

R. A. Gregory
Exploration Licence 9/2013 Priory
Annual Report Licence Year 5 & Final Report



Ken Morrison
24 December 2018

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SUMMARY

Exploration over the 5 year term of EL 9/2013 began with a regional search for basalt pipes interpreted from MRT aeromagnetic surveys to have a similar signature to the basalt at Mother Logans quarry, assumed to be the source conduit for the detrital sapphires known to fossickers in the alluvial sediments in Mother Logans Creek. By the end of licence year 2, no previously unmapped basalt bodies were located and no prospective alluvial sites close to known basalt intrusions had been identified.

Consequently, the exploration focus shifted to alluvial prospects with a history of sapphire fossicking and the licence was reduced, in two stages, from the original area of 205 km² to a two part 11 km² EL covering the four prospects considered worth further investigation; Littlechids, Priory, Bells Marsh and Logans. Prospecting at the four sites with hand tools, plus one excavated bulk sample of terrace sediments adjacent to Littlechids Creek, demonstrated that Logans was by far the most prospective site. The other three are tailings deposits from abandoned early alluvial tin mining and the concentration of small sapphires and zircons is too low to justify re-processing the tailings. Littlechids and Priory prospects are also both on private farm land and close to houses.

From mid 2015 all further work was conducted at Logans, with the aim to test the potential for an artisanal scale, campaign style alluvial mining operation on several terrace positions mapped along a 300 metre length of Mother Logans Creek, corresponding to the extent of a basalt talus fan derived from the pipe-like intrusion 300 metres upslope from the creek. Seven bulk sampling campaigns were conducted between June 2015 and April 2018. Each involved an excavator pre stripping part of a terrace surface and digging a stockpile of basal alluvial gravel, ranging from 3-10 m³ in volume, from a pit or trench. Depth to granite or hornfels basement ranged from 1-4 metres. The stockpiles were processed on-site using a portable hydraulic shaker screen plant combined with manual sieving and visual inspection of the tabled clean screened products. Three size fractions of cleaned sediment were produced. Each campaign lasted from 6-10 days and the excavator operator rehabilitated each site prior to demobilizing.

From the surface mapping all terraces sampled appeared to be equally prospective however the subsurface results varied substantially, both between and within bulk samples. Pits excavated in campaigns #1, #3 and #5 were essentially barren of sapphire but encouraging pockets of sapphire, zircon and black spinel (blackjack) enrichment were recovered in campaigns #2, #4, #6 and #7. Visual observation of blackjack abundance in the basal gravels within a pit is the best indicator of alluvial trap sites enriched in heavy mineral including sapphire.

Approximately 10% of the sapphires recovered were of sufficient quality, in terms of clarity and absence of flaws, to be faceted. The economics of having gemstones cut in Tasmania are not viable for stones of approximately <1 ct in the rough. On average a 1 ct rough stone produced a 0.25 ct faceted gemstone, with higher or lower yields depending on the shape of the rough stone and whether flaws needed to be cut out. Permission was granted by MRT to allow a parcel of Logans cut stones, to be sold into the Tasmanian wholesale jewelry market, to determine their commercial value. The parcel of 28 stones, with a range of colours and a size cut-off of 0.2 ct, achieved a best offer of \$Aus 400 /ct. Typically around half the decent quality stones recovered at Logans were too small to be worth cutting locally, if the aim is to achieve commercial profitability.

The erratic and unpredictable distribution of basal traps with significant sapphire enrichment, combined with the overall small resource potential in the terraces, resulted in the conclusion that achieving the required permits to mine and developing even a small scale campaign style mining operation would be uneconomic. An extension of term was not warranted and the EL expired at the end of licence year 5.

1. INTRODUCTION

1.1 Report Map Datum

GDA94 – MGA Zone 55 (Figures 1-5).

1.2 Exploration Rationale

The rationale for exploring this EL was originally based on the observation that a number of pipe-like basalt occurrences are known in the Priory area, as are several recorded sites yielding basalt-derived sapphires, zircons and spinels from restricted local occurrences of alluvial sediments and tin mine tailings. The Priory area provides an opportunity to explore for small scale sapphire deposits close to the eroded remnants of the source extrusions. Because the targets are shallow, near surface alluvial sediments, and the indicator minerals are easily recognised, they can be explored using low cost, low impact traditional prospecting methods, combined with the benefit of modern regional geology maps and aeromagnetic data.

1.3 Geological Setting

The regional geology of the EL is covered by MRT Digital Atlas 1:25,000 scale Blue Tier and Binalong Sheets, extracts from which (minus a legend) are shown on Figure 4. The dominant rock type covering the EL is felsic granite, a part of the Devonian I-type Mt Pearson pluton within the Blue Tier Batholith (Black et al, 2005). Small patches of contact hornfelsed Mathinna Supergroup sandstone and shale overlie the granite, as remnants of the erosional unroofing of the pluton.

