

**First Annual Report**  
**on**  
**EL 4/2010 – EVANDALE**

**Reporting Period:** 14 September 2010 – 13 August 2011  
**Project Operator:** ABx4 Pty Ltd  
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**Date:** 11 August 2011

**COORDINATES ARE WGS84 (GDA94/MGA55)**

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# 1 ABSTRACT

## Objective:

Exploration Licence (EL) 4/2010 “Evandale” was applied for in order to facilitate an exploration program to discover economically viable deposits of bauxite associated with Tertiary Volcanics, in an area with old penepained surfaces preserved as plateaus. The goal of the program is to determine the quality and quantity of the bauxite in the area using an RC drill rig mounted on a light Mitsubishi 12 tonne truck.

## Methodology:

1. Detailed geological mapping, including geomorphological mapping, to define the areas with best potential for bauxite.
2. Systematic sampling of natural outcrops and exposures in road cuts of lateritic weathering profile.
3. Chemical analyses of samples, including specialist analyses to determine total and available alumina, total and reactive quartz, loss on ignition and other analyses as required in bauxite search.
4. Drill testing of zones with best potential defined by work under 1, 2. and 3, by an RC drill rig mounted on a light Mitsubishi truck to get samples representing the whole lateritic weathering profile (from upper-most iron rich zone through alumina rich zone down into mottled and pallid saprolite zone).
5. Systematic drill testing at close spacings to obtain data for resource estimation in the best target areas defined by programme under 4.

## Results:

Over the reporting period a total of 21 holes were drilled in the Evandale Tenement for a total of 126m.

## Recommendations for future work:

Recommendation for future work include further:

- Detailed geological mapping, including geomorphological mapping and study of satellite images to define the areas with the best potential for bauxite.
- Systematic sampling of natural outcrops and exposures in road cuts of lateritic weathering profile.
- Chemical analyses of samples, including specialist analyses to determine total and available alumina, total and reactive quartz, loss on ignition and sieving (+0.26mm) at 260 microns as required in the bauxite search.
- Drill testing of zones with best potential with an RC drill rig mounted on a light six wheel truck to get samples representing the whole lateritic weathering profile (from upper-most iron rich zone through alumina rich zone down into mottled and pallid saprolite zone).
- Systematic drilling at close spacings to obtain data for preliminary resource estimation in the best target areas defined by program.

**ABSTRACT Cont**

- Systematic sampling and drilling at waypoints with best bauxite potential.
- Detailed analysis of assay results to determine assaying strategy for future drilling.

## 2 INTRODUCTION

### Exploration Rationale

Exploration Licence (EL) 4/2010 “Evandale” was applied for in order to facilitate an exploration program to discover economically viable deposits of bauxite associated with Tertiary Volcanics, in an area with old peneplained surfaces preserved as plateaus. The goal of the program is to determine the quality and quantity of the bauxite in the area using an RC drill rig mounted on a light Mitsubishi 12 tonne truck.

### Geological Setting

In the Evandale area, the occurrences of bauxite are located in areas with Tertiary basaltic volcanics.

Study of geomorphology based on a digital terrain model led the company’s geologist to the conclusion that Tertiary basaltic volcanics are preserved on remnants of old surface which form larger plateaus or smaller ‘mesas’.

Bauxite was formed during the Tertiary period when tropical climate prevailed (high rainfall and relatively high temperatures). Bauxite is present in the upper part of the ancient lateritic / saprolitic weathering profile. Except for the lateritic crust, ancient lateritic / saprolitic weathering profile is easily eroded because weathered rocks are soft.

However, under protective cover of Tertiary basaltic volcanics, large tonnages of bauxite may have been preserved. This concept is being tested by drilling.

The bauxite has formed in the lower areas of central Tasmania between two massive plateaus of Dolerite. The large valley is made up of Dolerite, young volcanics, recent sediment and some sandstone which have been extensively laterised. There is a small amount of older volcanics in the bauxite areas which are believed to be the source rock for the bauxite.

### Tenement Information

EL 4/2010 “Evandale” was granted on and from 14 September 2010 for a period of 5 years to ABx4 Pty Ltd (**ABx4**).

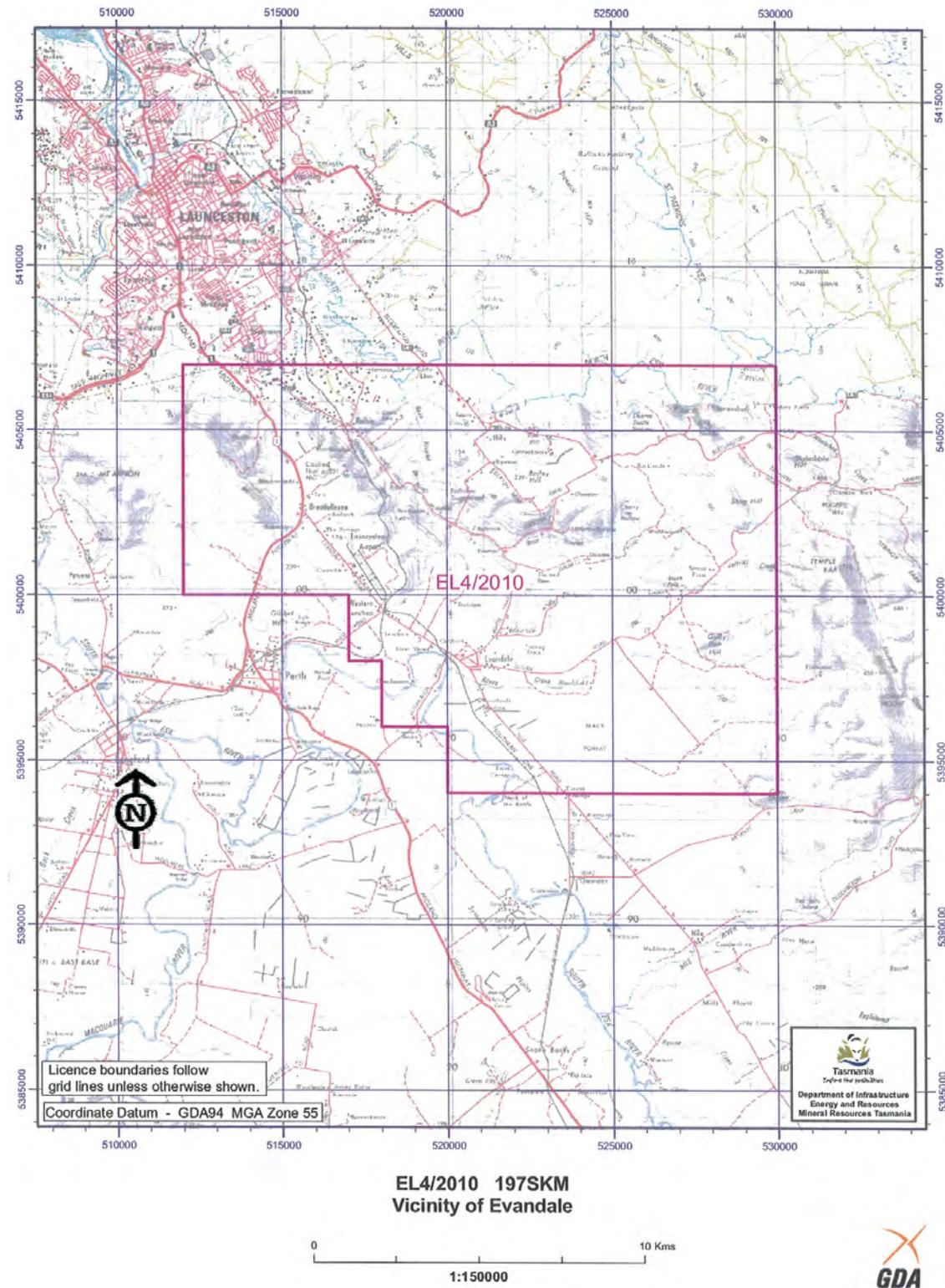
This is the First Annual Report for the reporting period 14 September 2010 - 13 August 2011 incorporating the results of work completed during the first year of tenure.

Total area of the Licence is 197 sq km and its Mineral Category is 1 – Metallic Minerals and Atomic Substances.

### Location

The Evandale Tenement is located from the edge of Launceston to Campbelltown where there is a rail line which connects all the ports of Tasmania to each other. Ports and rail way lines in Tasmania are generally under capacity and the Tenements are often over the working railway lines. EL 4/2010 is close to the City of Launceston which could offer a wide range of services and skilled work force.

**INTRODUCTION Cont**



Map 1 – Location Map of EL 4/2010 “Evandale”

**Tenure, including joint venture details and title transfers**

EL 4/2010 “Evandale” is 100% owned by ABx4 which is a 100% owned subsidiary of Australian Bauxite Limited.

### **3 REVIEW OF PREVIOUS WORK**

#### **Prior to Current Tenement**

Historical references for bauxite in the Evandale Tenement are reported by H.B. Owen in his book “Bauxite in Australia”, 1954, most notably in White Hills which was the basis for initial exploration of the area.

