

# **Central Desert Joint Venture**

**TANAMI REGION  
NORTHERN TERRITORY**

## ***FIRST ANNUAL REPORT for EXPLORATION LICENCES***

**EL 8077  
EL 9479  
EL 10282  
EL10283  
EL10299  
EL 10300  
EL 10355  
EL 10411  
EL 22177  
EL 22179**

***4<sup>TH</sup> JUNE 2001 to 3<sup>RD</sup> JUNE 2002***

### ***LEGEND 2 AGREEMENT***

**COMPILED BY: M.MUIR**

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Newmont Exploration  
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## OTTER GOLD NL

**TITLE:** ANNUAL REPORT FOR ELs 8077, 9479, 10282, 10283, 10299, 10300, 10355, 10411, 22177 & 22179 – The Legend 2 Agreement.

**PERIOD:** 4<sup>th</sup> June 2001 to 3<sup>rd</sup> June 2002

**COMPILED BY:** Maryanne Muir

**LOCATION:** GRANITES 1:250,000 SF 52-3  
TANAMI 1:250,000 SE 52-15

**COMMODITY:** GOLD

**DATE:** JULY 2002

## SUMMARY

This is the first annual report for tenements of the Legend 2 Agreement (ELs 8077, 9479, 10282, 10283, 10299, 10300, 10355, 10411, 22177 & 22179). Tenements were granted on the 4/06/2001 for a period of six years.

Activities completed during the reporting period include ground checking, regional helicopter surface sampling, ground based surface sampling, airborne magnetic surveys and regional based posthole drilling combined with regional angle RAB drilling. The regional magnetic surveys were integrated with Otter Gold NL current aeromagnetic database and used as part of the Fractals multiscale edge analysis (worming) carried out over the Tanami by Otter Gold NL.

All of the area covered by the subject ELs remains under CDJV title and therefore details covered in this report should remain on **CLOSED FILE**.

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## 1.0 INTRODUCTION

This report contains details of exploration activities conducted within ELs 8077, 9479, 10282, 10283, 10299, 10300, 10355, 10411, 22177 & 22179 for the period 4<sup>th</sup> June 2001 to 3<sup>rd</sup> June 2002. These tenements are part of the Legend 2 Agreement and thus the tenements are regarded as a single area for the purposes of reporting.

### 1.1 LOCATION AND ACCESS

The tenements are located approximately 650km northwest of Alice Springs along the Tanami Track (Figure 1).

Main access to the tenements is by the Tanami Track. Tenements to the south west use tracks established by Otter Gold via the 'Jims Mine Haul Road', Normandy North Flinders Team and Delta Gold. Access to tenements in the south is via the Tanami Downs Road and then exploration and station tracks. EL 9479 is accessible from the Groundrush Mine Haul Road and then exploration tracks from the Mine. Access to most areas is limited during the wet season (December to April).

### 1.2 TENEMENT STATUS

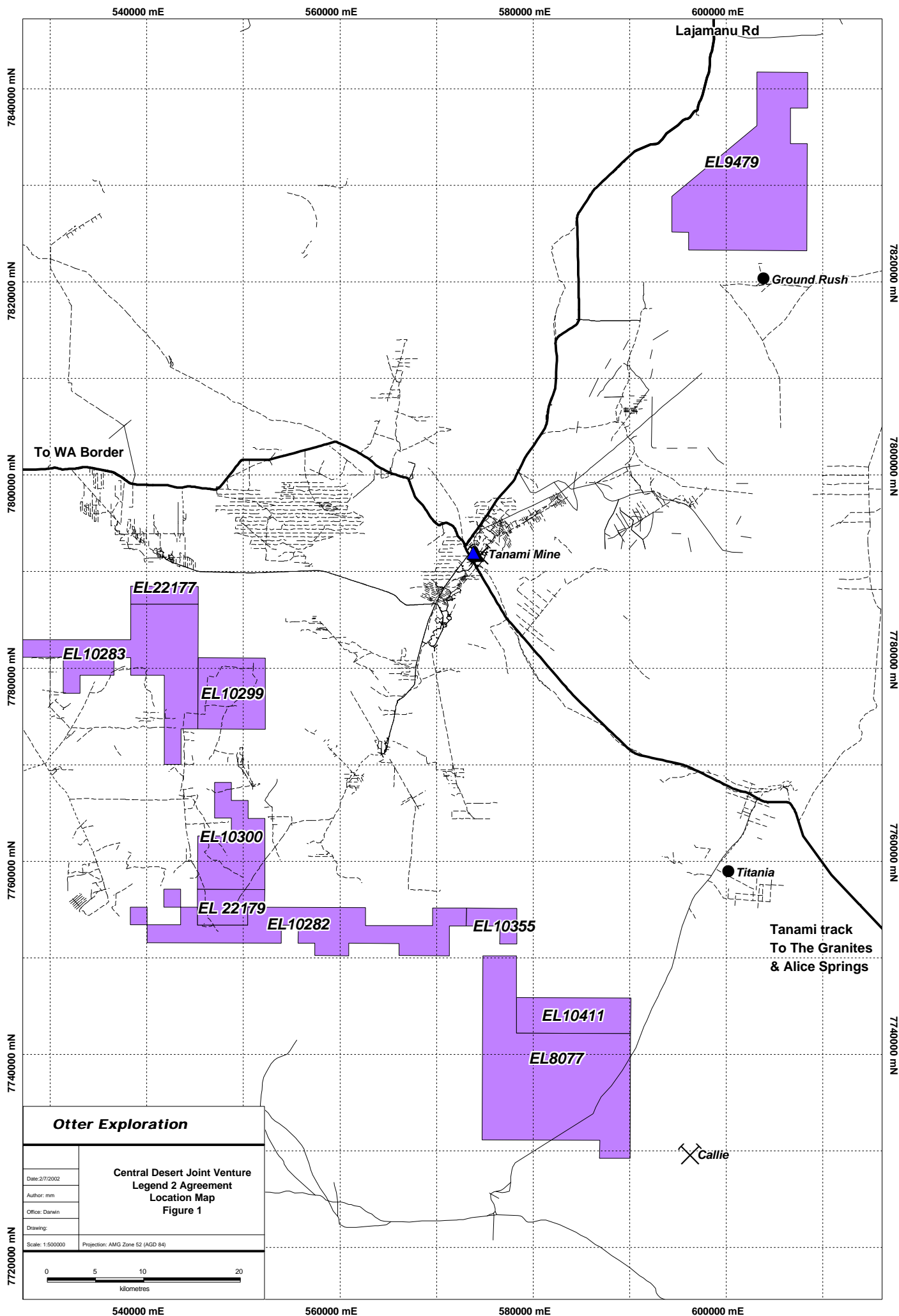
The following table details relevant information relating to tenement status:

Tenement	Year	Area(sq km)	Blocks	Rent (\$)	Covenant (\$)
EL 8077	1/6	203	66	660	35,000
EL 9479	1/6	168	56	560	26,700
EL 10282	1/6	104	34	340	45,000
EL 10283	1/6	113	35	350	85,000
EL 10299	1/6	51	16	160	26,700
EL 10300	1/6	55	17	170	28,400
EL 10355	1/6	13	4	40	11,500
EL 10411	1/6	43	14	140	202,400
EL 22177	1/6	13	4	40	10,600
EL 22179	1/6	22	7	70	12,000

**Table 1.** Tenement Status

### 1.3 REGIONAL EXPLORATION HISTORY

Initial investigations of the Tanami area were conducted by Davidson (1905) who discovered gold-bearing quartz reefs on the 10<sup>th</sup> of August, 1900. The reefs were mined between 1902 and 1908. Mining was restricted to the wet season however, due to lack of permanent water.



A gold rush was precipitated by the discovery of slab of stone containing an estimated 180oz of gold in 1909. The rush continued until 1913 when up to 200 men were working the field. Intermittent exploration and mining was conducted between 1913 and 1938, including the construction of an amalgamation plant in 1927. No official exploration was conducted in the Tanami Desert between 1938 and 1965.

In 1985, Harlock Pty. Ltd. commenced exploration within the Tanami mining leases which led to the commencement of open pit mining in mid-1987 (Nicholson, 1990). Zapopan NL acquired the ground and continued mining until March 1994.

Otter Gold Mines Pty. Ltd. was granted access to explore around the mine site in 1989. Low-level Au anomalism was discovered in late 1989, which lead to the identification of the highly anomalous Redback Rise area. The Dogbolter and Jim's Find prospects were also identified by the Otter screening process.

In September 1990, the Shell Company of Australia Ltd. (Shell) entered into a joint venture with Otter. Management of the project was entrusted to Shell. In August 1993, Shell completed their earning phase (50%) by spending \$5 million on exploration. In October 1994, a new joint venture was formed between Otter Gold NL and Acacia Resources Ltd. as a result of Shell divesting its mineral assets. The new joint venture is known as the Central Desert Joint Venture (CDJV), with participating interests 60% Otter and 40% Acacia (currently owned by AngloGold Australasia and known as AngloGold). Otter Gold NL assumed management of the project.

In December 2001 – January 2002 Normandy NFM gained a controlling interest in Otter Gold NL, all interests remained unchanged where the Normandy NFM team took control of Mining Leases and Exploration ground. In particular the Groundrush ore was transported to the Tanami Mine for crushing and milling. By May 2002 Newmont Gold had taken over Normandy and had a controlling interest in Normandy NFM and Otter Gold NL.

## **2.0 REGIONAL GEOLOGY**

The Granites-Tanami Block is bound to the west by the Canning Basin, and to the east by the Wiso Basin. It is considered to be one of the western-most Palaeoproterozoic inliers of the North Australian Orogenic Province, developed during the Barramundi Orogeny (Blake et al., 1979).

The stratigraphy of the Tanami Region has been revised as a result of an intensive study recently completed by the NTGS (Hendrickx et al., 2000). The stratigraphy outlined by Blake et al (1979) has had some significant modifications (Table 2).



Blake et al (1979)						Hendrickx et al (2000)			
Birrindudu Group		Coomarie Sandstone				Birrindudu Group	Coomarie Sandstone		Suplejack Downs Sandstone
		Talbot Well Formation					Talbot Well Formation		
		Gardiner Sandstone					Gardiner Sandstone		
Suplejack Downs Sandstone						Pargee Sandstone	Nanny Goat Creek Volcanics		
Mount Winnecke							Mount Winnecke Group		
Pargee Sandstone							Mount Charles Formation		
Tanami Complex	Mt. Charles Beds	Killi Killi Beds	Nanny Goat Creek Beds	Nongra Beds	Helena Creek Beds	Tanami Group	Killi Killi Formation		Twigg Formation
							Dead Bullock Formation		
						McFarlane Peak Group			
Archean						Browns Range Metamorphics “Billabong Complex”			

**Table 2.** Comparison of stratigraphic nomenclature (Hendrickx et al, 2000).

The oldest rocks of Archean age belong to the Billabong Complex and the Browns Range Metamorphics. Lying unconformably above the Archean basement is the palaeoproterozoic McFarlane Peak Group. These rocks are characterised by a thick sequence of mafic volcanic, volcanoclastic and clastic sedimentary rocks.

The Tanami group is subdivided into three formations:

Twigg Formation: purple siltstone with minor sandstone and chert  
 Killi Killi Formation: turbiditic sandstone  
 Dead Bullock Formation: siltstone, mudstone, chert and banded iron formation

The Pargee Sandstone unconformably overlies the Tanami Group and is exposed on the western side of the Coomarie Dome extending into Western Australia. The Pargee Sandstone comprises thick-bedded quartz arenite, lithic arenite and conglomerate with pebbly sandstone and conglomerate at the base.

The Mt Charles Formation comprises an intercalated package of basalts and turbiditic sediments, which occur on the western side of the Frankenia Dome. The Mt Charles Fm is host to structurally controlled vein hosted gold mineralisation in the Tanami Mine Corridor.

The Mt Winnecke Group is also interpreted to lie unconformably over the Tanami Group. This group is divided into two units including siliclastic sediments and felsic volcanics.

The Nanny Goat Volcanics are characterised by extrusive volcanic rocks including quartz-feldspar ignimbrite, feldspar ignimbrite, rhyolite lava, basalt and minor siliclastic sediments.

The Birrindudu group comprises 3 or 4 units with Gardiner Sandstone at the base, overlain by Talbot Well Formation and Coomarie Sandstone. The Suplejack Downs sandstone is interpreted to belong to this group but its relationship is unclear.

Cainozoic laterite, silcrete, calcrete, and Quaternary debris cover 60 – 70% of the Tanami Desert. The Quaternary sediments are generally unconsolidated, representing the most recent phase of erosion and deposition of sands, gravels and lithic fragments.

### **3.0 EXPLORATION 4<sup>TH</sup> JUNE 2001 TO 3<sup>RD</sup> JUNE 2002**

#### **3.1 SURFACE SAMPLING**

Surface sampling was completed at  
EL8077 (134 regional samples; Figures 2 & 3),  
EL10282 (265 regional and regional infill samples; Figures 5 & 6),  
EL10283 (619 regional, regional infill and infill samples; Figures 13 & 14),  
EL10299 (234 regional and regional infill samples; Figures 13 & 14),  
EL10300 (208 regional samples; Figures 11 & 12),  
EL22177 (11 regional samples; Figure 13 & 14),  
EL22179 (530 regional, regional infill and infill samples; Figures 5, 6, 7 & 8)

Regional bulk samples were taken on a standard 500m x 500m grid using a Robinson helicopter. Regional Infill Samples were also taken with a helicopter on a 250m x 250m grid in areas where the broader spaced samples showed kicks in anomalism, to confirm the original anomalism. These were later sieved to either -200 microns or -25mm (1/4") and 150 gramme samples were sent to ALS to be assayed for ultra low-level Au (0.1 ppb) using the ZARG method.

IF anomalism was returned from the same area twice on a regional scale then an infill programme was initiated. The standard pattern was 50m x 50m. The site was assessed for appropriate geochemical method and sampled by vehicle using the Tracknav/DGPS programme to collect location data. Samples were again sent off to ALS to be assayed for ultra low-level Au (0.1 ppb) using the ZARG method.