The granites and metasedimentary rocks represent basement to the Cenozoic basalts and alluvial sediments which are the important lithologies for sapphire exploration. Figure 4 and the Blue Tier geology sheet show that the basalts are a very minor part of the regional geology and they often outcrop as small, roughly circular in plan view, pipe-like intrusions. The best exposures of olivine-spinel inclusion-rich amygdaloidal basalt pipes, which appear to be spatially linked to detrital sapphires, are in rehabilitated and active quarries at Logans prospect, and Halfway Hill inside ML 9M/2010, respectively (Figures 3 and 4). These basalts are classed as basanites and are relatively enriched in apatite, nepheline and some rare elements (data provided courtesy of John Everard, MRT), in comparison to northeast Tasmanian Tertiary basalts generally.

At the regional scale Tertiary and Quaternary alluvial sediments are restricted to narrow terraces of the George River and at the mouths of some tributary creeks, mainly south of the EL boundary. However, in detail a number of gemstone prospects are recognised (Figure 4) in gravels of undifferentiated Cenozoic age, either associated with abandoned placer tin mines (Priory and Bells Marsh) or close to basalt but with no previous mining (Logans and Littlechilids). A basalt source rock has not been located at Littlechilids prospect but has been inferred (Duncan and Lloyd, 2013), partly due to the common coarse angular black spinel in the creek gravel.

1.4 Licence Information

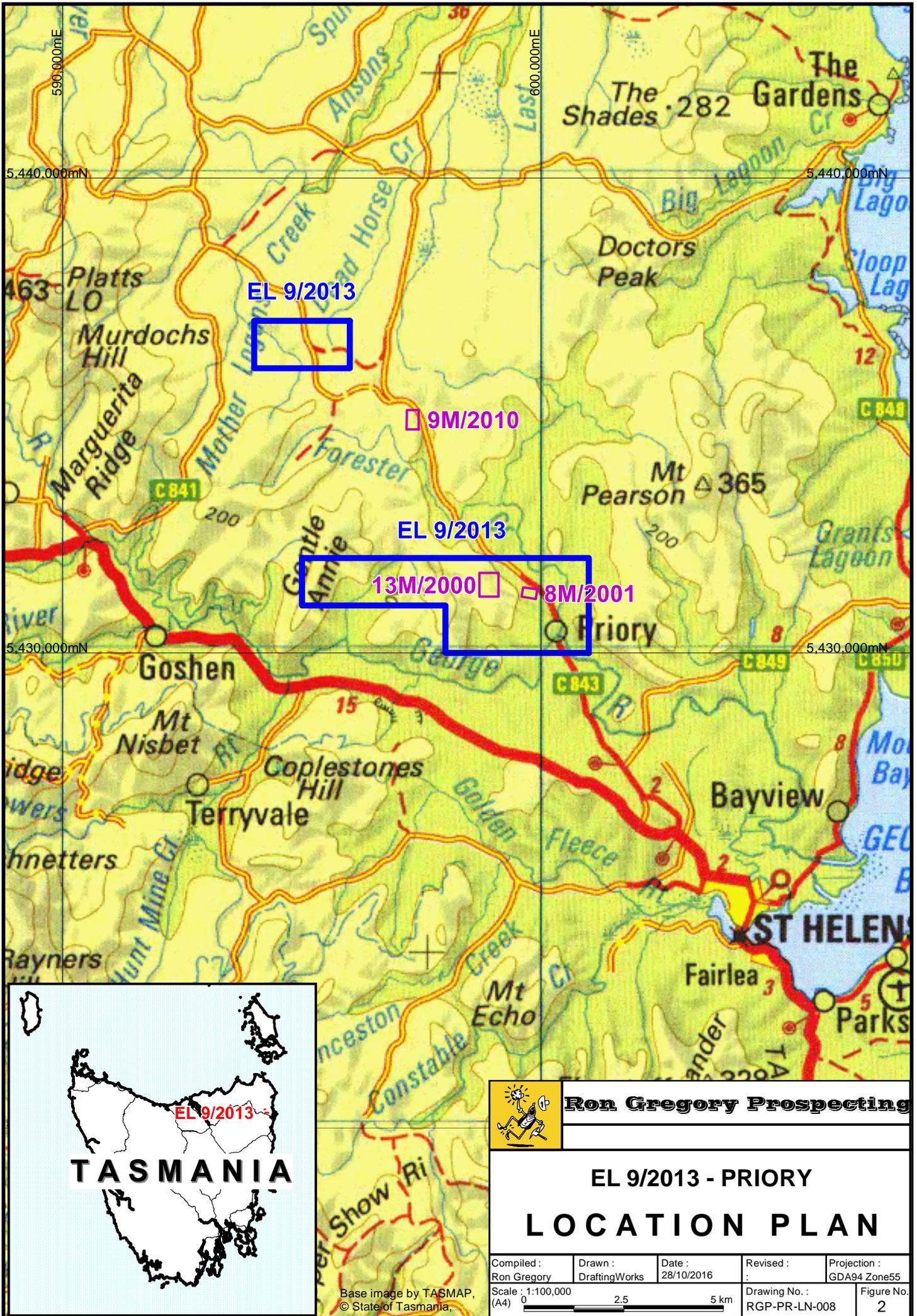
EL 9/2013 Priory (see Figures 1-4).