- H.B. Owen, 1954, Bauxite in Australia, Bulletin 24

#### **During current Tenement**

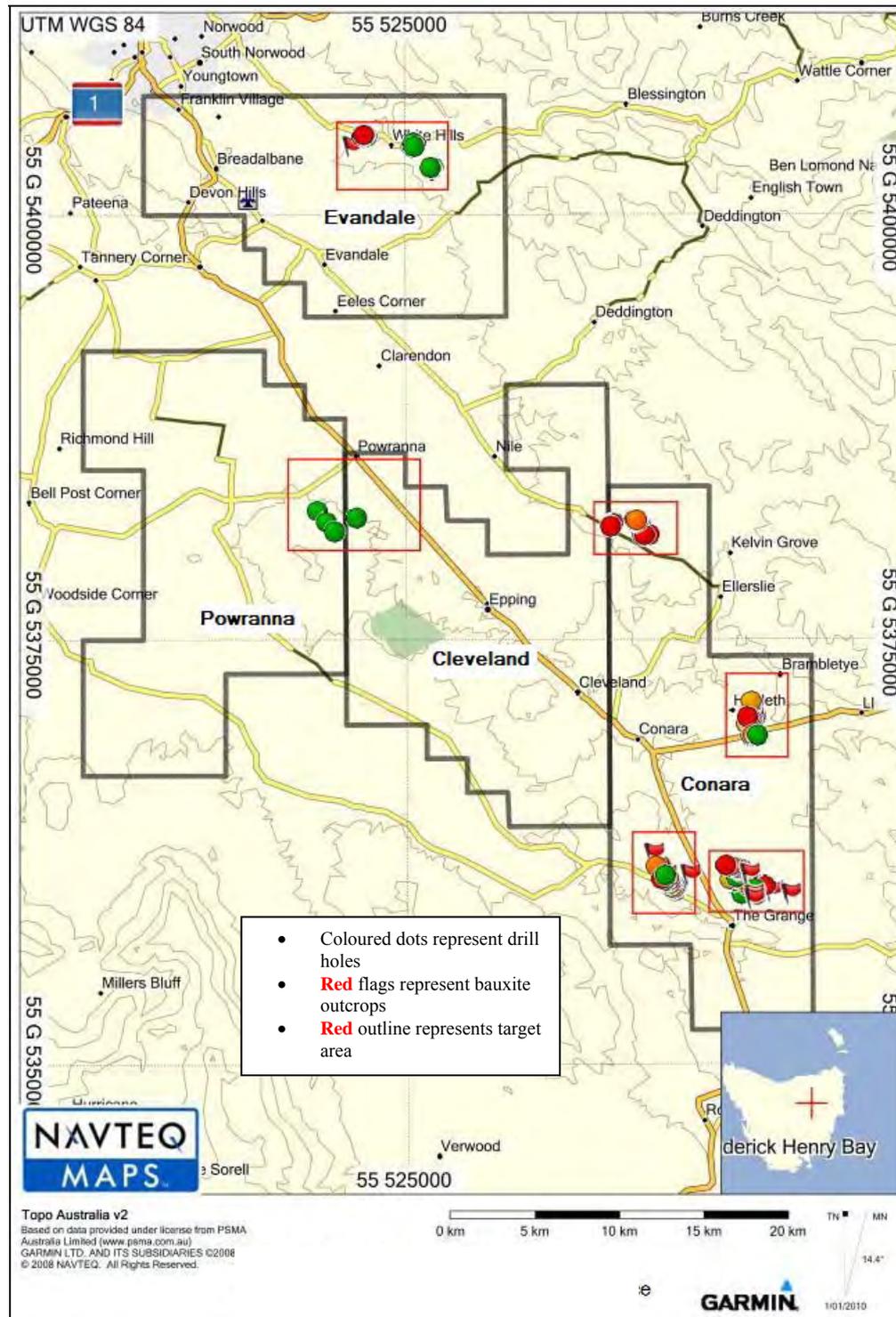
This is the first year of exploration in EL 4/2010.

## 4 EXPLORATION COMPLETED DURING THE REPORTING PERIOD

### Literature Review

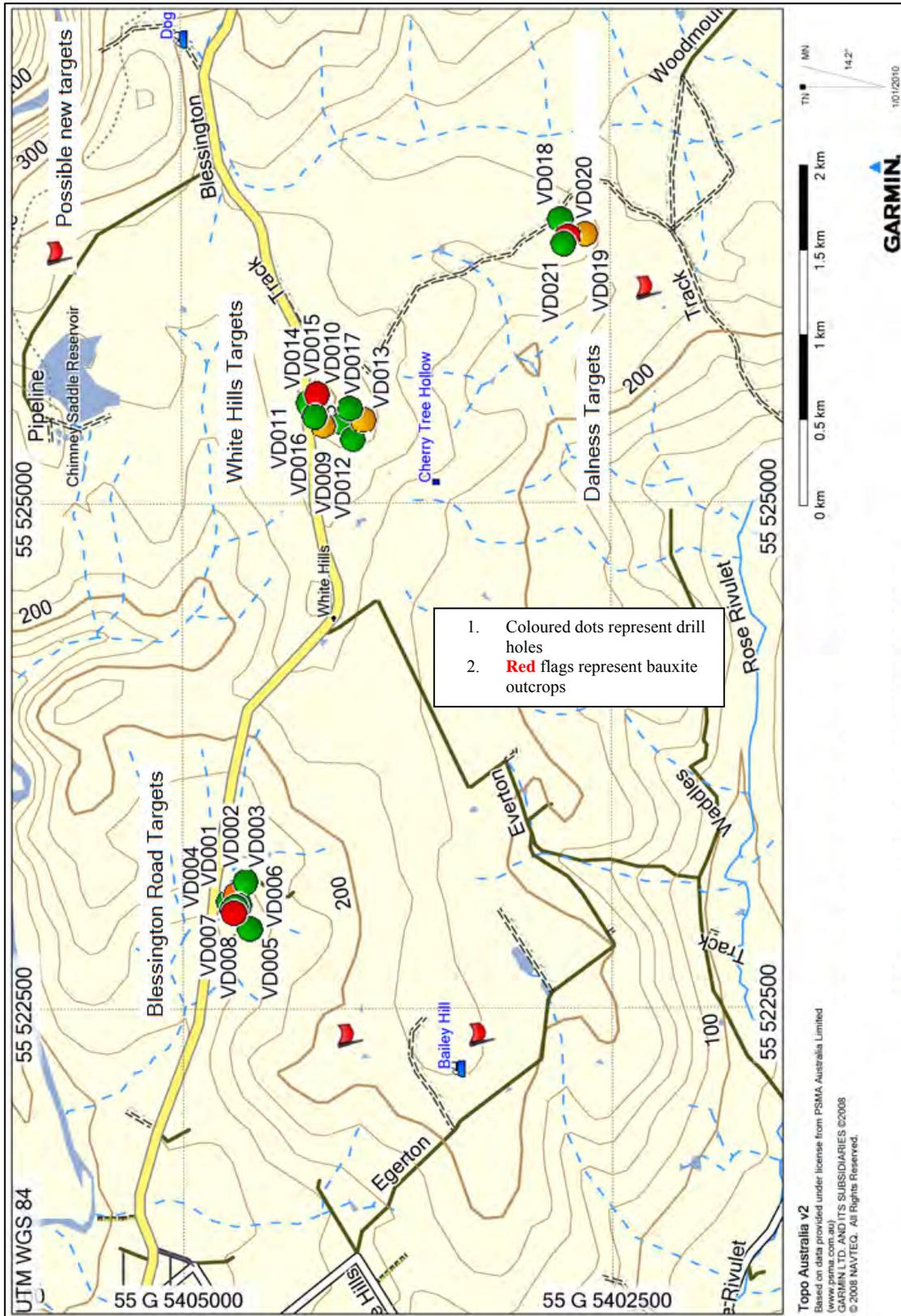
H.B. Owen, 1954, Bauxite in Australia, Bulletin 24

### Regional Exploration Activities



Map 2 –Location of Drill-hole Targets for EL 4/2010 Evandale, showing adjacent tenements held by ABx4

**EXPLORATION COMPLETED DURING THE REPORTING PERIOD Cont**



Map 3 – Close up of EL 4/2010 Target Areas

**EXPLORATION COMPLETED DURING THE REPORTING PERIOD Cont****White Hills Target****Total holes: 8 (VD009-VD016)**

The White Hills Target had consisted of two steep sided hills which had bauxite exposed down the slope and the host volcanics outcropping in a road cutting far below. The bauxite was described as a bauxite formed on Dolerite (Owen 1954), but the grey vuggy light-weight volcanic outcropping directly below the bauxite makes an excellent host rock for bauxite and hence the bauxite is more likely hosted in the volcanoclastic.

Despite good grades from reconnaissance sampling, no samples from this area had less than 12% reactive silica and recoveries for the area were very poor. The eastern hill was not drilled well because of the thick bushland but more drilling in this area is not recommended because of the very limited area available for bauxite formation.

**Blessington Road Target****Total Holes: 8 (VD001-VD008)**

This target outcrops along the Blessington road, down a paddock and under a home stead. This target has younger volcanic basalts over the top and if the bauxite extended under the basalts then the target could be very significant. Drilling showed a vertical contact between the bauxite and the basalt. This is believed to have formed from the heavy basalt flows 'pushing' the less solid bauxite down a hill like a bulldozer. It is seen in many areas where basalts are present next to bauxite and the 'push zones' are characterised by long skinny deposits with thick intercepts but vertical contacts with the basalt. (Bauxite can still form under the basalt but at EL 6997 Inverell (NSW) 6m of bauxite was found 27m below the basalt making it uneconomic).

Textures in this bauxite are similar to textures found in Dolerite but that was the only indicator of the bauxites origin. Bauxite deposits hosted in Dolerite are considered unfavourable because their size will likely be quite small and thin due to dolerite being an incredibly hard and solid rock and not porous in nature. Bauxitisation would be more difficult. The mottled zone beneath this bauxite was unique.

Three holes intersected bauxite with an average thickness of 3.5m and a maximum thickness of 5m. The average grade for bauxite in holes VD001-VD008 with a cut off grade of 2.5 A/S ratio is; 29.0% Available Alumina (avl  $\text{Al}_2\text{O}_3$ ), 8.5% Reactive Silica (rx  $\text{SiO}_2$ ), 39.8% Total Alumina, 10.5% Total Silica and 22.5% Iron oxide. Recoveries for the area were quite low averaging 53%. Sieving also was not very effective with only minor reductions in total silica. Total silica is too high in this target for it to be of any economic value.

**Dalness Targets****Total Holes: 4 (VD018-VD021)**

The Dalness Targets are very small bauxite occurrences, which are probably formed on dolerite, which is the major rock type for the area. The large ridges the occurrences formed on looked promising but were actually mostly dolerite with one corner of bauxite. The second area had a large pit but the occurrence was round but still very small.

