

# **TNT MINES LIMITED**

ABN 67 107 244 039

**EL27/2004**

**ROSSARDEN-ROYAL GEORGE**

**ANNUAL REPORT TO 26 NOVEMBER 2011**

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## **1.0 INTRODUCTION**

This report is a summary of the exploration activities conducted on the Rossarden – Royal George exploration licence, EL27/2004 (Figures 1 and 2), for the period ending 26 November 2011.

Much of sections 1 and 2 are taken from the independent geologist's report that appears in the TNT Mines rights issue prospectus, November 2011.

The licence was originally acquired as part of a program to acquire all the significant hard-rock tin and tungsten assets in northeast Tasmania which may be suitable for open pit development. EL27/2004 also contains the only significant uranium prospects in Tasmania.

Hard rock tin and tungsten in north-east Tasmania is associated with the presence of altered alkali-feldspar granites and aplites, and deposits occur both within the granites (endogranitic types) and within the Mathinna Group sediments lying above or adjacent to the intrusive granites (exogranitic types).

Endogranitic types can be broadly put into two categories: flat or relatively flat-lying greisens of relatively low grade e.g. the Anchor deposit (0.2% Sn) which are amenable to open pitting; and steeply dipping greisen/quartz greisen lodes with higher grades e.g. Royal George (0.65% Sn) and Rex Hill (grade up to 1.4%).

The exogranitic types occur as sheeted veins or fracture stock works with the Mathinna Group slates and quartzites. The ideal situation for development of this style of mineralisation is above a cupola of altered aplite, where mineralising fluids are focussed into fault fissures formed during forcible doming caused by the intrusion of the aplite. They have potential for high tonnages at moderate to good grades, e.g. Aberfoyle and Storeys Creek.

The Aberfoyle mine operated between 1916 and 1982 and produced 2.1 million tonnes of ore at 0.91% Sn and 0.28% WO<sub>3</sub>. The Storeys Creek mine operated between 1892 and 1982 during which time it produced 1.1 million tonnes of ore at 1.09% WO<sub>3</sub> and 0.20% Sn

### **1.1 Location and tenure**

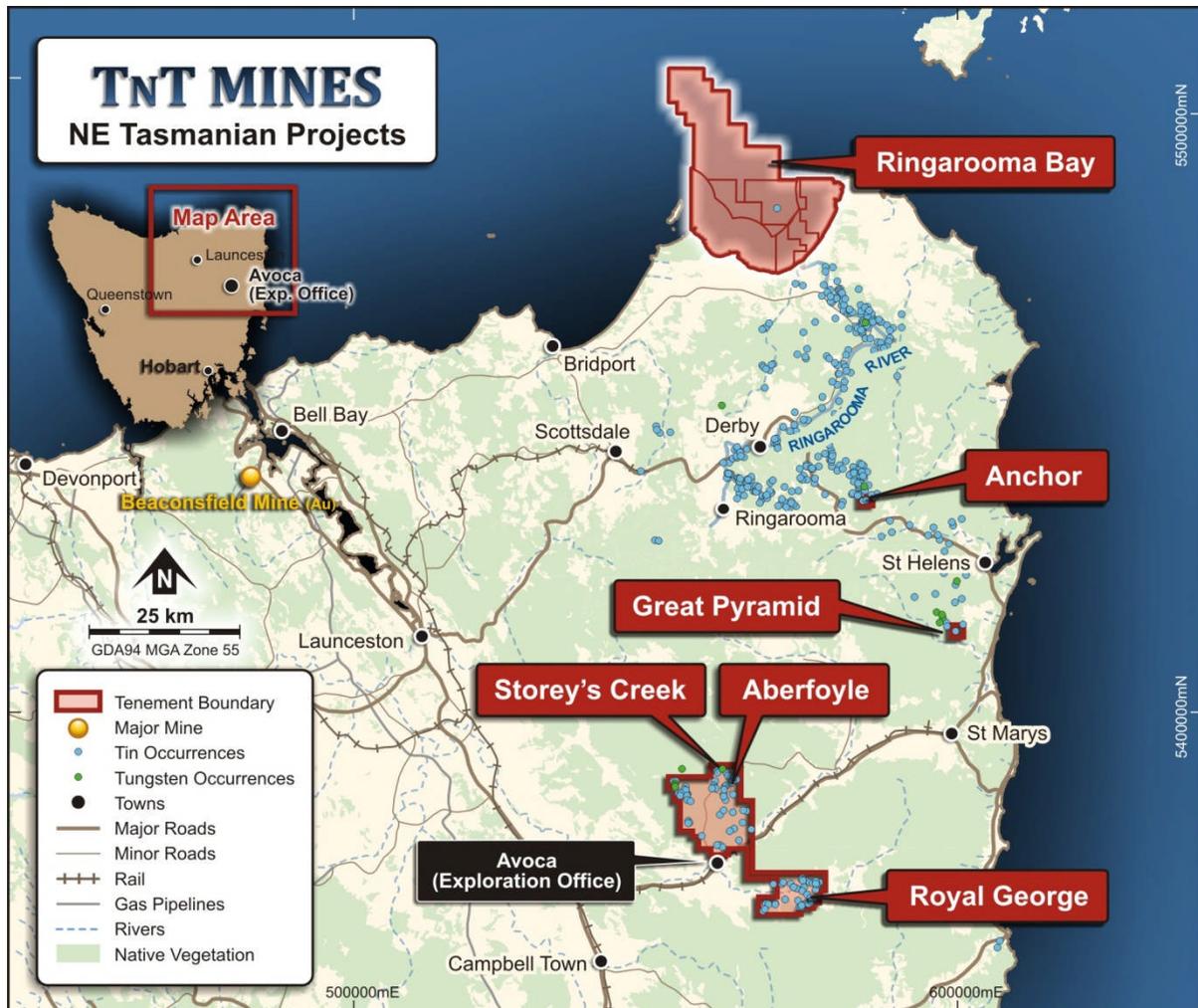
The licence is located around the towns of Avoca, Royal George and Rossarden in the Fingal valley, approximately 30km south-east of Launceston (Figures 1 and 2). Avoca is the main centre and is accessed via the Esk Main Road Hwy, off the Midlands Highway. Access through the tenement is via sealed and unsealed public roads and four-wheel drive tracks. The tenement can be found on the St Pauls (1:100,000) LTIS map sheets.

Topographically the area is of variable. The tenement is dissected by the broad valleys of the South Esk and St Pauls rivers. Undulating grazing and cropping land to the south rises to the forested foothills of the dolerite massif of Snow Hill while to the north there is a sharp rise to the peneplaned St Clair surface at 600-800 metres. The area is mostly forested with some grassy country. The surface is deeply dissected to the south by several creeks including Storeys Creek, Aberfoyle Rivulet and Castle Carey Rivulet and to the north rises up through dolerite scree to the 1500m Ben Lomond massif which lies just to the north of the tenement.. In general, vehicular access is good with various unsealed vehicle 4WD tracks accessing the numerous old workings.

The licence covers a total area of 212 km<sup>2</sup>. The licence is wholly owned and managed by TNT Mines Limited.

E27/2004 was granted to Allstrong Investments Pty Ltd on 27 November 2004. Minemakers Limited ("Minemakers"), via its wholly owned subsidiary, Minemakers Australia NL, purchased

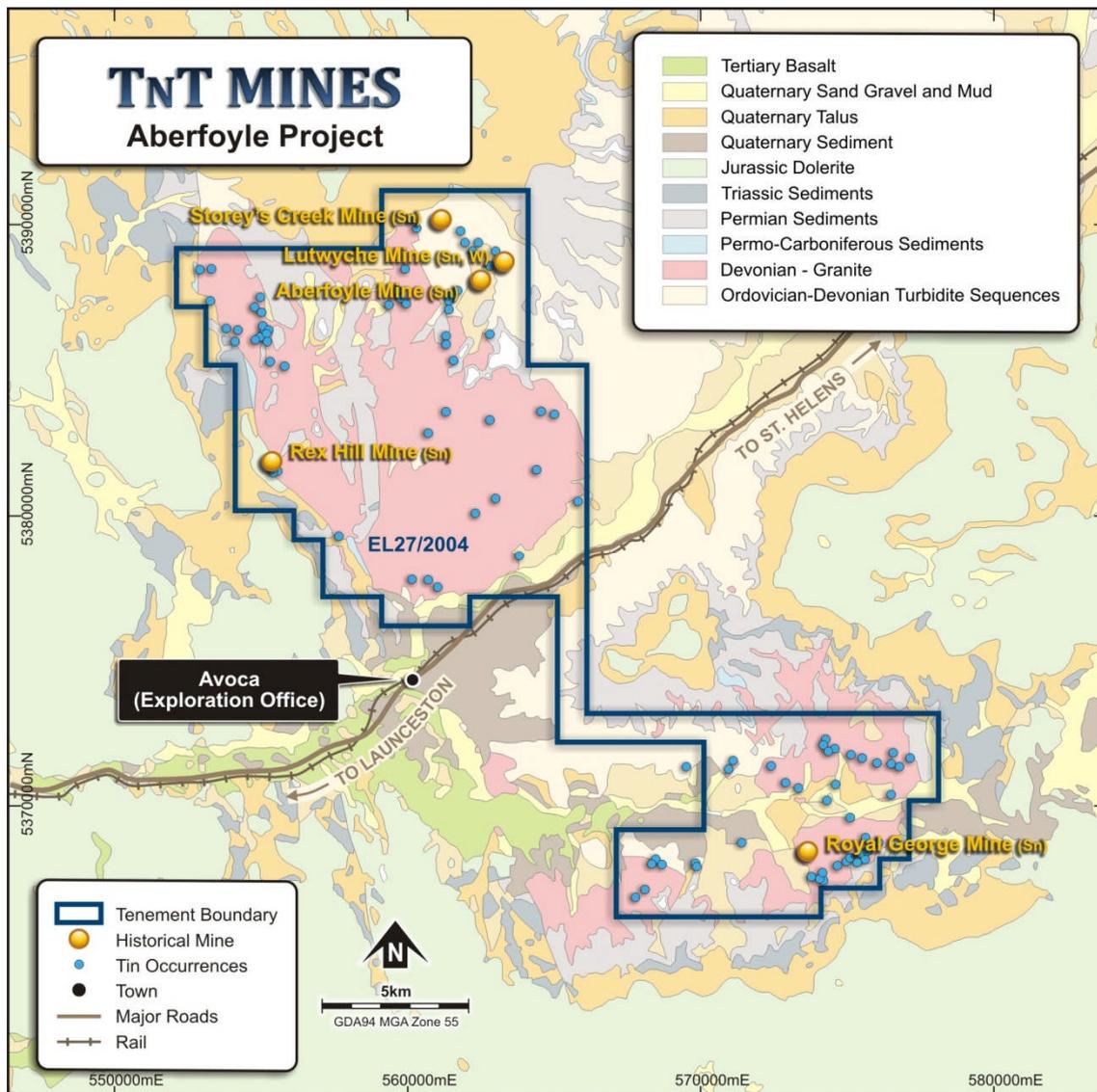
Allstrong outright on the 23<sup>rd</sup> November 2006. Allstrong subsequently underwent a change of name to Minemakers TTT Pty Ltd on the 18<sup>th</sup> May 2007. On the 15<sup>th</sup> April 2011, Minemakers TTT Pty Ltd changed its name to TNT Mines Limited. On the 19<sup>th</sup> July 2011, TNT Mines Limited demerged from the Minemakers group to become a separate public unlisted company.



