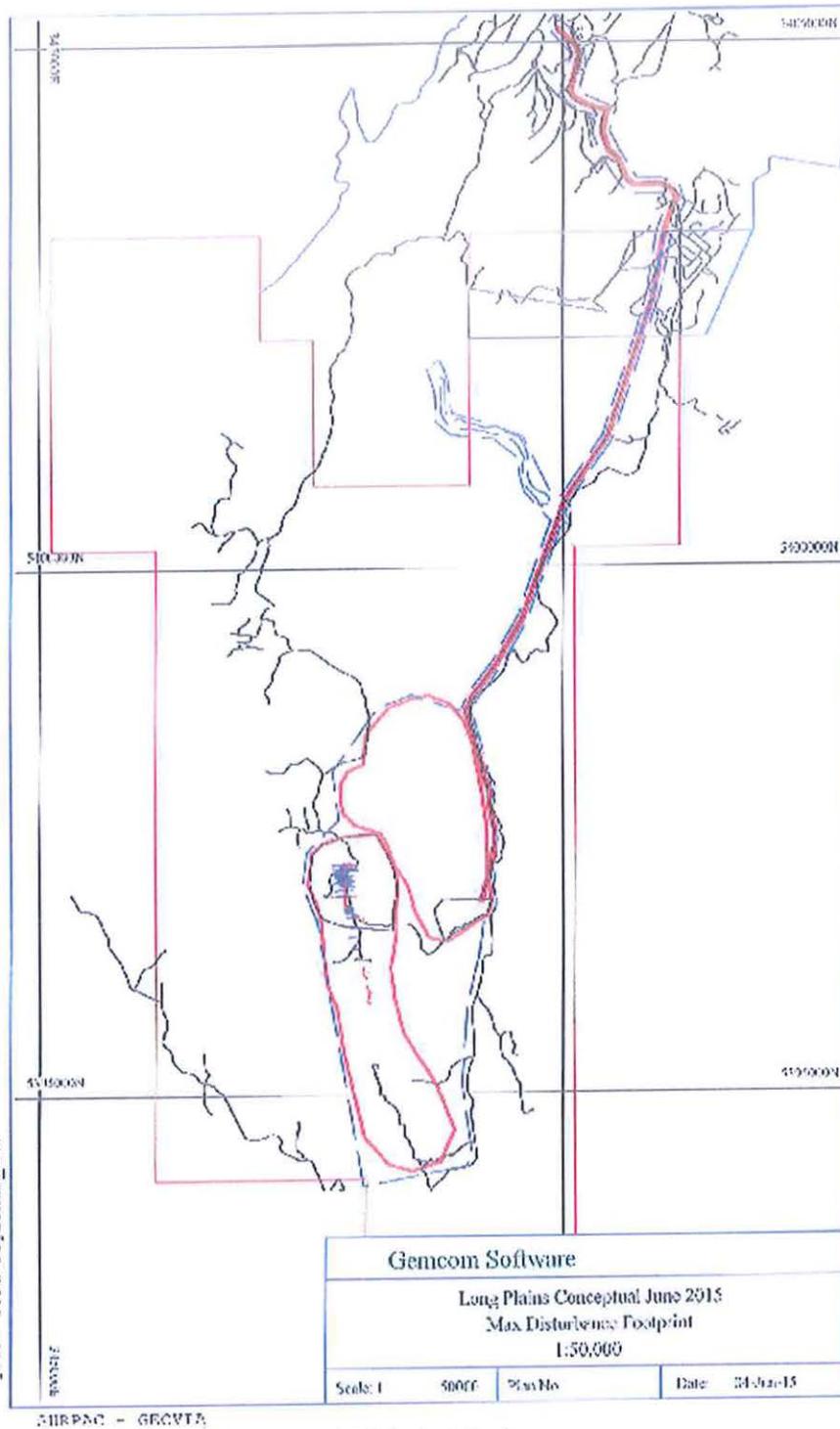


Figure 8 Long Plains max footprint ( dashed line)

**Disturbance Area:**

With this initial mine design completed, Grange can now finalise the maximum potential and immediate disturbance footprints. These areas will be the subject of focussed natural values and heritage studies where the studies already completed are insufficient in scope and or coverage.

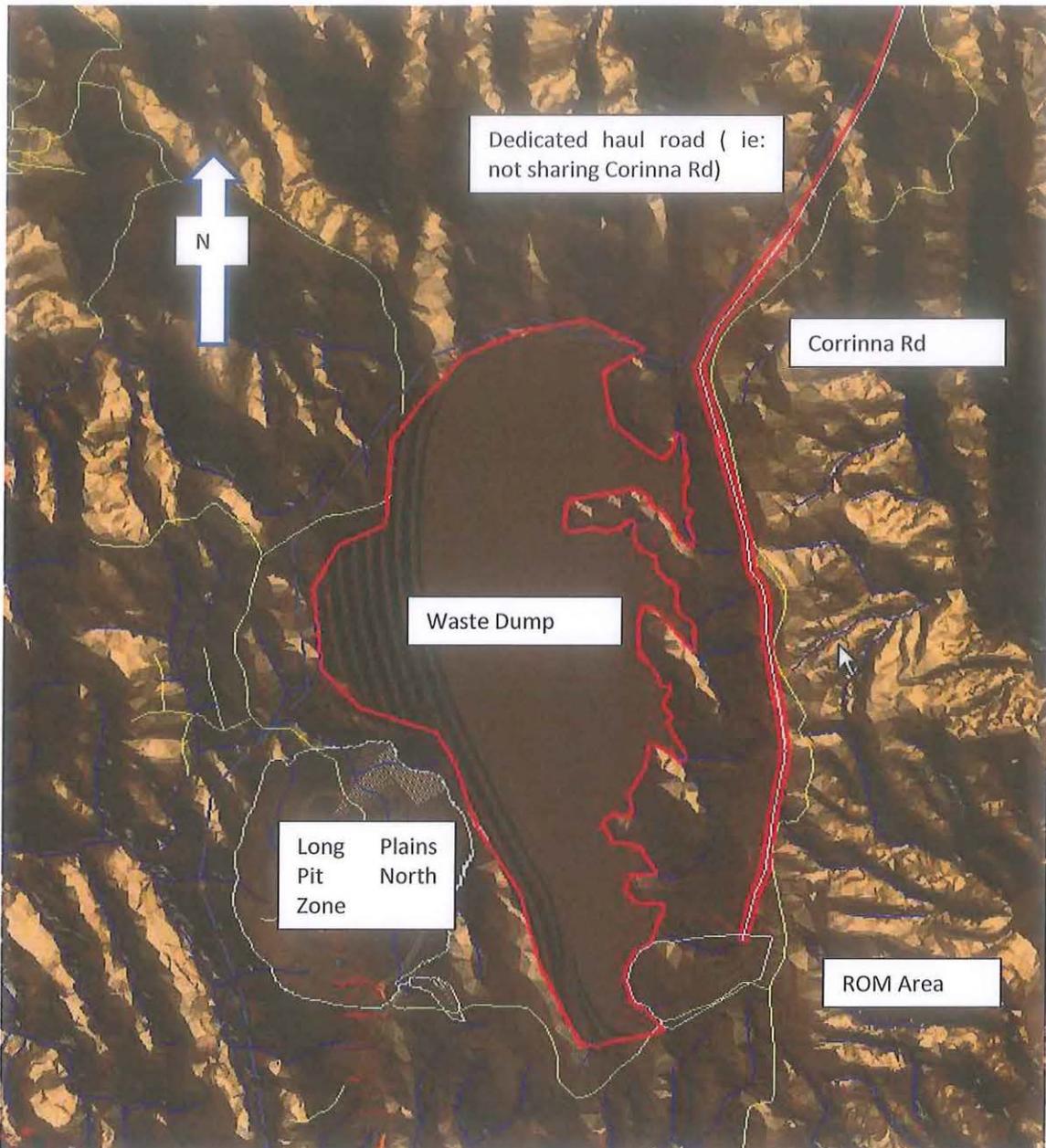


Figure 9 Conceptual Mine Plan February 2015.