The EL area originally covered 205 km² but partial relinquishment at the end of Year 1 and Year 2 reduced it to the current area of 11 km², comprising two parts.

Categories 1 and 5.

Holder: R. A. Gregory.

Licence Year 5: 7 November 2017 to 7 November 2018.

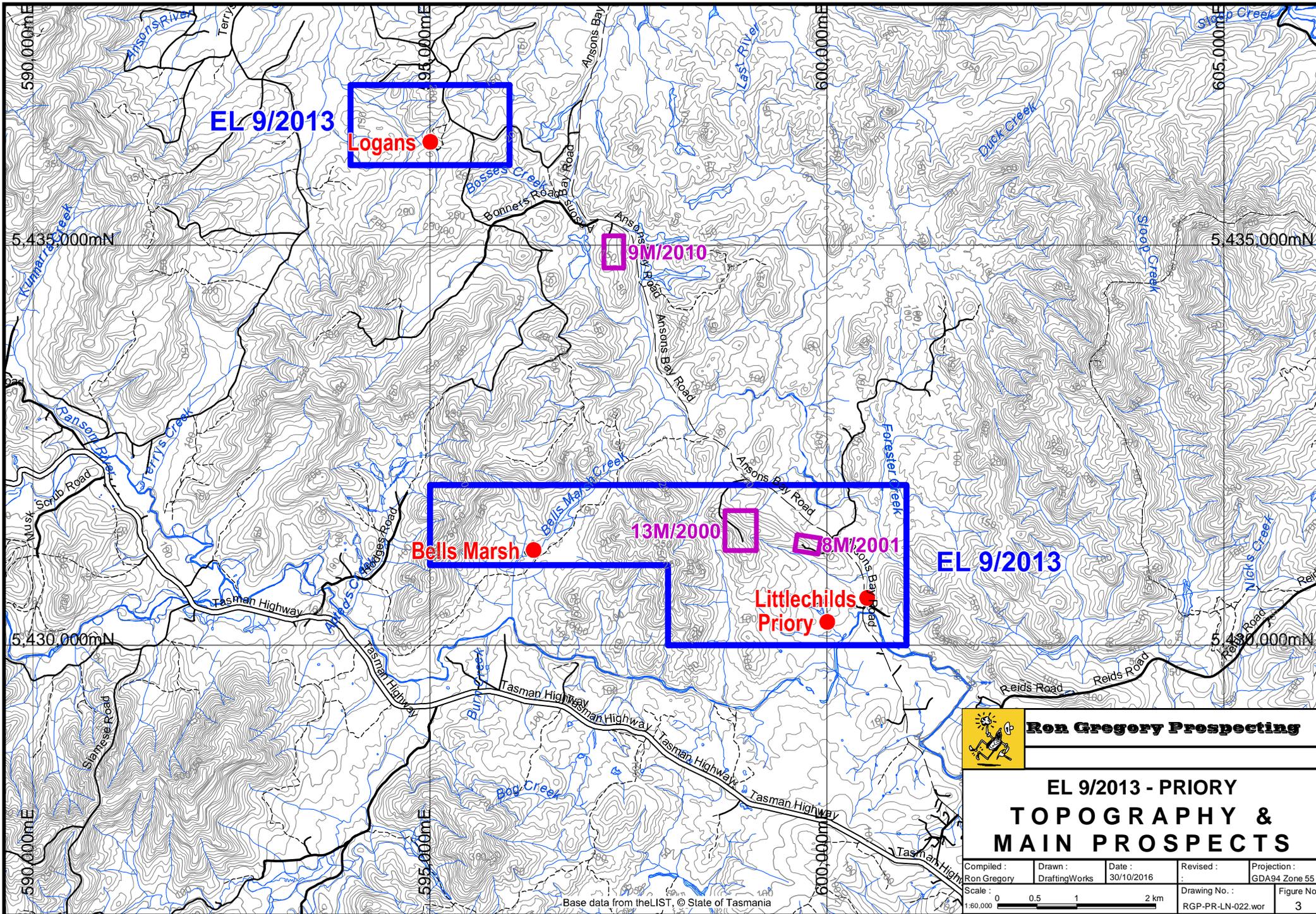


Ron Gregory Prospecting

**EL 9/2013 - PRIORY
LOCATION PLAN**

Compiled : Ron Gregory	Drawn : DraftingWorks	Date : 28/10/2016	Revised : :	Projection : GDA94 Zone55
Scale : 1:100,000 (A4) 0 2.5 5 km		Drawing No. : RGP-PR-LN-008	Figure No. 2	

Base image by TASMAP,
© State of Tasmania.