**Figure 1: Location plan of TNT Mines tenements in north-east Tasmania**

## 1.2 Geology overview

A Silurian/Devonian sedimentary succession (the Mathinna Group) has been folded and intruded by Devonian granites. After uplift and peneplanation during Carboniferous times it was unconformably overlain by Permian/Triassic sediments followed by intrusion of a 300m thick Jurassic dolerite sill. A further period of erosion then removed the post-Carboniferous stratigraphy from the area of the mines leaving the Ben Lomond massif comprised of dolerite. The Mathinna Group has only been subjected to low grade regional metamorphism. Contact metamorphic effects close to the granite are generally minor with the development of some biotite spotting within 60m of it (Figure 2).



**Figure 2: Regional geology - EL27/2004**

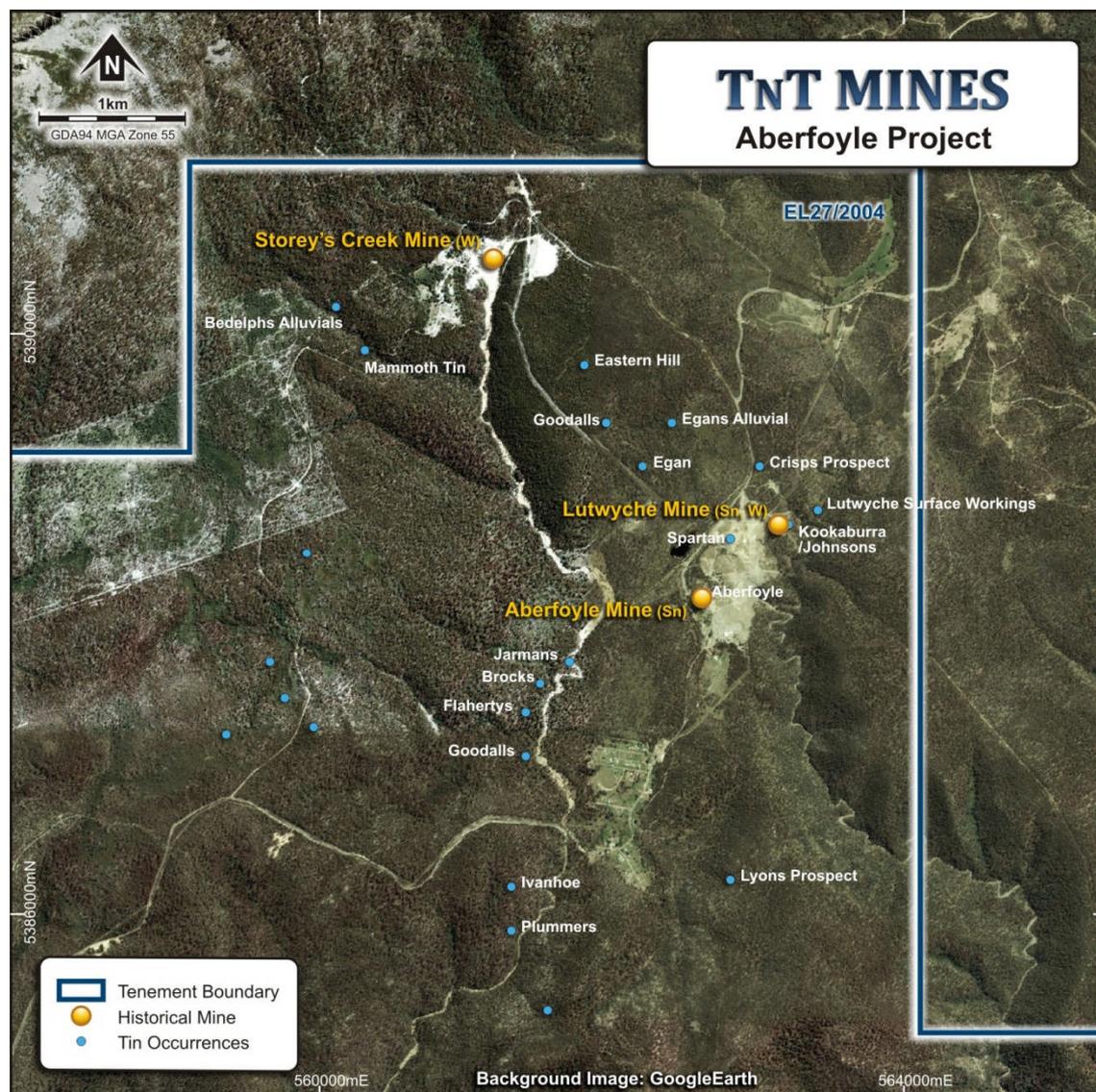
### 1.2.1 Aberfoyle-Lutwyche Mine area geology

At Aberfoyle the sediments are tightly folded along axes striking NW with near vertical dips and a gentle plunge. Cleavage is insignificant but bedding plane and axial plane faults are common and are important in the control of ore deposition.

The mineralisation occurs in northerly trending fissure veins with steep westerly dips, occupying a zone about 60m wide in the folded slates and siltstones. The vein swarm lies directly over an aplite cupola, intersected by the main shaft, and which is interpreted to be genetically connected with the mineralisation. The workings extend over a strike of 400m but recent drilling by Minemakers has intersected mineralised veins over a strike length of at least 800m. There are nine veins in five groups of which the 26 vein system and the western veins are the most important. The vein system is shown on the cross section of the mine presented in Figure 5. Underground, five major folds and 19 lesser folds were recorded that form a complex small scale anticlinorium with a north westerly trend. The fold axes plunge at about 25° to the southeast and the axial planes dip at 85° to the southwest. This vein system extends 180m south of the Brandon Shaft as an intense swarm of narrow mineralised veins that may be amenable to open pit mining (McGushin & Keyes 1981).

There are two main groups of faults striking north and northwest. The north striking faults are the most important and are known as the Aberfoyle No. 1 Fault System. It has been traced from the

surface down through all levels of the mine. The total throw on these faults varies from 37m at the north end of the mine to 12m at the south end. The northwest to southeast faults form a small but important zone of strike faults which trends parallel to the fold axes of the Mathinna sediments (plunging gently southeast) and dip steeply to the southwest.



**Figure 3: Northern prospects – EL27/2004**

At the Lutwyche prospect two sets of tin bearing veins up to 100mm wide are reported with one group striking between 320° and 340° and dipping at 70° to the southwest and the other striking between 40° and 65° and dipping 70°- 85° to the southeast. The Lutwyche zone of fracturing and quartz veining can be traced 750m southeast of the Aberfoyle Rivulet before it becomes covered with Permian rubble, and intense quartz veining is reported 2.4km along strike to the ESE. The mineralisation at Lutwyche is open both at depth and closer to surface. An exploration target of 1.0-1.2Mt at 0.9 to 1.1% combined tin and tungsten seems reasonable for extended zone of mineralisation intensively tested by Aberfoyle.

Tin veins are also reported from the Kookaburra Prospect between Lutwyche and Aberfoyle. At Brock's Show, about 1km NW of the town of Rossarden, narrow tin veins and cassiterite deposited in joints were mined to a depth of 15m and produced about eight tonnes of tin.

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### *1.2.2 Storeys Creek Mine area geology*

The Storey's Creek Mine is based on a NNW trending sheeted vein system that forms a zone 30-50m thick and 300m long, dipping 25°- 30° southwest. While there are two main veins these are part of a group of veins with varying dips and strikes. The large veins were stoped out by earlier miners. In addition to these large veins there were other smaller veins which were too small to be mined. TNT Mines plans to assess the ground in the vicinity of the mine to determine if the fine veins form an economically mineable deposit.

The wolframite (Fe,Mn)WO<sub>4</sub> and cassiterite (SnO<sub>2</sub>) mineralisation occur in quartz veins hosted by Silurian/Devonian sandy shales of the Mathinna Group. In the vicinity of the mines these sediments are described as highly siliceous massive competent sub-greywackes. The Mathinna Beds are closely folded along north westerly axes and pitch to the southeast at about 20° at Storey's Creek. These sediments have been intruded by numerous steeply dipping basic dykes up to 1m wide at right angles to the bedding. These dykes were emplaced prior to the mineralisation and are highly altered. Three abnormally flat dykes at 45° to the normal strike, known as "caunter" dykes, were subsequently refractured along their walls to allow deposition of rich veining.

A Devonian granite batholith, the Ben Lomond Granite, outcrops over an area of 130km<sup>2</sup> in the environs of the tin mines and its emplacement generated the mineralizing fluids which deposited the veins in suitable fractures in the sediments. At the surface at Storey's Creek the granite outcrops about a kilometre west of the mine. It is a coarse grained porphyritic leucogranite similar to some of the granites forming the Blue Tier Plateau in this region. The granite has a finer grained contaminated margin indicating that it has absorbed some country rock along the contacts which cut across the bedding. In places the upper contact granite bulges and some of these are topped by aplite cupolas. Such a cupola is present beneath the Storey's Creek Mine at a depth of 180m and the bulges are interpreted to have developed where the mineralizing fluids left the granite.

At Storey's Creek Mine two main veins were worked. The No.1 vein strikes at 350° and dips west at 20° and the No.2 vein strikes at 335° and dips west at 37°. The veins are 40m apart at the adit level but the two merge at a depth of 70m below adit level where they are 5.5m thick. North and south of the intersection they diverge with No.1 being 1.0m to 1.3m thick and No.2 being 0.7m to 2.5m thick. The section of the mine shown in Figure 6 gives a simplified view. The veins are somewhat irregular along strike and branch and join in places and there is also a sheeted vein system of narrow veins. In addition to the main vein system, five narrow tin-rich caunter veins run into the footwall for up to 70m, three of which are along caunter dykes. The grade of the mineralisation varies with the distance from the cupola and generally economic mineralisation is only found between 30m and 330m above a cupola. At Storey's Creek the cupola is about 180m below surface.

The wolframite and cassiterite were usually deposited early on the walls of the veins and the mineralisation extends from the surface to the full depth of the mine (200m below surface), a length of 400-450m down the dip of the veins, but is not wholly regularly distributed. The veins were worked over a strike length of about 700m.