## Max Disturbance Area (775ha)

String	Segment	Length	Area m2	Area ha	Area sq km	Description
1	1		129,320	13	0.13	ROM pad area
1	2	5,800				Length haul Road on EL30-2003
1	3		625,214	63	0.63	Pit area (perimeter)
4	1	1,323				Length haul Road on 2M-2001
5	1	2,783				Length haul Road on 11M-2008
6	1		113,760	11	0.11	Road to SDTSF (second option)
8	1		2,152,439	215	2.15	Max Dump extents (NZ-C2 and S2)
8	2		2,239,878	224	2.24	Max Pit extents (NZ-C2 and S2)
8	3		240,520	24	0.24	Haul Road area with 12.5m each side of CL
6	2		7,746,606	775	7.75	Max disturbance area

\* Haul road assumed 25m wide and offset minimum 30m from Corinna Rd alignment. ( Plus 5-10m from existing Corinna road foundation and drainage infrastructure.)

Disturbance corridor is 50m either side of haulage corridor and 50m outside maximum extents of pits, dumps etc.

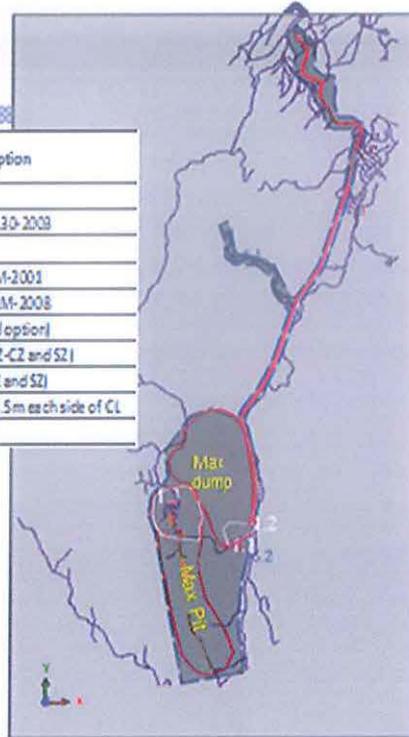


Figure 10 Conceptual Study Area to be assessed for possible disturbance ( max extent of all inferred resource)

## Min Disturbance Area (493ha)



String	Segment	Length	Area m2	Area ha	Area sq km	Description
1	1		129,320	13	0.13	ROM pad area
1	2		625,214	63	0.63	Min Pit extents (NZ only)
2	1		989,580	99	0.99	Min Dump extents (NZ only)
6	1	4,518.2				Road to SDTSF (second option)
6	2	5,808.2				Length haul Road on EL30-2003
6	3	2,781.1				Length haul Road on 11M-2008
6	4	1,032.5				Length haul Road on 2M-2001
8	1		113,759.5	11	0.11	Haul Road area with 12.5m each side of CL
5	1		4,932,610	493	4.93	Min disturbance area

\* Haul road assumed 25m wide and offset minimum 30m from Corinna Rd alignment. ( Plus 5-10m from existing Corinna road foundation and drainage infrastructure.)

Disturbance corridor is 50m either side of haulage corridor and 50m outside minimum extents of pits, dumps etc.

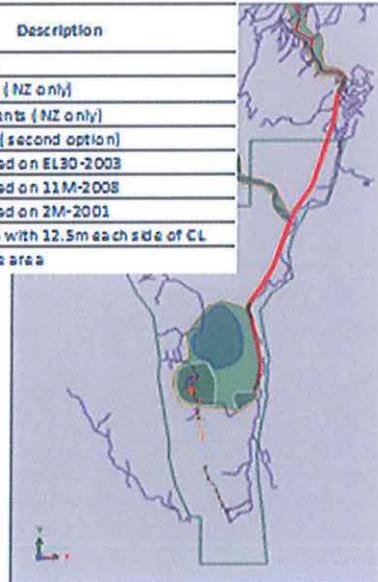


Figure 11 Conceptual Study Minimum disturbance ( planned mine footprint)

***Financial Analysis-Conceptual Mine Design***

Financial analysis of this mine design used confidential proprietary financial dimensions related to the magnetite pellet business. It demonstrates a robustly positive NPV but only if processed while the main Savage River site is in production.

The window of opportunity for Long Plains development therefore is between 2019 and 2032.

**Grange Strategy** with Long Plains is to allow the development of Long Plains as an expansion case at any time of our choosing (ie: leave the door open for immediate development) especially in the next 15 years. This is because Long Plains will never work as a stand-alone project, so the window is closing on this project as time progresses.

Immediate plans for 2015-16 are for progression of long-lead mine planning and environmental items to support a full DPEMP submission in one year's time (that's May 2016.)

***Tenure:***

Grange is requesting our last term for the exploration lease ( current term expires 19 June 2015) .

Grange plans to convert to a mining lease in May 2016 and will need to have a DPEMP prepared in draft at that time to support a successful mine lease application.

### ***Discussion of Results;***

#### **Water Quality Data Acquisition**

For water sampling conducted at various sites as described in the text between June 19 2013 and June 18 2014;

- Dissolved copper all less than 4ug/L and all samples at or below level of detection except during 2/7/2013 flood event.
- Sulphate Levels are considered low and indicate low rates of acid rock drainage in catchment.
- Manganese levels are considered low (no comment on Figure 12 Water Quality Testing-Manganese).
- Aluminium levels are considered low except during high flow event.
- Total Iron levels are considered low, but levels may be associated with land disturbance.

The water quality sampling program will continue for the next few years with monthly samples to be taken and analysed to establish baseline data that covers high flow events

### ***Conclusions***

This most recent exploration campaign continued the program of studies, investigations and works named the Long Plains Development Proposal and Environmental Management Plan ( LP-DPEMP).

The LP-DPEMP is in progress between January 2013 and Aug 2018 to provide the following:

- Baseline environmental surveys/studies.
- Referral to SEWPaC under the EPBC Act.
- Development and submission of a Notice of Intent to the Tasmanian EPA
- Technical studies into the impacts of a mining operation at Long Plains and management of those impacts
- Preparation and submission of a DPEMP to the Tasmanian EPA and the Waratah Wynyard Council.