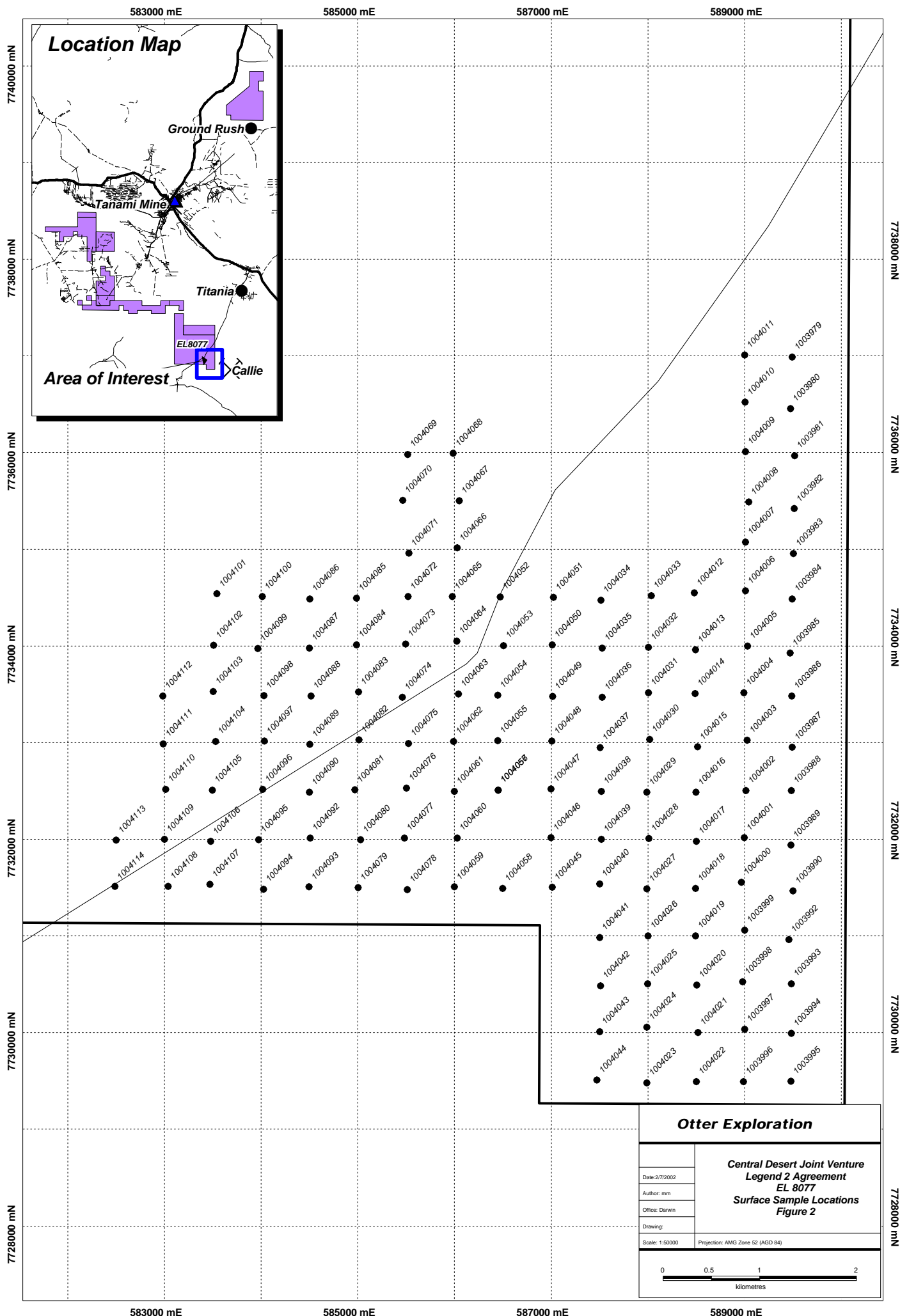
##### **3.1.1 EL 8077**

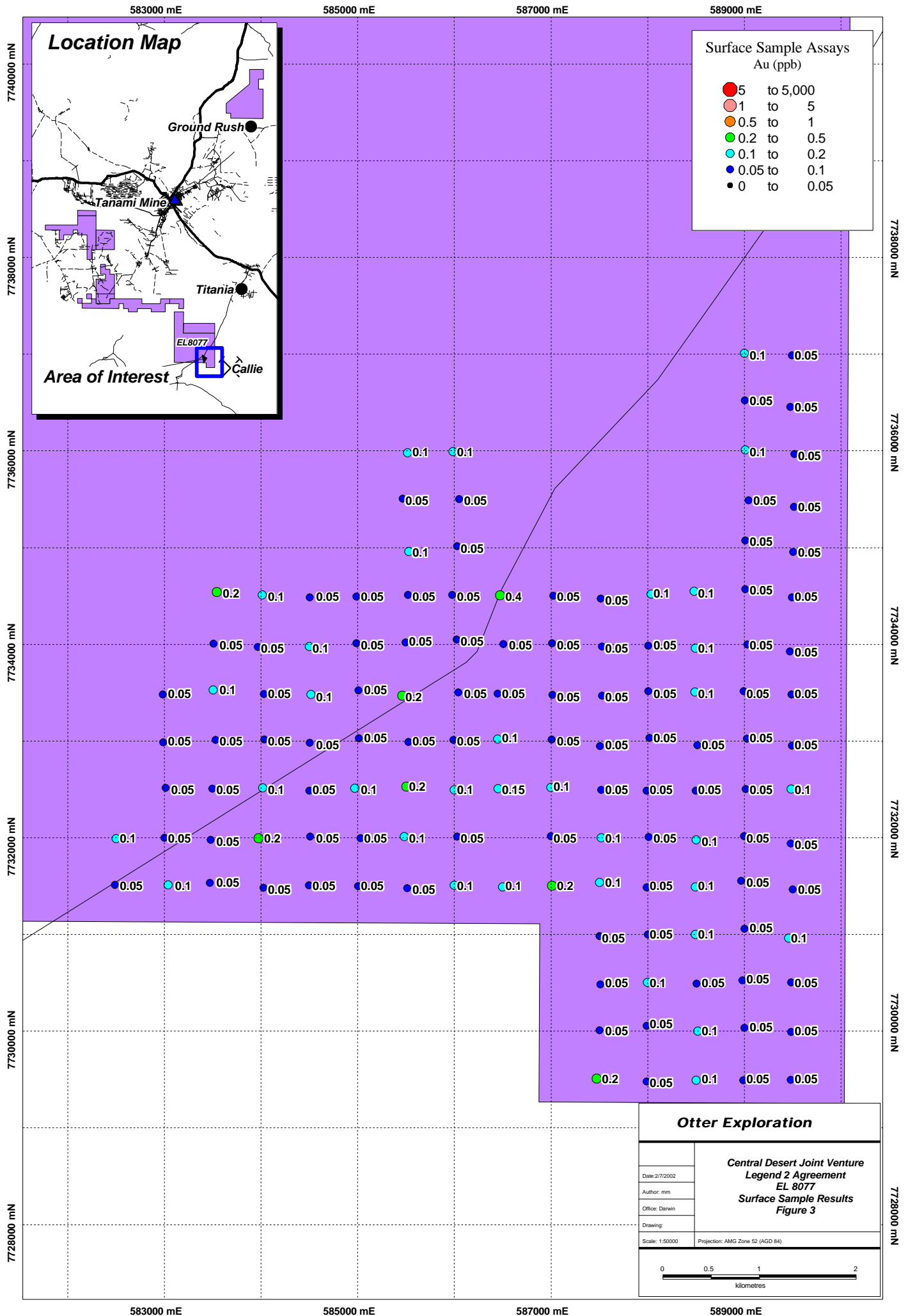
Work completed during November 2000 included a 500m x 500m regional surface sampling programme conducted by helicopter. During this programme 134 samples were collected. See Figures 2 & 3.

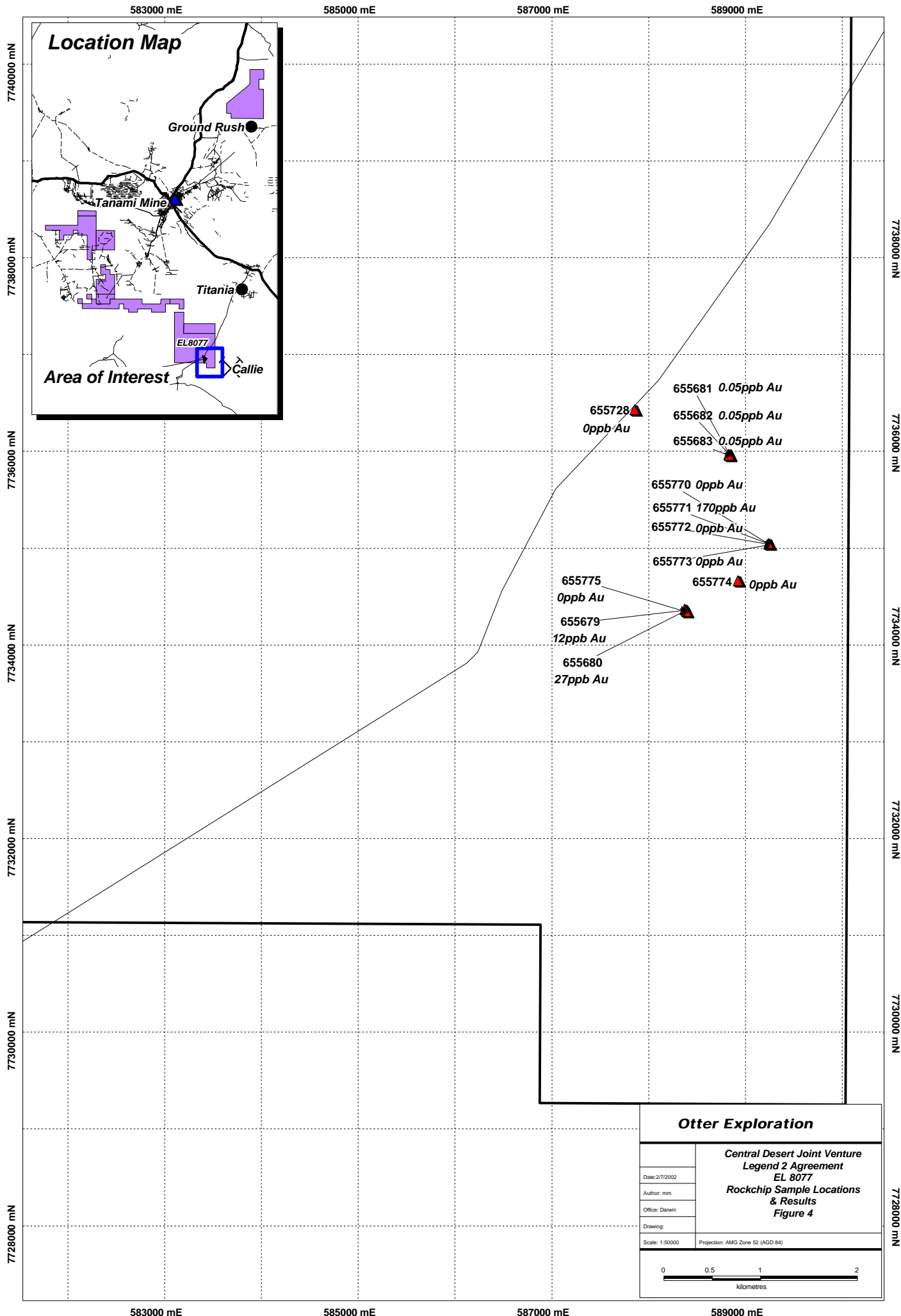
The region was logged as predominantly orange brown sandy loam with occasional outcropping massive quartz veins. No significant results were obtained from this programme. The maximum result was 0.4ppb Au (sample No 1004052).

##### **3.1.2 EL 9479**

No surface sampling has occurred within this Exploration Licence.







### 3.1.3 EL 10282

Within EL 10282, 265 helicopter surface samples were taken on a 500m x 500m grid completed in November 2000. A high of 0.5ppb Au was located in the central portion of the sampling. However a north west – south east trend (paralleling the Trans Tanami Fault) just above detection limit was defined and a 250m x 250m grid was designed to confirm the trend. The results were inconclusive and it was decided not to continue in this region. See Figures 5 & 6.

The samples collected were mainly orange brown sandy loam with occasional lags and rock fragments. Quartz float was recognised in the eastern portion of the sampling. The samples were analysed by the ALS ZARG method and were sieved with the 200 micron sieve. The samples were taken between 10 – 30 centimetres depth. Brief geological reconnaissance of the area showed regions of low relief – mainly granitic outcrop falling off to the south into the younger cover of the Pedestal Beds. Combined with the granite – McFarlane Peak Group geology is interpreted.

### 3.1.4 EL 10283

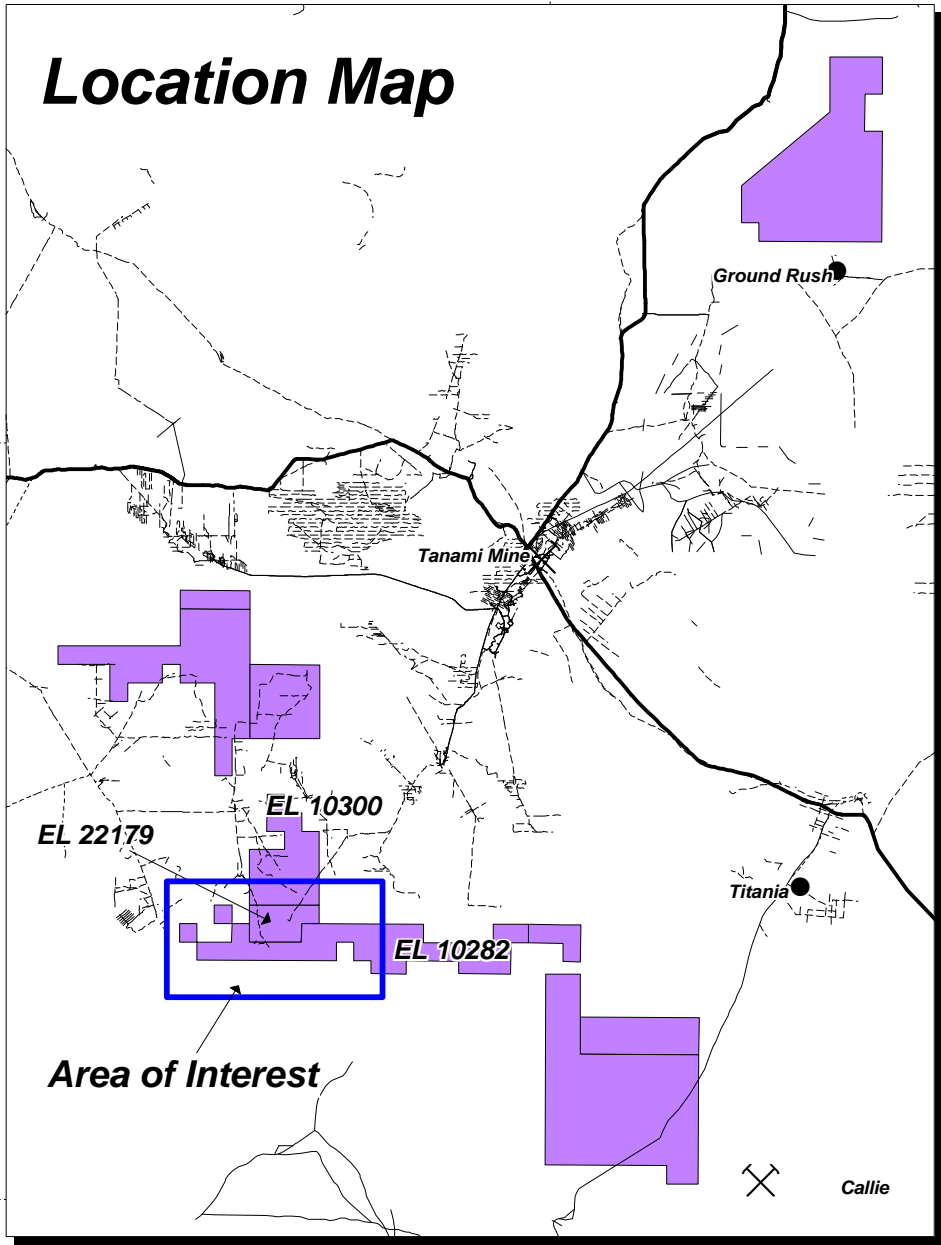
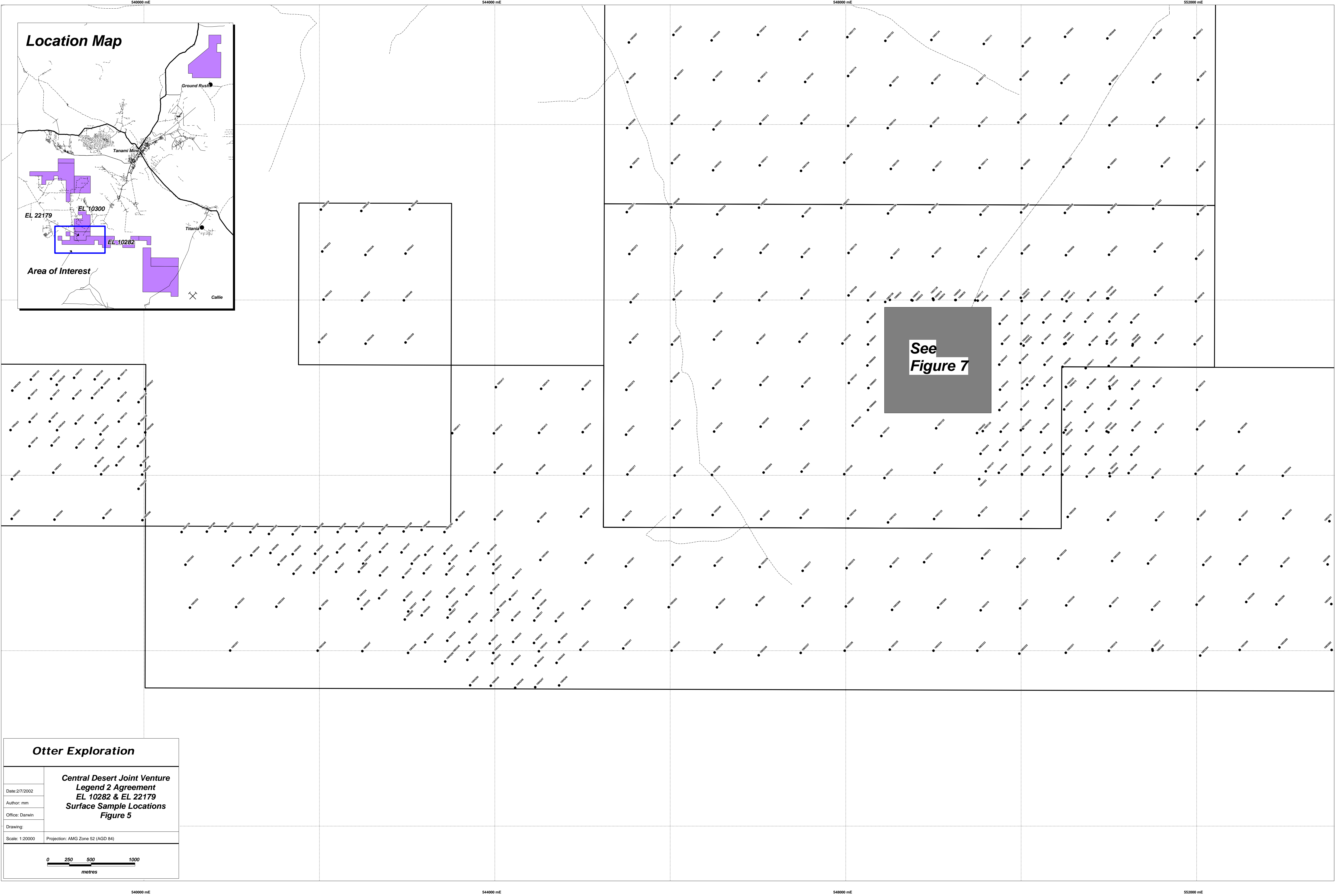
The regional helicopter surface sampling programme covered the majority of EL 10283. 500m x 500m surface samples were taken by November 2000. The majority of the samples were described as orange brown sandy loam with lag being noted in the north east of the tenement. A high of 6.1ppb Au was recorded in the south of tenement and has been resampled to the infill level. The region is now called Tawny Devil. Other 'highs' include several results around 0.8ppb Au. Three regions were infilled to 250m x 250m because of perceived clusters of anomalism. See Figures 13 & 14.