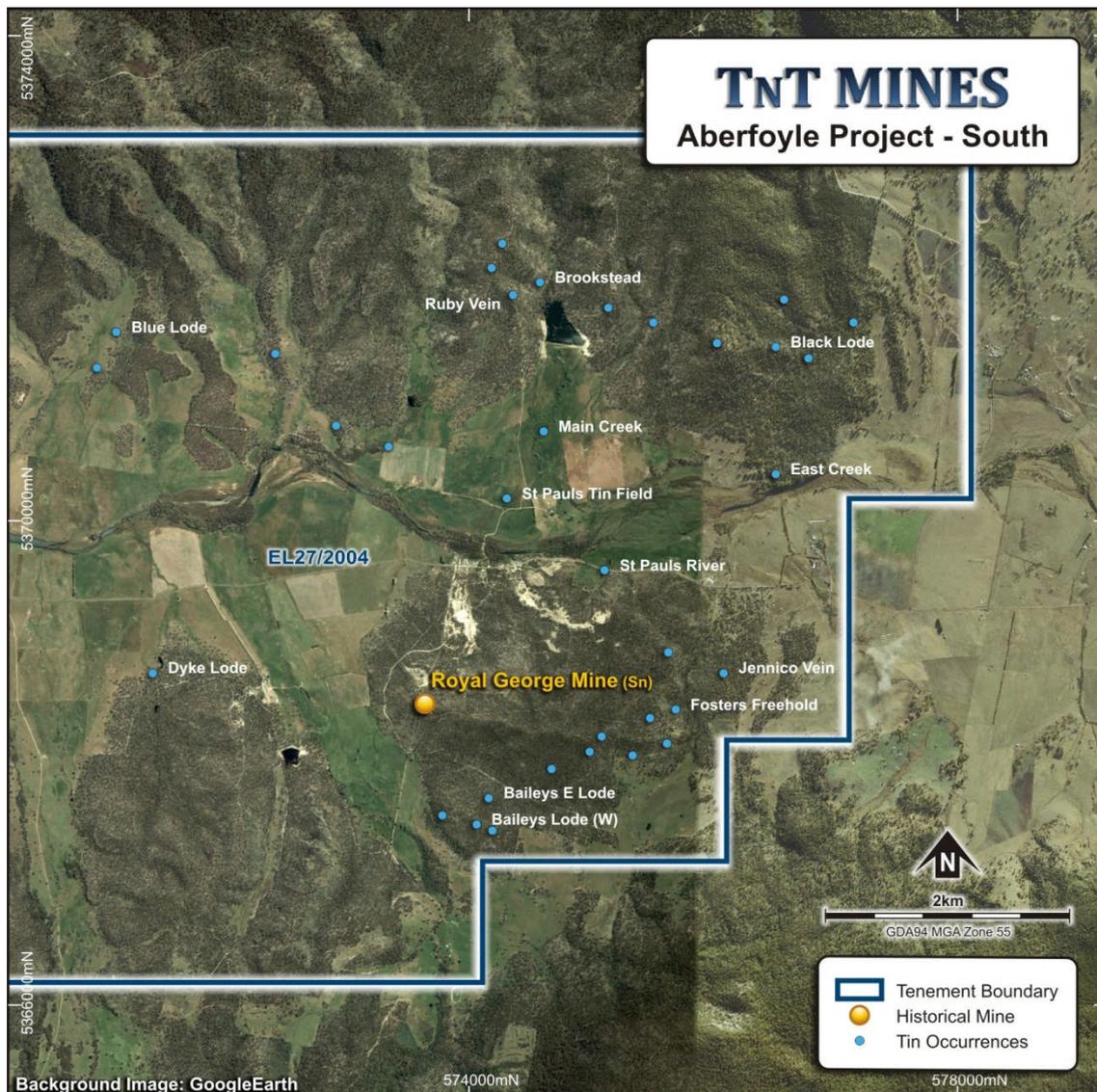
In the northern central part of the mine, large patches of late stage sulphide mineralisation occur replacing the veins at their intersection with a set of transverse joints or faults. The sulphides include galena and sphalerite with some stannite, and, because galena contaminates the tin concentrates, these patches of sulphides were usually left as pillars.

### *1.2.3 Royal George Mine area geology*

The country rock in the area of the Royal George Mine consists of granitic rocks which intrude Silurian to Devonian sandstones and siltstones of the Mathinna Beds. The main granite is coarse grained with porphyritic feldspar and biotite in a groundmass of quartz, feldspar, and biotite, with accessory tourmaline. This granite also exhibits other phases in some localities such as pegmatites, graphic granite, aplitic dykes, etc. Extremely hard fine grained granite is also present but shows no particular relationship to the mineralisation which is present in both types of granite. The granites are assigned a Devonian age and are considered to be variants of the Ben Lomond granite.

At Royal George, tin mineralisation has been introduced into the granitic rocks over a strike length of 250m. The deposit is formed by a steeply dipping zone of lodes striking at 310° to 320° and dipping 75° to 82° to the southwest. The lodes are variably spaced and the group narrows to the north. They are variously described as joints or fracture planes with some showing good slickensides. The zone of mineralisation plunges shallowly to the north. A surface plan showing the old open pit and the location of the drill hole collars is presented as Figures 7 and 8

Pneumatolytic fluids have travelled up the lodes altering the granite to greisen and introducing tin and base metal sulphides into the wall rock. This mineralisation penetrates the walls of the lodes to varying extents, typically up to 1.5m wide, and the mineralised group of lodes may be up to 20m wide but not continuously mineralised over this width. Between 5-20% disseminated pyrite, sphalerite, arsenopyrite and chalcopyrite are present in the strongly mineralised greisen bands. Sulphides average 3% within the host granite for 30m each side of the main zone of mineralisation. The cassiterite is described as fine grained and rarely visible but coarser cassiterite is reported in the higher grade zones below the old stoping.



**Figure 4: Royal George prospects**

#### 1.2.4 Rex Hill and Gipps creek area Mine area geology

Lying 9km SW of Aberfoyle is the old Rex Hill Mine which was discovered prior to 1890 and had its main period of production from 1893-1909. The mineralisation is present in greisenised granite containing a high grade quartz vein on a lode. At the surface the mineralisation was identified as silver-lead but as this was mined it was found to be essentially tin accompanied by base metal sulphides. The ore was pipe-like at the surface but became dyke-like at the No.3 Level (90m below surface). Details of production are sketchy but in total 20,000t of ore may have been processed with an average head grade of 2.5% Sn and grades up to 5% Sn. Recovered grades were reported at 1.3% to 1.4% Sn in 1904 but the base metal sulphides made treatment difficult and at that time were of no commercial value.

### 1.3 Exploration Rationale

The tenement was acquired to test the potential for development of open pit mines to exploit the remaining tin and tungsten resources at the old Aberfoyle, Storeys Creek and Royal George mines. Predictions of sustained growth in tin and tungsten demand and prices coming off historical lows underlay the acquisition of the project. Exploration was not initially a priority but has

subsequently become more of a focus, particularly in light of strong demand and pricing for tungsten. EL27/2004 contains one of the most significant tungsten-mineralised areas in Tasmania.

## **2.0 REVIEW OF PREVIOUS WORK**

### **2.1 Historic mining and exploration before current tenement**

#### *2.1.1 Aberfoyle-Lutwyche Mine area exploration and mining*

Low grade tin bearing veins exposed at the surface at Aberfoyle were discovered in 1916 but little work took place until 1926 when a prospecting syndicate was formed to investigate the veins at depth. Aberfoyle Tin NL took over late in 1926 and sank two shafts. One was vertical to a depth of 18m and the other was an underlay shaft following a 0.5m thick vein down to the 18m level.

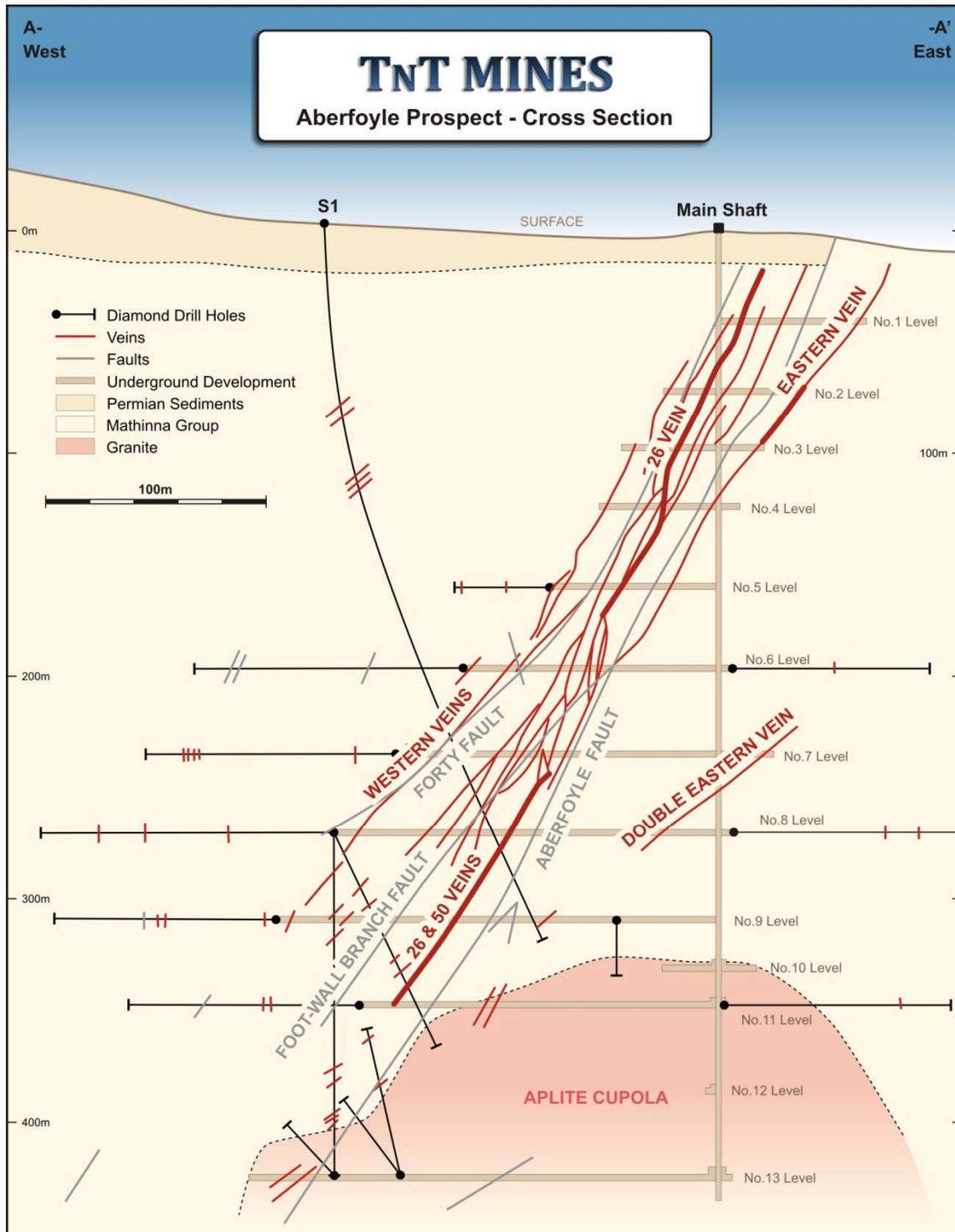
In 1928, surface exploration was abandoned and an adit was driven from the west bank of the Aberfoyle Rivulet. It was designed to intersect the tin bearing veins 56m below the surface workings. This adit was driven for 320m and exposed a group of veins between 274m and 318m. Although modest in size they encouraged further development and production from the mine commenced in 1931 and expanded from 1934 when the main shaft was sunk to 70m and No. 2 Level opened up.

Following extensive working, the Aberfoyle and Storey's Creek Mines were sold to Rossarden Mines Ltd in May 1981. By the time the Aberfoyle Mine closed in 1982 the Spiers (or Main) Shaft was 420m deep with fourteen levels spaced 30-35m apart. This shaft entered an aplite cupola at a depth of 318m. Total production is recorded as 2.1Mt at 0.91% tin (Sn), 0.28% tungsten oxide (WO<sub>3</sub>).

The Lutwyche mineralisation is located in an area containing tin veining to the northeast of Aberfoyle and was estimated to have produced about a tonne of tin concentrate. It was accessed by horizontal development from the No.13 Level of the Spiers Shaft at the Aberfoyle Mine. Before closure in 1982 a shaft was raise bored to surface but it was probably never fully commissioned.

Most of the exploration at Aberfoyle was concentrated on the mining leases and not reported on in detail. Exploration Licence EL28/1978 was originally granted to Aberfoyle Exploration Pty Ltd in April 1979 and passed to Rossarden Mines Ltd when they purchased the mine in 1981. The exploration licence was surrendered in 1982 and the work undertaken reported in Summons 1983.

In 1989, based on underground sampling, other old Aberfoyle records, and limited drill hole data, Juka Mine Management (Juka) made some estimates of potential mineralisation in open pits to depths of 70m (No.2 Level), 110m (No.4 Level), and 150m (No. 5 Level) covering the main Aberfoyle lodes. This work was commissioned by Stacpoole Enterprises Pty Ltd. (Ref. Roberts & Teh 1989 also McGushin & Keyes 1980). The database for this study was insufficient to establish resources but formed the basis for planning additional work. The study was based on the estimation of the quartz content of the mineralised zone which previous work on the mine had shown was closely related to the tin grade. This enables workable estimation of the tin content of low grade mineralisation by visual assessment of the quartz content with which the cassiterite is usually associated.