Grange has confidence that this resource can be mined economically and has a potential "fit" in the Life of Mine Plan (LOMP). The various strategic options that include Long Plains as a satellite ore feed source are currently being evaluated by the Technical Services team at Grange Resources.

Grange intends to apply for a Mining lease in 2016 over much of the EL30/2003 area as part of this work.

#### **Environment**

Surface disturbance operations were limited to monitoring activities only.

No rehabilitation is planned to maintain access to sampling infrastructure.

Table 4 EL30-2003 Near Bowry Creek Quarterly Report-Expenditure July 2014-June 2015

M:\Geology\Exploration Drilling\Exploration\Quarterly_Costs\2015\MRT_costs_Jun2015.xlsx\EL reporting period						
Exploration Quarterly Report EL30/2003 near Bowry Creek						
4 Quarters Q3 2014 to Q2 2015(est)		Q3 2014	Q4 2014	Q1 2015	Q2 2015 (est.)	Total for
		July-Sept	Oct-Dec	Jan-Mar	Apr-Jun	reporting
1. Geoscientific Costs	Geology	\$ 10,833	\$ 10,833	\$ 10,000	\$ 10,000	\$ 41,667
	Geochemistry			\$ 2,233	\$ 2,233	\$ 4,466
	Geophysics			\$ -	\$ -	\$ -
	Remote Sensing			\$ -	\$ -	\$ -
	<b>Total</b>	\$ 10,833	\$ 10,833	\$ 12,233	\$ 12,233	\$ 46,133
2. Drilling & Gridding Costs	Gridding	\$ -	\$ -	\$ -	\$ -	\$ -
	Drilling					
	Diamond m	\$ -	\$ -	\$ -	\$ 0	\$ -
	Reverse Circulation m	\$ -	\$ -	\$ -	\$ 0	\$ -
	(see note below)	\$ -	\$ -	\$ -	\$ -	\$ -
	<b>Total</b>	\$ -	\$ -	\$ -	\$ -	\$ -
3. Land Access Costs						\$ -
4. Rehabilitation Costs						\$ -
5. Feasibility Study Costs		\$ 31,555		\$ -	\$ -	\$ 31,555
6. Other Costs						\$ -
	<b>Totals</b>	\$ 42,388	\$ 10,833	\$ 12,233	\$ 12,233	\$ 77,688
9. Cumulative Expenditure at time of last report		\$ 5,988,818	\$ 6,031,206	\$ 6,060,005	\$ 6,060,005	
Total expenditure to date	(sum of 8 and 9)	\$ 6,031,206	\$ 6,042,040	\$ 6,072,238	\$ 6,072,238	
<b>Exploration Progress Report</b>						
Q3 2014 Hydro geology costs - installation and instrumentation of open hole water bores and hydrologists> (LP-DPEMP)						
Aquatic Science water quality sampling, analysis and reporting						
Q4 2014	Aquatic Science water quality sampling, analysis and reporting					
Q1 2015	Aquatic Science water quality sampling, analysis and reporting					
Q2 2015 ( estimated)	Aquatic Science water quality sampling, analysis and reporting					

**Expenditure July 2014-June 2015 :**

Exemption from conditions of a Mineral Exploration Lease

During late 2014, the price of iron ore fell dramatically, requiring Grange to request from Mineral Resources Tasmania, an exemption from the conditions then pertaining to EL30-2003 from 7 January to 18 June 2015.

The exemption was granted, permitting Grange to postpone much of the planned expenditure related to the continuation of the LP-DPEMP.

The work planned for the next extension of term seeks to re-start the planned LP-DPEMP work for the next lease period which amounts to a planned expenditure of \$400,933 which is a reforecast of LP-DPEMP expenditure.

Table 5 Exploration plans for 19 June '15-18 June '16

Budget		Actual		2016												Grand Total
Task	Task 1	Task 2	Task 3	June15	July15	August15	September15	October15	November15	December15	January16	February16	March16	April16	May16	Total
303.01	Preliminary Studies/ Works (for EPBC Referral and Preliminary EPA) Total			-	-	-	-	-	-	-	-	-	-	-	-	-
303.02	EPBC Act - SEWPaC - Preliminary			-	-	-	-	-	-	-	-	-	-	-	-	-
303.02	Preliminary referral to SEWPaC under EPBC Act			-	-	-	7,500	-	-	-	-	-	-	-	-	7,500
303.02	Discuss with SEWPaC			-	-	-	1,000	1,500	-	-	-	-	-	-	-	2,500
303.02	Minister makes controlled action decision on referral			-	-	-	-	10,667	15,333	13,333	15,333	5,333	-	-	-	60,000
364.01	Convert Exploration lease to a mining lease			-	-	-	-	-	-	83,933	-	-	-	-	-	83,933
364.01	EPBC Act - SEWPaC - Preliminary Total			-	-	-	8,500	12,167	15,333	13,333	15,333	60,333	-	-	-	123,000
303.03	NOI			-	-	-	-	-	-	-	-	-	-	-	-	-
303.03	Draft NOI			-	-	-	-	-	-	-	-	5,000	-	-	-	5,000
303.03	Meeting EPA			-	-	-	-	-	-	-	-	1,000	1,500	-	-	2,500
303.03	Submit NOI			-	-	-	-	-	-	-	-	-	1,000	-	-	1,000
303.03	Receive Guidelines DPMP			-	-	-	-	-	-	-	-	-	-	-	-	-
303.03	NOI Total			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04	Technical Issues			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-01	Mining			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-02	Water Management- Vibrating wire piezometers and water bores			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-02	Water Management- quarterly sampling			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-02	Water Management- Stream gauging			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-03	Waste Rock Management			-	-	-	-	-	-	7,111	10,222	8,889	10,222	13,889	17,500	67,833
303.04-04	Traffic / Ore Movement			-	-	-	5,417	8,333	8,750	17,167	16,583	8,333	5,417	-	-	70,000
303.04-05	Rehabilitation and Closure Plan			-	-	-	-	-	-	12,500	5,000	-	-	-	-	17,500
303.04-06	Tailings			-	-	-	-	-	-	-	-	-	-	4,500	10,500	15,000
303.04-07	Conservation			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-08	Heritage			-	-	-	-	-	1,750	750	-	-	-	-	-	2,500
303.04-09	Noise & Air management plans			-	-	-	-	-	-	-	3,150	3,850	-	-	-	7,000
303.04-10	Miscellaneous			-	-	-	-	-	-	-	-	-	-	-	-	-
303.04-11	Community Consultation			-	-	-	-	-	-	7,000	10,063	8,750	10,063	9,625	7,000	62,000
303.04	Technical Issues Total			-	-	-	6,417	8,333	10,500	44,828	45,018	29,822	25,701	28,014	35,000	232,333
303.04	DPMP Preparation			-	-	-	-	-	-	-	-	-	-	-	-	-
303.05	DPMP Preparation			-	-	-	-	-	-	-	-	-	-	-	-	-
303.05	DPMP Submission and Assessment			-	-	-	-	-	-	-	-	-	-	-	-	-
303.07	Meeting EPA			-	-	-	-	-	-	-	2,500	-	-	-	-	2,500
303.07	Submission DPMP to Council			-	-	-	-	-	-	-	5,000	10,000	-	-	-	15,000
303.07	EPA assessment			-	-	-	-	-	-	-	-	-	9,722	10,185	5,093	25,000
303.07	EPA report to Board			-	-	-	-	-	-	-	-	-	-	-	-	-
303.07	EPA Board meeting			-	-	-	-	-	-	-	-	-	-	-	-	-
303.07	EPA Advice to Council			-	-	-	-	-	-	-	-	-	-	-	-	-
303.07	Council meeting			-	-	-	-	-	-	-	-	-	-	-	-	-
303.07	Council approval			-	-	-	-	-	-	-	-	-	-	-	-	-
303.07	DPMP Submission and Assessment Total			7,500	-	-	-	-	-	-	-	10,000	9,722	10,185	5,093	42,600
303.08	EPBC Act - SEWPaC - Assessment			-	-	-	-	-	-	-	-	-	-	-	-	-
303.08	Assessment under bilateral agreement			-	-	-	-	-	-	-	-	-	-	-	-	-
303.08	SEWPaC negotiations			-	-	-	-	-	-	-	-	-	-	900	2,200	3,100
303.08	Offset requirements and identify potential sites			-	-	-	-	-	-	-	-	-	-	-	-	-
303.08	Offsets surveys			-	-	-	-	-	-	-	-	-	-	-	-	-
303.08	SEWPaC Approvals			-	-	-	-	-	-	-	-	-	-	-	800	2,200
303.08	EPBC Act - SEWPaC - Assessment Total			-	-	-	-	-	-	-	-	-	-	-	800	2,200
Grand Total				7,500	-	-	13,917	20,500	25,833	57,861	60,351	95,155	35,424	39,099	42,293	400,933