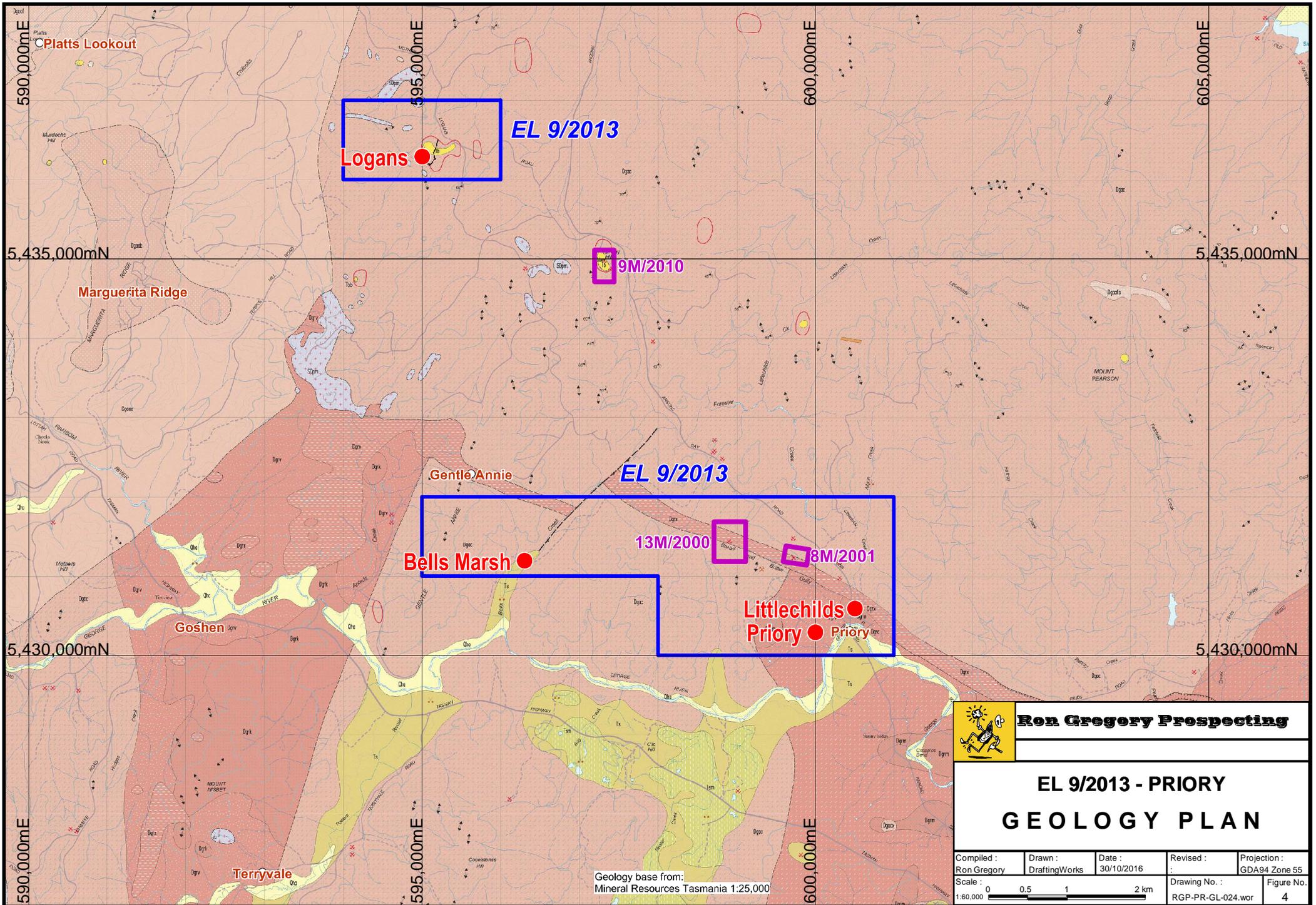


Ron Gregory Prospecting

**EL 9/2013 - PRIORY
TOPOGRAPHY &
MAIN PROSPECTS**

Compiled : Ron Gregory	Drawn : DraftingWorks	Date : 30/10/2016	Revised : :	Projection : GDA94 Zone 55
Scale : 1:60,000			Drawing No. : RGP-PR-LN-022.wor	Figure No. : 3