**Figure 5: Cross section of Aberfoyle Mine**

At Aberfoyle, Minemakers estimated that a proposed pit to 110m was a possible option and that the exploration target was a body of mineralisation between 4Mt and 5Mt and that target grades of 0.15% to 0.25% Sn and 0.02% to 0.03% WO<sub>3</sub> may be achievable. Possible open pit outlines are illustrated in **Error! Reference source not found**. Further drilling is required to provide more data before feasibility studies can be carried out.

### 2.1.2 Storeys Creek area exploration and mining

Alluvial cassiterite and mineralised veins were discovered at Gipps Creek, 6.5km to the west, in 1872 and soon after alluvial cassiterite was reported at Storey's Creek. The veins at Storey's Creek were worked for tin from 1891 until 1900 when tungsten became marketable. The mining was by small parties until 1913 when the Storey's Creek Tin Mining Syndicate took over the mine. This syndicate operated until 1928 when it became unprofitable. During this period up to 12,000t/y of ore were raised grading between 0.75% and 1.75% tin and 0.75% to 2.0% tungsten. After a period of successful tributing the mine was taken over in 1937 by the Storey's Creek Tin Mining Company.

Once the tungsten mineral wolframite became marketable at the turn of the century the production of tungsten was greater than the production of tin. Total estimated production is 1.1Mt of ore at 1.09% tungsten oxide ( $WO_3$ ) and 0.18% tin (Sn). Up until 1962 recoveries were estimated at 6,300t of tungsten oxide and 1,118t of tin metal. Mining was being phased out in 1979 with the extraction of pillars and the mine was closed in 1982.

The Aberfoyle Mine also operated until 1982 and Storey's Creek and other prospects in the area were held by Aberfoyle Tin NL at that time. Some minor exploration of the prospects was carried out by it but the Storey's Creek Mine was not identified as an exploration target.

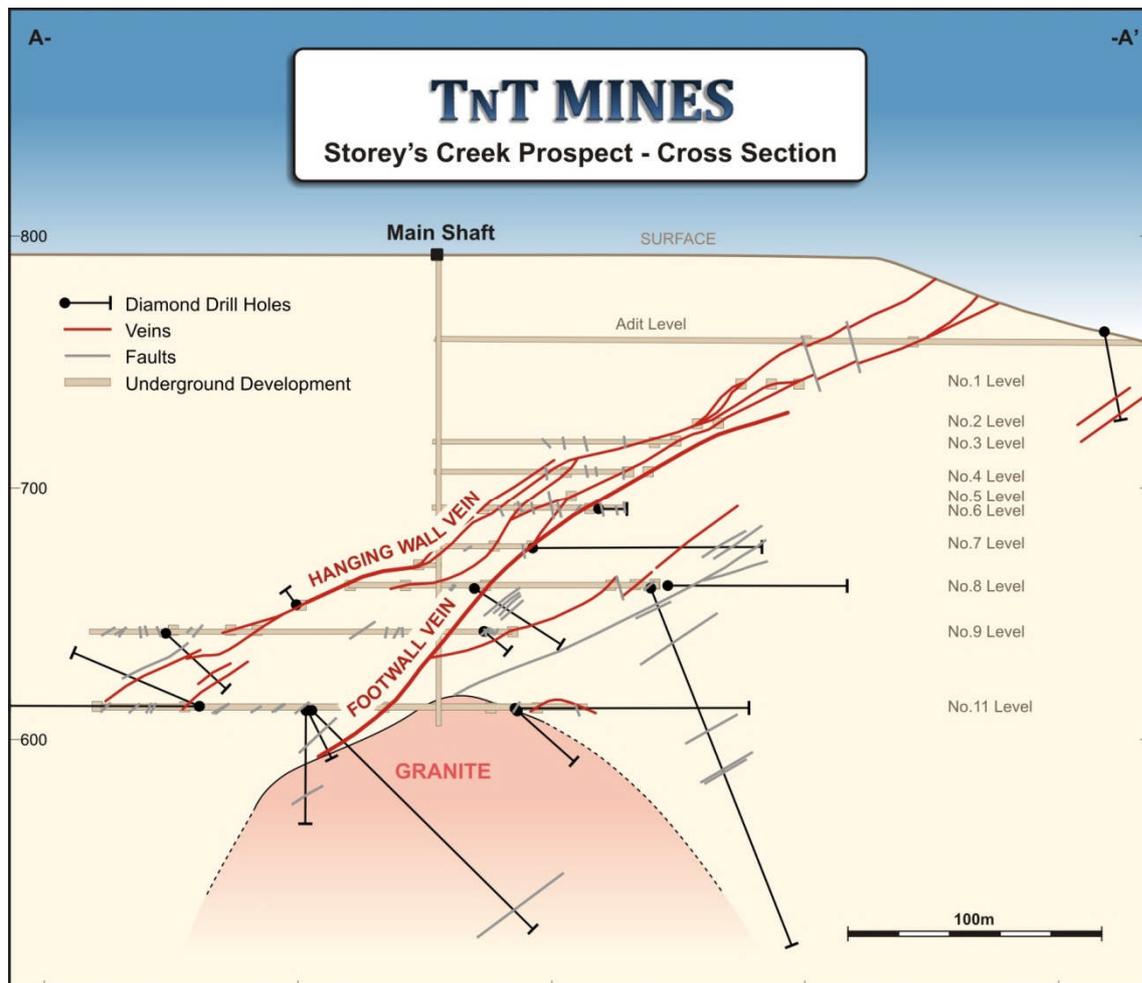


Figure 6: Cross section of Storeys Creek Mine

### 2.1.3 Royal George area exploration and mining

The mineralisation was discovered in the 1880s and was initially grouped with a number of mineralised outcrops in the St Paul's River valley (Figure 4). Only minor production took place until the Royal George Mine operated from 1911 until 1922 with production of 170,000t at 0.65% Sn containing 1,105t of tin metal. The ore was mainly mined from two underground levels and to the surface with open stopes (Figure 7). Available data on drill holes is presented in Table 1. The question marks against the tin grades indicate that there was no remaining sample for CRA to re-assay at a later date. Problems with assaying for tin present as cassiterite do occur fairly frequently and CRA was checking for poor assaying. These drill hole intersections and subsequent intersections are plotted on the long section of the mine presented on Figure 8.

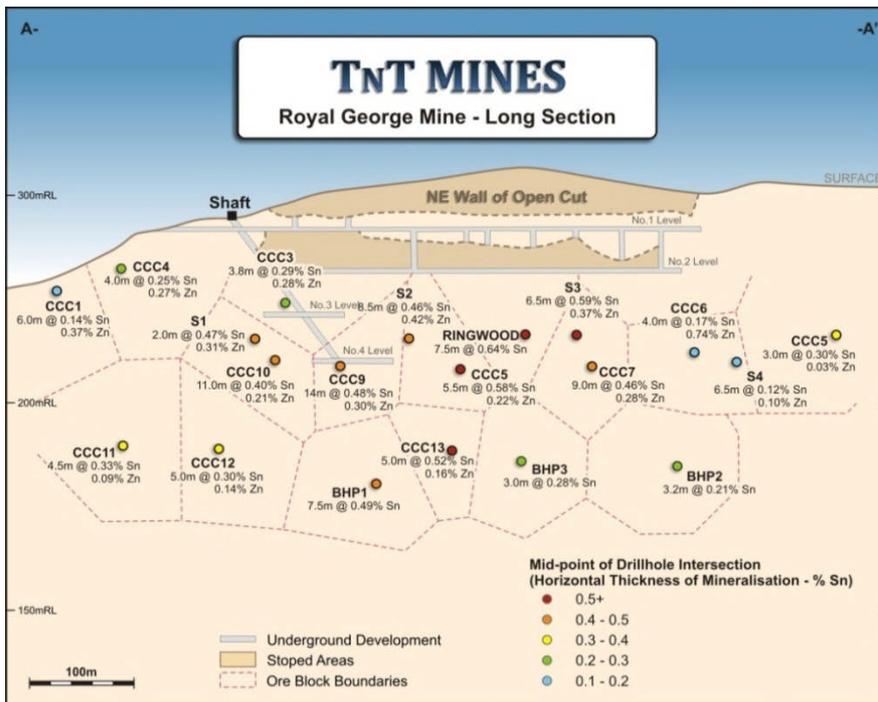
In 1965 the Cornwall Coal Company (CCC) pegged several Mineral Leases (21 year tenure) and conducted exploration until 1971 with the assistance of the Tasmanian Mines Department. From August 1966 to February 1967 Government Geologist G. Urquhart carried out surface and underground mapping and completed logging and sampling of DC holes 66CC.1 to 66CC.7 The programme was then taken over by A.J. Noldart who logged and sampled holes 66CC.8 and 66CC.9 and supervised the drilling, logging, and sampling, of holes 66CC.9, 67CC.11 to 13. He also deepened the inclined shaft to the No.3 and No.4 Levels where some channel sampling was carried out. Most of this drilling was EX size (21.5mm core diameter) and this small core size is reported to have led to recovery and sampling problems and anyway is not considered to be a suitable size for this style of mineralisation by Featherstone. Two deeper levels (No.3 & No.4 Levels) were later established in 1968 by the Cornwall Coal Co. from an inclined shaft to a maximum depth of 80m below surface.

Royal George Drilling									
Hole No.	Comment	EHO	Easting MGA(m)	Northing MGA(m)	Elevation (m)	From (m)	To (m)	Interval (m)	Grade % Tin
55/1	-43.5° to 045°	112.8			312.7	90.2	98.5	8.3	0.64 ?
BHP57/1	AX -60° to 045°	187.2	574013	5369585	308.2	147.1	155.8	8.7	0.29
					Inc.	147.1	153.9	6.8	0.33
BHP57/2	AX -60° to 045°	190.1	574013	5369585	306.0	135.3	140.5	5.2	0.21 ?
					&	182.9	184.7	1.8	0.32
BHP57/3	AX -60° to 045°	155.5	574013	5390215	309.1	139.0	144.5	5.5	0.17
					Inc.	139.0	142.0	3.0	0.29
66CC.1	EX -60° to 57°	43.8	573525	5368655	273.5	19.4	26.2	6.8	0.14
66CC.2	EX U/G -0° to 240°	26.8	573583	5368565	264.6	-	-	-	-
66CC.3	EX U/G -42° to 221°	28.9	573600	5368575	263.4	18.3	25.9	7.6	0.29
66CC.4	EX -60° to 057°	38.1	573536	5368624	278.3	13.7	18.3	4.6	0.25
66CC.5	EX -61° to 059°	81.7	573691	5368311	294	69.8	73.3	3.5	0.30
66CC.6	EX -60.5° to 036°	94.5	563647	5368358	295.6	80.2	84.5	4.3	0.18
					&	88.5	92.3	3.8	0.21
66CC.7	EX -60° to 049°	109.6	573615	5368408	298.2	87.4	102.1	14.7	0.39
					Inc.	88.7	99.4	10.7	0.46
66CC.8	EX -60° to 059°	109.7	573585	5368461	299.9	83.1	88.8	5.7	0.24
					&	93.8	106.3	12.5	0.38
66CC.9	EX -60° to 060°	109.4	573554	5368513	295.2	79.9	104.3	24.4	0.41
					Inc.	82.0	97.5	15.5	0.49
67CC.10	EX -60° to 060°	106.7	573539	5368539	291	84.1	88.4	4.27	0.40
					&	98.1	101.2	3.1	0.19
67CC.11	EX -60° to 058.5°	135	573478	5368587	278.4	111.9	117.3	5.3	0.33
67CC.12	EX -60° to 059°	155.4	573500	5368546	284.8	121.6	126.8	5.2	0.30
					&	131.9	135.3	3.5	0.21
67CC.13	EX -60° to 060°	153.9	573557	5368450	294.1	119.8	126.7	6.9	0.22
					Inc.	124.7	126.7	2.0	0.49
					&	132.9	138.2	5.3	0.52
79RGC.1	NQ -58° to 059°	266.4	573472	5368461	283	221	223	2	0.11
89S1	HQ -50° to 057°	127.4	573532	5368544	288.1	73.4	75.8	2.4	0.47
89S2	HQ -52° to 056°	127.4	573573	5368484	296.8	78.4	89.9	11.5	0.46
89S3	HQ -53° to 060°	120.0	563613	5368412	297.9	77.5	85.7	8.2	0.59
89S4	HQ -56° to 058°	148.5	573654	5368344	294.1	85.3	94.1	8.8	0.12