Totals \$400,933 planned exploration expenditure on EL30-2003 for July 2015 to June 2016

Path=M:\Geology\LP\_DPMP\LP-DPMP\Long Plains - DPMP PID-000363\_01 Reforecast 30-5-14.xlsx]Reforecast 6-01-15

Long Plains Northern WQ Sites (1:12000 GDA 94 UTM/UPS)

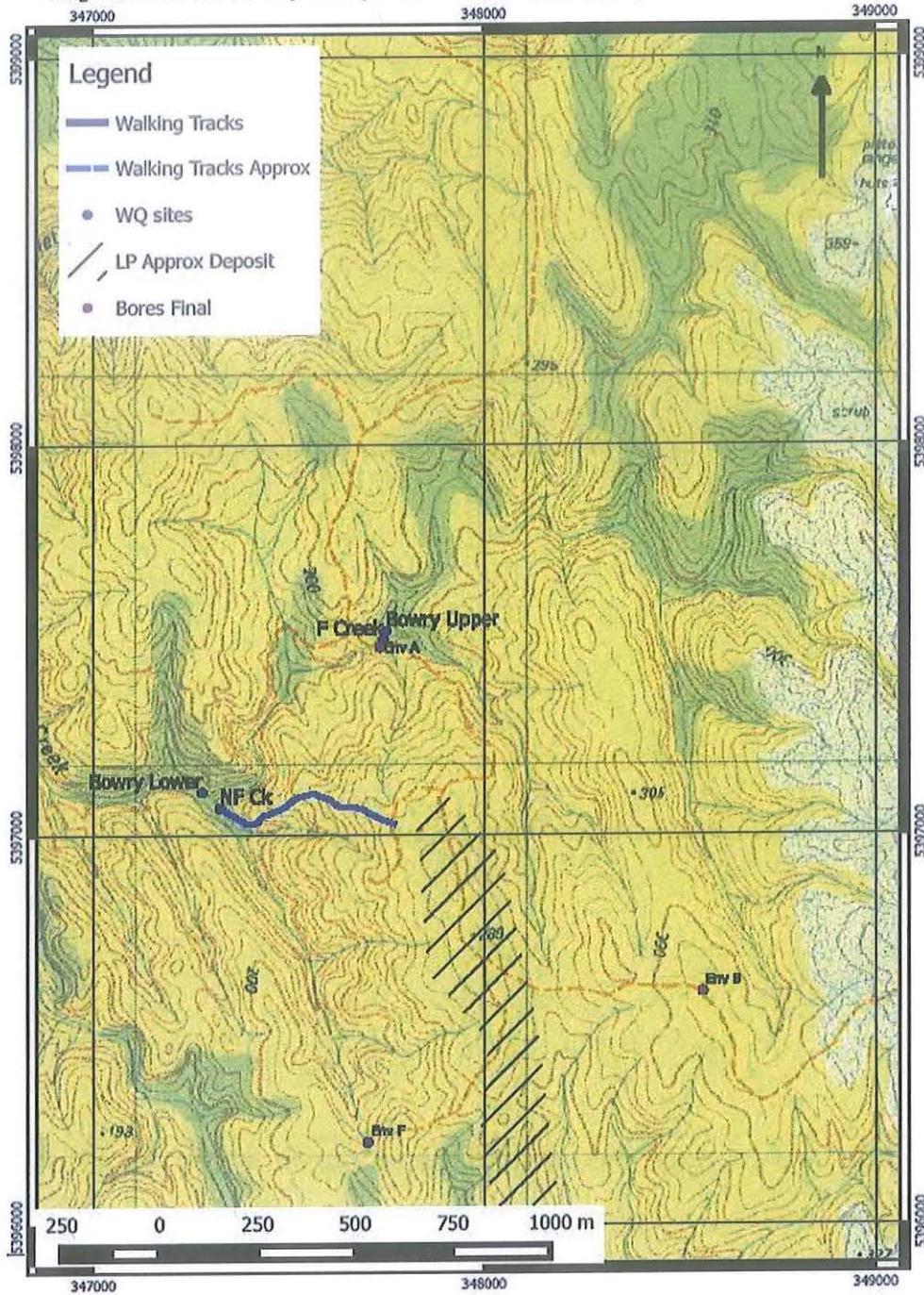


Figure 12 Long Plains North water sampling location map

Long Plains Southern WQ Sites (1:12000 GDA 94 UTM/UPS)