Base data from theLIST, © State of Tasmania

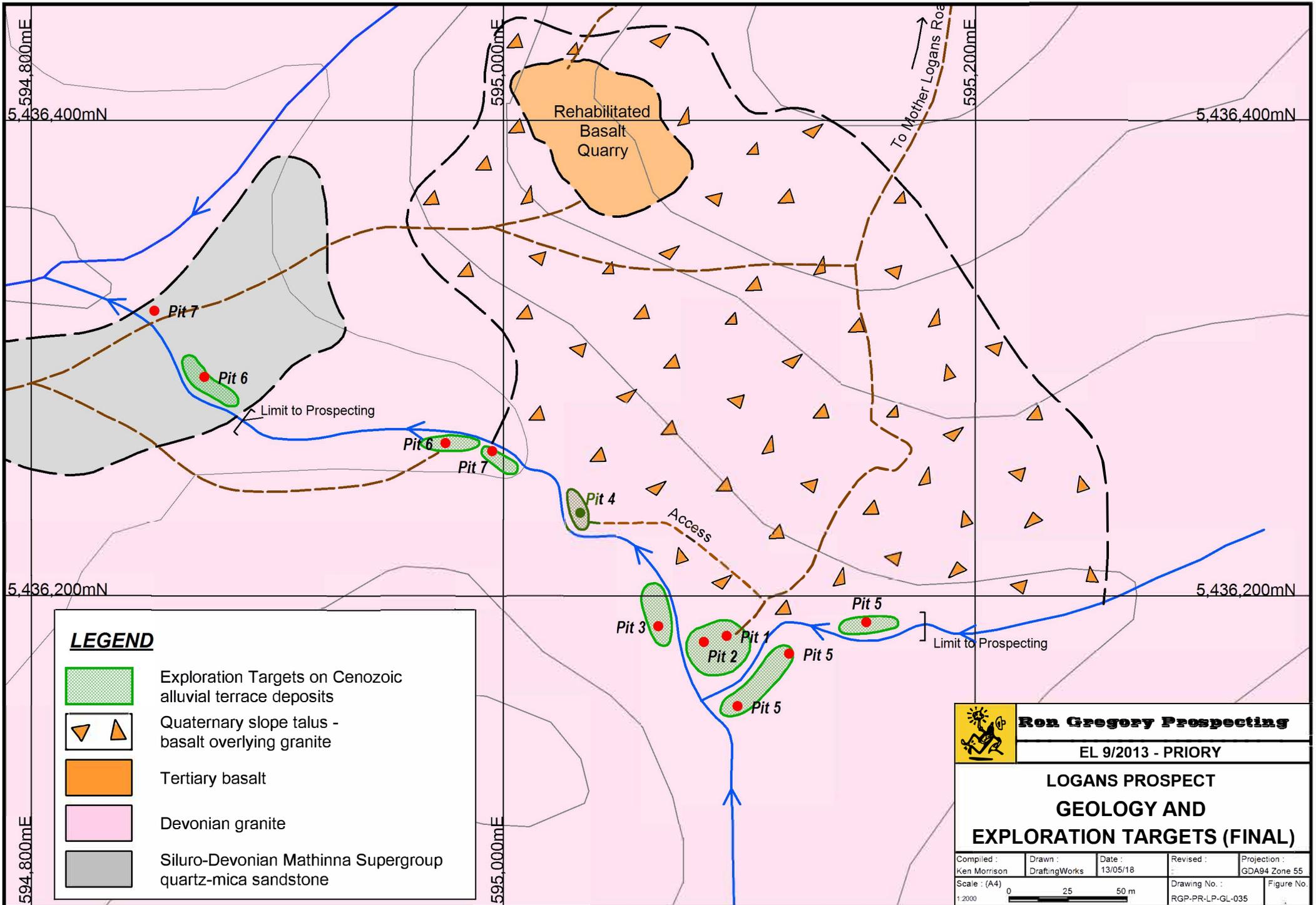


Ron Gregory Prospecting

EL 9/2013 - PRIORY GEOLOGY PLAN

Compiled : Ron Gregory	Drawn : DraftingWorks	Date : 30/10/2016	Revised : :
Scale : 1:60,000			Projection : GDA94 Zone 55
		Drawing No. : RGP-PR-GL-024.wor	Figure No. 4

Geology base from:
Mineral Resources Tasmania 1:25,000



LEGEND

-  Exploration Targets on Cenozoic alluvial terrace deposits
-  Quaternary slope talus - basalt overlying granite
-  Tertiary basalt
-  Devonian granite
-  Siluro-Devonian Mathinna Supergroup quartz-mica sandstone