During the middle of February 2001 some 108 surface samples were taken over the Tawny Devil district. The samples were taken as bulk samples on a 100m x 50m grid, dug to a depth of about 15cm to 30cm. The samples were brought back to camp, dried and then sieved with a 200 micron sieve. Samples with a "lag" fraction were also taken where available. The "lag" component consisted mostly of calcrete – these will be sent off to confirm anomalism.

Results returned to date are between 0.1ppb Au and 1.3ppb Au and form a neat coherent anomaly around the original 1ppb Au. The 6.1ppb Au has been followed up by a 0.3ppb Au and 0.2ppb Au.

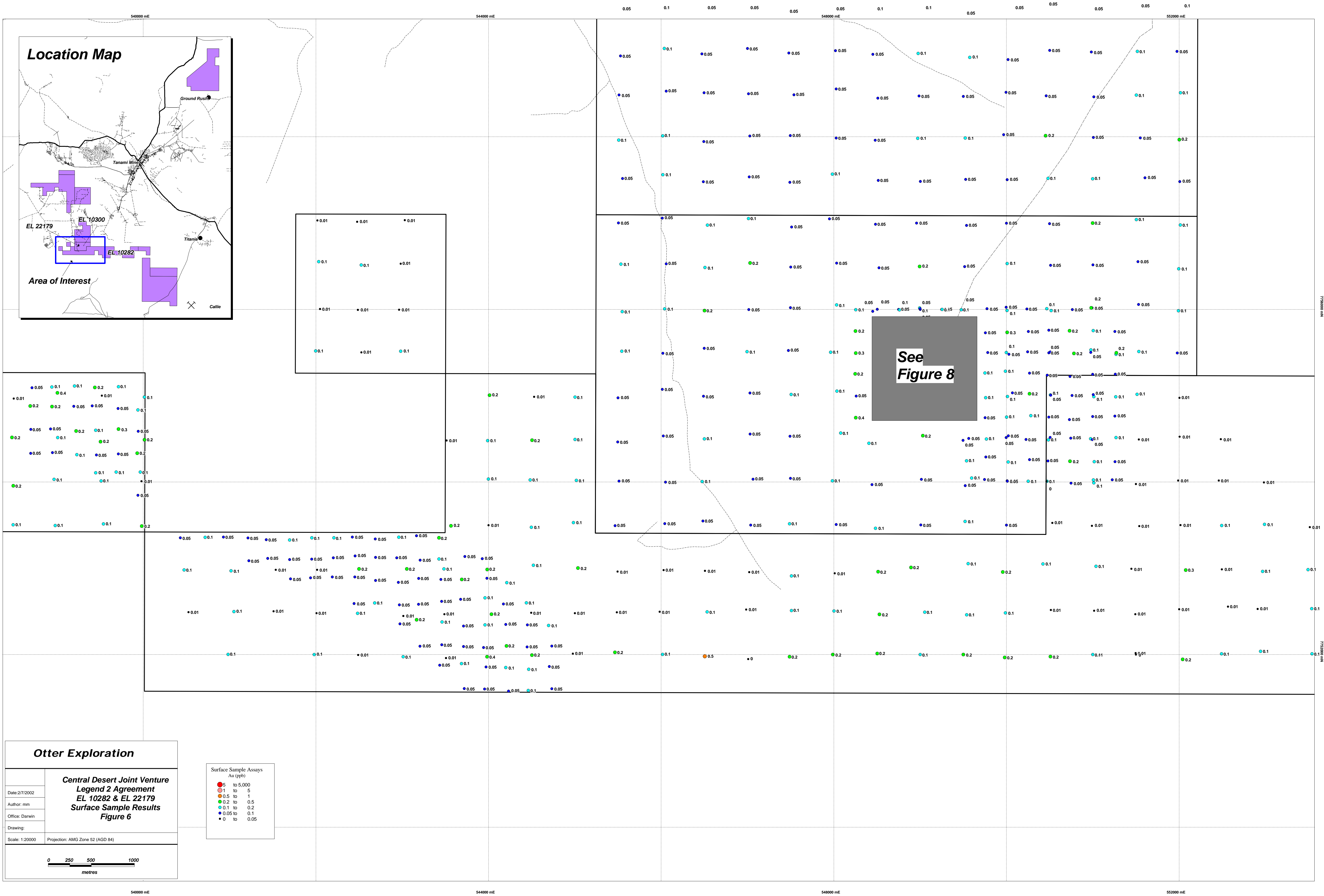
Geology from the recent NT DME basement map demonstrates the underlying rocks to be Killi Killi in origin. Logging from the surface samples shows the region to be predominantly orange brown sandy loam. The shallower holes are associated with a low ridge of calcrete in the central portion of the programme.

Further work proposed should involve some sort of post hole drilling to confirm depth to basement and anomalism at depth. See Figures 15 & 16.

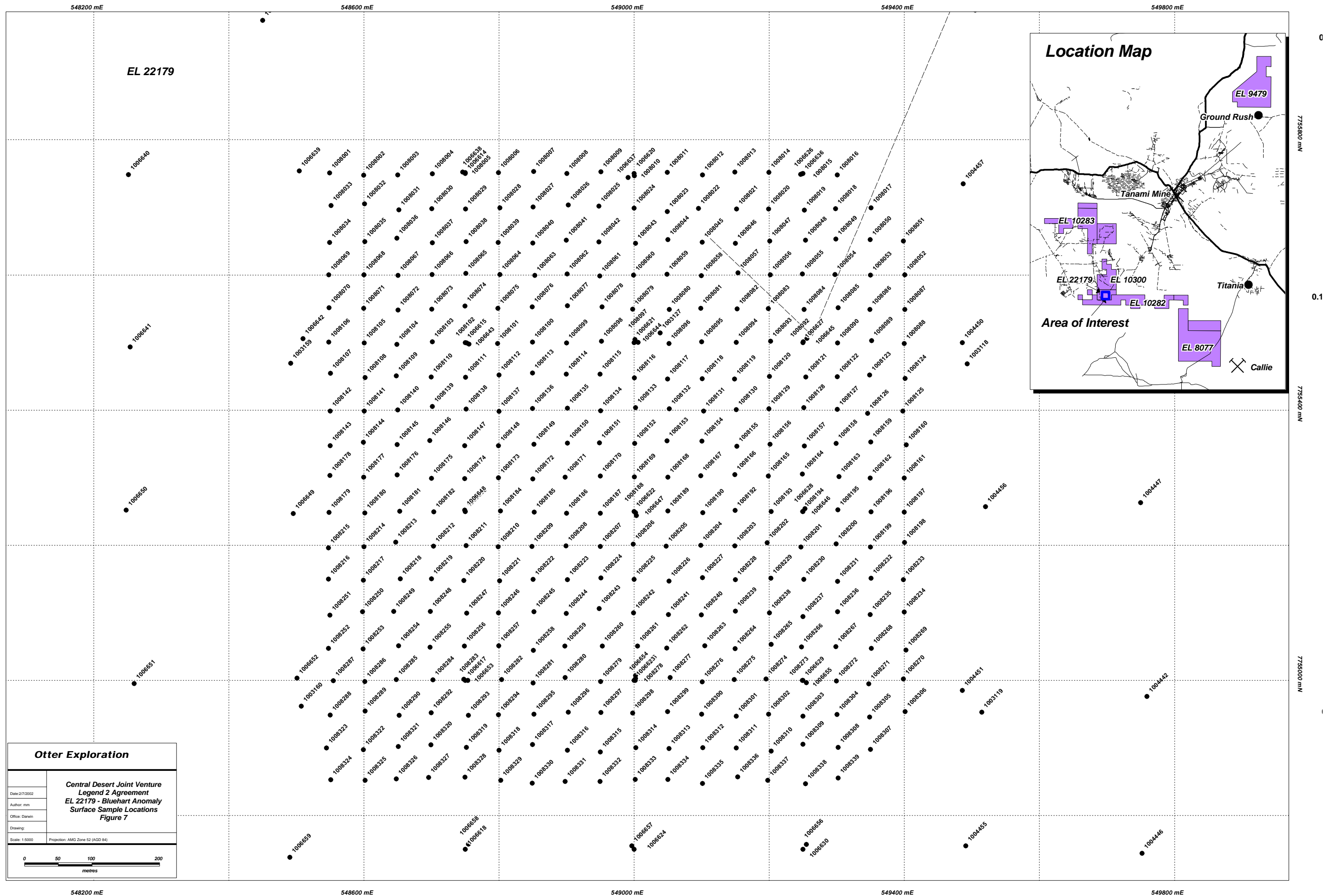


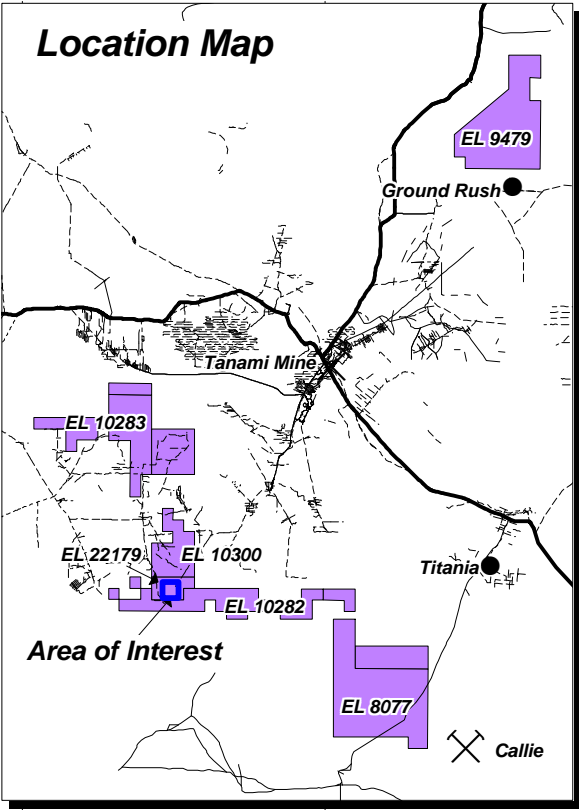
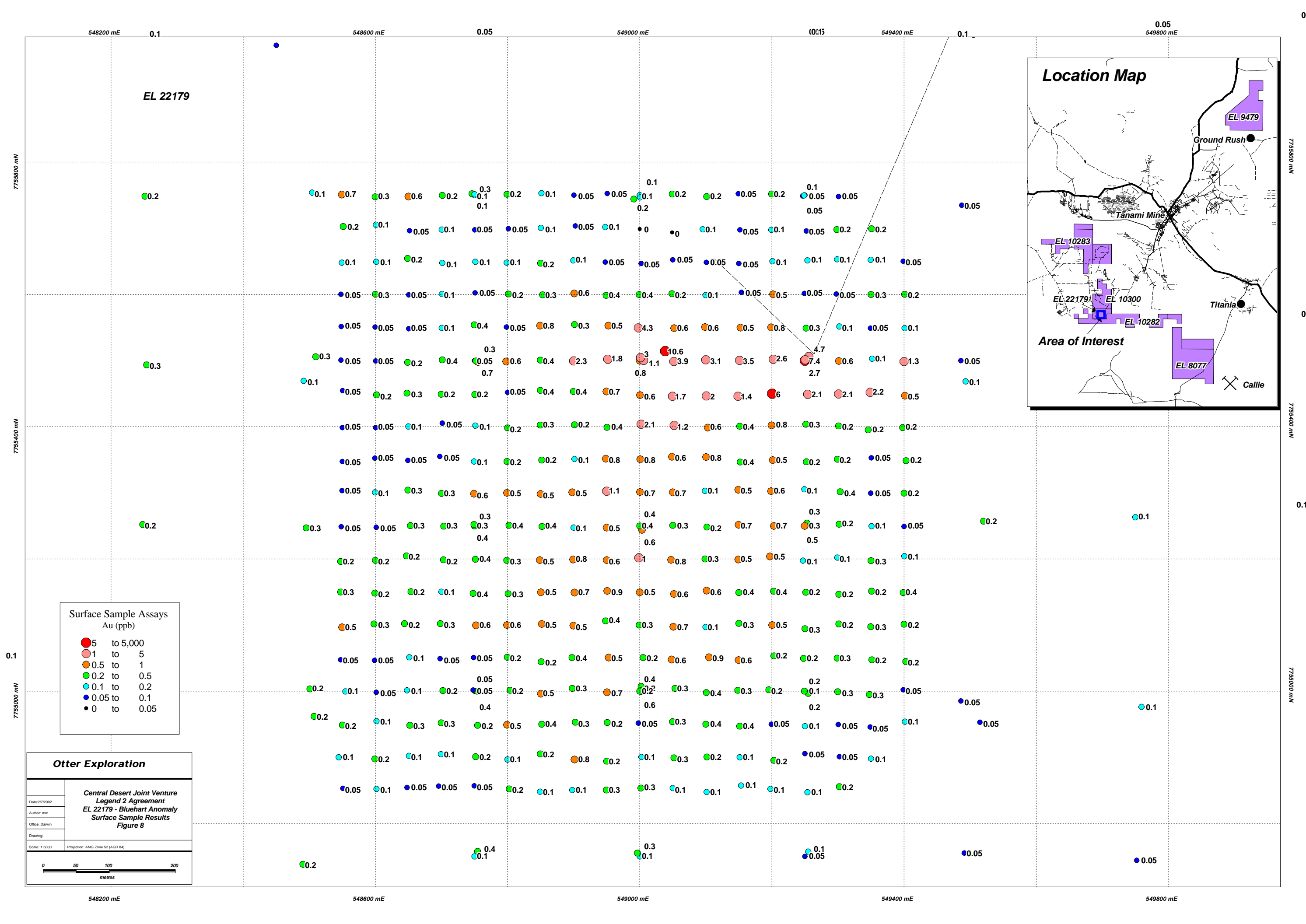
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Office: Darwin	
Drawing:	
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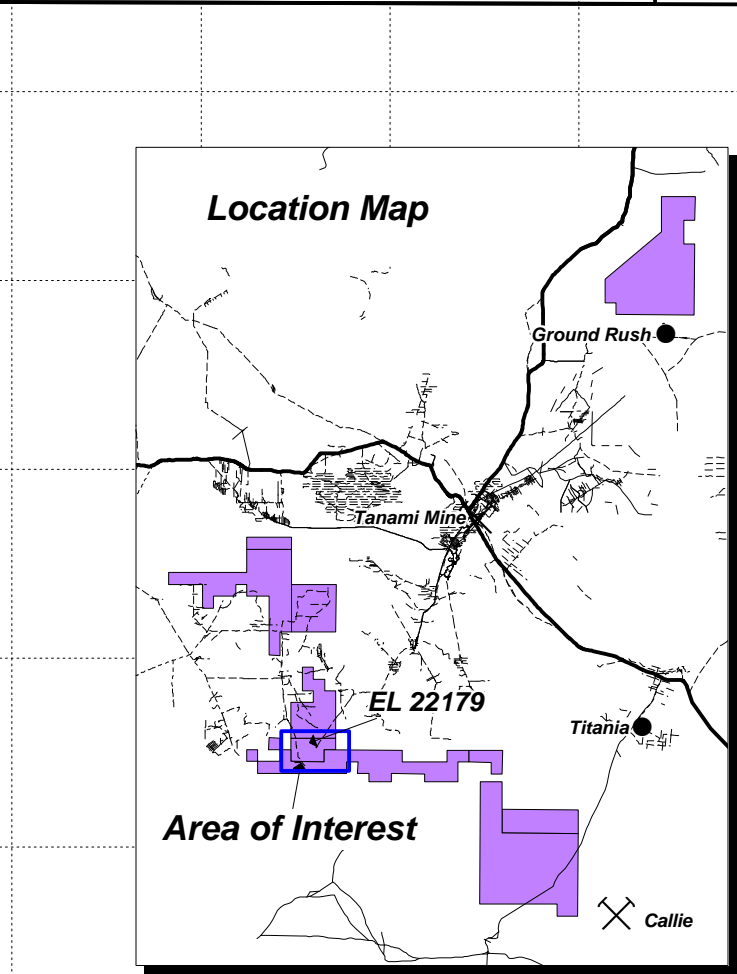
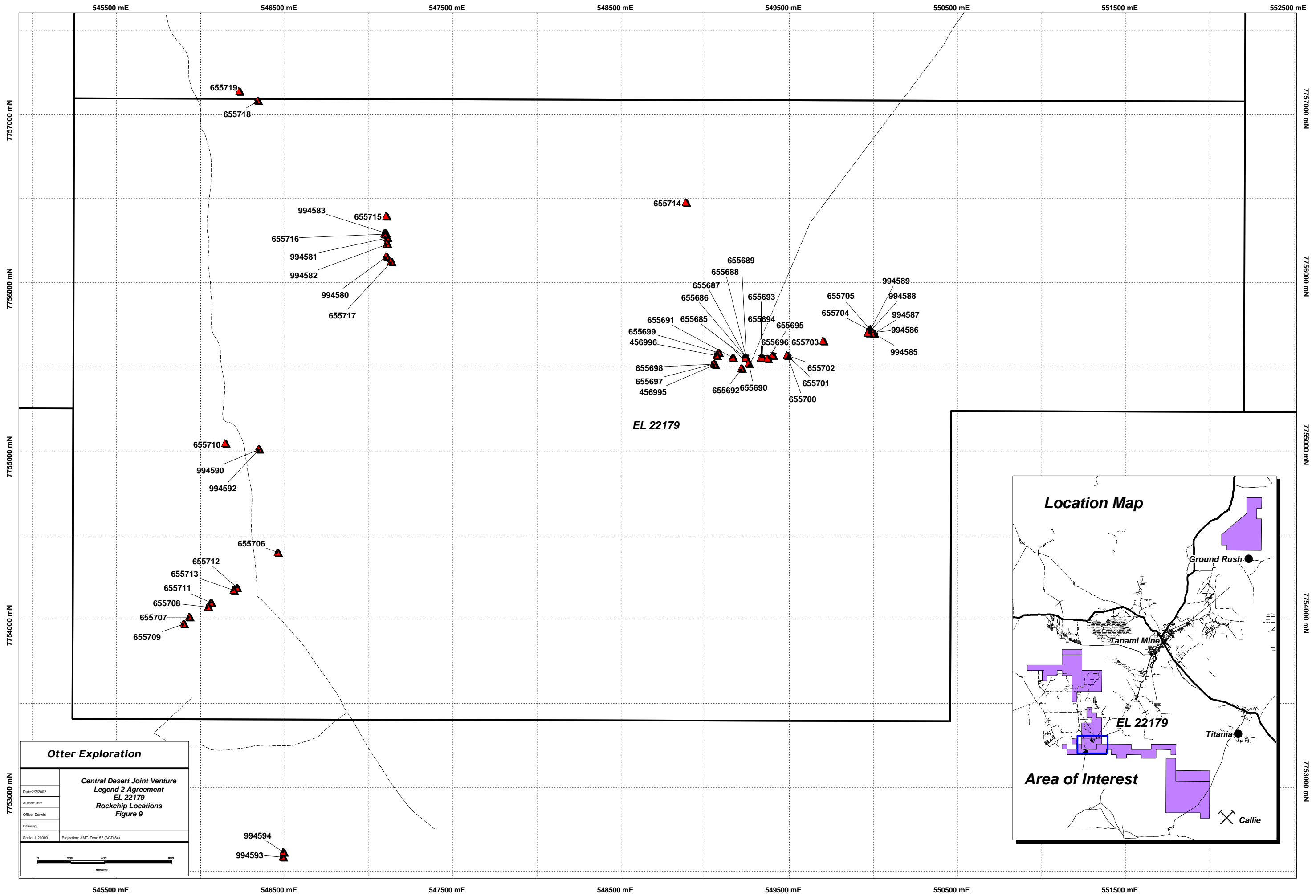