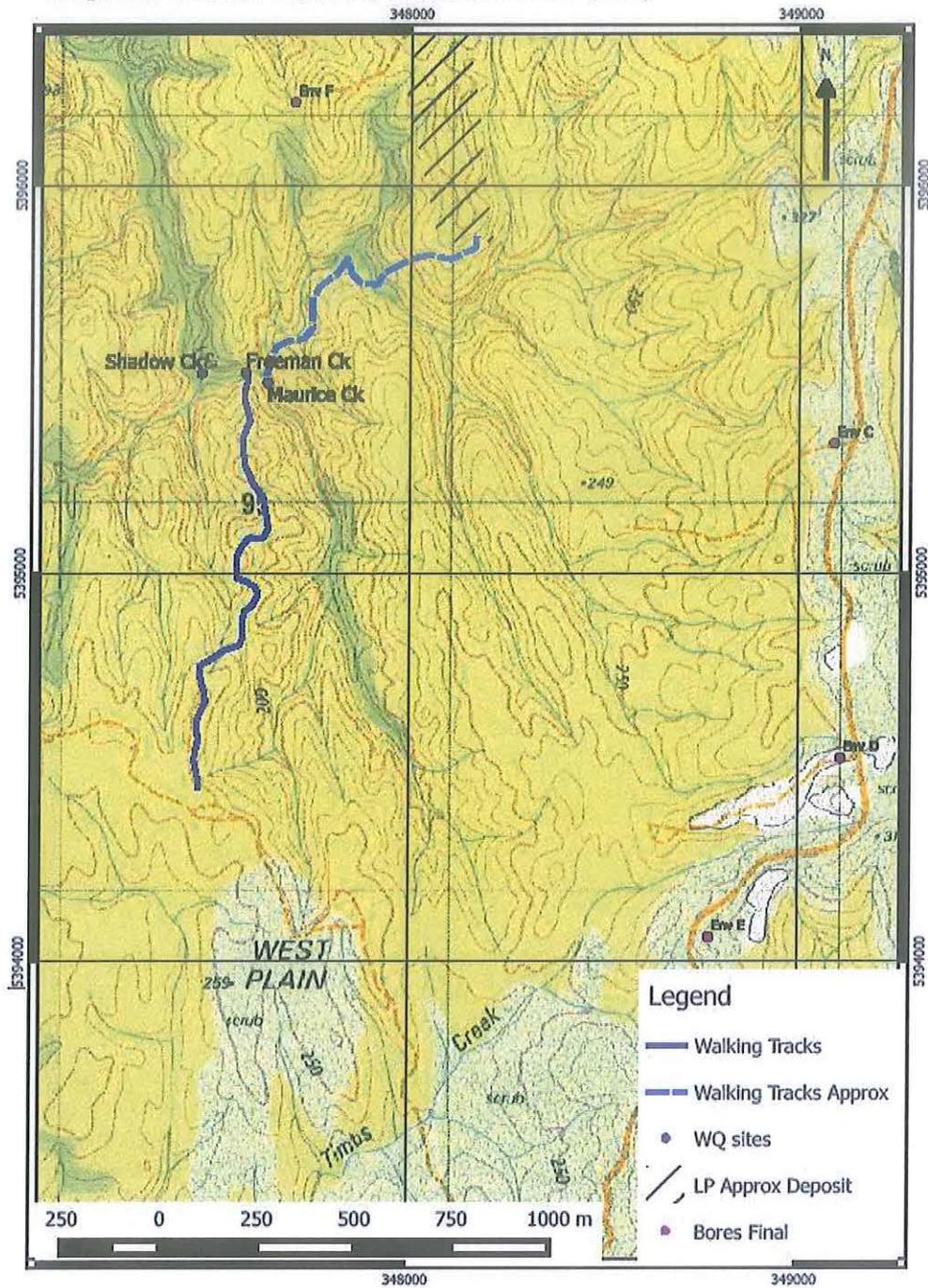


Figure 13 Long Plains South Water Sampling location map

The water sampling sites in the south include ; Shadow and Maurice Creeks with a flow gauging installation at Freeman creek and new drilled water monitoring bores at sites Env C, EnvD and Env E as shown above. The sampling sites were selected to capture data of the entire watershed running off of the southern end of the Long Plains ore body.



# LONG PLAINS WATER QUALITY

Daniel Ray  
3 June 2015  
Graphs updated June 2015  
path=M:\Geology\LP\_DPEMP\LP-DPEMP\water baseline sampling