Only one hole (VD019) intersected the bauxite zone which was 4m thick and had an average grade with a cut off grade of 2.5 A/S ratio of: 25.9% Available Alumina (avl  $\text{Al}_2\text{O}_3$ ), 2.9% Reactive Silica (rx  $\text{SiO}_2$ ), 32.4% Total Alumina, 4.5% Total Silica and 39.0% Iron oxide. Recoveries for the area were

**EXPLORATION COMPLETED DURING THE REPORTING PERIOD Cont**

quite low averaging 57%. Sieving appeared to be effective at reducing total and reactive silica but more results are required for accurate comparisons.

Exploration around the area has revealed other outcrops of red material from lateritic weathering but failed to achieve a significant grade. There are still plenty of areas till to be explored which have promising geology and also significant possibility of finding bauxite under basalts.

## 5 DISCUSSION OF RESULTS

Despite good grades from the reconnaissance sampling at the White Hill Target, no samples from this area had less than 12% reactive silica and recoveries for the area were very poor. The eastern hill was not drilled well because of the thick bushland but more drilling in this area is not recommended because of the very limited area available for bauxite formation.

At Blessington Road Target, three holes intersected bauxite with an average thickness of 3.5m and a maximum thickness of 5m. The average grade for bauxite in holes VD001-VD008 with a cut off grade of 2.5 A/S ratio is; 29.0% Available Alumina (avl  $\text{Al}_2\text{O}_3$ ), 8.5% Reactive Silica (rx  $\text{SiO}_2$ ), 39.8% Total Alumina, 10.5% Total Silica and 22.5% Iron oxide. Recoveries for the area were quite low averaging 53%. Sieving also was not very effective with only minor reductions in total silica. Total silica is too high in this target for it to be of any economic value.

At Dalness Target, only one hole (VD019) intersected the bauxite zone which was 4m thick and had an average grade with a cut off grade of 2.5 A/S ratio of: 25.9% Available Alumina (avl  $\text{Al}_2\text{O}_3$ ), 2.9% Reactive Silica (rx  $\text{SiO}_2$ ), 32.4% Total Alumina, 4.5% Total Silica and 39.0% Iron oxide. Recoveries for the area were quite low averaging 57%. Sieving appeared to be effective at reducing total and reactive silica but more results are required for accurate comparisons.

Exploration around the area has revealed other outcrops of red material from lateritic weathering but failed to achieve a significant grade. There are still plenty of areas till to be explored which have promising geology and also significant possibility of finding bauxite under basalts.

## 6 CONCLUSIONS AND RECOMMENDATIONS

Over the reporting period a total of 21 holes were drilled in the Evandale Tenement for a total of 126m.

Recommendations for future work include:

- Detailed geological mapping, including geomorphological mapping and study of satellite images to define the areas with the best potential for bauxite.
- Systematic sampling of natural outcrops and exposures in road cuts of lateritic weathering profile.
- Chemical analyses of samples, including specialist analyses to determine total and available alumina, total and reactive quartz, loss on ignition and sieving (+0.26mm) at 260 microns as required in the bauxite search.
- Drill testing of zones with best potential with an RC drill rig mounted on a light six wheel truck to get samples representing the whole lateritic weathering profile (from upper-most iron rich zone through alumina rich zone down into mottled and pallid saprolite zone).
- Systematic drilling at close spacings to obtain data for preliminary resource estimation in the best target areas defined by program.
- Systematic sampling and drilling at waypoints with best bauxite potential.
- Detailed analysis of assay results to determine assaying strategy for future drilling.

## 7 ENVIRONMENT

### **Surface Disturbing Operations:**

ABx4's surface disturbing operations are minimal.

Drilling is conducted by an RC drill rig mounted on a light Mitsubishi 12 tonne truck. All drill holes are filled immediately after completion.

Existing tracks are used wherever possible. In the event that any specific access is required for drill rigs and/or service vehicles, track construction will be minimised and in accordance with directions of any landowners who may be affected.

### **Surveys (archaeological, botanical):**

A botanical survey was conducted by Philip Milner Consultant Pty Ltd covering the White Hills Target Area within EL 4/2010.

Please refer to Appendix A for the complete Survey.

### **Rehabilitation:**

All drill holes are filled immediately after completion.

All landholders sign a rehabilitation statement at the completion of each program confirming their satisfaction with the rehabilitation completed.

## 8 EXPENDITURE

Table 1 – Exploration Activity and Expenditure Table for reporting period 14 September 2010 – 13 August 2011

Exploration Category	Description of Activity	Quantity	Expenditure
<b>Office Administration</b>			
<b>Authority Management</b>	Environment		
<b>Office Activities</b>	Data Processing & Interpretation		\$98
<b>Field Activities</b>	Geological Mapping		
	Sampling	core storage	
	Equipment Hire		
	Accommodation/Field Camp	Days	\$11,359
	Travel	Vehicle Hire	\$3,459
	Land Holder Liaison		
	Field Supplies		\$3,011
	Other	Freight Charges	\$172
	<b>Geophysics</b>		
	Airborne		
	Type	Line kms	
	Ground		
	Type	Line kms	
	<b>Drilling (program cost)</b>		
	RAB/AC	Holes/total metres	
	RC	21 holes for 126 metres	\$1,054
	Diamond	Holes/total metres	
	Other	Holes/total metres	
<b>Laboratory</b>	ME-XRF 13B, Reactive Silica & Available Alumina	79 Samples	\$3,196
<b>Salaries / Wages</b>	Employees	Field Assistance	\$376
	Contractors	3 personnel Dec 2010	\$3,619
		<b>Grand Total</b>	<b>\$26,344</b>

Note: Office Administration was met by parent company – Australian Bauxite Limited.

Total expenditure for all Tasmanian tenements from 14 September 2010 – 13 August 2011 is \$425,240.

The minimum annual expenditure requirement for all Tasmanian tenements is \$361,000. Although a shortfall has been met for EL 4/2010's annual expenditure, this was due to unfavourable assay results and a consequent emphasis given to exploration in other tenements such as Deloraine EL 9/2010.

Nevertheless, further reconnaissance exploration and drilling is planned for the next reporting period.

## **9 REFERENCES**

H.B. Owen, 1954, Bauxite in Australia, Bulletin 24

**First Annual Report**

**on**

**EL 4/2010 – EVANDALE**

**APPENDIX A – BOTANICAL SURVEY**

**ABx4 Pty Ltd**

**WHITE HILLS TARGET AREAS**  
**BOTANICAL & FAUNA HABITAT SURVEY OF PROPOSED DRILL**  
**SITES**

**For ABx4 PTY LTD**

**15<sup>th</sup> January 2011**



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**A.B.N.No. 32 068 906 258**

**Introduction:** **ABx4 Pty Ltd** the holder of Exploration Licenses EL4; EL5; EL6; EL7; EL8; EL9; and EL14/2010, a wholly owned subsidiary of Australian Bauxite Ltd is undertaking an exploratory program in an area of the midlands between Launceston and Cranbrook and is undertaking a targeted drilling program in four locations in the area of White Hills.

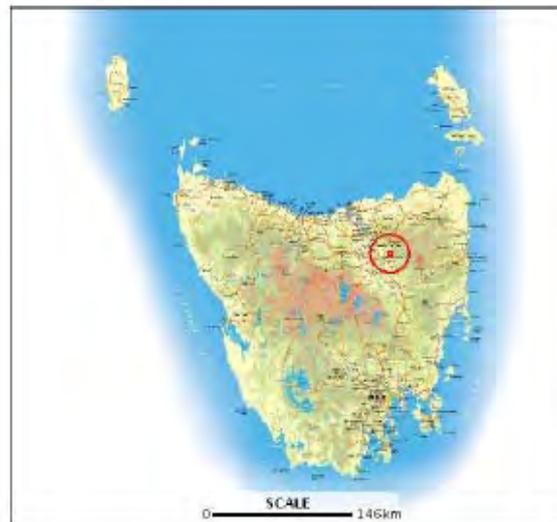
The exploration program will involve numerous shallow drill holes which will not require the clearing and/or leveling of drill pad sites and so is expected to have a minimal impact on the ground surface and adjacent vegetation.

A botanical and fauna habitat survey is required of each target area as part of the MRT license conditions to determine any likely impacts on threatened species or threatened vegetation communities.

**Objectives:** The objectives of this survey were to;

- Undertake a desktop survey to confirm the known biological records and the natural values present in the exploration target areas and in the vicinity.
- Undertake a field survey of the exploration target areas to observe and record the natural values present including the vegetation types and plant communities, the flora and in particular any threatened species and potential habitat for species of threatened fauna.
- Determine the possible impacts of the proposed exploration program on the natural values present and make recommendations on how those impacts can be minimized.

**Location of Study Area:**



MAP REF: Tasmap 1:25,000, Sheet No. 5240, Blessington

BIOREGION: Northern Midlands

WHITE HILLS TARGET AREAS:

- Target Area No.1: 780 Blessington Road, White Hills. GRID REF: 523080E – 5404685N
- Target Area No.2. and No.3. property of “Dalness” located between Dalness Road and Blessington Road. GRID REF: 526405E – 5402809N
- Target Area No.4. 970 Blessington Road, “Dalness”, White Hills. GRID REF: 525407E – 5404257N  
(All Grid References MGA Zone 55 GDA94)

NOTE: The target areas are numbered in the sequence that each site was surveyed.

**Site Description:**

Much of White Hills and the nearby area of Evandale have been long cleared for agriculture, which includes grazing on improved pasture, a range of crops and the use of some pivot irrigation. Remnant vegetation is now mainly restricted to ridgelines, locations with poor shallow soils and some creek-lines and watercourses.

**Desktop Survey of Natural Values:**

The DPIW database “The Natural Values Atlas” was accessed for the known biological records of the locality and environs. Records of threatened species of flora and fauna known to occur within a 5,000 metre radius of the location were also accessed. Data sourced included the vegetation types and plant communities, the occurrence of any threatened vegetation communities, the recorded locations of any threatened species of plants and threatened fauna known or expected to occur in the vicinity.

REFERENCE POINTS for the locality: Target Area No.1: 523080E – 5404685N

Target Area No. 2 & 3: 526405E – 5402809N

Target Area No.4: 525407E – 5404257N

**Desktop Survey Results:**

VEGETATION COMMUNITIES:

The following vegetation communities are mapped under the TasVeg mapping program as occurring within 1,000 metres of the three study area reference points.