**Table 1: Royal George – diamond drilling results**



**Figure 7: Plan view of Royal George Mine and drilling**



**Figure 8: Long section of Royal George Mine with ore blocks and drill intercepts**

In 1977, CRAE became interested in the deposit and entered into a joint venture with CCC in 1979 over the Royal George MLs and the surrounding EL7/1978. During 1979, CRAE work comprised re-sampling and re-assaying of all old drill core and sample pulps, checking and correcting old data, compiling new data including a 3D model, and drilling of one hole to test the mineralisation at depth. Metallurgical testing of a 1,200kg bulk sample from the No.4 Level was also carried out. Re-assaying gave tin values 10-50% higher than the original Mines Dept. assays. Assaying for a number of other elements was undertaken but only silver, zinc, and copper, were considered significant. Based on the CRAE data in 1979 a feasible exploration target is an estimate of a body of mineralisation between 0.5-0.7Mt at between 0.35-0.45% tin.

The CRAE work highlighted problems with the estimation of the tin grades which is considered by Featherstone to be primarily due to the small size of drill core resulting in small samples. CRAE also considered that the core sizes were inadequate and their work suggested that good sampling could increase grades.

In 1988 Spectrum Resources Australia Pty Ltd (Spectrum) was granted EL5/1988 of 4km<sup>2</sup> and subsequently EL27/1989 of 5km<sup>2</sup> over the Royal George workings. In 1989, Spectrum drilled four DC holes to confirm the presence of mineralisation below the stoped out areas of the mine. Acknowledging previous problems due to small cores Spectrum drilled four HQ sized holes (63.5mm diameter core) through the mineralised zones during 1989 (89S1-4). Spectrum considered the results did support previous estimates of the mineralisation but the tin price was too low at that time to warrant mounting an operation.

## **2.2 Exploration during current tenement**

### *2.2.1 Aberfoyle-Lutwyche*

Under an MOU, Minemakers joined Austria's Wolfram Bergbau (WB) in an appraisal of the tungsten potential of all of the Company's Tasmanian tungsten projects. Subject to satisfactory tungsten grades being obtained from the Aberfoyle and Storey's Creek drill programmes, Wolfram Bergbau started to carry out initial metallurgical test-work programmes at its Mittersill laboratory in Austria on tailings from both the Storey's Creek and Aberfoyle Mines commencing in February 2007. At the time the MOU was terminated the metallurgist who was conducting the investigation of the Tasmanian tailings moved to another company. Unfortunately, no useful results had been obtained when the studies were abandoned.

An RC drilling programme of 13 holes for a total of 1,243m was completed at Aberfoyle on 29 March 2007. This programme was conducted by Minemakers with WB providing A\$120,000 towards the cost of the drilling and assaying at Aberfoyle. These holes are shown on Figure 9. Wolfram Bergbau pulled out of the MOU with Minemakers in March 2008.

A second RC drilling programme at Aberfoyle of 8 holes for a total of 1,223m was completed in May 2009. These holes were along strike from the previously drilled RC holes extending 300m to the north and 400m to the south of the earlier drilling programme. Most of these holes intersected modest tin bearing veins so the full extent of the mineralisation has not yet been defined. These holes are plotted on Figure 9.

The results of the assaying and analysis of the samples from these drill holes were published in Minemakers' Annual Report for 2009 on Exploration Licence EL27/2004 (Russell Fulton et al 2009). Although no paired holes were drilled to compare RC and DC drill results at Aberfoyle, the author considered it worthwhile to plot a cross section through a pair of RC holes to enable the pattern of the veining to be visually revealed (Figure 10). The results confirm that the tin mineralisation is very nuggetty in character which indicates that sample sizes should be as large as practicable and the density of drilling and sampling needs to be higher than that applied when sampling mineralisation with a more even tenor.

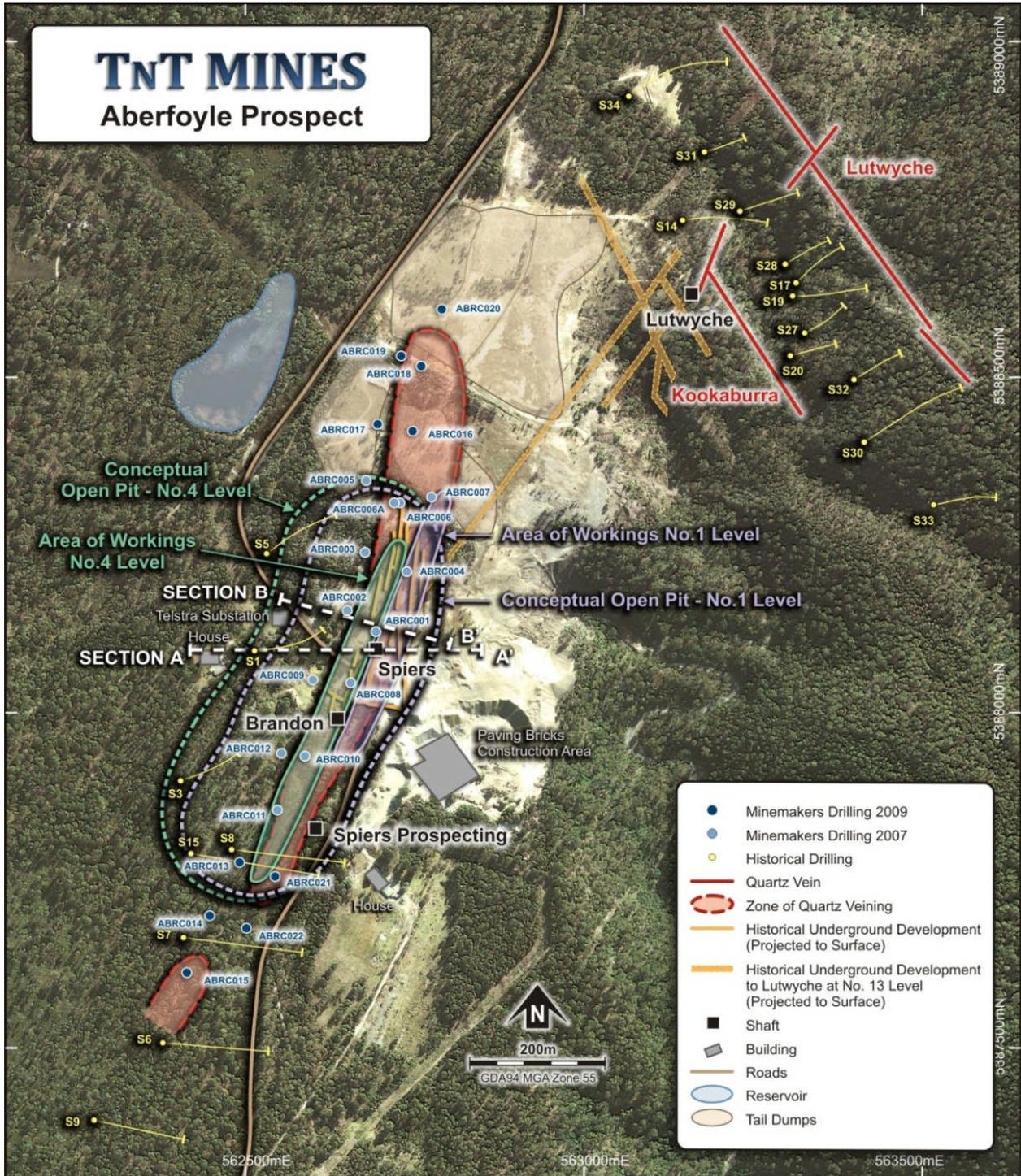
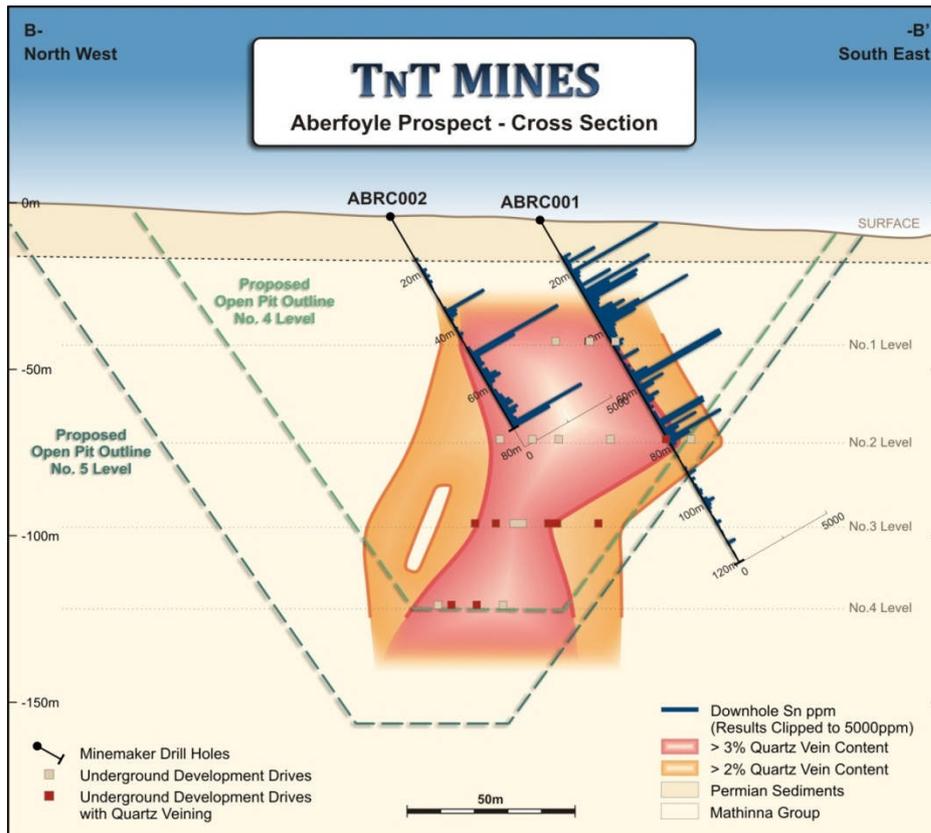


Figure 9: Plan view of Aberfoyle-Lutwyche with drilling and potential pit outlines