Appendix 1 HydrologyWater Quality Report

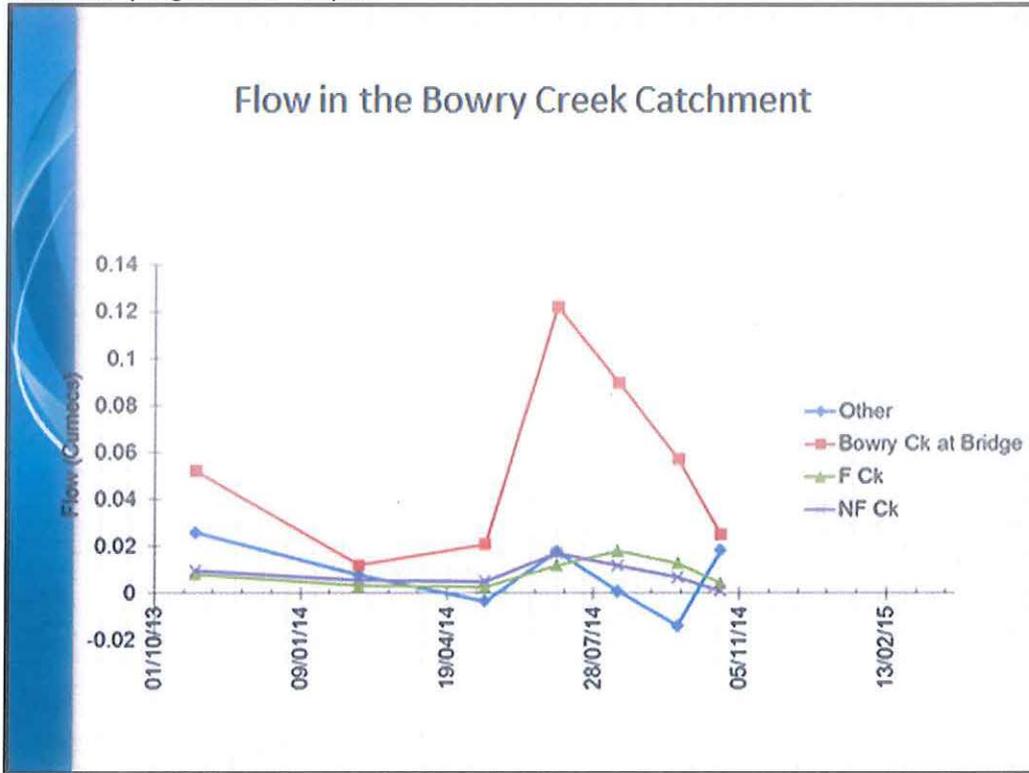


Figure 14 Water Flow Bowry Catchment

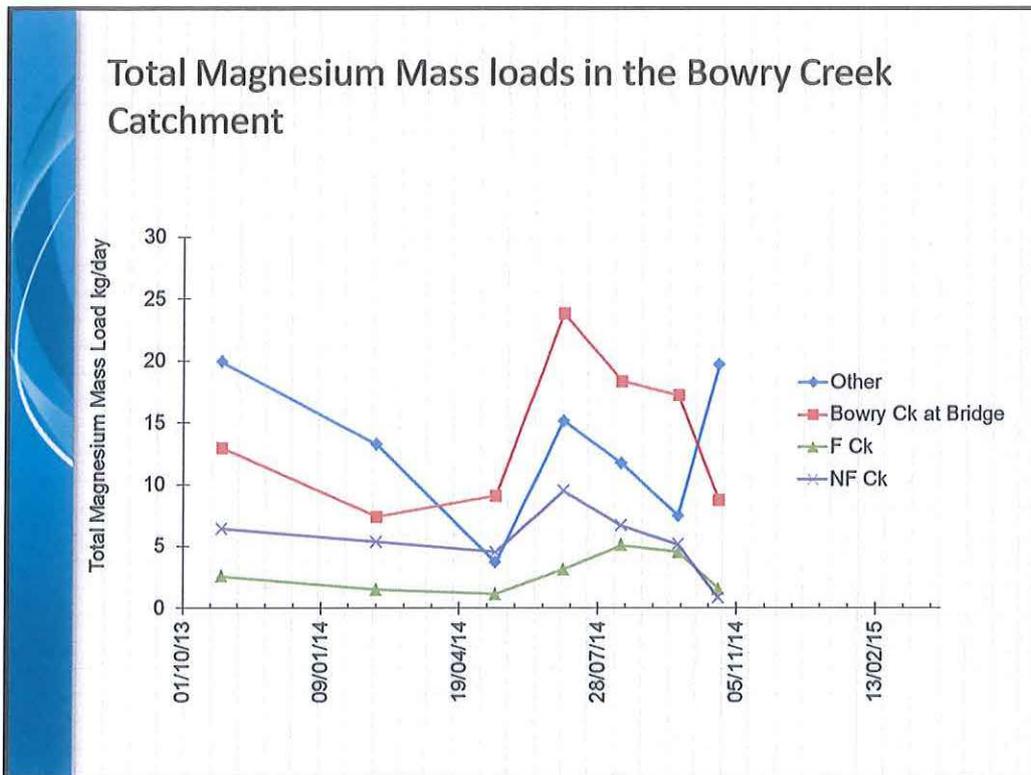


Figure 15 Water Flow- Total Magnesium Mass load Bowry Catchment

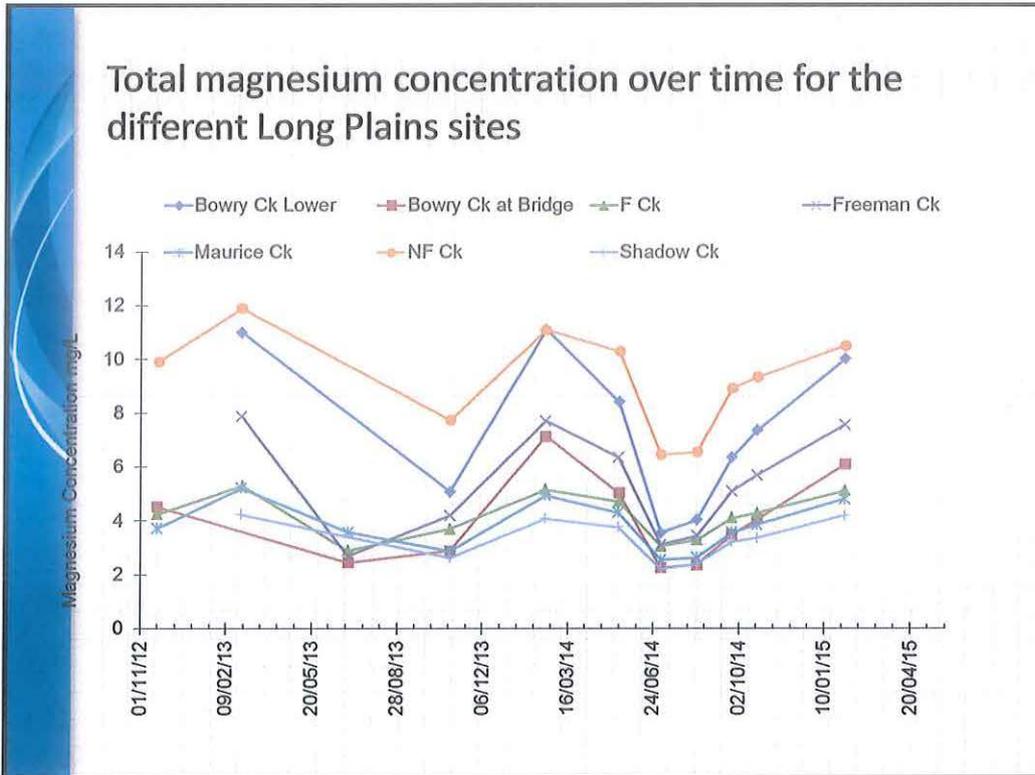


Figure 16 Total Magnesium Concentration.