VEGETATION COMMUNITY	TasVeg Code / Map colour	EXTENT IN STUDY AREA
<i>Eucalyptus amygdalina</i> Inland Forest & Woodland on Cainozoic Deposits	DAZ / bright green with "x"	Within Target area 4 only.
<i>Eucalyptus amygdalina</i> Forest & Woodland on Dolerite	DAD / Bright green with horizontal lines	Follows ridgeline from centre to north-west of target area 3. Large patch in SE quadrat and scattered small patches in north of study area 4.
<i>Eucalyptus viminalis</i> Grassy Forest & Woodland	DVG / Medium green	A small area of this community in south of target area 2/3 and on NE periphery. One small area in SE of target area 4.
<i>Bursaria – Acacia</i> Woodland & Scrub	NBA / Olive Green	North of Blessington Rd near Target Area 1. Two areas within study area of Target 4.
Lowland Grassland Complex	GCL / bright yellow	Three small patches in north of area 2/3 which overlap with two in area 4.
Agricultural Land	FAG / cream	Most of target area 1, most of area 2/3, and more than 50% of area 4.
Weed Infestation	FWU / cream with "x"	In NW quadrat of study area 1. Scattered & widespread in Study area 2/3. SE periphery of study area 4.
Plantations	FPL / FPU / cream with zig zag lines	Small areas in eastern half of study area 1.
Extra-urban miscellaneous (quarries, pits etc)	FUM / lime-yellow with "z"	Near centre of study area 1.

**TABLE 1: Vegetation Communities and extent within the study area as per TasVeg mapping program.**

*Eucalyptus amygdalina* Inland Forest and Woodland on Caino zoic Deposits (DAZ) is a community usually dominated by the Black Peppermint *Eucalyptus amygdalina* although other species such as *Eucalyptus viminalis*, *E. pauciflora* or occasionally *E. ovata* are present and can sometime form the dominant canopy species. Dry sclerophyll shrubs, often low or prostrate species, Bracken *Pteridium esculentum* or grasses and graminoids with forb species can dominate the ground stratum depending on the soil type, fertility and depth and the drainage conditions, as well as the additional historical factors of firing and land use. There can be a high diversity of species in the ground layer vegetation although many of the remnants are now degraded.

This community is strongly associated with lateritic sediments in the northern Midlands and its main area of distribution is in the northern Midlands. Some outlying localities include the Fingal Valley, West Tamar, Bridgenorth and Westbury, between Cranbrook and Swansea on the east coast and in the Cressy – Blackwood Creek area.

The community was much more extensive in the northern Midlands at the time of white settlement however much of it has been cleared for agriculture. Large areas on the less fertile soils in the northern Midlands areas were cleared in the 1960's following the introduction and widespread use of superphosphate.

The community is of high conservation value and is listed as a threatened native vegetation community under the Tasmanian *Nature Conservation Act 2002*.

*Eucalyptus amygdalina* Forest and Woodland on Dolerite (DAD) is more widespread than the former community and is often located on rocky sites in low rainfall areas. The community typically is dominated by uneven aged Black Peppermint less than 25metres in height and with a variable understorey ranging from grassy to shrubby. In target area 4 the two Eucalypt communities occur side by side and each has a similar structure with the dominant trees and a similar composition of species in the ground stratum. It is principally the underlying geology which separates them.

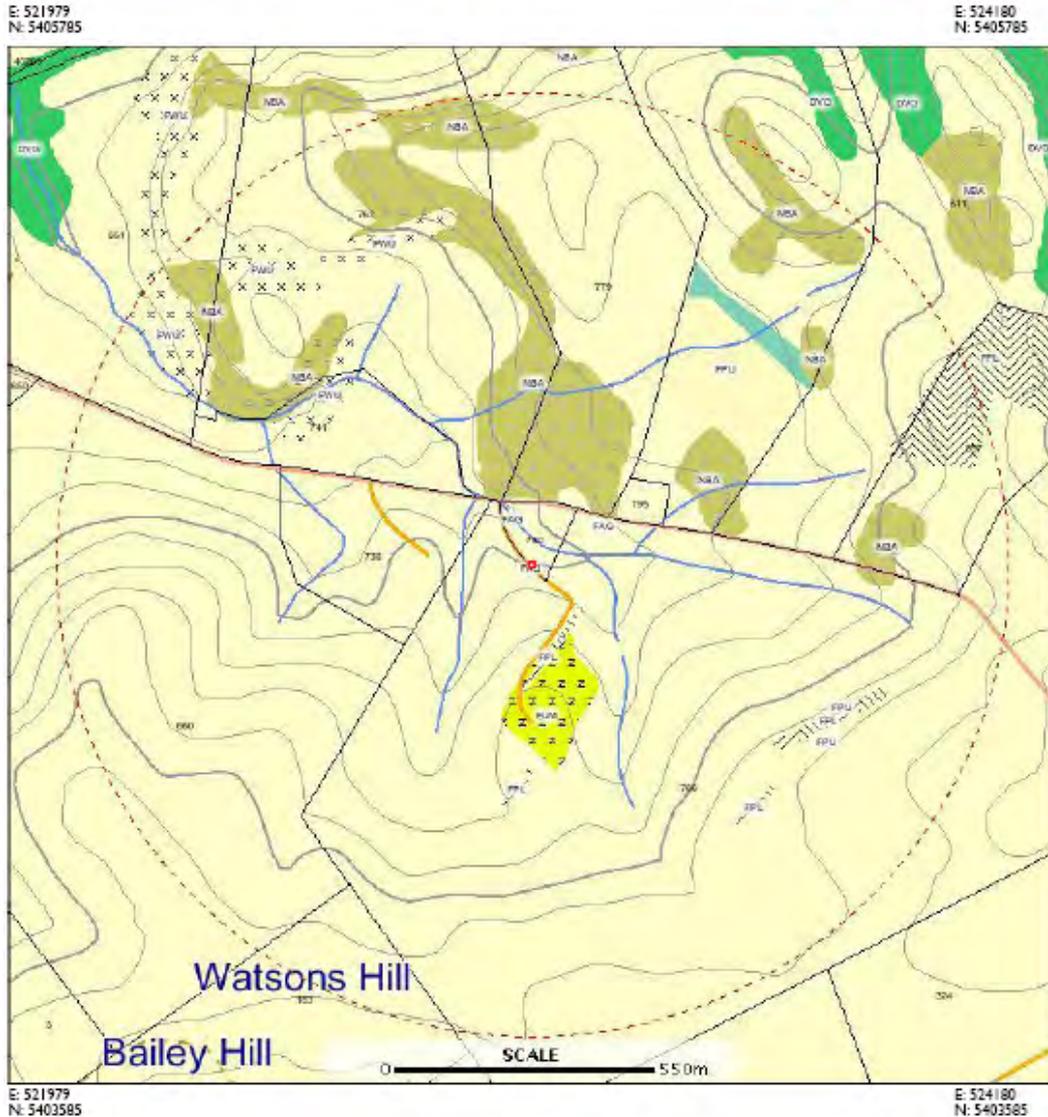
*Eucalyptus viminalis* Grassy Forest and Woodland (DVG) is a community which is prevalent through the midlands and often found on rocky dolerite slopes. The understorey is usually grassy although the specific composition is dependent on a sites fire and grazing history. The canopy is generally open with low branched trees between 15 and 25 metres in height.

*Bursaria – Acacia* Woodland and Scrub (NBA) occurs on basalt or dolerite and its presence is usually the result of past clearing or degradation of Eucalypt forest. The floristic complexity can vary greatly with some sites being depauperate and infested with weeds and others reflecting a degraded phase of *Eucalyptus viminalis* woodland which have a high degree of species diversity in the ground stratum, and often including threatened species.

Lowland Grassland Complex (GCL). Most of the native and semi-improved pastures throughout the midlands are mapped as this community but is distinguished from the mapping unit Regenerating Cleared Land (FRG) by having more than 25% of native species. Many areas which were originally this community have been ploughed and converted to improved pasture dominated by exotic pasture grasses.