**Otter Exploration**

Central Desert Joint Venture Legend 2 Agreement EL 22179 - Bluehart Anomaly Surface Sample Results Figure 8	
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Author: mm	
Office: Darwin	
Drawing:	
Scale: 1:5000	Projection: AMG Zone 52 (AGD 84)

0 50 100 200 metres

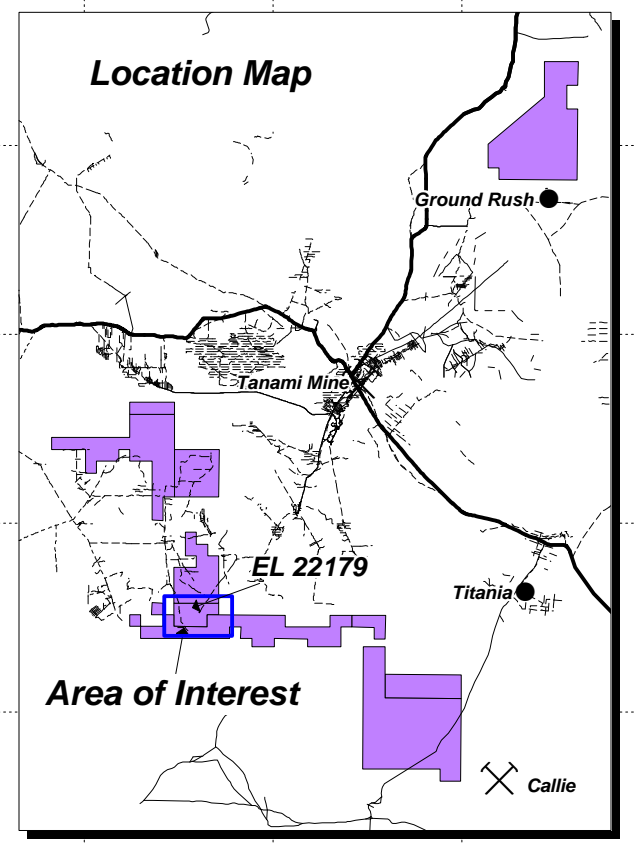
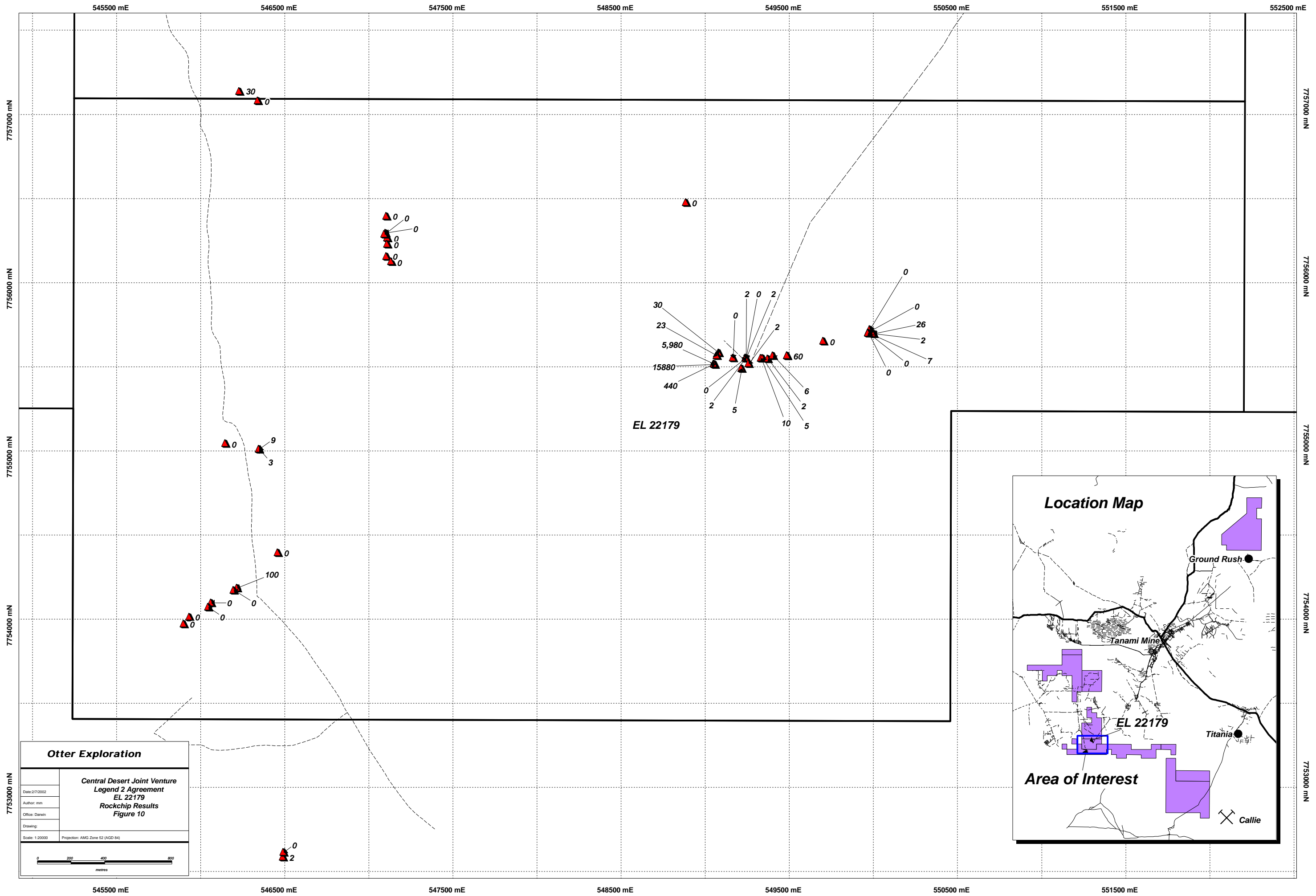


**Otter Exploration**

Date: 2/7/2002	<b>Central Desert Joint Venture Legend 2 Agreement EL 22179 Rockchip Locations Figure 9</b>
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Office: Darwin	
Drawing:	
Scale: 1:20000	Projection: AMG Zone 52 (AGD 84)

0200400600

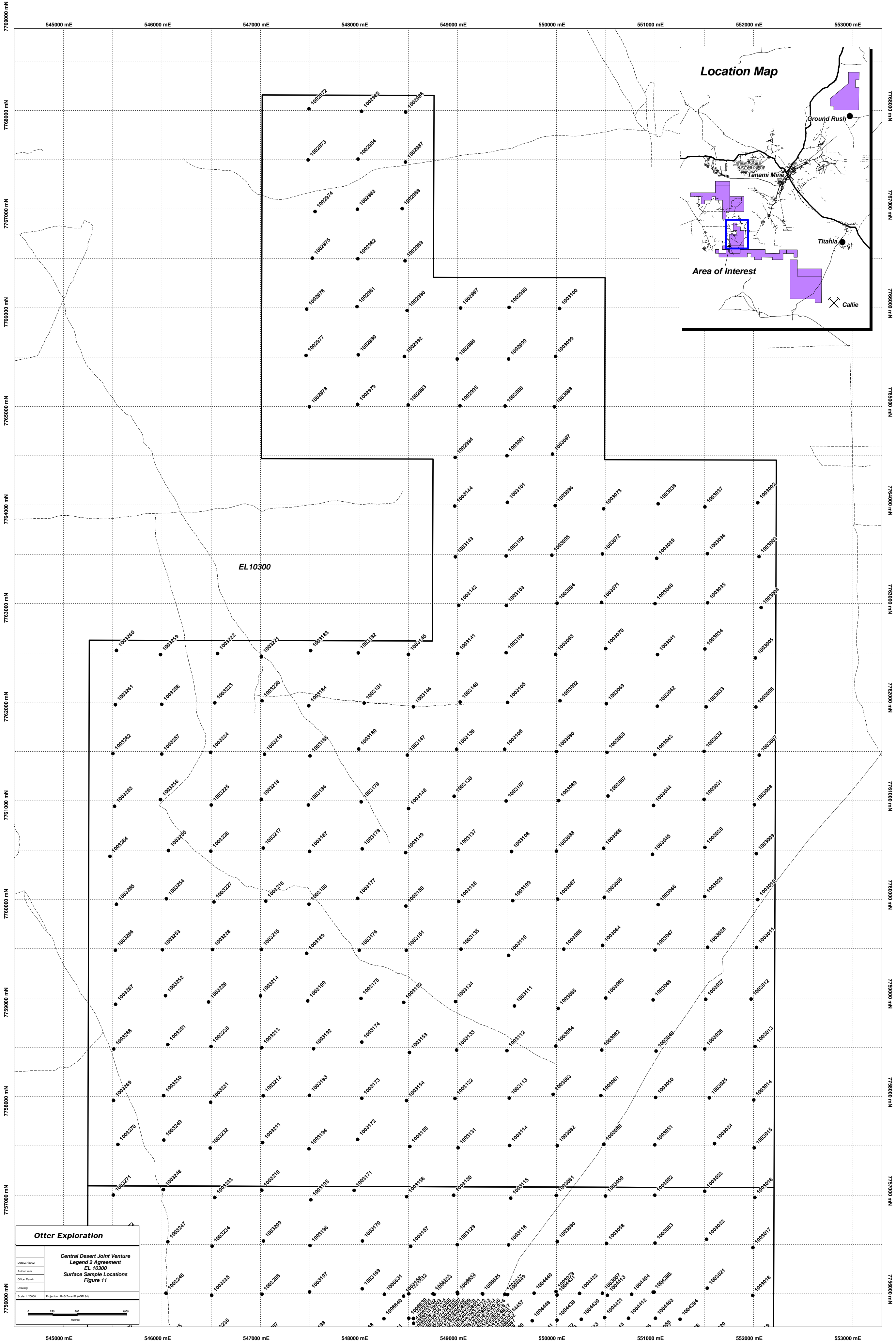
metres



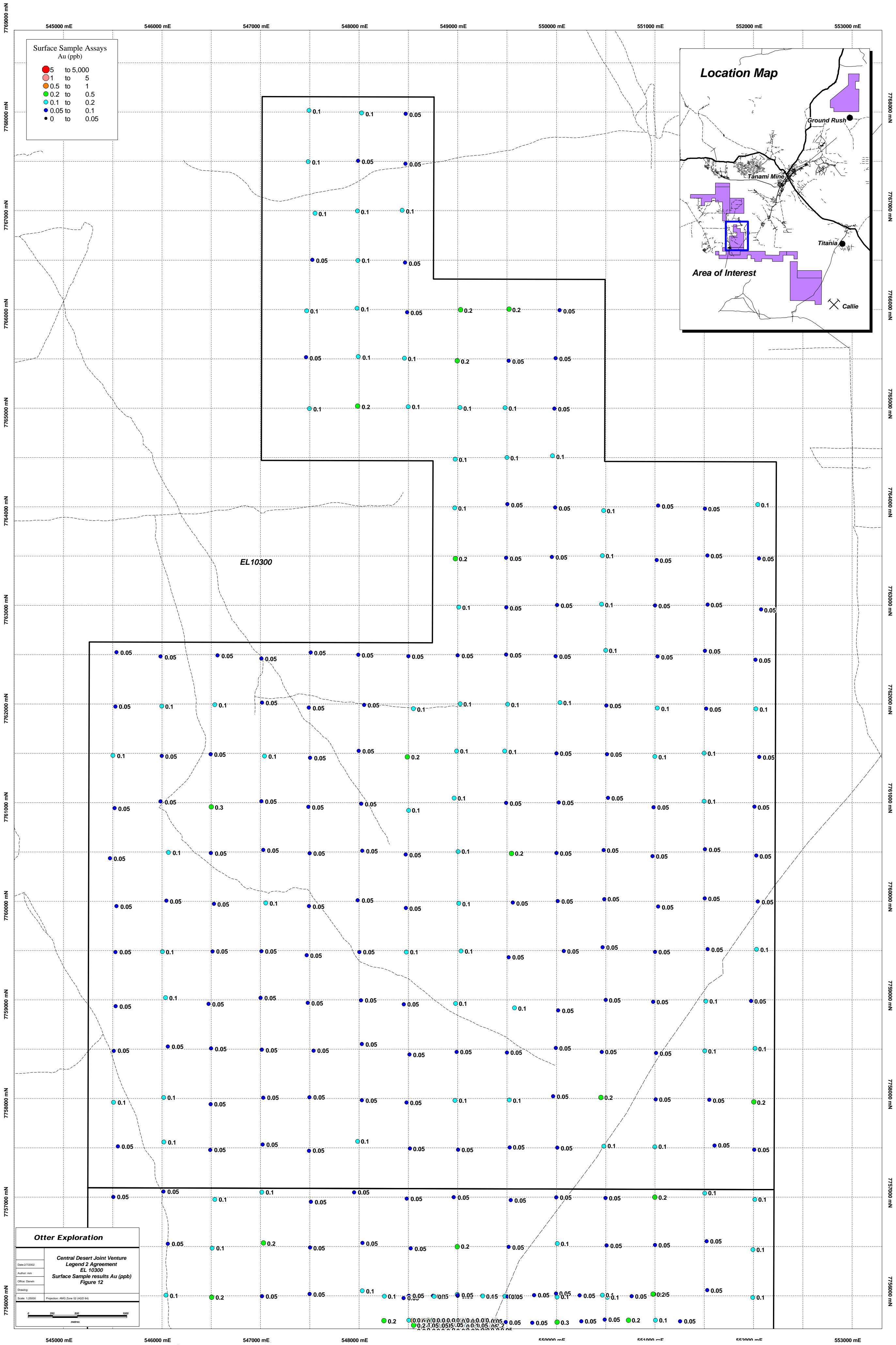
**Otter Exploration**

Central Desert Joint Venture Legend 2 Agreement EL 22179 Rockchip Results Figure 10	
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Office: Darwin	Drawing:
Scale: 1:20000	Projection: AMG Zone 52 (AGD 84)