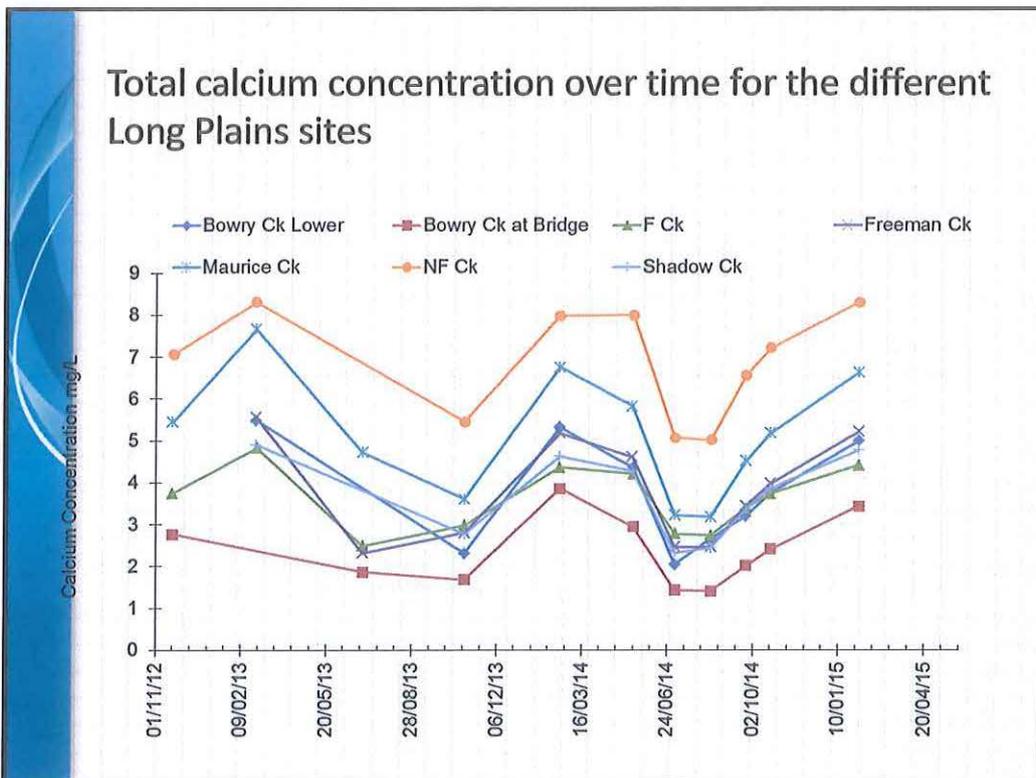


Figure 17 Total Calcium Concentration

## Total Copper ( $\mu\text{g/L}$ ) at different Long Plains sites. (Graph needs updating)

Copper graph needs updating

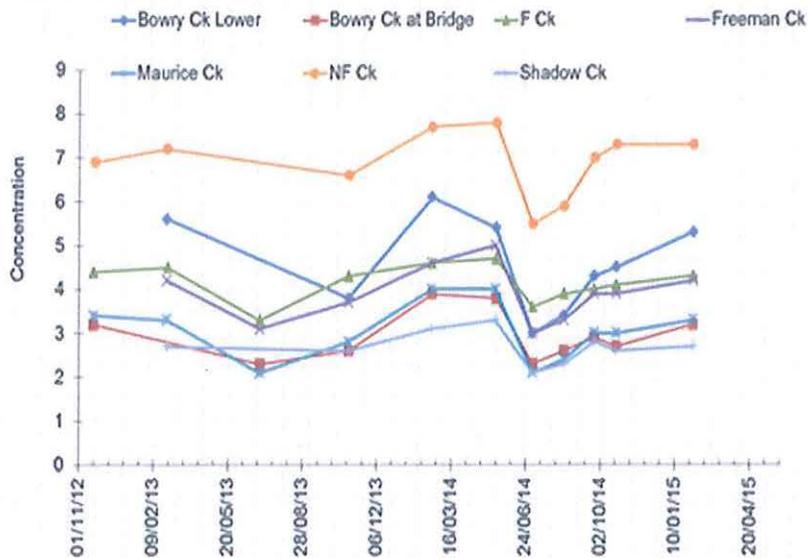
Date_Time	Taken_BY	Bowry Ck Lower	Bowry Ck at Bridge	F Ck	Freeman Ck	Maurice Ck	NF Ck	Shadow Ck
22/Nov/2012	DJR		< 1	1		< 1	< 1	
28/Feb/2013	DJR	< 1		< 1	< 1	< 1	< 1	< 1
02/Jul/2013	DJR		7	12	5	21		
29/Oct/2013	DJR	1	1	< 1	1	1	< 1	< 1
18/Feb/2014	DJR	< 2	< 2	< 2	< 2	< 2	< 2	< 2
14/May/2014	DJR				< 2			< 2
15/May/2014	DJR	< 2	< 2	< 2			< 2	
03/Jul/2014	DJR	< 2	< 2	< 2	3	3	< 2	< 2
14/Aug/2014	DJR	< 2	< 2	< 2	< 2	< 2	< 2	< 2
24/Sep/2014	DJR	< 2	< 2	< 2	< 2	4	< 2	< 2
23/Oct/2014	Em/Brok	< 2	< 2	< 2	< 2	< 2	< 2	< 2
03/Feb/2015	Em/Brok	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Note levels are low with increase during the July 2013 flood event.

\*Dissolved copper all less than  $4\mu\text{g/L}$  and all samples at or below level of detection except during 2/7/2013 flood event

Figure 18 Water Quality Testing -Copper

## Sulphate levels over time



Sulphate levels are low indicating low levels of Acid Rock Drainage within the catchment.