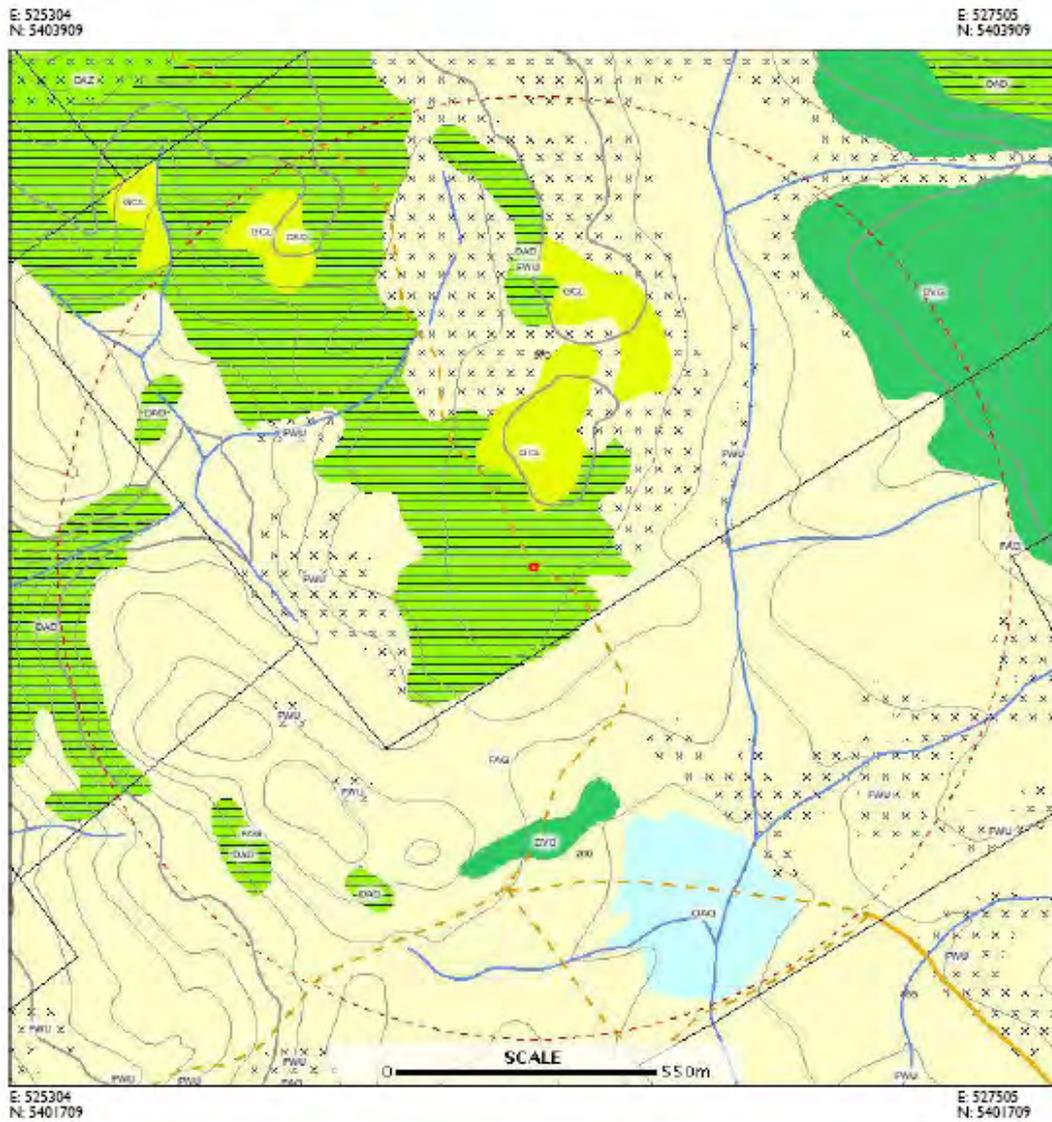
The species composition of GCL varies greatly depending on location and disturbance history. Lowland grassland communities are of high conservation value where they are in good condition

but are becoming increasingly rare due to conversion to improved pasture and increased cultivation of crops such as canola and poppies.



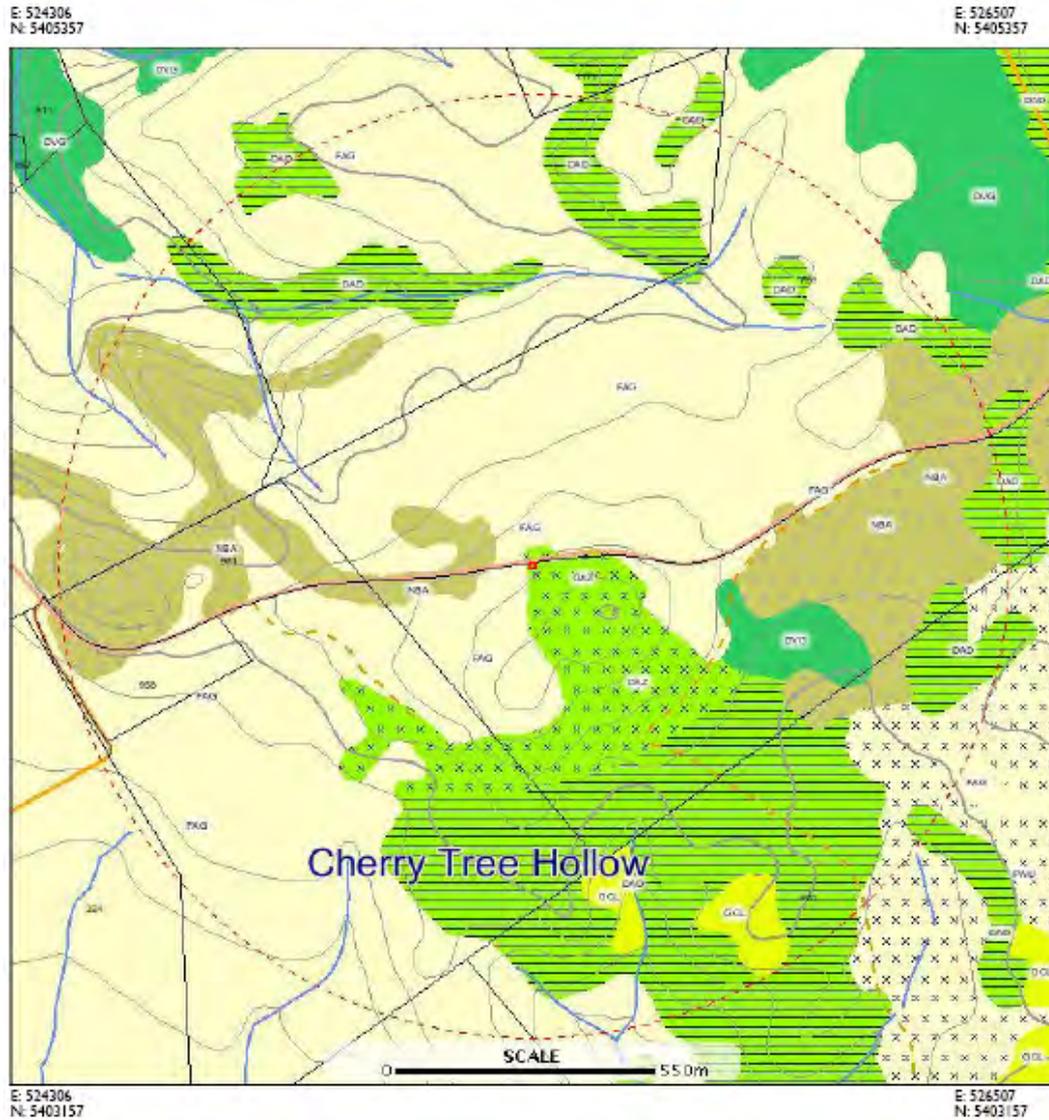
**FIGURE 1: Vegetation Communities as per TasVeg mapping program within 1,000 metres of reference point Target Area No.1. GRID REF: 523080E – 5404685N**

- CODE:** DVG ..... *Eucalyptus viminalis* Grassy Forest & Woodland  
 NBA ..... *Bursaria - Acacia* Woodland & Scrub  
 FAG ..... Agricultural Land  
 FPL / FPU ..... Plantations  
 FWU ..... Weed Infestations  
 FUM ..... extra-urban miscellaneous (quarries, pits etc)



**FIGURE 2: Vegetation communities as per TasVeg mapping program within 1,000 metres of reference point Target Areas No.2 & No.3.: GRID REF: 526405E – 5402809N.**

- CODE:** DAZ .....*Eucalyptus amygdalina* Inland Forest & Woodland on Cainozoic Deposits,  
 DAD .....*Eucalyptus amygdalina* Forest & Woodland on Dolerite  
 DVG ..... *Eucalyptus viminalis* Grassy Forest & Woodland  
 FAG ..... Agricultural Land  
 GCL ..... Lowland Grassland Complex



**Figure 3: Vegetation communities as per TasVeg mapping program within 1,000 metres of reference Point Target Area No.4. GRID REF: 525407E – 5404257N.**

- CODE:**
- DAZ ..... *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits
  - DAD ..... *Eucalyptus amygdalina* Forest & Woodland on Dolerite
  - DVG ..... *Eucalyptus viminalis* Grassy Forest & Woodland
  - NBA ..... *Bursaria* – *Acacia* Woodland & Scrub
  - FAG ..... Agricultural Land
  - FWU ..... Weed Infestation

#### THREATENED VEGETATION COMMUNITIES:

- One natural vegetation community mapped within the study area No.4. is listed as threatened under the Tasmania *Nature Conservation Act 2002*. *Eucalyptus amygdalina* Inland Forest & Woodland on Cainozoic Deposits is listed as a vulnerable community under the Act as it has been subject to extensive clearing and fragmentation throughout the northern midlands and in particular since the 1960's.

#### VEGETATION COMMUNITIES OF CONSERVATION SIGNIFICANCE

- Although the community *Eucalyptus amygdalina* Forest and Woodland on Dolerite is relatively widespread it mainly occurs on freehold land and is considered to be under-reserved in the state and particularly so in its old-growth condition.
- The same can be said for *Eucalyptus viminalis* Grassy Forest and Woodland which predominantly occurs on private land. It also is considered to be under-reserved across the state, and particularly so in its old-growth condition. Both communities are being targeted for further reservation under the RFA.
- Any native grassland which is in good condition and has a high diversity of species would be of high conservation value.

#### THREATENED FLORA:

Eleven species of threatened flora listed under the Tasmanian *Threatened Species Protection Act 1995* and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* are recorded on the "Natural Values Atlas" database as occurring within 3,000 metres of one or more of the three study area reference points.

One species of threatened flora *Arthropodium strictum*, is recorded on the database from within 500 metres of the reference point for target area No.4.

- *Aphelia gracilis* the Slender Fanwort is listed as being rare in Tasmania. There are 6 records of this species 2.8 km from target area 2/3 dated from between 2002 and 2005.
- *Aphelia pumilio* the Dwarf Fanwort is also listed as being rare in the state with 2 records from 2004 from the same locality as the above species.
- *Arthropodium strictum* the Chocolate Lily is listed as being rare under the Tasmanian Act. There are 2 records from within 500 metres of site 4 and a further 8 from within 2,000 metres of both this site and site 2/3. Most records are from along Blessington Road.
- *Epacris exerta*, the South Esk Heath is listed as an endangered species under the Tasmanian Act and has a pending listing as endangered under the Commonwealth Act. The species is restricted to the riparian zone of the North Esk River and well outside the target areas.
- *Grevillea australis linearifolia*, the Narrow-leaf Grevillea is listed as being rare under the Tasmanian Act. It also is a riparian species and is recorded only along the North Esk River in this location.
- *Gynatrix pulchella*, the Fragrant Hemphush has one 2007 record from along the North Esk River, 2km to the north-east of the target areas.
- *Haloragis heterophylla* the Variable Raspwort is considered to be rare in Tasmania. There are three records on the data base about 3km east of site 2/3.