0 200 400 600 metres





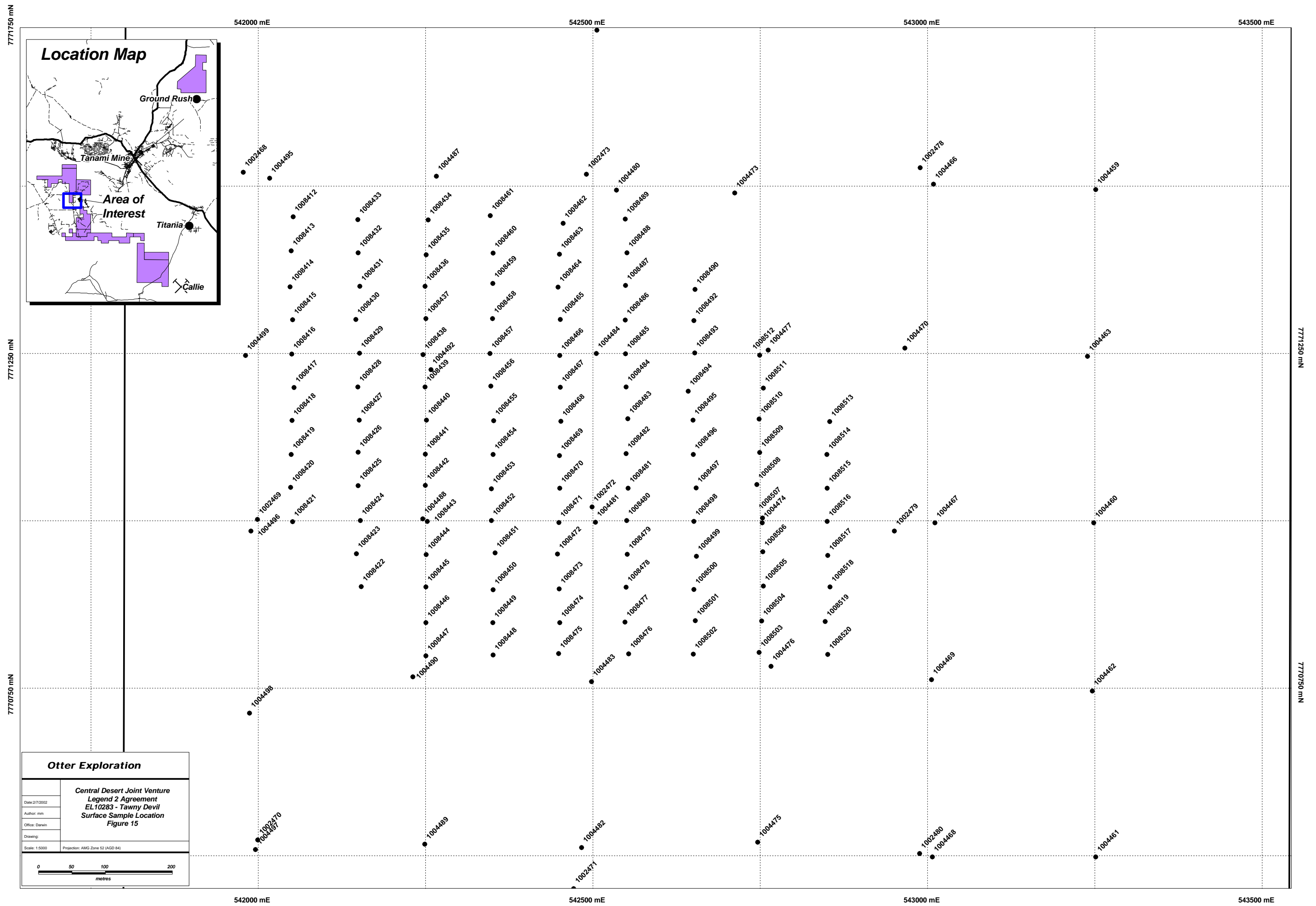


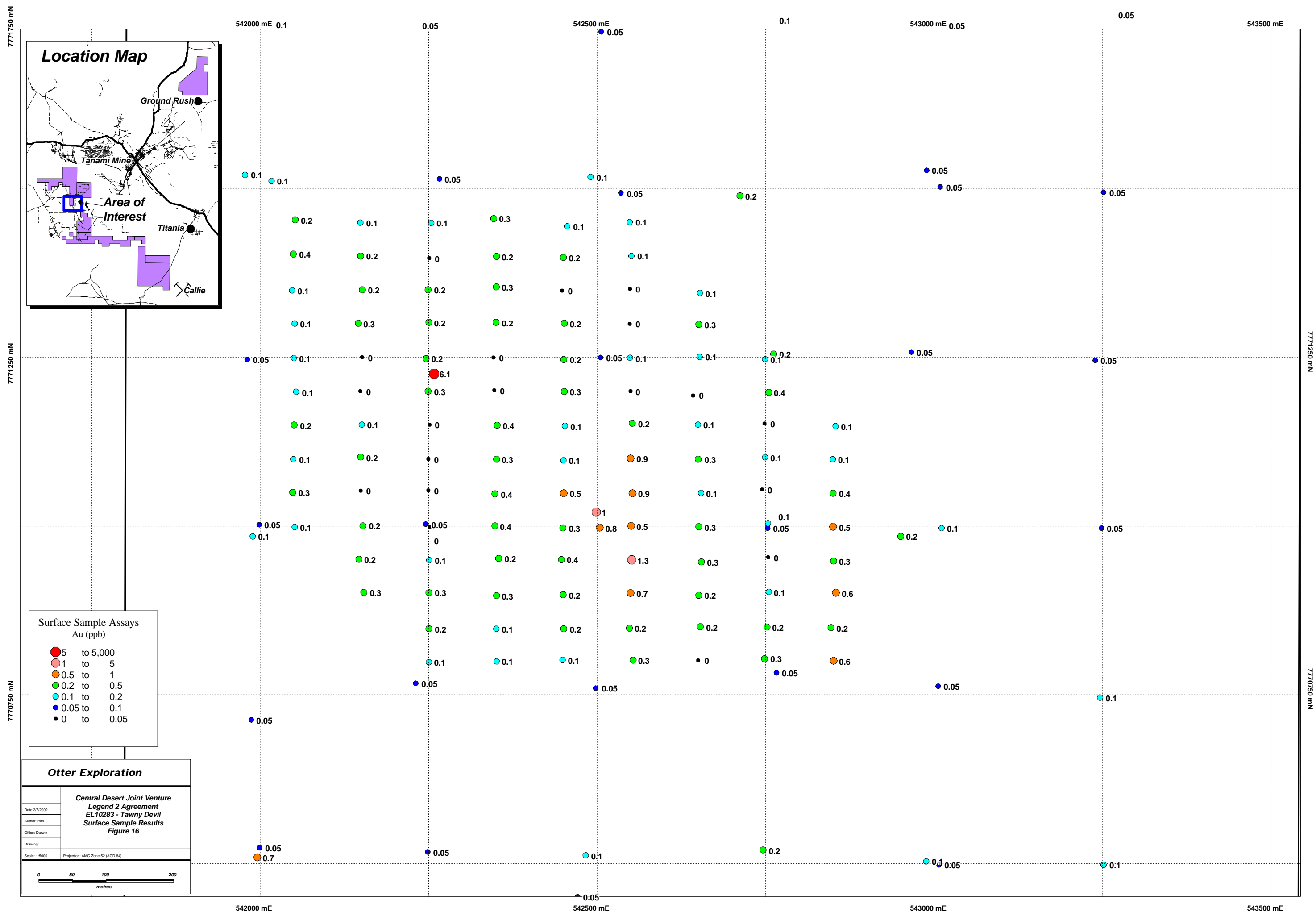












### **3.1.5 EL 10299**

234 regional 500m x 500m & 250m x 250m regional infill samples were taken in EL 10299 by helicopter. The region is once again logged as a flat orange brown sandy loam predominantly. A region in the north east of the EL was resampled to the 250m x 250m infill and dubbed Kobi. Further sampling was planned but a site inspection was recommended initially as initial results were low (0.3ppb Au range) but consistent. See Figure 13 & 14.

### **3.1.5 EL 10300**

208 regional 500m x 500m surface samples were taken in EL 10300 by helicopter. The region is once again logged as a flat orange brown sandy loam. No significant results were derived from this programme. See Figures 11 & 12.

### **3.1.7 EL 10355**

No surface sampling has occurred within this Exploration Licence.

### **3.1.8 EL 10411**

No surface sampling has occurred within this Exploration Licence.

### **3.1.9 EL 22177**

11 Regional surface samples were taken by helicopter within this Licence. No significant results were received, with a maximum of 0.1ppb Au. The region is to the south of Pendragon / Molech mine lease and is on the southern side of the Pendragon shear within what is interpreted to be Killi Killi Beds. Surface samples were described as orange brown sandy loam in a flat terrain.

### **3.1.10 EL 22179**

Some 530 samples have been taken in total over EL 22179. During the December 2000 period some 30 samples were taken with the Helicopter on a 250m x 250m grid over the high of 10.6ppb from the initial 500m x 500m helicopter surface sampling programme. An earlier programme consisting of approximately 50 samples (at 250m x 250m) was taken over the eastern portion of the EL. The results returned from this 50 sample programme were not significant. However, the later 30 sample programme was successful in confirming the original 10.6ppb Au with 1.1ppb Au, 4.7ppb Au, 7.4ppb Au, 0.8ppb Au, 0.7ppb Au & 0.6ppb Au over a 500m length

This confirmed anomalism, which initiated a 50m x 50m programme which involved taking 336 samples in bulk form (because of wet ground conditions) over the January to

February period and transporting them back to camp where they were dried and then sieved with the fine (200 micron) sieve. These were packaged and sent to ALS – Perth for ZARG analysis. Logging of the surface samples revealed the north eastern portion of the area to have quartz float and predominantly a “lag” fraction where the southern areas are dominated by orange brown sandy loam.

Results returned were encouraging, with an east – west trending anomaly outlined. The anomaly is outlined by a 1ppb Au contour with values up to the initial 10.6ppb Au. Other highs include 7.4ppb Au, 6ppb Au, 4.7ppb Au, 4.3ppb Au & 3.9ppb Au with a cluster of results between 1 – 3 ppb Au. Currently, a drilling programme is being planned to cover the higher anomalies. See Figure 7 & 8.

## **3.2 ROCKCHIP RESULTS**

### **3.2.1 EL 8077**

A site visit was conducted along a portion of the Tanami Downs tracks within EL 8077. This involved a basic rockchipping programme. Several massive quartz veins were noted. Some of these veins were partially brecciated with vugs filled with specular hematite. Rockchips results reflect that the buck quartz section of the ‘system’ assayed below detection limits. Quartz veins described as containing pyritic casts assayed at 12ppb Au. Another generation of quartz veining adjacent to the buck veining assayed up to 27ppb Au. The veining appeared to be hosted in silicified sediments. See Figure 4 for results and locations.

A second visit entailed the re sampling of more quartz veining from an old costean within the Madam Margi district. One sample returned 170ppb Au.

### **3.2.2 EL 22179 - Bluehart**

A brief visit to outcropping material to the east of the programme was undertaken with several rockchips being taken – the highest result being 11ppb Au and 6ppb Au. The 15880 ppb Au rockchip was latter resampled and returned 5980ppb Au. Rock types encountered on the visit were not like any encountered in the Tanami corridor. They appeared to be sediments of higher metamorphic grade. It is currently believed the package of rocks belongs to the M<sup>c</sup>Farlane Peak Group and is a higher grade metamorphic unit (?gneiss, ?amphibolite). Observation also revealed at least two phases of deformation and a series of? sheeted quartz veins (WNW orientation). Rockchipping of these veins did not disclose any grade. There appears to be a large north-west feature across the EL, which corresponds with a topographical high in the region. A series of north south structures appear to transect the outcrop and are also apparent on the geophysics. (? Related to the Trans Tanami Structure!)

An old NNFM hole was noted and sampled. The hole returned a result of 32ppb Au. Subsequent rockchips (12) of predominantly quartz veins in the anomalous district returned 11ppb Au, and 6ppb Au, 5ppb Au, and 2ppb Au.

During March 2001 petrological studies were requested in the Bluehart (EL22179) Region. The full reports are to be found in Appendix 4.

Two rock samples were sent from the Bluehart prospect for analysis. These have been described as originally laminated carbonaceous sediments transformed to a mylonitic gneiss and porphyroblastic gneiss respectively by amphibolite (or hornblende horfels) facies thermal metamorphism under a regional and possibly localised strain environment. The metamorphic conditions for the formation of these rocks were determined to be High Temperature and Low Pressure.

### **3.3 DRILLING**

#### **3.3.1 EL 9749 – Posthole drilling**

Posthole drilling within the Talbot South Licence was spurred by the Groundrush discovery of Normandy North Flinders to south of this EL. The three fences of drilling were disappointing with in excess of twenty metres of Gardiner Sandstone, its finer grained equivalents and Antrim Plateau Volcanic Basalts being encountered. A total of 19 postholes were drilled for 1254 metres with the highest result being 6ppb Au in a bottom of hole sample. See Figure 17 for locations.

#### **3.3.2 EL 8077 – Posthole Drilling**

Aircore posthole drilling was conducted over worm anomalies 146 and 152. These were considered to be the best geophysical anomalies generated from the Fractal worming process on EL8077. Drilling was planned on a 200m x 200m grid, but was spaced out to 400m x 400m during the course of the programme due to time constraints and depth of cover. See Figure 18 & 22.

Drilling at Anomaly 146 encountered three to four metres of transported sand underlain by up to 70m of plastic lake clays over Dead Bullock Formation. No significant result was returned in either sample 2 or 3 and although some coherent geochemistry was observed in sample 1; the depth and type of cover suggest that there would be little correlation between surface and bedrock response.

The effectiveness of the drilling at Anomaly 153 was hampered by the location of an exclusion zone in the centre of the grid. It was hoped that any anomalism would be detected in this way. The worm anomaly occurs directly along strike from DBS and was a high priority target.

A lone anomalous 25ppb Au sample 2 result (TDPH044) was returned from the northern edge of the grid with an accompanying low-level sample 3 result. This anomalous

posthole result actually lies closer to anomaly 152, which was not drilled due to time constraints as it sits in a 70m+ deep palaeochannel. Bottom of hole geology for TDPH044 indicated an altered or strongly weathered mafic unit.

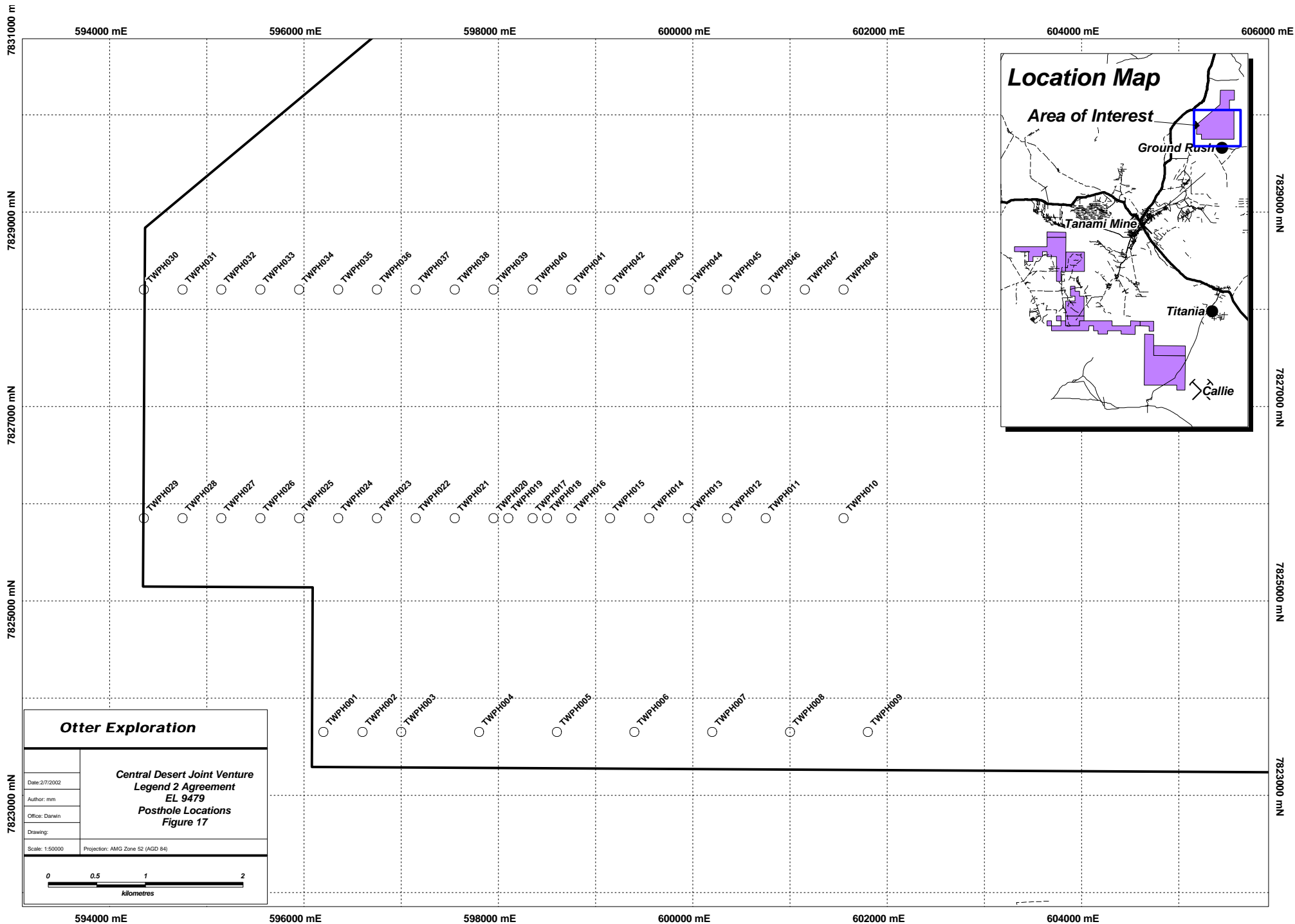
Time and difficulty of drilling aircore posthole within EL10411 (anomaly 144) resulted in only four deep holes for a total of 246m being completed. Two of which ended in Antrim Plateau Volcanics. Results were disappointing.