Figure 19 Water Quality Testing Sulphate

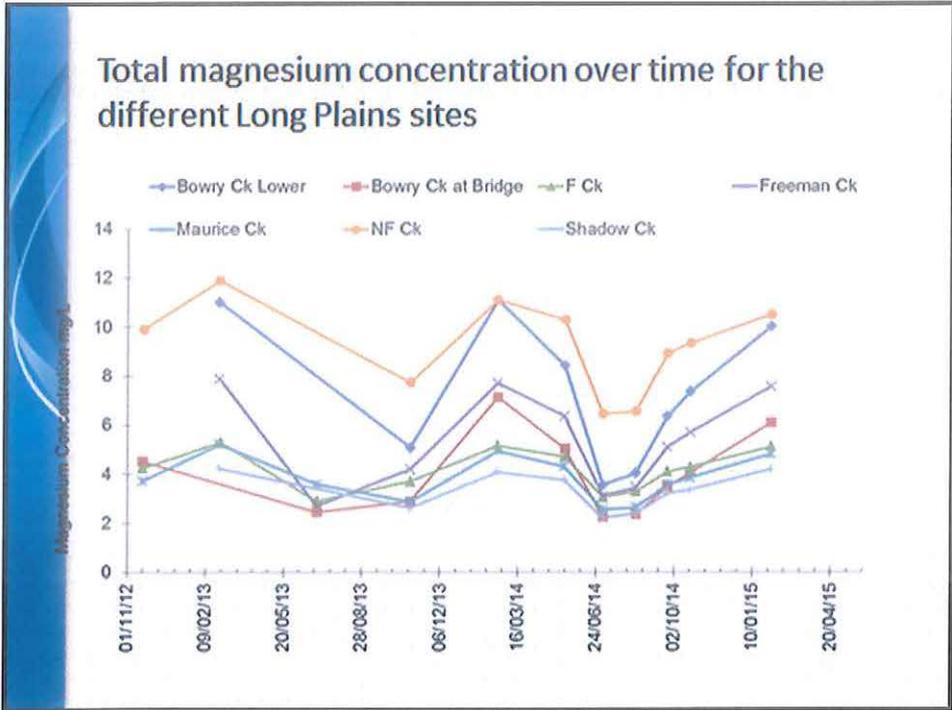


Figure 20 Water Quality Testing Magnesium

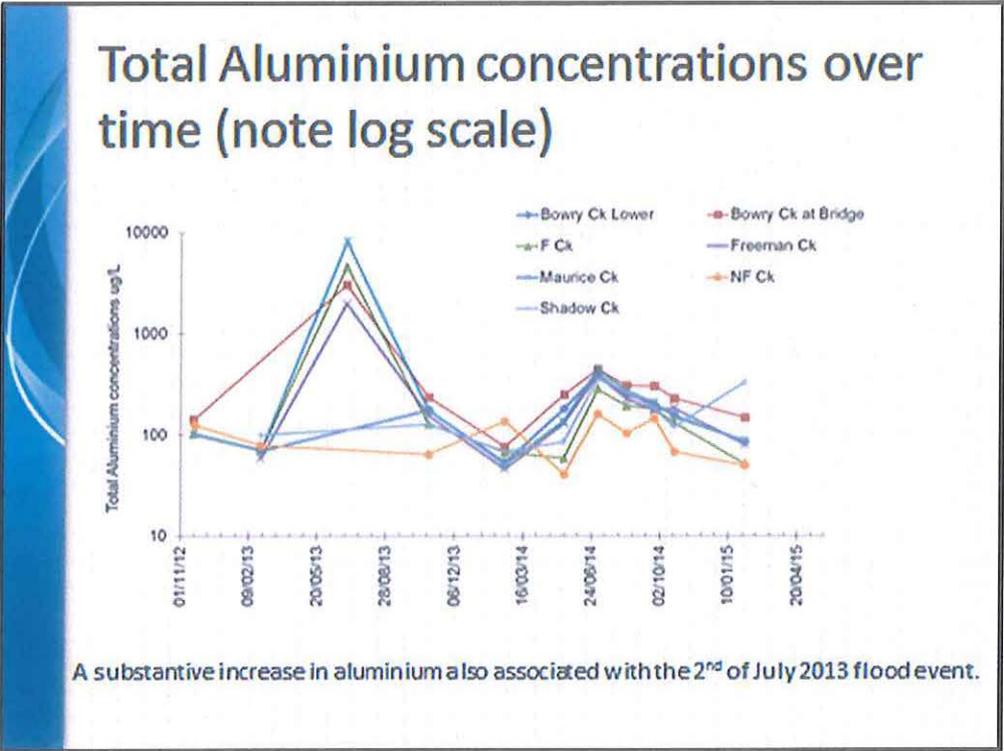


Figure 21 Water Quality Testing Aluminium

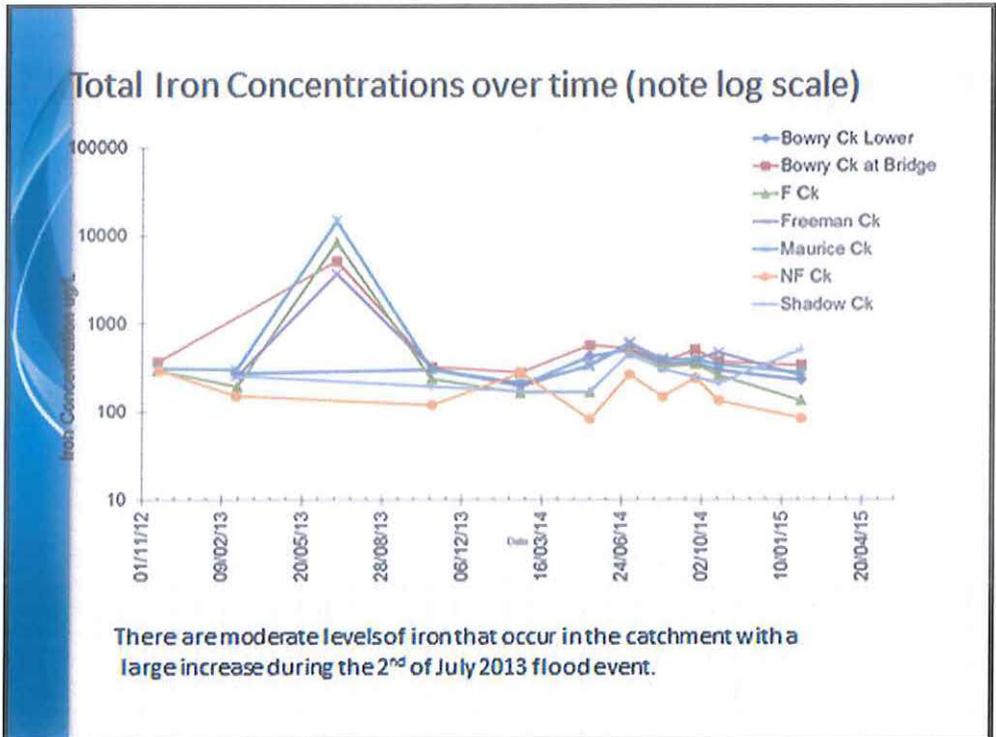


Figure 22 Water Quality Testing Total Iron

## **Appendix 2 Magnesite Karst in Northwest Tasmania - Geology, Geomorphology and Hydrology**

### **Summary**

#### Location

- Magnesite is found as a number of discontinuous, steeply dipping lenses up to 400 m thick, within highly deformed Proterozoic metasedimentary rocks in northwestern Tasmania.

Major deposits are found at Main Rivulet and Bowry Creek (tributaries of the Savage River, between Corinna and Savage River), at the Savage River Mine, in the Lyons, Keith and Arthur Rivers, and at Central Creek, a small tributary of the Arthur. A further deposit is found in Cann Creek, to the northwest of the Arthur- Lyons deposits.

- Karst processes and landforms in magnesite- review

- There appears to have been no previous quantitative studies of karst processes in magnesite. Whilst karst in even less soluble rocks such as quartzites has been examined, major texts are silent on the matter of karst processes in this carbonate.

- Magnesite is apparently more soluble than dolomite or calcite (ie more may go into solution) however it appears to be less reactive (ie the solution process takes far longer). This may be due to higher ionic bond strength and lattice energy in magnesite crystals.

The relatively high hydration energy of magnesium in solution means that it is only rarely found as a precipitate under atmospheric conditions.

- Magnesite has been shown to be dissolved by both atmospheric and enhanced concentrations of CO<sub>2</sub> in water and by humic acids. We presume that dilute sulphuric acid is also capable of dissolving magnesite in the field, and field evidence suggests that this is the case. Weathering by the oxidation of Fe found in solid solution in the magnesite and mechanical removal of weathering products by groundwaters may also be a significant process in the development of landforms.

- Other than Sharples' (1997) report on the karst values of the Arthur-Pieman region, Klir's (1962, 1968) and Zenis & Gaal's (1986) papers on karst features and hydrology exposed in magnesite mines in Czechoslovakia, descriptions of karst features in magnesite appear to be restricted to 'in passing' comments contained in papers primarily concerned with geological description or assessment of mining potential.

Karst features in the northwest magnesites were first described (in passing) by Waller (1902) at Victory Springs. This was followed by Nye's (1925a, 1925b) brief descriptions of surface karst and caves at Central Creek. Shannon described the karst at Main Rivulet and Bowry Creek in more detail in various unpublished reports to mining companies in the 1980's and early 1990's. He was the first to point out the relict nature of much of the karst and their potential for palaeoenvironmental research. Sharples' (1997) comprehensive reconnaissance of the karsts expanded on the summary of known features provided by Kiernan (1995) as part of the Tasmanian Karst Atlas project.

- This study provides more detailed descriptions of karst landforms, hydrology and water chemistry and attempts to quantify, in very broad terms, the history of processes which have led to karst development in the magnesites.<sup>2</sup>

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<sup>2</sup> HouseholdCalverSharples1999\_MagnesiteKarstNWTas pp6

**Appendix 3 Extension of term application - Rental charges and prescribed fee**

PO055872 : 1103B - MINERAL RESOURCES TASMANIA Open order

Purchase order header

Purchase order lines

Type	Budget check results	Line number	Item number	Product name	Procurement category	Site	Warehouse	Location	Quantity	Worker	Unit	Unit price	Discount	Discount percent	Net amount	Purchase order	Receive from
		10		Services	SR	M2C			58.00		Ea	\$8.29			2,015.02	F7	
		20		Services	SR	M2C			1.09		Ea	\$32.20			\$32.20	F7	

Figure 23 purchase order Extension of term application '15-16

**Appendix 4 MRDA\_E2 Long Plains EL30-2003 18 June 2015**