- *Hypoxis vaginata* var *vaginata* the Sheathing Yellowstar is provisionally listed as being rare in Tasmania. There are two records of this species from about 2.5 km north of site 2/3.
- *Myriophyllum integrifolium* the Tiny Water-milfoil is considered to be vulnerable in Tasmania. There are 4 records from along the North Esk River.
- *Prostranthera rotundifolia*, the Round-leaf Mint Bush is listed as being vulnerable under the Tasmanian Act. It is a riparian species and there are 11 records on the database from along the North Esk River.
- *Teucrium corymbosum*, the Forest Germander is listed as being rare under the Tasmanian Act. There are three records on the database from the vicinity of the North Esk River and about 3km north of site 2/3.

#### THREATENED FAUNA:

Two species of threatened fauna listed under the above Acts are recorded on the database as occurring within 5,000 metres of the study area. No species have been recorded from within 500 or 1,000 metres of the study area reference points.

- The Tasmanian subspecies of Wedge-tailed Eagle *Aquila audax* subsp *fleayi*. The bird is listed as being endangered under both State and Commonwealth Acts and requires large trees within tracts of old-growth forest for nesting. There are two known nest tree sites 3km to the north-east of the study area within a gorge on the North Esk River. Both sites were first recorded in the 1980's.
- The Spotted-tailed Quoll, *Dasyurus maculatus* subsp *maculatus* is listed as a rare species under the Tasmanian Act and vulnerable under the Commonwealth Act. There is two records on the database from about 1970 and 1978. One about 3.5km south of the study area and the other about 4km to the south-east.

The following eight species of threatened fauna could occur in the locality based on habitat mapping and on the known geographical range of each.

- The Tasmanian subspecies of the Masked Owl *Tyto novaehollandiae* subsp *castinops* is listed as being endangered in Tasmania and considered to be vulnerable under the Commonwealth Act.  
This bird requires large tree hollows for nesting and old-growth forest as habitat.
- The White (Grey) Goshawk *Accipiter novae hollandiae* is endangered in Tasmania. The species requires mature wet forest as habitat.
- The Swift Parrot *Lathamus discolor* is listed as endangered both in Tasmania and nationally and inhabits mature Blue Gum forests (*Eucalyptus globulus*) and *Eucalyptus ovata* Forest and requires tree hollows for nesting.
- The Eastern-barred Bandicoot *Parameles gunnii* is relatively widespread in Tasmania but considered to be vulnerable nationally.
- The Tussock Skink *Pseudemoia pagenstecheri* is a grassland species which is considered to be vulnerable in Tasmania.
- The Swan Galaxia *Galaxias fontanus* is considered to be endangered in Tasmania and nationally. The species is endemic to Tasmania.
- The Green and Gold Frog *Litoria raniformis* is considered to be vulnerable in Tasmania and Nationally.

- The Cataract Gorge Snail *Pasmaditta jungermanniae* is restricted to the catchments of the two Esk rivers and is considered to be vulnerable under the Tasmanian Act.

### **Field Survey:**

The field survey was undertaken on Thursday the 2<sup>nd</sup> December 2010.

Methodology: Each of the four proposed target areas was surveyed on foot, and included any remnant vegetation which was present in the vicinity of each site.

Vascular plant species were recorded, vegetation communities were observed and cross-referenced with the TasVeg map sourced from the Natural Values Atlas database.

Limitations: This survey was conducted in early summer when many species are in flower, however there are numerous species which flower later or in other seasons. No botanical survey can guarantee that all flora will be observed and recorded in a single survey in one year due to seasonal and annual variation in abundance and the possible absence of flowers and fertile material for identification. Ephemeral species which may have been present includes species of orchids, lilies, herbs, grasses and other graminoids. However all significant species known to occur in the study areas and their environs have been considered in this report.

### **Field Survey Results:**

The field survey covered four locations within the White Hills area where exploratory drilling is proposed, and all of the sites are within 3 kilometres of each other.

Much of the White Hills area has been cleared for agriculture in the distant past but some remnants of the original vegetation remain along ridgelines, in rocky areas and along the gorge of the North Esk River a few kilometers to the north of the study area. Gorse is a significant agricultural and environmental weed in the locality and has impacted on both areas of remnant vegetation and on agricultural land.

**Target Area No.1. GRID REF: 523080E- 5404685N** is located in an area adjacent to Blessington Road and in an area which has been completely cleared for agriculture and is comprised of improved pasture with shelter belts of exotic conifers nearby. There were no areas of remnant natural vegetation in the vicinity of this target area and the proposed drilling program will have no impact.

**Target Area No.2. GRID REF: 526186E – 5402291N** was the first of three target areas which are located on the property of “Dalness”. This area was predominantly an area of gorse infestation which has been recently cleared and adjacent to cleared pasture and cropping land. Some remnant ground stratum species were still present, however no threatened species were observed. A large soil stored reserve of gorse seed is undoubtedly present at this site and care will be needed to avoid the inadvertent transfer of soil which may contain the weed seeds from this drill site to other locations.

The proposed drill sites in this target area will not impact on any remnant vegetation.

**Target Area No.3. GRID REF: 526405E – 5402291N** was the second of three target areas located on the “Dalness” property about 500 metres north-east of target area 2. The target area is located within a significant patch of remnant vegetation comprising *Eucalyptus amygdalina* Open Forest over Dolerite which had a grassy ground layer. The forest and tree canopy was in good condition although there were no old-growth trees or habitat trees with significant hollows observed. There was a relatively high level of diversity in the ground stratum vegetation, including the listed threatened species *Arthropodium strictum*, the Chocolate Lily. There were also infestations of Gorse around the periphery of the remnant vegetation. A small gravel pit with a heap of subsoil material was also located within the area.

The location of proposed drill sites within this target area should be sited for minimal impact, avoiding populations of the Chocolate Lily as much as possible and sited where possible around the periphery of the remnant vegetation.

**Target Area No.4. GRID REF: 525407E – 5404257N** was the third target area on the “Dalness” property and was located adjacent to the Blessington Road near the northern boundary of the property. Although the vegetation in the location is mapped under TasVeg as being *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits (Ref: Figure 3), which is a listed threatened community, the original vegetation within the actual target area has been cleared in the past and converted to semi-improved pasture. Some trees remain but the ground layer is composed of pasture grasses, some remnant *Poa labillardierei* and Bracken *Pteridium esculentum*. The proposed drilling in this location will have no impact on any area of remnant vegetation.

Should the target area be extended southwards along the ridge however, it will be in an area of *Eucalyptus viminalis* Grassy Forest which has not been disturbed to any great extent. An area of this community (DVG) is mapped on TasVeg (Ref: Figure 3) to the immediate east of the target area reference point and appears to be a larger area which extends more westwards than as mapped, and therefore closer to the target area. This community was in good condition and had a good level of species diversity in the ground stratum although no threatened species were observed. The proposed drilling program will not impact on this area of vegetation unless it is extended.

#### VEGETATION COMMUNITIES:

The most significant area of remnant vegetation was in the vicinity of Target Area 3. where the *Eucalyptus amygdalina* Open Forest on Dolerite was in good condition and had a high diversity of species in the ground stratum.

Target area No.1 was devoid of natural vegetation and Target Area No.2 almost so.

Target area No .4 was mapped under TasVeg as the threatened community *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits, however it has been largely cleared at some time in the past. The area to the south of this target area is the community *Eucalyptus viminalis* Grassy Forest which is in good condition.

**THREATENED VEGETATION COMMUNITIES:**

One vegetation community listed under the Tasmanian *Nature Conservation Act 2002* was observed during the field survey.

Although *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits was present in Target Area No.4 it has been largely cleared in the past and replaced with semi-improved pasture. The proposed drilling program will not have an impact on this community.

**VEGETATION COMMUNITIES OF CONSERVATION SIGNIFICANCE:**

Most areas of remnant vegetation in the northern midlands which are still in good condition are of conservation significance. On this basis the remnant area of *Eucalyptus amygdalina* Grassy Forest on Dolerite within Target Area 3 is considered to be important as is the area of *Eucalyptus viminalis* Grassy Forest located to the south of Target Area No.4.

**THREATENED FLORA:**

One plant species listed under the Tasmanian *Threatened Species Conservation Act 1995* and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* was observed and recorded during the field survey.

- *Arthropodium strictum* the Chocolate Lily was observed to be widespread within the area of remnant forest of Target Area No.3.

The proposed drilling program within this target area should aim to limit impact of the ground stratum vegetation and this species. Field staff should ensure that they are able to recognize this species, and avoid as much as possible. It is however very difficult to observe and recognize when not in flower.



**PHOTO 1: THREATENED FLORA ... *Arthropodium strictum* the Chocolate Lily**



**PHOTO 2: THREATENED FLORA ... *Arthropodium strictum* the Chocolate Lily**

No other threatened species of plants which have been previously recorded within 3,000 metres of the target area reference points, and referred to in the desktop survey section of this report was observed during the field survey of the target areas.

**THREATENED FAUNA:**

No species of fauna listed under the above Acts was observed during the field survey.

**THREATENED FAUNA HABITAT:**

No potential habitat for the threatened species of fauna which are known or expected to occur in the locality was observed within the target area. Old-growth trees with hollows may be present elsewhere on the property however no significant trees with hollows were observed during the survey. The grassy understorey within the areas of remnant vegetation could provide habitat for species such as the Eastern-barred Bandicoot although no evidence was observed of its likely presence. The landform and ground stratum vegetation was not considered to be suitable for the Tussock Skink to occur, although it could be present in moister locations nearby.

**ENVIRONMENTAL WEEDS:**

Four significant environmental weeds were observed during the field survey.

- Gorse *Ulex europeaus* was observed to be a common and widespread weed across the property and was prevalent in the vicinity of Target Area No.2 and No.3. This species is by far the most significant weed in the location and it is also listed as a weed of national significance.
- Hawthorn *Crataegus monogyna*, was observed as an occasional weed near Target Area No4.
- Spear Thistle *Cirsium vulgare* is a widespread weed of pasture and disturbed ground throughout Tasmania.
- Slender Thistle *Carduus cynocephala* Infestations of this weed were observed in the vicinity of Target Area No.4.