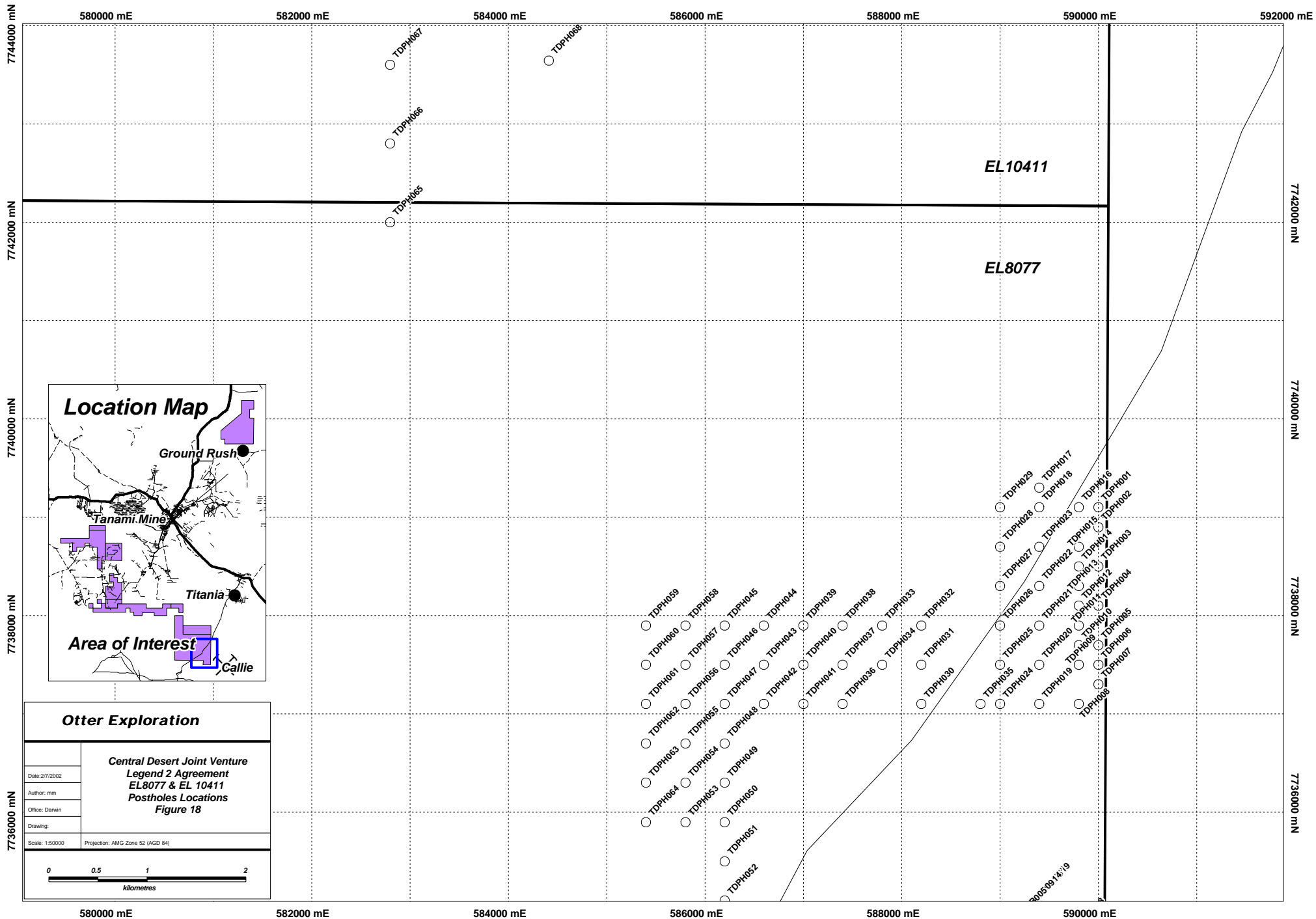
### **3.3.3 EL 8077 – Angle RAB at Madam MARGI**

Two lines of angled RAB drilling (38 holes; 2031m) were drilled at Madam Margi West 500m apart. Previous posthole RAB and vacuum drilling defined an anomalous zone of 1.5km strike with a high result of 1.5g/t Au at bottom of hole. The RAB lines targeted the anomalism trending approximately 135 degrees and across worm anomalism (drop off). See Figure 19 & 23.

Drilling encountered a thin layer of transported sands above intercalated dolerites and carbonaceous schists of the Dead Bullock Formation. A series of south-dipping qtz+K-spar+py veins were intersected at the southern margin of a thick and laterally extensive dolerite unit.

Results were disappointing with no significant intercepts and very little down-hole anomalism.









### 3.4 MAGNETIC SURVEY

During the mid-November to December of the 2000 period a regional scale aeromagnetic survey was conducted over ELs 10282, 10283, 10299, 10300, 10355, 22177 and 22179 (Figure 20 & 21). The survey was part of the Deep Cover Programme instigated by Otter to determine methods of exploring under transported cover. Data files are included in Appendix 3.

#### **Magnetic Survey Specifications**

Company: Kevron Geophysics Pty Ltd

Aircraft: SHRIKE 500

Magnetic Sensor mean terrain clearance: 50m

Flight Line Spacing: 150m

Tie Line Spacing: 1500m

Flight Line Orientation: 045-225 degrees TN (Block I), 045-225 degrees TN (Block F)

Tie Line Orientation: 135-315 degrees TN (Block I), 135-315 degrees TN (Block F)

Navigation: Real-time differential GPS to achieve better than 5m real and 2m relative positioning in both lateral position and height.

### 3.5 WORM DATA

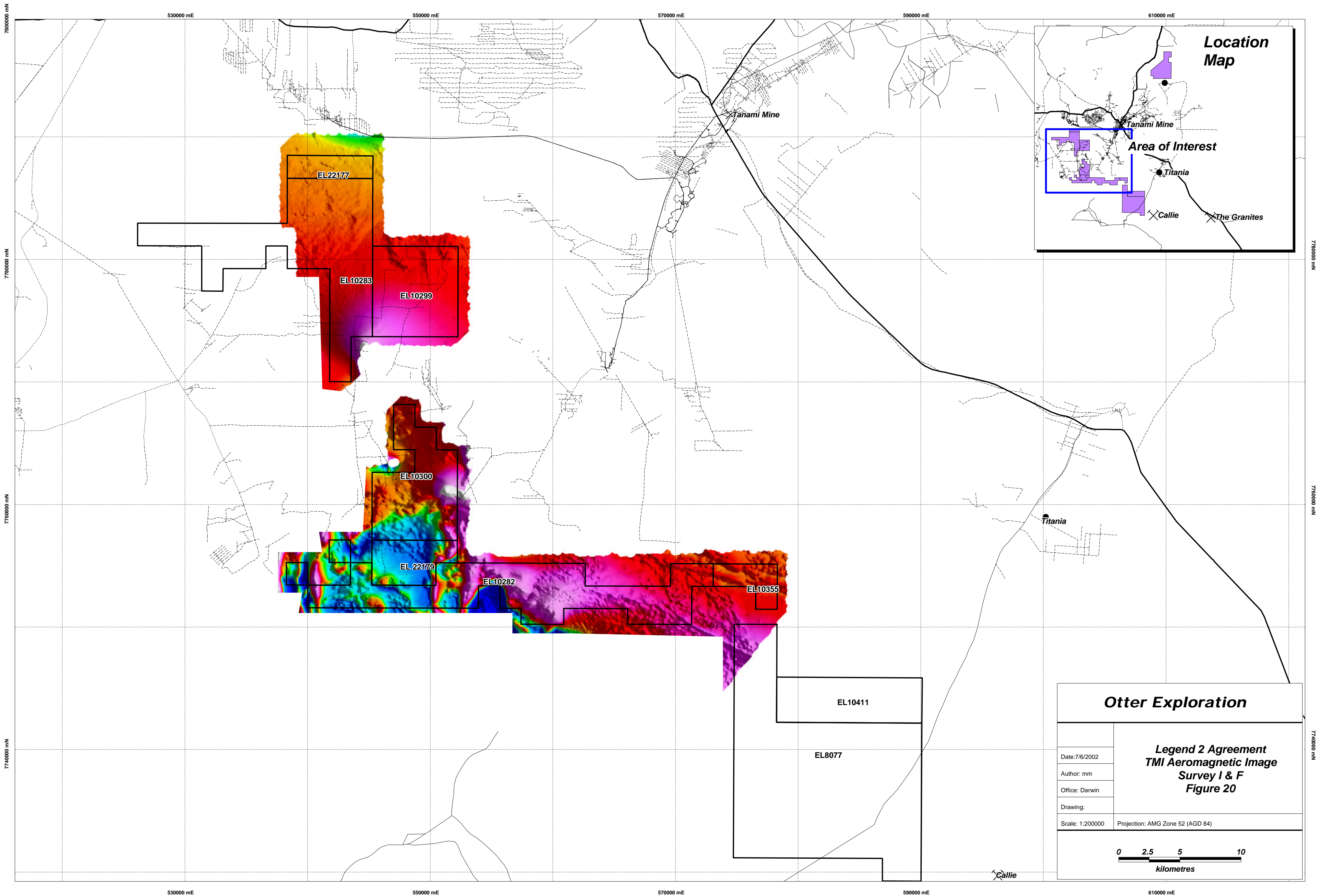
The data obtained during the geophysical survey was used in the analysis by Fractal graphics. This analysis, dubbed worming, is a tool used for emphasizing edges – and is used as a cost effective tool for exploring under deep cover.

The stitched data set was subdivided into 40km by 60km areas and grided using a 40m grid. Grided data sets were forwarded to Fractal Graphics in Perth for 'Fractal Worm' processing. Regional scale aeromagnetic and gravity data were also 'wormed'. See Figure 22 & 23 for examples of data that has been wormed.

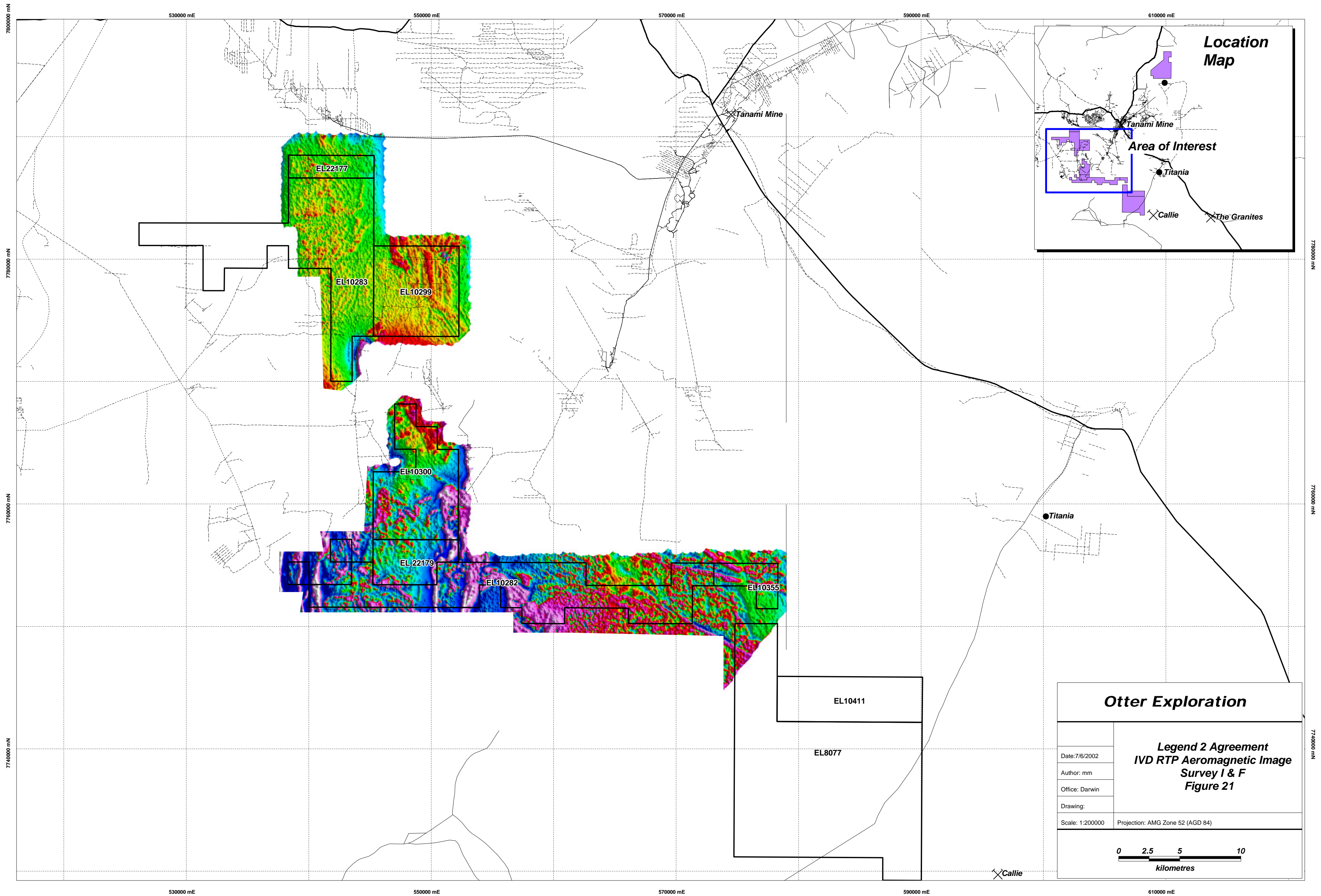
The advantage of using the Fractal Worms to assist with interpretation of the basement geology is that they facilitate better definition and location of contacts between adjacent lithologic packages and faults.

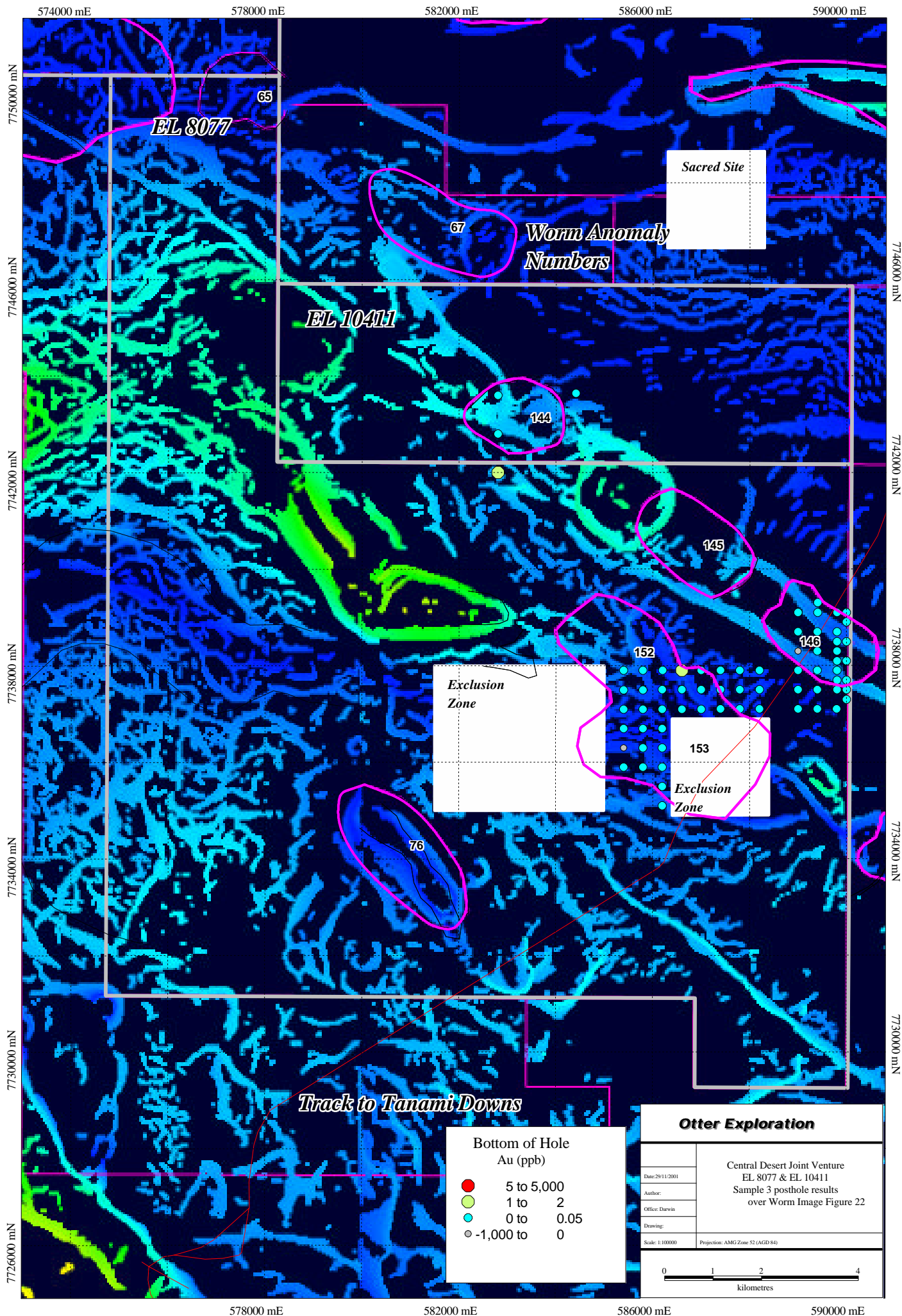
Utilising the key parameters relevant to the geological model developed earlier for the Granites – Tanami intrusion-related gold mineralisation, 'worm anomalies' were identified. These worm anomalies comprise zones that have one or more of the following attributes:

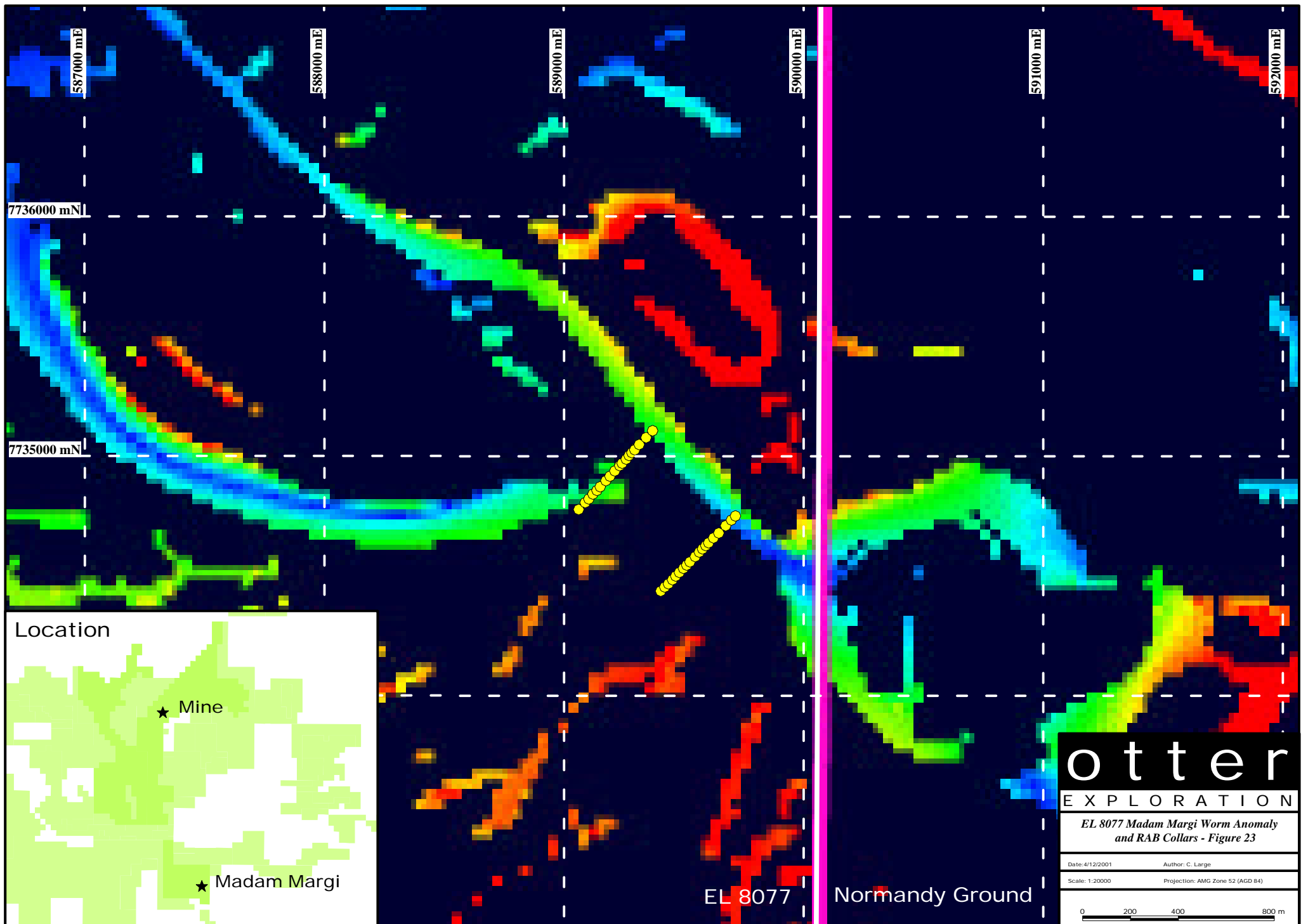
- An anomalous decrease in magnetic intensity along or within a single lithology.
- An anomalous increase in magnetic intensity along or within a single lithology.
- Zones of anomalous tight folding within favourable lithologies
- Zones of complex faulting within favourable lithologies











Anomalies are assessed on the following attributes.

- Nature of the host rocks
- Nature of the cover rocks / surface geology
- Regolith
- Proximity to granite / thermal aureole
- Nature of proximal granites
- Relationship to major and lower order structures
- Nature of the anomaly
- Local stratigraphic features incorporating orientation, folding, doming, etc.
- Existing sampling / drilling if any
- Cultural influences

A mechanism for ranking anomalies has been established that takes into account the different styles of mineralisation likely to be encountered.

#### **4.0 EXPENDITURE 2001-2002**

Total expenditure on all Legend 2 tenements since inception till the end of the first Licence Year was \$668954.78. Total expenditure excluding Tenements and CLC compensation is **\$384,704.99**. The expenditure since inception till the end of the first Licence Year on individual tenements is summarised in Table 3.



Table 3 : Expenditures for 2001/2002

<b>CENTRAL DESERT JV - LEGEND SINCE INCEPTION EXPENDITURE TO 30/06/02 (end of 1st year)</b>										
	EL 8077	EL 9479	EL 10282	EL 10283	EL 10299	EL 10300	EL 10355	EL 10411	EL 22177	EL 22179
Salary & Wages	67,165.80	21,334.61	2,134.59	3,387.62	1,102.65	1,043.34	-	12,141.72	-	4,024.39
General Administration	17,455.55	2,716.09	695.80	349.18	233.42	534.19	-	19,363.19	-	1,240.76
Camp Allocations	8,980.98	7,120.89	484.22	-	-	-	-	2,320.78	-	150.44
Survey	91.43	91.43	-	-	-	-	-	91.43	-	-
Environmental	-	-	-	-	-	-	-	59.78	-	-
Light Vehicles alloc	704.43	4,153.47	452.51	1,447.14	-	-	-	27.30	-	972.51
Geology - Consultants	1,514.73	-	346.27	243.64	171.06	181.43	42.51	1,447.33	43.54	74.65
Geology - Contractor	-	-	-	-	-	-	-	1,440.00	-	-
Drilling _RAB	44,102.00	11,477.50	-	-	-	-	-	5,378.00	-	-
Assaying - RAB & Other	10,904.00	963.00	-	-	-	-	-	330.00	-	2,526.50
Geochemistry	3,665.93	-	4,152.47	15,833.22	3,641.78	3,648.91	-	-	1,195.70	6,284.21
Petrology - Consultants	111.04	361.06	-	-	-	-	-	111.04	-	695.84
Geophysics - Consultants	156.82	702.30	-	-	-	-	-	1,148.91	3,603.28	-
Aeromagnetics	3,807.85	32,076.81	6,200.51	5,319.93	4,697.31	4,786.27	3,594.38	11,781.51		3,870.11
<b>Total = \$ 384,704.99</b>	<b>158,660.56</b>	<b>80,997.16</b>	<b>14,466.37</b>	<b>26,580.73</b>	<b>9,846.22</b>	<b>10,194.14</b>	<b>3,636.89</b>	<b>55,640.99</b>	<b>4,842.52</b>	<b>19,839.41</b>
<b>Covenant</b>	<b>\$35,000</b>	<b>\$26,700</b>	<b>\$45,000</b>	<b>\$85,000</b>	<b>\$26,700</b>	<b>\$28,400</b>	<b>\$11,500</b>	<b>\$202,400</b>	<b>\$10,600</b>	<b>\$12,000</b>
<b>Fees not included in the Expenditures</b>										
Tenements	106,921.39	1,684.19	616.63	1,262.17	1,072.15	1,082.15	5,040.00	107,963.33	952.15	982.16
CLC Compensation	10,721.22	250.00	3,343.98	250.00	250.00	250.00	250.00	11,817.29	250.00	-
CLC Meetings	1,027.82	17,565.16	844.04	843.99	843.99	843.99	-	1,027.82	843.99	843.99
CLC - Consultants	905.23	2,795.73	-	-	-	-	-	905.23	-	-
<b>Total = \$284,249.79</b>	<b>119,575.66</b>	<b>22,295.08</b>	<b>4,804.65</b>	<b>2,356.16</b>	<b>2,166.14</b>	<b>2,176.14</b>	<b>5,290.00</b>	<b>121,713.67</b>	<b>2,046.14</b>	<b>1,826.15</b>



## 5.0 PROPOSED WORK PROGRAM 2002-2003

The work programme for the next reporting period will consist of :

- Deep RC drilling within EL 8077 to test aeromagnetic targets
- Follow up drilling within EL 22179 to test the Bluehart anomaly and mapping to delineate any possible anomalism on surface.
- Follow up drilling within EL 10283 to test the Tawny Devil anomaly and a site visit to delineate any possible anomalism on surface.
- Follow up drilling within EL 10299 to test the validity of the Kobi anomaly and site visit to delineate any possible anomalism on surface.
- Follow up drilling within EL 10411 to complete the pattern commence in 2001.
- The main focus within EL9479, 10282, 10300, 10355 & 22177 will be on analysis of the worms and definition of potential targets in regard to drilling and previous sampling.

See Table 4 for proposed expenditures.

**TABLE 4 Proposed expenditure 2002-2003**

<b>Tenement</b>	<b>Proposed Expenditure</b>
EL 8077	\$21,000
EL 9479	\$10,000
EL 10282	\$8,500
EL 10283	\$15,000
EL 10299	\$14,000
EL 10300	\$8,000
EL 10355	\$7,000
EL 10411	\$30,700
EL 22177	\$8,000
EL 22179	\$15,000
<b>TOTAL</b>	<b>\$137,200</b>

## 6.0 ENVIRONMENTAL

Environmental disturbance has been kept to a minimum wherever possible. Mature trees were not disturbed and trimming of vegetation was limited to small bushes and grasses in order to obtain line of sight in gridding. All rubbish was removed from sites.

Differential GPS placed all drilling gridlines. All drill pads were cleared by hand and all Angle RAB and postholes were plugged with concrete plugs and back filled.

See Appendix 1 for environmental register.

**Maryanne Muir**  
**Contracting Geologist**

## 7.0 BIBLIOGRAPHY

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**Tunks, A. J.**, 1996, *Geology of the Tanami Gold Mine, Northern Territory*, PhD Thesis, University of Tasmania, Hobart.

# **APPENDIX 1**

## **Environmental Register**

**OTTER GOLD NL**  
**TENEMENT ENVIRONMENTAL MANAGEMENT REGISTER**  
**ENVIRONMENTAL IMPACT RECORD**

**Tenement Name:** Legend 2      **No:** EL's 8077, 9479, 10282, 10283, 10299,  
10300, 10355, 10411, 22177 & 22179

**Report Ref No's:** Legend 2 1st Annual Report – July 2002

**Exploration Activities:** Low impact geochemical sampling.  
Medium impact posthole/regional Angle RAB drilling

**Grid & Traverses:** DGPS lines.

**Soil Sampling:** 134 surface samples – EL 8077  
265 surface samples - EL 10282  
619 surface samples - EL 10283  
134 surface samples - EL 10299  
208 surface samples - EL 10300  
11 surface samples - EL 22177  
530 surface samples - EL 22179

**Costeans/pits:**

**Drilling:** EL 9479 49 postholes (1254m drilling)  
EL 8077 65 postholes (2398m drilling)  
EL 8077 38 Angle RAB holes (2031m drilling)

**Drill Traverses:** DGPS located – only bushes under 2m were knocked over  
to aid in line of site gridding.

**Drill Pads:** Cleared by hand and left to rehabilitate naturally

**Ground Geophysics:**

**Access Track:** Existing tracks used. Regional sampling took place using a  
helicopter. Infill sampling and drilling took place using  
existing tracks where available.

**Camps:**

**Other:**

**Compiled by:** Maryanne Muir

**Date:** 2/7/02

**OTTER GOLD NL  
TENEMENT ENVIRONMENTAL MANAGEMENT REGISTER**

**REHABILITATION RECORD**

<b><u>Tenement Name:</u></b>	Legend 2	<b><u>No:</u></b>	EL's 8077, 9479, 10282, 10283, 10299, 10300, 10355, 10411, 22177 & 22179
<b><u>Disturbance:</u></b>	Low - Med impact	<b><u>Rehabilitation Date:</u></b>	24/7/01
<b><u>Grids &amp; Traverses:</u></b>	DGPS lines left to rehabilitate naturally		
<b><u>Soil Sampling:</u></b>	Surface holes backfilled		
<b><u>Costeans/pits:</u></b>			
<b><u>Drilling:</u></b>	EL9479/EL8077/EL10411 – all postholes plugged with concrete plugs and backfilled and left to rehab naturally. EL8077 Angle RAB holes plugged with concrete plugs and backfilled – left to rehab naturally		
<b><u>Drill Pads/Access:</u></b>	Drill pads cleared by hand and left to rehab naturally		
<b><u>Ground Geophysics:</u></b>			
<b><u>Access Tracks:</u></b>	Still required.		
<b><u>Camps:</u></b>			
<b><u>Other:</u></b>			
<b><u>Inspected / Clearances:</u></b>		<b><u>Bond/Security released:</u></b>	
<b><u>Compiled by:</u></b>	Maryanne Muir	<b><u>Date:</u></b>	2/7/02
<b><u>Follow-up Inspection Report:</u></b>			

# **APPENDIX 2**

## **Sampling Data**

See attached files.

# **APPENDIX 3**

## **Geophysical Data**

See attached files.



# **APPENDIX 4**

## **Petrology Data**

***Central Desert Joint Venture***

***Legend 2 Agreement***

***EL 22179***

***Bluehart Petrology***

***Applied Petrological Services***

SAMPLE NUMBER: 655690

LOCATION: ELA 22179, Bluehart project area

ROCK NAME: Sheared/deformed, thermally metamorphosed interbedded carbonaceous mudstone and muddy siltstone

FIELD DESCRIPTION: Gneiss, possibly a metamorphosed sediment. Host to platy augen minerals. Foliation defined by a platy white mineral. Overlying a slate in outcrop. 2 ppb Au.

OFFCUT DESCRIPTION:

A medium to dark grey and locally red-brown, strongly oxidised/weathered, crystalline and foliated or banded, fine to medium grained metamorphic rock. Coarse sand to granule-sized silicate augen are enclosed by within an anastomosing assemblage of quartz + mica. The metamorphic mineralogy is strongly overprinted by hematite.

THIN SECTION DESCRIPTION

LITHOLOGY: PRIMARY MINERALOGY, TEXTURES

A crystalline rock that has a penetrative fabric defined to some extent by the distribution and orientation of platy mica minerals. The composition of the rock is estimated as:

Quartz (24%)

Muscovite (25%)

Andalusite (5%)

Feldspar/cordierite (10%)

Biotite (1%)

Rutile (1%)

Graphite (35%)

Pyrite (<1%)

Pyrrhotite (<1%)

Chalcopyrite (<1%)

The composition of the rock is dominated by fine grained, equigranular, subhedral to anhedral quartz and muscovite. In places the muscovite is medium grained. Minor amounts of similar sized (ghosted) feldspar (?plagioclase) or cordierite are interlocking with and interstitial to the quartz and muscovite. Present are porphyroclasts of medium to coarse-grained euhedral, tabular and ghosted andalusite. The muscovite and quartz are host to abundant very fine-grained inclusions of tabular to prismatic graphite. Graphite is also interstitial to the silicate minerals. Grains of rutile are interlocking with the granular quartz, feldspar and platy muscovite. Sparse grains of pyrrhotite occur as inclusions with the rutile. Sparse grains of very fine-grained pyrite are interstitial to the silicate minerals. Trace amounts of biotite occur as inclusions within quartz.

An early penetrative fabric was defined by segregation banding. Bands of exclusive, medium grained muscovite were interposed with bands of equigranular quartz + muscovite. The fabric is enhanced by a preferred to sub-preferred orientation of muscovite both with the muscovite-exclusive bands and quartz + muscovite bands. Within the coarser grained muscovite plates, a sub-fabric is defined by a preferred orientation of graphite grains.

Late shearing has taken place along the orientation of foliation/banding. Fragments of the muscovite-rich layers/bands have been dislocated and sub-rotated to lie at variable angles to the initial layered fabric. The andalusite porphyroblasts have also been rotated or sub-rotated. The resulting fabric is mylonitic with rotated blocks of medium to coarse grained (graphite impregnated) muscovite and tabular to prismatic medium to coarse grained andalusite forming augen amongst and anastomosing network of finer grained quartz and muscovite.

The rock has discrete and discontinuous veinlets (at high angles to plane of strain) of fine to very fine-grained anhedral quartz. In places muscovite is intergrown with the quartz.

ALTERATION

#### REPLACEMENT

Alteration is weak. Andalusite and finer grained feldspar/cordierite are replaced by fine-grained muscovite. The muscovite altered feldspar and andalusites have undergone strong plastic deformation.

#### DEPOSITION

Fine-grained muscovite has formed along discontinuous shears and cavities located along shears.

#### COMMENTS

Thermal metamorphism of a carbonaceous mudstone and siltstone within a local or regional strain environment. The early alternating bands of muscovite -rich domains and bands of quartz + muscovite may reflect a primary sedimentary layering: carbonaceous mudstone and carbonaceous muddy siltstone. Impregnation of muscovite with abundant graphite has made them behave in a more brittle manner. Retrograde alteration associated with ongoing shearing and deformation, is represented by sericite/muscovite after andalusite and feldspar. The presence of biotite and andalusite indicates upper amphibolite facies possibly pyroxene hornfels facies contact metamorphism. The rock may in fact be described as a mylonitic gneiss.