Ron Gregory Prospecting
 EL 9/2013 - PRIORY

**LOGANS PROSPECT
 GEOLOGY AND
 EXPLORATION TARGETS (FINAL)**

Compiled : Ken Morrison	Drawn : DraftingWorks	Date : 13/05/18	Revised : :	Projection : GDA94 Zone 55
Scale : (A4) 1:2000			Drawing No. : RGP-PR-LP-GL-035	Figure No. : :

In licence Year 2 terrace gravels were bulk sampled with two pits at Logans prospect and work commenced on the first pit at Littlechields Creek near Priory (Morrison, 2015b). At Logans, an estimated total 15 cubic metres of basal alluvial gravel, representing previous generations of the drainage system, was sampled and processed on site by wet screening, manual sieving and visual inspection of the resulting +3mm concentrate. Approximately 150 rough sapphire fragments, plus a further hundred or so slightly smaller stones, were recovered, yielding 25 cut stones ranging in size from 0.1 to 1.4 carats.

Completion of the magnetic anomaly screening in Year 2 resulted in a further partial relinquishment (Morrison, 2015c).

Most of the work at Littlechields Creek was undertaken in licence Year 3 and a stockpile of Littlechields terrace sediment was transported to Bells Marsh where a dam and processing facility is being established, away from private farm land and river water, and by utilizing old abandoned tin workings. Bulk sampling continued from two new pits (Pits 3 and 4) at Logans in Year 3 (Morrison, 2016). Approximately 190 fragments of rough sapphire were recovered, along with numerous spinel and small zircon indicator minerals. Generally the sapphire colours are reasonable but the majority of the stones are either too small or too fractured and/or dull and cloudy to warrant cutting. No stones of cuttable quality were recovered from Pit 3 but 18 stones classed as potential cutters were recovered from Pit 4. A yield of approximately 10% cuttable quality stones is consistent with the earlier results in Pit 2. Only 11 stones were actually cut, as the other 7 were considered too small despite their acceptable quality.

Year 4 exploration (Morrison, 2017) continued at Logans prospect with excavator prospect pits in two areas designed to test the extent of gemstone accumulation upstream from previous sampling sites. These pits exposed overburden thickness of up to three metres and basal gravels with low concentrations of spinel indicator heavy mineral (Pits 5, Figure 5). No bulk sampling was conducted from these sites and they were rehabilitated on the same day they were excavated. This work effectively down graded the prospect by restricting its length potential.

An estimated 8 cubic metres of alluvial gravel was sampled from an extension of the previous Pit 4 and processed on site by a combination of hydraulic sluice box gravity separation and manual sieving, to produce a +3mm washed concentrate. 68 fragments of rough sapphire were recovered for a total weight of 106.6 carats. Three stones weighed >8 carats each but they were of non gem quality. 8 stones were cut, producing small decent quality gems ranging from 0.13 to 0.60 carats, for a total weight of 2.58 carats. The yield was consistent with the overall result achieved at Logans to date.

The 3km access track to Bells Marsh was upgraded and additional earthworks completed in preparation for a processing site and water recycling dam at Bells Marsh. The stockpile of previously excavated Littlechields bulk sample gravel was relocated to the new processing site at Bells Marsh.

3. EXPLORATION COMPLETED IN THE CURRENT YEAR

Exploration during the 2017-2018 licence year consisted of excavating and sampling two alluvial terrace sites at Logans (Pits 6 & 7 – see Figure 5) and processing the Littlechilds bulk sample, which had been stockpiled at Bells Marsh. All earthworks at Logans, including subsequent rehabilitation of the entire area of disturbed sites and access tracks, was conducted, as with all previous campaigns at Logans and Bells Marsh, by Jason Rattray from Pyengana, using a 8 tonne tracked excavator. The final rehabilitation work at Bells Marsh was done by excavator contractor Michael Youd with a smaller 3 tonne digger which was carried by truck to the site

Logans Exploration

Sampling and processing methods were the same as in previous years. During both campaigns #6 and #7 the downstream extent of the prospect was tested with test pits (Figure 5) but neither encountered alluvial gravels on basement and when combined with the previous negative results further upstream, the most prospective length of the creek appears to be limited to a 200 metre section displaced downstream from the centre of the area where the basalt talus fan reaches the creek (Figure 5).

Pits 6 and 7 in that central area (Figure 5) both produced pockets of decent sapphire concentration. Pit 6b (Table 1) yielded 265 stones weighing 373 ct. 36 were of sufficient quality to cut but only 13 were big enough to cut locally. Pit 7b yielded 169 sapphires weighing 344 ct. 17 were classed as cutters but only 7 on those were big enough to cut in Tasmania. The overall result from both campaigns, and also from the 5 previous bulk sampling campaigns, is that local pockets, or basement trapping sites, of relatively high grade concentration with economic potential exist at Logans but their distribution is erratic and unpredictable from the surface.