PHYTOPTHORA: There was no symptomatic field evidence observed of the root pathogen *Phytophthora cinnamomi* during this field survey.

**Survey Conclusions:**

The proposed exploratory drilling program in Target Areas No.1, 2 and 4 will not impact on any areas of significant vegetation or habitat.

Target Area No.3 is located within an area of significant vegetation which contains a threatened species of plant.

Precautionary measures for managing the weed Gorse will be important in Target Area No.2.

**Recommendations:**

**VEGETATION COMMUNITIES:**

The proposed drilling program within Target Areas 1, 2 & 4 are located in areas previously cleared and so will have a minimal impact.

Target area No.3 is located within a significant area of remnant vegetation. Drill sites should be positioned in order to minimize impact of the ground stratum vegetation and located around the periphery of the remnant where possible.

No mature trees will need to be felled to accommodate any of the drill sites.

Ensure the adequate containment within each drill pad site of all silt, dust, sediment and other contaminants resulting from the drilling program to avoid impacting on adjacent soils and ground stratum vegetation.

**THREATENED VEGETATION COMMUNITIES:**

The threatened vegetation community, *Eucalyptus amygdalina* Inland Forest & Woodland on Cainozoic Deposits is present at Target area No.4 , however the community is in a highly modified state and the proposed drilling program will have little or no impact. No specific action is required in addition to the recommendations made under vegetation communities (above).

**THREATENED FLORA:**

One species of threatened flora were observed during the field survey within Target Area No.3. Field staff should ensure they are able to recognize this species in order to position drill sites where the species is not present.

The compliance with recommendations made under Vegetation Communities (above) will also ensure that there is minimal impact on this species.

**THREATENED FAUNA:**

No species of threatened fauna was observed or recorded during the field survey and no specific action is required.

**THREATENED FAUNA HABITAT:**

No potential habitat for threatened fauna such as mature trees with hollows was observed during the survey. The exploration program will not impact on any established trees and will have minimal impact on the grassy ground stratum vegetation at Target Area No.3 and so will not impact on potential habitat for threatened species of fauna.

**ENVIRONMENTAL WEEDS:**

Gorse *Ulex europeus* was observed over the property and in the vicinity of Target Areas No.2 and 3.

Ensure that soil contaminated with Gorse seeds is not transferred from drill sites to clean locations.

As a precautionary measure and in order to prevent the introduction of weeds into weed free areas all equipment and machinery should be subject to a wash-down procedure to remove any soil or mud which could contain weed seeds before being transported into and out of the exploration area and between each target area.

**PHYTOPHTHORA:** Accepted protocols in regard to hygiene and wash-down procedures for all machinery and equipment, including the drill rig itself should be followed, to ensure that the pathogen is not inadvertently introduced into disease free locations by way of extraneous soil, mud and gravel adhered to tyres, work-boots and equipment.

Philip Milner

Vegetation Consultant

## Appendix 1: Vegetation Communities and Species Recorded

### 1. *Eucalyptus amygdalina* Inland Forest and Woodland on Cainozoic Deposits (TasVeg Code DAZ)

This community was present only in the vicinity of target area No.4. The community in this location has been largely cleared in the past and the ground stratum has been converted to semi-improved pasture with only some remnant Tussock Grass *Poa labillardierei* and Bracken *Pteridium esculentum* remaining amongst exotic pasture grasses. Although this community is listed as being a threatened native vegetation community under the Tasmanian *Nature Conservation Act 2002* it is considered to be in a depauperate condition in this location.

DOMINANT TREES	COMMON NAME	FREQUENCY
<i>Eucalyptus amygdalina</i>	Black Peppermint	common
<i>Eucalyptus viminalis</i>	White-gum	occasional
UNDERSTOREY TREES AND TALL SHRUBS		
<i>Acacia dealbata</i>	Silver wattle	occasional
MEDIUM SHRUBS		
<i>Bursaria spinosa</i>	Prickly Box	uncommon
HERBS & HERB-LIKE PLANTS		
<i>Acaena echinata</i>	Sheeps Burr	occasional
GRASSES & GRAMINOIDS		
<i>Poa labillardierei</i>	Silver Tussockgrass	occasional
FERNS & ALLIED PLANTS		
<i>Pteridium esculentum</i>	Bracken	uncommon
ENVIRONMENTAL WEEDS		
<i>Anagallis arvensis</i>	Scarlet Pimpernel	occasional
<i>Cirsium vulgare</i>	Spear Thistle	common
<i>Crateagus monogyna</i>	Hawthorn	occasional
<i>Ulex europaeus</i>	Gorse	occasional

## 2. *Eucalyptus amygdalina* Forest & Woodland on Dolerite (TasVeg Code DAD)

The main occurrence of this community in the areas surveyed was in the target area No.3. Refer to the vegetation map at Figure 2 on page 6 of this report. The grid reference used as the reference point for the survey is located within the actual target area. It is a significant patch of remnant vegetation which is in good condition and although it is not a threatened community it does contain good numbers of the threatened species *Arthropodium strictum*, the Chocolate Lily. The community extends along the low ridgeline towards the north-west and towards target area No.4. where the vegetation graded into an area of *Eucalyptus viminalis* Grassy Forest.

### DOMINANT TREES

<i>Eucalyptus amygdalina</i>	Black Peppermint	common
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### UNDERSTOREY TREES & LARGE SHRUBS

<i>Acacia mearnsii</i>	Black Wattle	common
<i>Bursaria spinosa</i>	Prickly Box	occasional
<i>Exocarpus cupressiformis</i>	Native Cherry	occasional

### MEDIUM SHRUBS

<i>Melicytus dentatus</i>	Tree Violet	uncommon
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### SMALL SHRUBS

<i>Astroloma humifusa</i>	Cranberry Heath	occasional
<i>Lissanthe strigosa</i>	Peachberry Heath	occasional
<i>Pimelea humilis</i>	Dwarf Riceflower	uncommon
<i>Bossiae prostrata</i>	Creeping Bossia	uncommon

### HERBS & HERB-LIKE PLANTS

<i>Acaena echinata</i>	Sheeps Burr	common
<i>Clematis gentianoides</i>	Ground Clematis	occasional
<i>Daucus glochidiatus</i>	Native Carrot	localized
<i>Dichondra repens</i>	Kidney Weed	common
<i>Drosera peltata</i> subsp <i>peltata</i>	Pale Sundew	occasional
<i>Euchiton</i> sp.	A Cudweed	occasional
<i>Gonocarpus tetragynus</i>	Common Raspwort	occasional
<i>Goodenia lanata</i>	Trailing Native-primrose	occasional
<i>Hypericum gramineum</i>	Small St Johns Wort	occasional
<i>Lagenophora stipitata</i>	Hill Daisy	common
<i>Leptorhynchos squamatus</i>	Scaly Buttons	occasional
<i>Oxalis perennans</i>	Grassland Woodsorrel	common
<i>Plantago varia</i>	Variable Plantain	occasional
<i>Poranthera microphylla</i>	Small Poranthera	common
<i>Veronica gracilis</i>	Slender Speedwell	occasional
<i>Viola hederaceae</i>	Ivy-leafed Violet	occasional
<i>Wahlenbergia gymnoclada</i>	Naked Bluebell	occasional

APPENDIX 1 (cont)

*Eucalyptus amygdalina* Forest on Dolerite (Cont)

GRASSES & GRAMINOIDS

<i>Agrostis sp.</i>	A Bentgrass	common
<i>Arthropodium milleflorum</i>	Vanilla Lily	occasional
# <i>Arthropodium strictum</i>	Chocolate Lily	occasional
<i>Austrodanthonia sp.</i>	Wallaby Grass	common
<i>Austrostipa mollis</i>	Soft Speargrass	common
<i>Poa labillardierei</i>	Silver Tussockgrass	common
<i>Poa rodwayi</i>	Velvet Tussockgrass	occasional
<i>Schoenus apogon</i>	Common Bogsedge	occasional
<i>Themeda triandra</i>	Kangaroo Grass	common

FERNS & ALLIED PLANTS

<i>Pteridium esculentum</i>	Bracken	common
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ENVIRONMENTAL WEEDS

<i>Centaureum erythraea</i>	Common Centaury	common
<i>Cirsium vulgare</i>	Spear Thistle	occasional
<i>Crataegus monogyna</i>	Hawthorn	occasional
<i>Ulex europeus</i>	Gorse	common

**3. *Eucalyptus viminalis* Grassy Forest & Woodland (TasVeg Code DVG)**

This community was observed to the immediate south of Target area 4. and is mapped under TasVeg as occurring to the east of this location. The community was in good condition and with a relatively high level of species diversity in the ground stratum.