SAMPLE NUMBER: 655691

LOCATION: ELA 22179, Bluehart project area

ROCK NAME: thermally metamorphosed interbedded  
carbonaceous muddy siltstone and siltstone

FIELD DESCRIPTION: Gneiss, possibly a metamorphosed basalt. Has white rod-like mineral parallel to foliation/banding. From erosion resistant outcrop. <1 ppb Au.

OFFCUT DESCRIPTION:

A medium to dark grey and locally red-brown, strongly oxidised/weathered, crystalline and foliated or banded, fine to medium grained metamorphic rock. Coarse sand to granule-sized silicate porphyroblasts are enclosed by within an anastomosing assemblage of quartz + mica. The metamorphic mineralogy is strongly overprinted by hematite in places.

THIN SECTION DESCRIPTION

LITHOLOGY: PRIMARY MINERALOGY, TEXTURES

A crystalline rock that has a penetrative banded or foliated fabric. The composition of the rock is estimated as:

Quartz (25%)  
Muscovite (20%)  
Andalusite (12%)  
Cordierite(12%)  
Biotite (1%)  
Rutile (<1%)  
Graphite (30%)  
Pyrite (<1%)  
Pyrrhotite (<1%)  
Chalcopyrite (<1%)

The composition of the rock is dominated by fine grained, equigranular, subhedral to anhedral quartz and muscovite. Anhedral, tabular grains of cordierite are mostly mutually interlocking with quartz. The quartz, cordierite and muscovite enclose Porphyroclasts of medium to coarse-grained euhedral, tabular to prismatic and ghosted andalusite. The muscovite and quartz are host to abundant very fine to ultra fine-grained inclusions of tabular to prismatic graphite. Grains of rutile are interlocking with the granular quartz, feldspar and platy muscovite. Sparse grains of pyrrhotite occur as inclusions with the rutile. Sparse grains of very fine-grained pyrite are interstitial to the silicate minerals. Minor to trace amounts of biotite occur as inclusions within quartz.

A penetrative fabric was defined by segregation banding. Those bands relatively rich in muscovite and graphite, and those bands relatively rich in cordierite define banding or foliation. Quartz is evenly distributed between the muscovite and graphite-rich bands and the cordierite rich (and graphite poor) bands. Within the muscovite rich bands, muscovite has a sub-preferred orientation. Within the muscovite rich bands, graphite mostly occurs as inclusions within muscovite. The andalusite porphyroclasts are contained mainly within the bands that are relatively rich in cordierite.

Discrete, late shearing has taken place along the orientation of foliation/banding. The andalusite porphyroblasts have also been rotated or sub-rotated into the plane of mineral segregation and preferred orientation of muscovite. The resulting fabric is weakly mylonitic.

The rock has discrete and discontinuous veinlets of fine to very fine-grained anhedral quartz. In places muscovite is intergrown with the quartz, or the veinlets are sealed exclusively with fine-grained muscovite.

## ALTERATION

### REPLACEMENT

Alteration is weak. Andalusite is completely replaced by fine-grained muscovite or coarse grained sericite. The muscovite altered feldspar and andalusite have undergone weak to moderate plastic deformation. Cordierite is partly altered to sericite/muscovite. Cordierite is altered more pervasively to smectite and kaolinite.

### DEPOSITION

Fine-grained muscovite has formed along discontinuous shears and cavities located along shears. Late-stage microfractures and residual cavities are sealed or lined with zeolites, hematite and goethite.

### COMMENTS

Thermal metamorphism of a carbonaceous mudstone and siltstone within a local or regional strain environment. The segregation banding defined by layers rich in muscovite and graphite and those relatively rich in cordierite may be interpreted to reflect primary bedding: A carbonaceous mudstone or muddy siltstone interbedded with a less carbonaceous siltstone. Retrograde alteration associated with ongoing shearing and deformation, is represented by sericite/muscovite after andalusite. The presence of biotite and andalusite indicates upper amphibolite possibly pyroxene hornfels facies contact metamorphism. The rock may in fact be described as a porphyroblastic gneiss.

# *Applied Petrological Services*

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**PETROLOGICAL STUDIES  
OF  
SUBSURFACE (RAB) AND SURFACE ROCK SAMPLES  
FROM  
SOUTH TALBOT, TANAMI DESERT**

**FOR  
OTTER EXPLORATION NL**

**October 2000**

APS Report 199  
Project No. 04054

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## SUMMARY

### BOTTOM OF HOLE RAB CHIPS

A petrological study has been undertaken on a selection of bottom-of-hole RAB chips from the Talbot South project area. From a mainly hand-specimen analysis of these RAB chips, the essential findings and comments are:

1. Alteration of the siltstone/mudstone lithologies is that of diagenesis to incipient regional metamorphism (or sub-greenschist facies). Petrographic studies of sample 993043 reveals a low-grade regional metamorphic mineralogy comprising quartz + illite + chlorite + carbonate. The micas (muscovite and biotite) present are detrital, with individual grains rotated into a plane of strain to provide a subtle but penetrative fabric. There appears to be no evidence of thermal metamorphism, certainly not of a greenschist facies grade. Colour variations in the rock (chocolate brown to green) relate to the preference for supergene hematite to have formed in the (detrital opaque bearing) siltstone rather than the mudstones.
2. The weakly metamorphosed, and relatively undeformed; mica-bearing mudstones/siltstones could well be depositional facies of the Gardiner Sandstone. This suggestion is based on:
  - a). Mica bearing variations of Gardiner Sandstone occur in the northern wall of the Carbine Pit (APS report 4032). At this location variations on the typically quartz-rich Gardiner Sandstone are well exhibited (although they are probably now not accessible).
  - b). In a drill section (WTDH003) at Galifrey, a sequence of conglomerates and mudstones/siltstones appear strongly to be conformable with overlying (outcropping), quartz-rich Gardiner Sandstone (defining a low lying resistant ridge). In diamond core, channels of conglomerate and mica bearing sandstone are set within a thick sequence of chocolate-brown and locally pale green mudstones and siltstones very similar in appearance and metamorphic grade to those identified in the RAB samples of this analysis. Higher up in the RC pre-collar core, a typically quartz-rich Gardiner Sandstone grades downwards into the chocolate-brown siltstone and mudstone. The interbedded siltstones/mudstones and conglomerates in WTDH003 have a relatively flat lying SW dipping orientation similar to overlying Gardiner Sandstone, that is in contrast to the steep NE dipping orientation of other sediments in Galifrey core.

In relation to the above, it is recommended that a review of the sediments as they occur in WTDH003 and associated pre-collar RC chip be undertaken. In reviewing these sediments and related structure, conclusions may be drawn as to whether or not the mudstones (and conglomerates) are in fact part of the Gardiner Sandstone. This would be a good step towards establishing whether or not the mudstones/siltstones that occur at the bottom of RAB core at Talbot could be part of the Gardiner Sandstone.

### SURFACE SAMPLES

Surface rock chips (Ela1 and Ela2a) taken from the Talbot South area are a strongly weathered, silty fine sandstone and muddy siltstone. Texturally, and as far as can be determined compositionally, these rocks are very similar to those described from bottom-of-hole RAB chips (993043). Pervasive hematite (especially in the finer grained rock) has mostly obscured any regional metamorphic mineralogy, but in sample Ela2a some amounts of relict illite are preserved. In essentially having similar primary rock and secondary mineral features to bottom-of-hole RAB



chips, the surface rock chips from Talbot South may also be considered to be belonging to the Gardiner Sandstone Formation, but just highly weathered.

Quartz vein material (Ela2b) from a surface location is interpreted to be of a hydrothermal nature. The presence of ghosted (by supergene chalcedony) and leached bladed carbonate suggests the quartz may have been epithermal in origin. The primary rock type of the minor amounts of wallrock marginal to the hydrothermal vein quartz is unresolvable as a result of strong weathering.

## RESULTS

TABLE 1. PETROLOGICAL SUMMARY

Sample	Lithology	Wallrock Replacement	Deposition
993043 BOH RAB	Interbedded, muscovite and biotite bearing, lithic/feldspathic quartz siltstone and silty mudstone	45% -quartz, illite, chlorite, carbonate, opaques - hematite, goethite	(veinlet) hematite
Ela1	Lithic/feldspathic quartz (muddy siltstone)	70% - quartz, ?pyrite - hematite, smectite/kaolinite	(veinlet) hematite
Ela2a	Silty fine sandstone	60% - quartz, illite, ?carbonate - hematite, smectite/kaolinite	(veinlet) hematite
Ela2b	(hydrothermal quartz vein lithology attached to unknown wallrock lithology)	100% - (weathering) chalcedony, hematite, goethite	- (vein/cement) quartz, ?silicate, carbonate, opaques; chalcedony (after carbonate) - (cavity/veinlet) hematite, goethite

**APPENDIX ONE:**

**PETROGRAPHIC/MINERAGRAPHIC DESCRIPTIONS**

SAMPLE NUMBER: 993043

Talbot South

LOCATION:

ROCK NAME: Interbedded siltstone and silty mudstone

FIELD DESCRIPTION: Siltstone

OFFCUT DESCRIPTION:

A selection of subangular, sand to pebble-sized RAB chips. The RAB chips are of medium to dark green and brown, weakly weathered muddy siltstone or silty mudstone. Laminated fabrics are defined by alternating laminae of brown and green siltstone/mudstone. Detrital muscovite is present.

THIN SECTION DESCRIPTION

LITHOLOGY: PRIMARY MINERALOGY, TEXTURES

The RAB chips have relict fragmental textures. The majority of the laminae comprise well sorted; framework clast supported populations of angular to subangular, silt-sized framework clasts. The framework clast population comprises:

Quartz (71%)

Feldspar (10%)

Muscovite (4%)

Tourmaline (1%)

Rock fragments (10%)

Biotite (2%)

Opaques (2%)

Monocrystalline quartz dominates the detrital framework clast assemblage. Identifiable rock fragments are of quartz + muscovite and possible volcanic (porphyritic textured) fragments. Detrital fragments of biotite, tourmaline and muscovite are also present. Plates of muscovite have been rotated into the plane of lamination. Some amounts of a detrital opaque mineral (magnetite ?) are present.

The siltstone laminae are interposed with laminae characterised by sparse, angular, silt-sized fragments enclosed by a more voluminous, secondary mineralogy that has formed after a primary mud-sized detrital assemblage. A penetrative fabric within these mudstone domains is defined by a weak preferred orientation of secondary clay minerals. The sparse silt-sized detrital fragments are of quartz.

ALTERATION

REPLACEMENT

Alteration is moderate to strong (45%). Muscovite, biotite, tourmaline and significant amounts of detrital quartz and feldspar remain preserved. Replacement minerals are quartz (35%), illite (25%), chlorite (5%), carbonate (35%) and opaques (<1%). Detrital quartz is in most places partly recrystallised. The secondary quartz is intergrown with pervasive illite that has formed after matrix and parts of the detrital feldspar. Biotite is partly altered to chlorite. The secondary quartz and illite are intergrown with and overgrown by pervasive fine to very fine-grained carbonate. The voluminous mudstone laminae are altered to pervasive illite.

The secondary and detrital opaques are altered to hematite and possible goethite. Ultra fine-grained hematite and goethite partly mask the secondary silicate minerals.

DEPOSITION

Discrete microfractures are sealed with ultra fine-grained hematite.

COMMENTS

Lamination is defined by interposed siltstone and mudstone laminae. Banding is also partly defined by the distribution of detrital opaques, and hydrated Fe-oxides that have formed after these opaques. The mudstone laminae are predominantly green, whereas the detrital opaque bearing siltstone laminae are predominantly brown as a result of hematite after the opaques. Detrital biotite is present.

SAMPLE NUMBER: Ela2b

Talbot South

LOCATION:

ROCK NAME: Hydrothermal vein quartz

FIELD DESCRIPTION: Vein quartz

OFFCUT DESCRIPTION:

A mottled medium brown to yellow-brown, strongly oxidised/weathered, hematite and goethite bearing, fragment of drusy vein quartz. Some of the coarser grained, more euhedral, late-stage quartz is amethystine in appearance. Early silica deposition or formation is amorphous in appearance.

THIN SECTION DESCRIPTION

LITHOLOGY: PRIMARY MINERALOGY, TEXTURES

A wallrock lithology, marginal to the vein or cavity fill assemblage, has been totally leached and replaced. Primary wallrock textures are not preserved.

ALTERATION

REPLACEMENT

Leaching is complete. The leached rock is replaced by chalcedony, some of which is strongly colloform banded. Abundant, ultra fine to very fine-grained hematite and goethite occur as inclusions within the chalcedony.

DEPOSITION

A voluminous deposition assemblage.

The vein or cavity filling assemblage comprises:

Quartz (92%)

Silicate ? (<1%)

Carbonate (<1%)

Chalcedony (8%)

Opaques (<1%)

Fine to coarse grained, tabular to prismatic, anhedral to euhedral quartz dominated the cavity fill assemblage. Secondary, liquid-rich fluid inclusion lie along annealed microfractures. Trace amounts of a needle-like mineral occur as inclusions within or along grain boundaries to the quartz. Trace amounts of an ultra fine-grained opaque mineral occur as inclusion within the quartz.

The anhedral to euhedral quartz is host to linear or bladed structures, some of which are parallel and some of which are intersecting. The structures are defined by mainly by the presence of chalcedony and/or chalcedonic quartz. The chalcedony and chalcedonic quartz is characterised by an abundance of ultra fine-grained hematite inclusions. The chalcedony encloses abundant inclusions of very fine to ultra fine-grained carbonate.

Residual cavities and late microfractures are sealed with ultra fine-grained hematite and goethite.

COMMENTS

Hydrothermal quartz (associated with Antrim plateau volcanics ?). The later formed chalcedony and chalcedonic quartz (after amorphous silica) are representative of weathering. The quartz encloses inclusions of a silicate mineral that cannot be identified. The cavity sealing assemblage that is dominated by quartz, may be interpreted to have original contained some amounts of carbonate. The carbonate was in a bladed form and has been leached and replaced by chalcedony and chalcedonic quartz.

SAMPLE NUMBER: Ela2a

Talbot South

LOCATION:

ROCK NAME: Silty fine quartz sandstone

FIELD DESCRIPTION: Weathered outcrop

OFFCUT DESCRIPTION:

A medium to dark brown-red, strongly oxidised, hematite bearing, quartz-rich fine sandstone. The presence of non-quartz detrital fragments is evidenced by the presence of clay after some fragments.

THIN SECTION DESCRIPTION

LITHOLOGY: PRIMARY MINERALOGY, TEXTURES

A moderately well preserved primary fragmental texture. The rock comprises a mostly preserved, well sorted, matrix to framework clast supported population of silt to fine sand sized, angular framework clasts. The most abundant, preserved framework clast is of detrital quartz (60% of rock). Also preserved are detrital fragments of muscovite and tourmaline (1% of rock). Rock fragments of polycrystalline quartz (some as chert ?) are also present (5% of rock). Some quartz fragments contain inclusions of ultra fine grained to very fine-grained muscovite.

ALTERATION

REPLACEMENT

Alteration is moderate to strong (60%). All with the exception of some amounts of detrital quartz are altered. Matrix, rock fragments and possible feldspar fragments are totally masked by pervasive, ultra fine to very fine-grained hematite. Some amounts of the detrital quartz are recrystallised. Grains of carbonate in places are ghosted by the pervasive hematite. Intergrowths of illitic clay and very fine-grained quartz are relict within the pervasive hematite. Some amounts of smectite and/or kaolinite are intergrown with the hematite.

DEPOSITION

Microfractures are sealed with ultra fine-grained hematite.

COMMENTS

A strongly oxidised fine sandstone. An equivalent of the siltstone from the bottom of RAB holes. Only quartz is preserved from the detrital framework clast assemblage. Relict within the hematite overprint is a quartz + illite + carbonate alteration (regional).

SAMPLE NUMBER: Ela1

Talbot South

LOCATION:

ROCK NAME: Strongly masked, lithic/feldspathic quartz (muddy) siltstone

FIELD DESCRIPTION: Mudstone/siltstone outcrop

OFFCUT DESCRIPTION:

A medium to dark brown to red-brown, strongly oxidised/weathered, hematite bearing, laminated, silty mudstone. The sediment contains detrital muscovite. Laminations are partly defined by relative concentrations of detrital muscovite.

THIN SECTION DESCRIPTION

LITHOLOGY: PRIMARY MINERALOGY, TEXTURES

A primary fragmental texture. The rock comprises a partly preserved, but mostly ghosted, well sorted, framework or matrix supported population of angular, silt-sized framework clasts. The framework clasts are interposed with indeterminable amounts of muddy matrix (up to 20 % ?). Preserved framework clasts are mainly of monocrystalline quartz. Less abundant, preserved framework clasts are of muscovite and tourmaline. Sparse rock fragments of chert are resolvable in some parts of the rock. The detrital muscovite flakes lie in a common plane. A crude lamination is defined by marginally perceivable grain-size variations. Sparse, detrital Fe-oxides (hematite after magnetite) are present.

ALTERATION

REPLACEMENT

Alteration is strong (70%). With the exception of detrital muscovite and tourmaline and some amounts of detrital quartz, the detrital assemblage is totally replaced or masked. The lithology is masked/replaced by pervasive very fine to ultra fine-grained hematite. Enclosed by the pervasive hematite are sparse, relict grains of pyrite.

DEPOSITION

Microfractures are sealed with ultra fine-grained hematite.

COMMENTS

A muddy siltstone. Detrital biotite was possibly present, but has been altered to clays.