**Figure 10: Aberfoyle cross section with pit outline and recent drill intercepts**

### 2.2.2 Storeys Creek

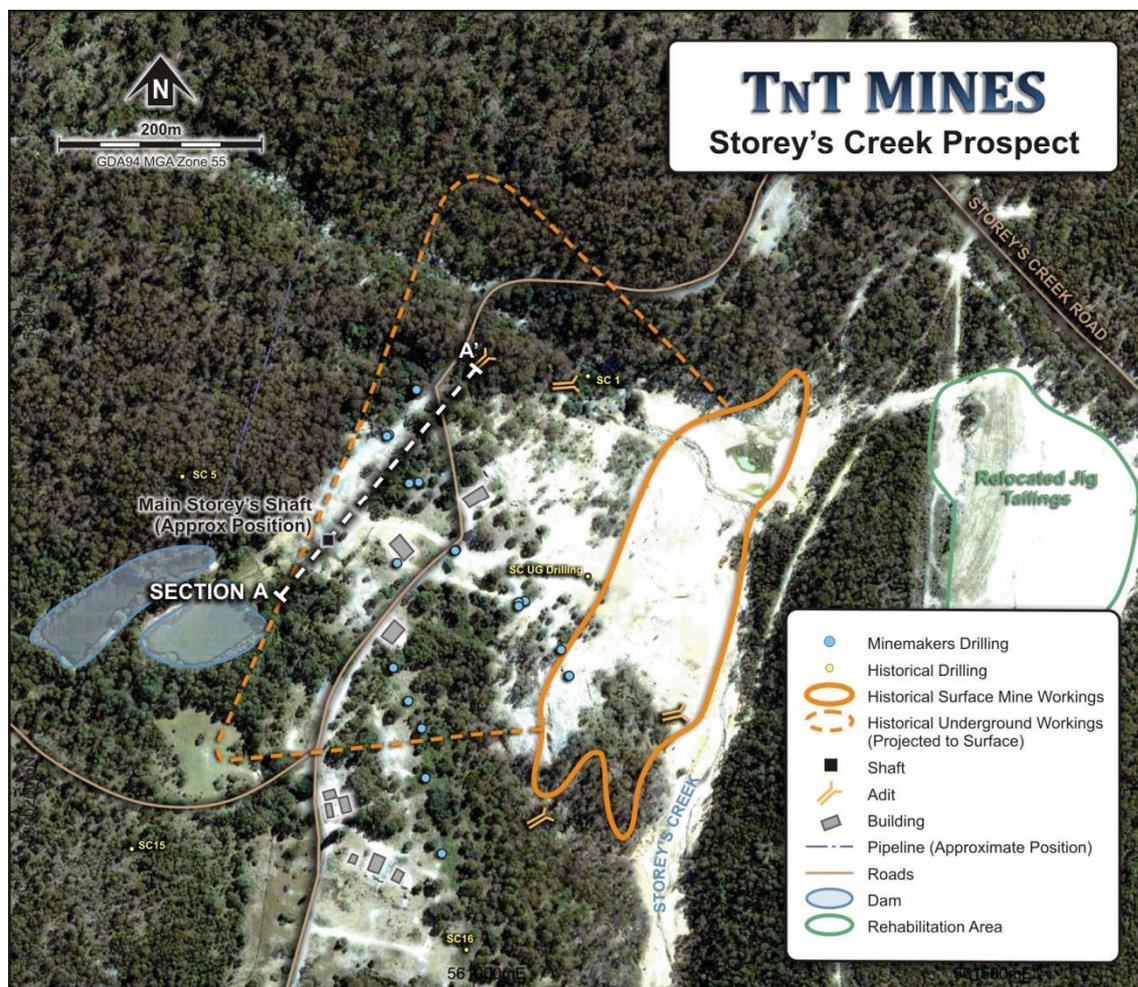
In July and August 2007 a 17 hole RC airblast percussion drilling programme for a total of 2,027m was undertaken at Storey's Creek (Figure 11). This programme was conducted by Minemakers and the drilling and assaying was equally funded by them and Wolfram Bergbau (WB) with whom Minemakers had a joint working relationship set out in a memorandum of understanding (MOU). This MOU operated from February 2007 until March 2008 and covered work on mineralisation within EL27/2004. WB were interested in the production of tungsten and undertook work, in their laboratories in Austria, on the processing of some of tailings from both the Storey's Creek and Aberfoyle mines. At the time the MOU was terminated, the metallurgist who was conducting the investigation of the Tasmanian tailings moved to another company. Unfortunately no useful results had been obtained when the studies were abandoned.

Previous drilling at Storey's Creek employed diamond core (DC) drilling and 18 holes with EX core (21.5mm in diameter) are stored at MRT. AX core (32.5mm in diameter) was also popular. The drill core is usually sampled for assaying by cutting it in half and Featherstone consider that the size of the sample produced is not large enough to give reliable grades for this style of mineralisation. RC drilling with holes typically 110mm to 130mm in diameter produces a considerably larger sample and usually gives more reliable results but the nuggetty distribution of mineralisation can still cause problems. RC holes are also cheaper and quicker to drill so more holes can be drilled for the same budget giving a better assessment.

Analysis of the results of RC drilling indicates that the tungsten mineralisation tends to occur in a limited number of veins within broader bands of mineralisation. As Storey's Creek was a tungsten mine which also produced tin, the miners selectively mined the tungsten bearing zones leaving some tin and other base metals in the ground.

Between 30 January and 15 February 2009 two diamond core (DC) holes were drilled at Storey's Creek. Hole SCDC001 (EOH 149.5m) was drilled parallel to RC hole SCRC006 and was PG3 size

(83.1mm in diameter) to 58.4m and HQ3 size (61.1mm in diameter) to EOH. Hole SCDC002 (EOH 100.7m) was drilled parallel to RC hole SCRC034 and was PQ3 size (83.1mm diameter) to EOH. Core recovery was excellent throughout and both holes intercepted the anticipated zones of tungsten, tin and base metal mineralisation. These holes were drilled to compare results from DC and RC drilling. The drill core from this drilling was placed into storage at Avoca and a close examination of the core, including cutting and assaying, was carried out during the summer months of 2009-2010.



**Figure 11: Plan view of Storey's Creek with recent drill collar locations**

### Assaying and Analysis

Several different techniques were employed by Minemakers in analysing samples.

The analytical schemes used were:

Pressed powder pill analysis by XRF for Sn & W.

Lithium metaborate fusion and analysis of glass by XRF for Sn >500 ppm, W >500 ppm

Aqua regia digest and analysis by ICP-AES for Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Th, Ti, Tl, U, V, W, Zn.

Four certified reference standards were included in the submitted samples to aid quality control of assaying/analysis.

Some discrepancies appeared to be present in the results. Most of these have been resolved with a better understanding of the geology and the remainder are anticipated to be satisfactorily explained. Minemakers planned to mount another drilling programme to further improve the data on the remaining mineralisation in this deposit.

### Review of the Assay Data from the Twin Hole Drilling

At Storey's Creek a diamond core hole and a percussion air blast hole were drilled side by side with the collars about seven metres apart. Assay values for the metals tungsten, tin, zinc, copper, and lead, were plotted as a histogram on the sides of the holes drawn on a cross section of them. These histograms provide a clear indication of the degree of correlation between the two holes of the grades of each of the metals in particular veins.

The tungsten mineralisation is mainly restricted to about four veins and the veins correlate very well between the two holes. The tungsten mineralisation is typically accompanied by tin but there are a number of tin veins without any tungsten.

The tin mineralised veins are more numerous than the tungsten. Correlation of veins between the holes is good for tin and tungsten. Better tin grades tend to occur with better tungsten grades. The higher tin grades in the diamond core drill hole may indicate a problem with the airblast technique but the tungsten, zinc and lead results do not show a bias to the same extent between the two holes. It is possible that dilution of the mineralisation could take place when an RC hole is intersecting veins and further drilling of this mineralisation should attempt to determine if this is taking place.

The copper mineralisation is fairly sparse and may show some correlation with tungsten but more study is required. Grades of around 100ppm Zn occur throughout the holes and there appears to be some association with copper. Low grade lead mineralisation is present throughout the two holes but higher values do not correlate well between holes or with other metals.

The mineralisation at Storey's Creek and Aberfoyle occurs in rocks overlying cupolas on the surface of the underlying granite pluton. It is interpreted that this is a genetically related feature of the mineralisation and that the identification of other cupolas on the surface of the granite is a very worthwhile exploration technique. This exploration model is reported on in the section of this report on the Aberfoyle Mine.

### *2.3.3 Gravity Survey Analysis for the Aplite Cupola Geological Model*

The Rossarden District in the northern portion of EL27/2004 contains two significant deposits and numerous small shows and it is therefore considered that this area has potential for hosting economically sized deposits that do not outcrop on the present land surface and therefore have not been discovered. Minemakers consequently developed an exploration strategy that will hopefully identify targets for more detailed geophysical work or for drilling.

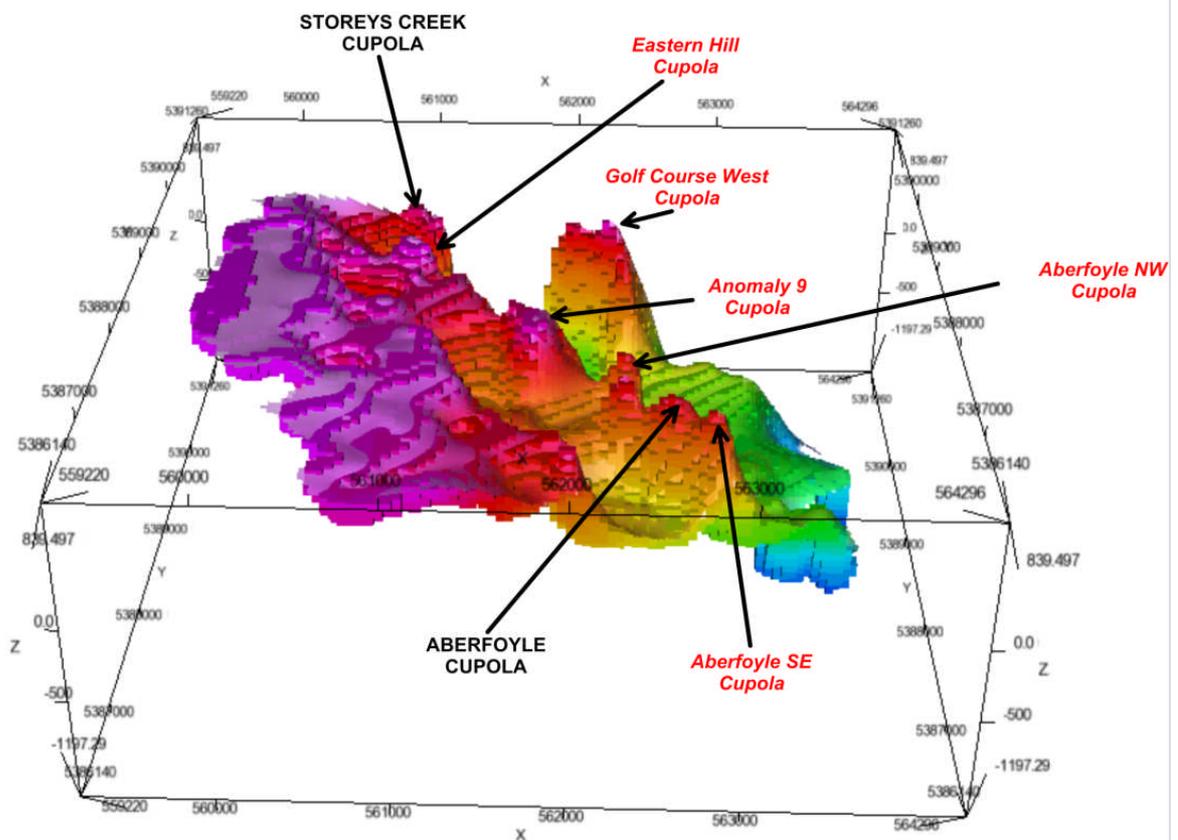
Geological investigations of the tin-tungsten mineral deposits at Storeys Creek and Aberfoyle/Lutwyche suggest that the deposits are genetically related to the Devonian age Ben Lomond Granite pluton that underlies much of the area. The proposed geological model is of vein deposits formed above aplite cupolas developed on the surface of the granite pluton. This geological model is illustrated by the cross section of the Aberfoyle Mine in Figure 5. To explore for as yet undiscovered deposits it is therefore necessary to locate cupolas of aplite at depth below the surface. Since aplite rock is typically less dense than the adjoining rocks a sensitive gravity survey may be able to reveal the location of cupolas.