Table 1 Bulk Sampling Summary to November 2018 (end licence year 5)

Prospect	ID	Date	gda East	gda North	Depth	Width	Length	Azi gda	Process Gravel	Cut Stones	Carats
Logans	Trench#1	Jun-15	595094	5436184	1.5m	1.0m	9m	244	5m3	1	1.4
Logans	Trench#2	Oct-15	595080	5436178	1.5m	1.2m	9m/6m	254	10m3	24	8.1
Logans	Pit#3	Nov-15	595080	5436175	1.5m	3.0m	3m	n/a	3m3	0	0
Littlechilds	Pit#1	Jan-16	600558	5430637	3.0m	1.2m	14m	184	10m3	0	0
Logans	Pit#4	Sep-16	595034	5436230	1.5m	2.0m	8m	139	10m3	11	6.9+
Logans	Pit#4ext	Jun-17	595034	5436230	1.5m	3.0m	3m	n/a	8m3	8	2.6
Logans	Pit#5a	Jun-17	595024	5436230	3.0m	3.0m	3m	n/a	n/a	0	0
Logans	Pit#5b	Jun-17	595088	5436176	2.0m	3.0m	30m	n/a	n/a	0	0
Logans	Pit#6a	Nov-17	594880	5436280	1.0m	2.0m	5m	n/a	n/a	0	0
Logans	Pit#6b	Nov -17	595000	5436255	1.5m	4.0m	8m	147	5.5m3	13	4.3
Logans	Pit#7a	Apr-18	594845	5436311	4.0m	2.5m	3m	n/a	n/a	0	0
Logans	Pit#7b	Apr-18	595022	5436239	2.0m	3.0m	12m	109	8m3	7	3.1

Bells Marsh-Littlechids Exploration

The 3 km access track to Bells Marsh was improved by removing fallen limbs, filling eroded gutters and improving drainage to reduce erosion and to allow light vehicle creek crossing at two locations. Further earthworks at Bells Marsh completed a stockpile pad and process plant site and refurbished an old overgrown tin mining dam, which became the water storage and recycling facility for processing the Littlechids bulk sample.

The 10 cubic metre sample from Littlechids prospect, which was trucked to a stockpile site at Bells Marsh in 2016, was moved to the new processing site at Bells Marsh. The stockpile was processed in October-early November 2018 when sufficient water had built up in the dam to enable the stockpile to be hydraulically sluiced with a high pressure nozzle. This method liberated the material, which over time had become partly consolidated, into a slurry and effectively allowed for manual shoveling the feed into the hydraulic shaker screen which had been used at Logans. To further reduce oversize gravel and undersize sand, both of which were more abundant in the Littlechids material, the shaker product was fed into a portable trommel-jig plant prior to tableing the final product for visual inspection. The set-up is shown in Photo 1.

The results from Littlechids were very disappointing, with only 12 poor quality sapphires weighing 12.3 ct recovered, none of which were potential cutters. This was consistent with observations made during the bulk sampling when it appeared that traces of blackjack were restricted to a thin surficial layer of tailings overlying barren alluvial gravel. The tailings must have been sourced from early tin mining either at the Albian-Forrester Creek workings, washed downstream during floods, or carted from the Priory tin mine to produce a stock fording over Littlechids Creek. Either way, it does not require a local basalt source to explain the Littlechids sapphires and it demonstrates that the site has no economic potential.



Photo 1 Processing Littlechild's bulk sample at Bells Marsh

4. DISCUSSION & CONCLUSIONS

The 5 year exploration program conducted on EL 9/2013 began by investigating potential basalt pipes interpreted from MRT aeromagnetic data, with an aim to locate primary sources of sapphire. This idea resulted from seeing a single large, non gemstone sapphire contained in a basalt cobble, found by local prospector Michael Lloyd at Logans prospect (Duncan and Lloyd, 2013). The basalt exposed in the rehabilitated Mother Logans quarry is clearly the source position for the alluvial sapphires and zircons known to exist in Mother Logans Creek, immediately down slope from the quarry. However, after more than a year of reconnaissance ground checking, panning creek sediments and examining hundreds (maybe thousands?) of basalt cobbles, no evidence of primary sapphires at Logans and no additional basalt pipes with sapphire potential had been located.

Consequently the EL was reduced to an area containing the four highest ranking alluvial prospects (Figures 3&4) and all subsequent exploration involved mapping and bulk sampling alluvial gravels. Logans prospect was established as the only site with genuine potential on both geological and land use/environmental criteria.

Several major conclusions resulted from the 5 year program.