DOMINANT TREES

<i>Eucalyptus viminalis</i>	White Gum	common
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SECONDARY TREES

<i>Eucalyptus amygdalina</i>	Black Peppermint	occasional
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UNDERSTOREY TREES & LARGE SHRUBS

<i>Acacia dealbata</i>	Silver Wattle	common
<i>Exocarpus cupressiformis</i>	Native Cherry	occasional

MEDIUM SHRUBS

<i>Cassinia aculeata</i>	Dolly Bush	occasional
<i>Melicytus dentatus</i>	Tree Violet	uncommon
<i>Olearia phlogopappa</i>	Dusty Daisybush	uncommon

SMALL SHRUBS

<i>Lissanthe strigosa</i>	Peachberry Heath	occasional
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APPENDIX 1 (cont)

*Eucalyptus viminalis* Grassy Forest (cont)

CLIMBERS

<i>Clematis aristata</i>	Southern Clematis	uncommon
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HERBS & HERB-LIKE PLANTS

<i>Acaena echinata</i>	Sheeps Burr	occasional
<i>Acaena novaezealandiae</i>	Buzzy	occasional
<i>Asperula conferta</i>	Prickly Woodruff	occasional
<i>Cynoglossum suavolens</i>	Sweet Hounds-tongue	occasional
<i>Dichondra repens</i>	Kidney weed	common
<i>Euchiton sp.</i>	A Cudweed	occasional
<i>Geranium potentilloides</i>	Mountain Cranesbill	occasional
<i>Hypericum gramineum</i>	Small St Johns Wort	occasional
<i>Lagenophora stipitata</i>	Hill Daisy	occasional
<i>Oxalis perennans</i>	Grassland Woodsorrel	common
<i>Plantago varia</i>	Variable Plantain	occasional
<i>Stellaria pungens</i>	Prickly Starwort	occasional
<i>Veronica gracilis</i>	Slender Speedwell	occasional
<i>Viola hederaceae</i>	Ivy-leafed Violet	occasional
<i>Wahlenbergia gracilentata</i>	Annual Bluebell	occasional
<i>Wahlenbergia gymnoclada</i>	Naked Bluebell	uncommon

ORCHIDS

<i>Microtis unifolia</i>	Common Onion-orchid	localized
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GRASSES & GRAMINOIDS

<i>Austrodanthonia sp.</i>	Wallaby Grass	common
<i>Poa labillardierei</i>	Silver Tussockgrass	common

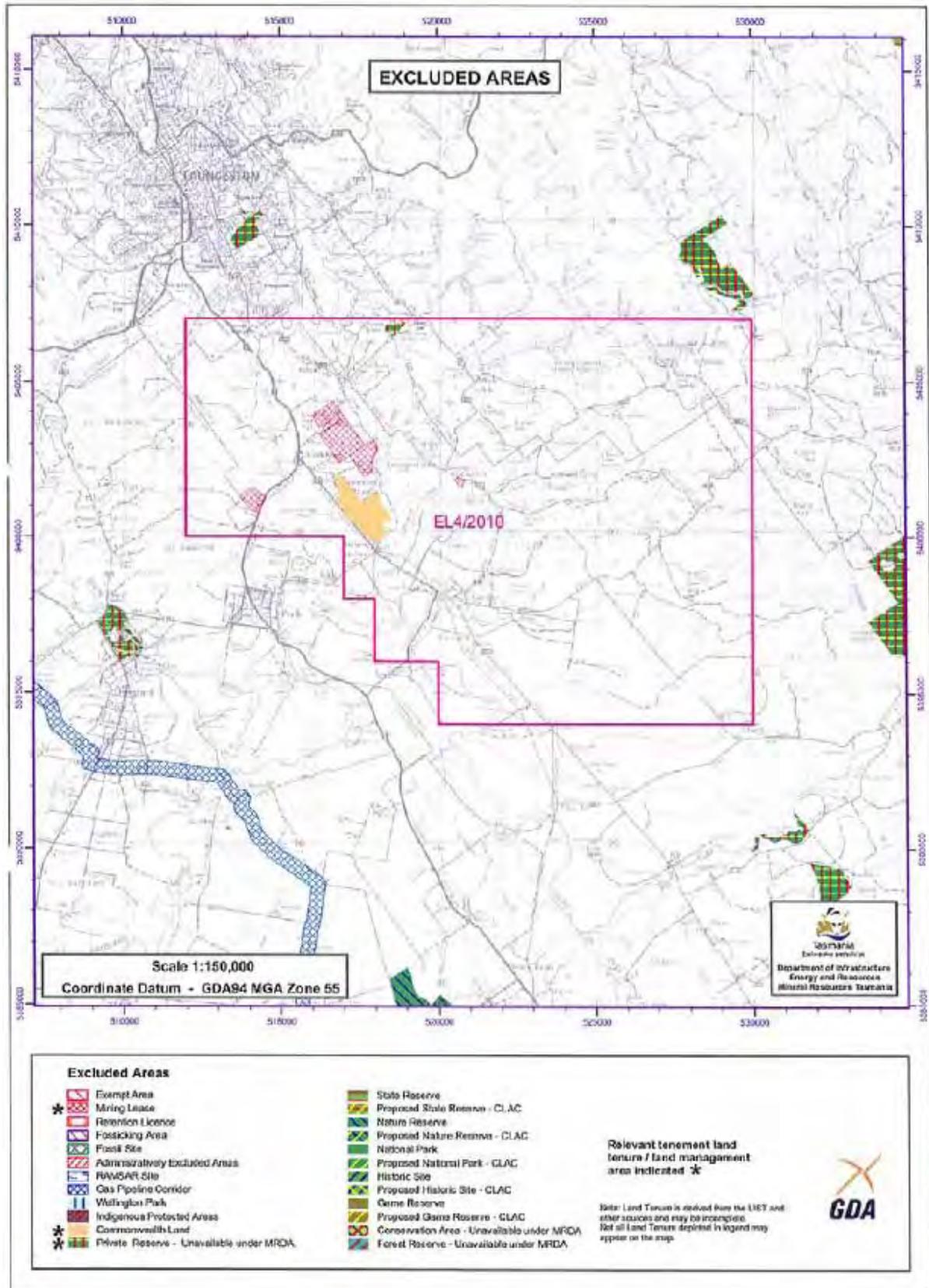
FERNS & ALLIED PLANTS

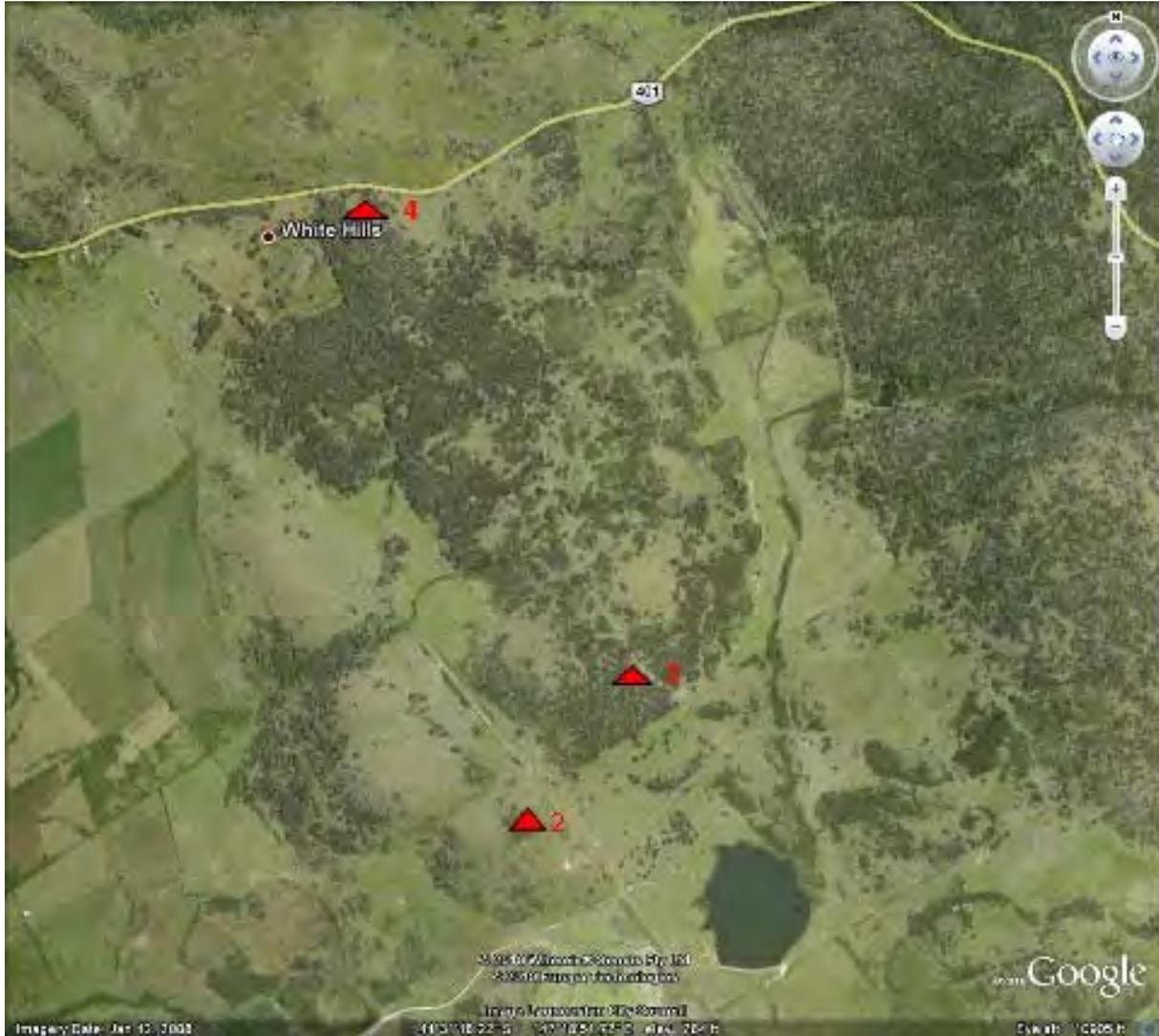
<i>Pteridium esculentum</i>	Bracken	common
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ENVIRONMENTAL WEEDS

<i>Anagallis arvensis</i>	Scarlet Pimpernel	occasional
<i>Briza minor</i>	Quaking Grass	common
<i>Carduus pycnocephala</i>	Slender thistle	occasional
<i>Cirsium vulgare</i>	Spear thistle	occasional
<i>Holcus lanatus</i>	Yorkshire Fog-grass	common
<i>Trifolium campestre</i>	Hop Clover	common
<i>Ulex europeus</i>	Gorse	occasional
<i>Vicia sativa</i>	Vetch	occasional

BOTANICAL & FAUNA HABITAT SURVEY FOR ABX4 PTY LTD: WHITE HILLS TARGET AREAS





MAP 2: Google satellite image showing Target Areas 2, 3 & 4 on the property of “Dalness”, White Hills.



**PHOTO 3: Target Area No.2 . Very sparse grassy ground layer where Gorse has been cleared.**



**PHOTO 4: Target Area No. 3. *Eucalyptus amygdalina* Forest on Dolerite with Grassy groundlayer**



**PHOTO 5: Target Area No.4. Cleared of original vegetation, semi-improved pasture & bracken**



**PHOTO 6: South of Target Area No.4. *Eucalyptus viminalis* Grassy Forest.**