Gravity and seismic surveys over parts of the area were carried out by Cominco in 1971-2 (MRT Ref.72\_0857). Further gravity surveying was undertaken by Mineral Resources of Tasmania 1974 (MRT Ref. UR1974\_14). The gravity data are available from MRT.

Minemakers therefore commissioned GroundProbe Geophysics Pty Ltd (GroundProbe, an associate of Geoforce Pty Ltd) to undertake modelling of the available gravity data over the Aberfoyle – Storey's Creek area. GroundProbe produced a report by Kate Godber in August 2010.

The modelling interpreted by GroundProbe suggests that the topography of the granite pluton is much more complicated than expected. This could be due to variations in the gravity being caused by other geological features than cupolas. GroundProbe have identified five anomalies that they consider worthy of further investigation. They are referred to as Storey's s Creek SE, Aberfoyle SE, Golf Course West, Eastern Hill North, and Anomaly Nine. The Golf Course West anomaly

requires additional gravity data to improve the reliability of the modelling. The anomalies at Storey's Creek and Aberfoyle are taken care of by additional work around these old mines. This leaves three anomalies recommended for further work.



**Figure 12: 3D sub-surface granite modelling from gravity data**

### **3.0 WORK COMPLETED DURING THE REPORTING PERIOD**

At the commencement of the reporting year, Minemakers Limited announced plans to demerge its Tasmanian assets, held through the wholly-owned subsidiary Minemakers TTT Pty Ltd, including EL27/2004, into a new company. The aim was to set up a new Tasmanian tin/tungsten fluorspar operation company which was to raise funds via a listing on the ASX to enable more vigorous and better funded exploration and development of the Tasmanian assets. The demerger process became drawn out through corporate and regulatory issues and when TNT Mines Limited finally demerged, market conditions were not conducive to capital raising via an IPO and have remained that way for the latter part of the year. TNT Mines has now commenced capital raising through a rights issue and expects to be well funded by the end of 2011.

Despite these difficulties, exploration work has continued through the year, albeit with a changed emphasis to the intention stated in the renewal application submitted last year.

As part of the demerger, TNT Mines reviewed the work conducted on the tenement and the prospectivity. Part of the outcome of the review was recognition from an independent source that the Storeys Creek-Aberfoyle-Royal George area represented one of the larger tin and tungsten mineralised systems in the world. In particular the tungsten prospectivity was very significant and very little modern exploration for tungsten had occurred.

TNT Mines revised its strategy to and decided to reassess the tenement with a greater tungsten focus and consequent to that took the decision to appoint a full time senior geologist, Dr Richard Langford, in May to oversee the work, which is described below. Work progressed well until Dr Langford resigned at the end of September, throwing field work plans into some disarray.

#### **3.1 3D modelling**

As part of the new strategy it was decided that the large amount of historical and new data available should be used to construct a 3D model of the geology and mineralisation using sophisticated software such as Leapfrog to aid in finding extensions to known mineralisation or new “blind” deposits. Gravity modelling was used in 2010 to target potential cupolas.

At the commencement of the tenure of EL27/2004, Minemakers contracted Maxwell Geoscience to digitise a large amount of MRT plans and sections relating to the Aberfoyle and Storeys Creek mines. However, there was still a large amount of data, including drill logs, plans and sections, that has been recovered from various sources, including the Queen Victoria Museum and MRT which had never been digitised. In particular, no Lutwyche mine data had been digitised.

A significant effort was placed into continuing the work of data entry and digitizing of old plans and sections. There is a plethora of pre-metric data and four separate mine grids associated with the Storeys Creek, Aberfoyle, Lutwyche and other minor workings. In particular, the conversion of old grids to MGA has been time consuming. The following extract from TNT Mines August monthly exploration report details some of the process:

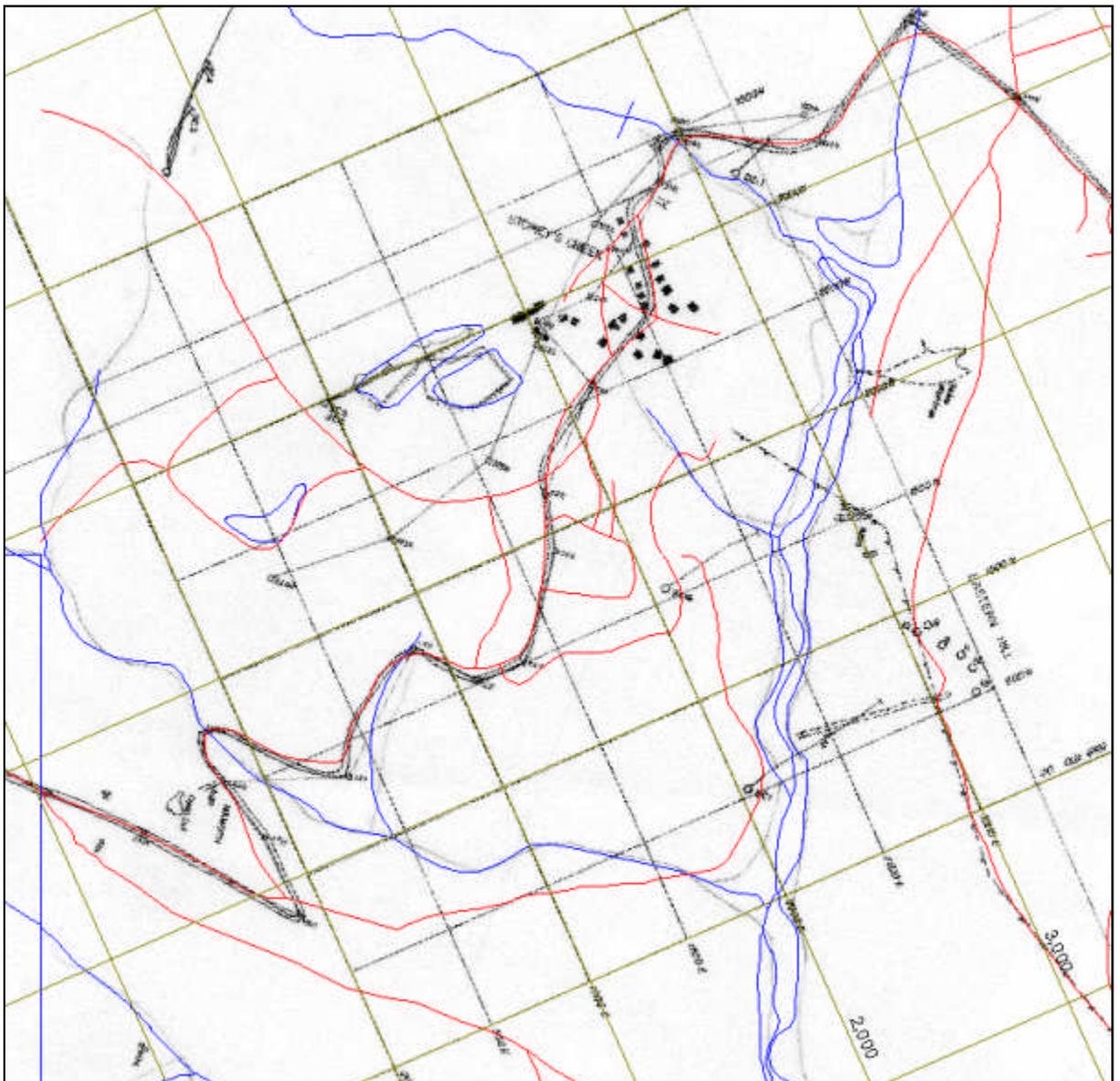
*The establishment of the correct parameters for converting the different mine grids to MGA was completed during the month. This is an essential step in the process of extracting both the detailed mine plan information, and the regional information, which was often on a mine grid, not AMG.*

*There are very few plans that have both the Aberfoyle Mine Grid and sufficient cadastral or topographic information to allow them to be georeferenced. One such plan includes the mine grid from 5000’N to 12000’S and 6000’W to 3000’E. This is catalogued according to its number on the CD of scanned maps as Plan 175. The plan was drawn for Aberfoyle Tin, NL in March 1951.*

Using the historical mining cadastral boundaries close to the grid origin, the angle of the grid can be measured as  $8.83^\circ$  ( $8^\circ 50'$ )  $\pm 0.05^\circ$  ( $3'$ ). The grid origin is established relative to the mining cadastre, part of which is still available from MRT. However, it is impossible to get anything other than a general fit between the MRT cadastre and the plan. The most likely position for the grid origin is 563010mE 5388460mN  $\pm 10$ m

There are several sources that can be used to pin down the origin and orientation of the Storeys Creek Mine grid. The best of these is probably Plate 1311A/72, which was drawn at a detailed scale when the mine was active. The parameters for the Storeys Creek grid are derived from the best fit locally over the mine area in Version 7 of the georeferencing process, and refer to the Old Imperial Grid (feet), as well as the later Metric Grid (metres).

- Grid angle relative to MGA =  $23.9^\circ$
- Easting origin of Old Grid = 560616
- Northing origin of Old Grid = 5389449
- Precision (line thickness) =  $<1$ m
- Estimated accuracy of grid origin =  $< 10$ m