- Although the sapphires and zircons at Logans alluvial prospect are clearly sourced from the site now occupied by Mother Logans quarry, they do not appear to be sourced from the coherent basanite basalt rock type outcropping in the rehabilitated quarry. The lone sapphire in basalt found by Michael Lloyd is probably a xenolith crystal, picked up either inside the pipe or on the surface, by the extruding lava. It is likely that the sapphires and zircons were extruded within an earlier tuffaceous explosive volcanoclastic facies, a porous and unstable lithology which was easily weathered and eroded. This implies that the gemstones may be older than the basalt preserved as outcrop today. Logans zircons have been dated by radiometric U-Pb in the 41-50Ma range (Duncan and Lloyd, 2013), dates consistent with basalt-derived zircons in the Ringarooma Valley (Yim et al, 1985), zircon inclusions in Weld River sapphires (McGee, 2005) and the oldest Tertiary basalts on Blue Tier (Sutherland and Wellman, 1986), all of which give Eocene dates clustering around 46Ma. To complete the test at Logans it is necessary to date the outcropping basalt, by a method which can avoid the zircons. Samples have been supplied to MRT for that purpose and at the time of writing this report nepheline with Ar-Ar dating potential has been extracted from the basalt but as yet no dating has been undertaken (Ralph Bottrill and John Everard, pers com).
- Alluvial deposits are the only targets with sufficient potential to justify exploration and excavator trenching or pitting to basement on alluvial terraces is the only effective exploration method for testing the sapphire potential of prospects defined in EL 9/2013.
- Exploration at Logans indicates restricted enrichments of sapphire at encouraging grades, in small discontinuous deposits of relatively rounded siliceous gravel contained in potholes eroded into bedrock. Black pleonaste spinel concentration correlates well with sapphire grade and the spinel (blackjack) is an effective heavy mineral indicator. Surface mapping of the alluvial terrace morphology gave no indication as to where the best trapping sites occur on the subsurface bedrock but productive sites often correspond to bends in the creek.
- Approximately 10% of the rough stones recovered from the seven bulk sampling campaigns at Logans are of sufficient quality, in terms of clarity and absence of fractures and cloudy inclusions, to yield cut stones in the 0.1-2 carat range. The economics of having stones cut locally in Tasmania proved not viable, in terms of the local wholesale value of cut stones less than approximately 0.25 carats.
- Exploration at Logans has proven that insufficient high grade gravel is available to warrant even a small campaign style mining operation. Additional prospects on the EL, which are associated with abandoned tin mine tailings, are considered to have even less potential than Logans and therefore no further work is proposed and the EL will expire at the end of licence year 5.

5. ENVIRONMENT

All pits, trenches and water sumps were backfilled and the surrounding working areas were rehabilitated at the completion of each sampling and processing campaign. All vehicle access tracks to the Logans sites have been rehabilitated and made unusable by light vehicles. Drains, grips and earth mounds were excavated in appropriate sites and vegetation slash spread over the sampling sites and access tracks. Access to the Littlechilids sampling site was across a paddock and no damage was done. At Bells Marsh, where the Littlechilids bulk sample was processed, the entire disturbed site was rehabilitated as per those at Logans and Littlechilids, but the bush access road on Crown land was left in an improved condition, due to earthworks carried out as part of the exploration program.

No contamination of Logans Creek water, or damage to the creek banks, occurred due to the bulk sampling and no litter or hydrocarbon residue remains on any of the sites. Modification to the creek morphology is resulting from and non permitted industrial scale fossicking.

Healthy, weed-free regrowth of the riverine vegetation is progressing well on the sites of Pits 1 and 2 at Logans, following rehabilitation in 2015 (Photo 2). Photo 3, shows the rehabilitated site at Littlechilids prospect and Photo 4 shows the recently rehabilitated processing site at Bells Marsh. A current view of the Pit 7 site at Logans, ie the most recent work area, is shown on the cover page of this report.



Photo 2 Rehabilitated Pits 1 & 2 sites, Logans prospect



Photo 3 Rehabilitated pit site, Littlechilds prospect



Photo 4 Rehabilitated processing site, Bells Marsh

6. EL RELINQUISHMENT

As outlined in the conclusions above, no further work is required to test the exploration model proposed for this EL and therefore no extension of term has been requested and so as of November 7th 2018, EL 9/2013 expired.

7. EXPENDITURE

For the period from the 1st October 2017 to the 7th November 2018, total expenditure on exploration, comprising; earthworks for track access, bulk sampling and site rehabilitation, geology, sample processing, travel and accommodation, mineralogy and stone cutting and tenement administration costs including site inspections, was \$88,029.00 including GST. A breakdown of expenditure categories is shown blow.

Geology	Sampling	Earthworks	Mineralogy	Tenement administration
\$14,085	\$33,451	\$23,768	\$8,803	\$7,922

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