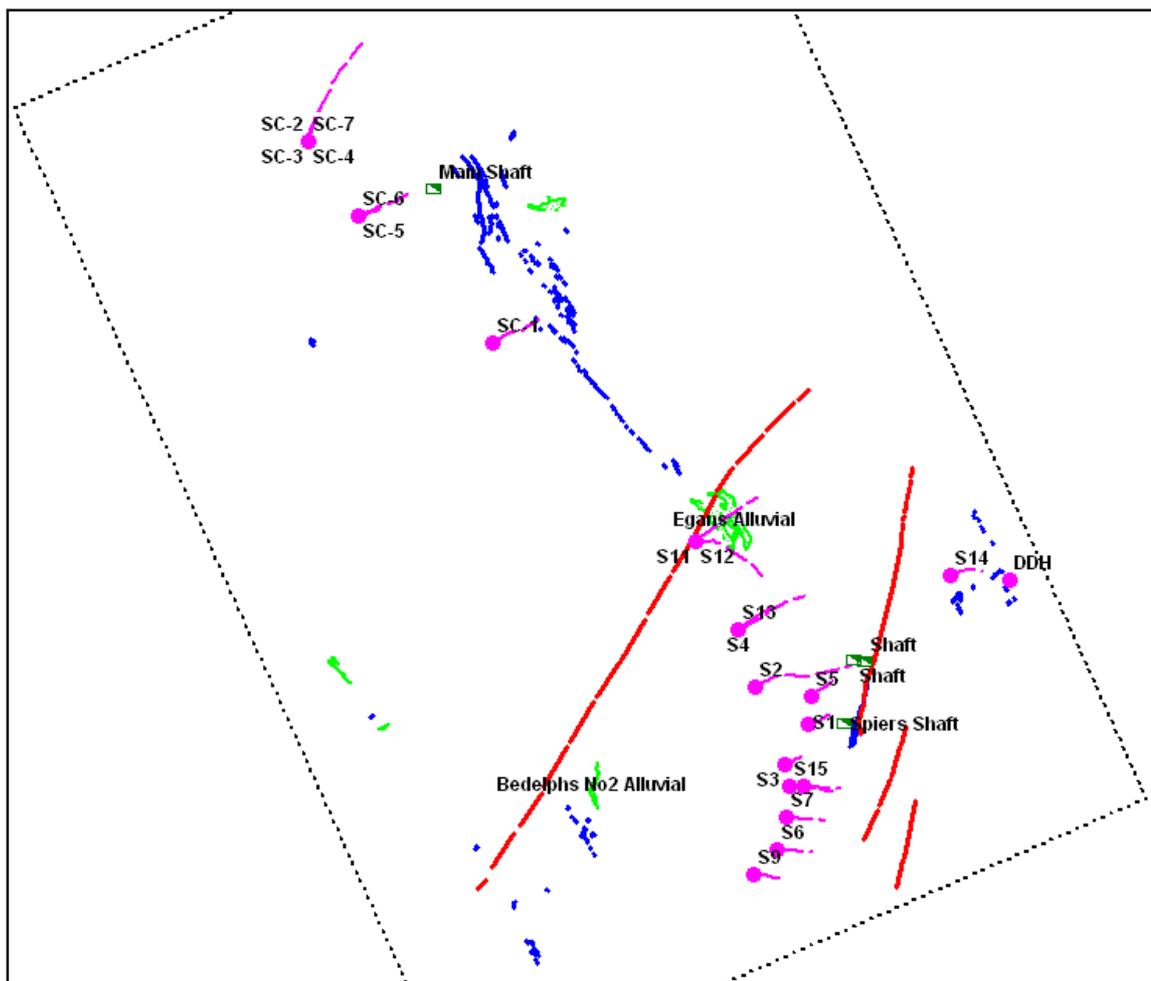


### Local best fit of the Storeys Creek Old Mine Grid to LIST cadastre

So far a total of 34 plans for the Rossarden area have been extracted from Open File Reports and geological survey publications, and georeferenced to allow for data extraction. The focus now is more on the data than on georeferencing, as nearly all the selected plans have been georeferenced. However, MRT have supplied an additional 247 scanned maps and plans for Aberfoyle-Lutwyche that need to be catalogued and selectively processed. These will most likely all be new plans, as there has been a two-way conversation with them to ensure that we both hold the same data.

Building a spatial index of tenements is in progress, allowing a better correlation between published geological observations and their position. This is particularly important for those older tenements for which the MRT does not have accurate spatial data.

Geological information, including critical drill collar information is being progressively extracted from plans that can now be georeferenced using the new mine grid parameters. Specifically, Plan G-20 from Aberfoyle has had a range of data extracted, including the collars for 22 drill holes and the locations of four shafts. This plan extends from Aberfoyle to Storeys Creek, and includes quartz veins, faults, and areas of alluvial working, all of which are now part of the growing spatial database for the area.



Outline of G-20 showing collars and traces (purple), shafts (dark green), quartz veins (blue), alluvial areas (light green) and faults (red)



linear trend over a distance of about 1.5 kilometres. Apart from four diamond holes drilled by Aberfoyle in the 1967-68 there appears to have been very little modern exploration. The area was reviewed in 1979 by Aberfoyle and recommendations for back hoe trenching, channel sampling and percussion drilling were made. This work was not carried out. The diamond holes were drilled at two sites with one vertical and one angled hole at each site. The collar locations are still marked. TNT Mines visited the area and confirmed the presence of a significant amount of shallow workings comprised mostly of trenches and shallow shafts. Greisen samples with significant very coarse tourmaline clots abound in the area. Some of the creeks have had large amounts of boulders dug out and stacked to allow access to basal wash.

## 4.0 DISCUSSION OF RESULTS

### 4.1 3D modelling

The 3D modelling is the cornerstone of the process of finding extensions to known mineralisation and new “blind” deposits. The loss of TNT Mines’ geologist dedicated to this task has temporarily brought the data digitizing, verification and sorting to a halt but this project will resume in the New Year when a replacement can be found.

### 4.2 Lutwyche

The Lutwyche vein system is an essentially unmined deposit (1.1Mt @ 0.45%WO<sub>3</sub> and 0.45% Sn), similar in size to the Storeys Creek mine (1.1Mt @ 1.09%WO<sub>3</sub> and 0.20% Sn) but at lower grades. Delineation of the deposit is incomplete however and the system may be larger with higher grades.

The Lutwyche feasibility carried out in the late 1970s- early1980s was summarised by Summons in 1983 and no further exploration has taken place since then. His conclusions are reproduced below:

1. *The Lutwyche vein system is similar to the Aberfoyle and Storeys Creek vein system on mineralogical, metamorphic, geometrical and structural grounds.*
2. *Lithological, metamorphic, vein mineralogy and gravity data imply the imminent presence of an aplite cupola at about the same elevation as 13 Level, but east of the present underground development.*
3. *The Lutwyche system of veins is inferred to be vertically zoned in tin and tungsten in a similar manner to the zoning in the Aberfoyle deposit. Evidence for this is seen in the bulk sample of Battery and Footwall Veins on Lutwyche 13 Level, where the head grade was 0.93%CM, the Sn:WO<sub>3</sub> ratio was 1:1, and the sample was notably rich in sulphides. Similar values were obtained from the lower levels at Aberfoyle (below 9 Level).*
4. *It is therefore a reasonable premise that the Sn: WO<sub>3</sub> ratios and the combined metal values will increase significantly above 13 Level, at least as far as 6 Level (RL 450m).*
5. *The grade of the quartz stringers between 6 Level and the surface (~100m vertical interval) is unknown, but may be tin-rich. No known parallels of this upper zone occur elsewhere in the Rossarden area.*
6. *The combined inferred and potential diluted ore resource over a strike extent of 350m, and a 400m vertical interval is ~1.1 million tonnes, (allowing for 25% wastage due to sub-economic vein widths and grades). The drill indicated strike extent of 800m consequently suggests the presence of a significant ore body in the Lutwyche area.*

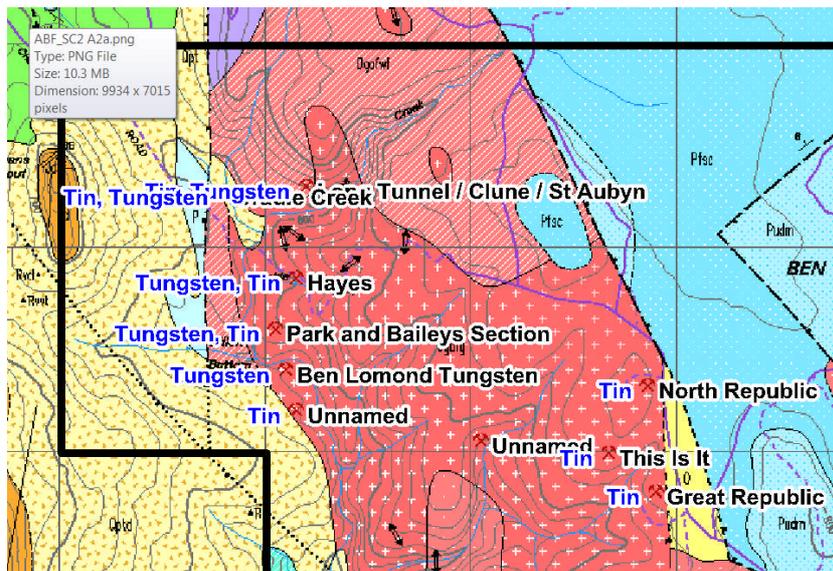
TNT Mines believes that now is the time for a reassessment of the potential to reopen Lutwyche. In particular, RC drilling of the upper levels may add significantly to the resource. At late 2011 prices, the *in situ* tungsten value at Lutwyche was around \$211M and the tin value approximately \$104M, on the known resource. On a global scale, tungsten projects are relatively rare.

### 4.3 Gipps Creek tungsten

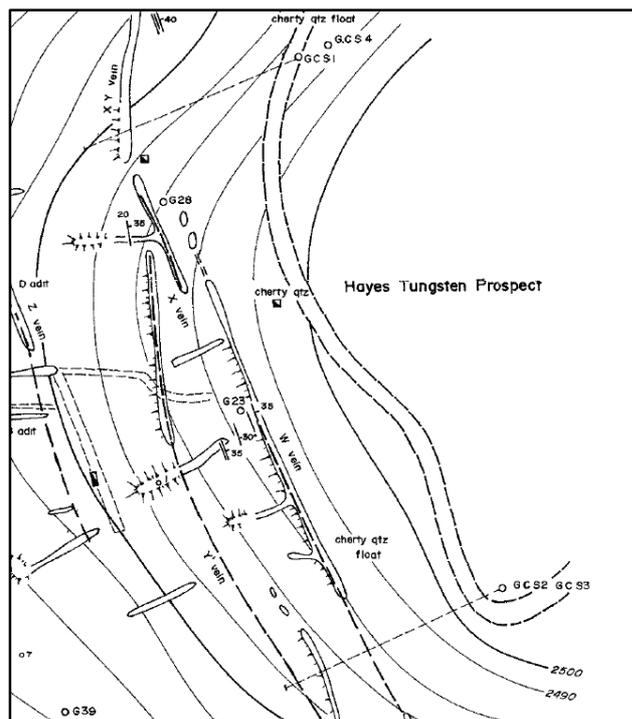
The Gipps Creek area is the only location of multiple historical tungsten workings that have not been subject to significant exploration. The location of the workings is shown below. The style of mineralisation is different to the veins systems at Storeys Creek, Aberfoyle and Lutwyche and the exploration target is large (5-10Mt), low-grade greisens amenable to open pit mining. The four narrow diameter holes drilled in the 1970s intersected low grade mineralisation but the

recommended follow up never took place. The second plan below shows the drill locations on a small part of a larger plan (MRT report 80\_1470) which maps most but not all of the workings in the area, some of which may date back to the late 19<sup>th</sup> century. It is likely that a heritage survey will be needed before any ground-disturbing work is carried out. Realistically, this area can be treated as a “new” prospect and exploration should proceed via programs of soil sampling, trenching, channel sampling and RC drilling.

In terms of the potential size of tungsten and tin greisen systems, the large Hemerdon system in England is currently being developed as a stockwork and sheeted greisen vein system, containing wolframite and cassiterite. The mineralisation has been defined to 230m depth without being closed off and contains an estimated 520,000 tonnes of WO<sub>3</sub> alone.



**Figure 13: Gipps Creek tungsten workings**



**Figure 14: Drill locations and old workings – Hayes prospect**

## 5.0 CONCLUSIONS AND FUTURE WORK

Although tin prices have come back from the strong highs earlier in the year the longer term outlook is positive and prices are not anticipated to fall back to previous low levels, below US\$15,000. Tungsten prices have remained strong and look to be stable into the future. These medium to longer term indications for both commodities underpin the value of the prospectivity and potential for development on EL27/2004.

From an anticipated more stable corporate platform in 2012, TNT Mines proposes the following programs:

- Soil sampling a large area between Storey Creek and Aberfoyle including to the east to look for subtle geochemical signatures associated with mineralising apophyses associated with the Ben Lomond Granite. The sampling will be on a broad, 200m grid spacing and approximately 500 samples will be collected and analysed to low detection limits for a suite of elements. This work will take the place of the previously proposed gravity survey work and follow on from the unsuccessful drilling based on reinterpretation of old gravity data. Successful delineation of targets will be followed up with diamond drilling.
- Lutwyche mine assessment. A preliminary estimate of mining costs will be made and will be followed by a scoping study into the redevelopment of the mine if results are favourable. Planning for RC drilling the upper levels has commenced and a proposal will be submitted to MRT.
- Gipps Creek tungsten (and tin). This area will be assessed via soil sampling, trenching and RC drilling. However, it is likely that a heritage survey will need to be conducted before any on ground work is undertaken.

## **6.0 ENVIRONMENT**

The two drill sites, SCDD003 and SCDD004 were rehabilitated during the year. No further ground-disturbing work was carried out.

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