

**Final Report**  
**on**  
**EL 8/2010 – CRANBROOK**

**Reporting Period:** 14 September 2010 – 13 August 2011  
**Project Operator:** ABx4 Pty Ltd  
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**Date:** 5 September 2011

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**NOTE: All Garmin maps use WGS – 84**

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# 1 ABSTRACT

## **Objective:**

Exploration Licence (EL) 8/2010 “Cranbrook” 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 penneplained surfaces preserved as plateaus. The goal of the program was 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.

## **Results:**

Exploration of the Cranbrook tenement identified five locations where bauxite was either previously recorded and/or had a high probability of occurring. Bauxite was identified at two of these locations. At two other locations, bauxite could not be identified, and there was no access to the last location.

Bauxite deposits that occur on dolerite tend to be very small and not laterally continuous compared to bauxite occurring on volcanoclastic. The Cranbrook Tenement has the right setting for large bauxite deposits with heavy laterisation preserved across the whole area but the volcanics appear to be generally younger than the laterisation event and hence bauxite has only formed in small areas adjacent to (or hosted by) dolerite.

## **Recommendations for future work:**

A recommendation was made to management to relinquish EL 8/2010 Cranbrook based on results of exploration and management accepted the recommendation.

## **2 INTRODUCTION**

### **Exploration Rationale**

Exploration Licence (EL) 8/2010 “Cranbrook” 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 was 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**

Bauxite deposits that occur on dolerite tend to be very small and not laterally continuous compared to bauxite occurring on volcanoclastic. The Cranbrook Tenement has the right setting for large bauxite deposits with heavy laterisation preserved across the whole area but the volcanics appear to be generally younger than the laterisation event and hence bauxite has only formed in small areas adjacent to (or hosted by) dolerite.

### **Tenement Information**

EL 8/2010 “Cranbrook” was granted on and from 14 September 2010 for a period of 5 years to ABx4 Pty Ltd (**ABx4**).

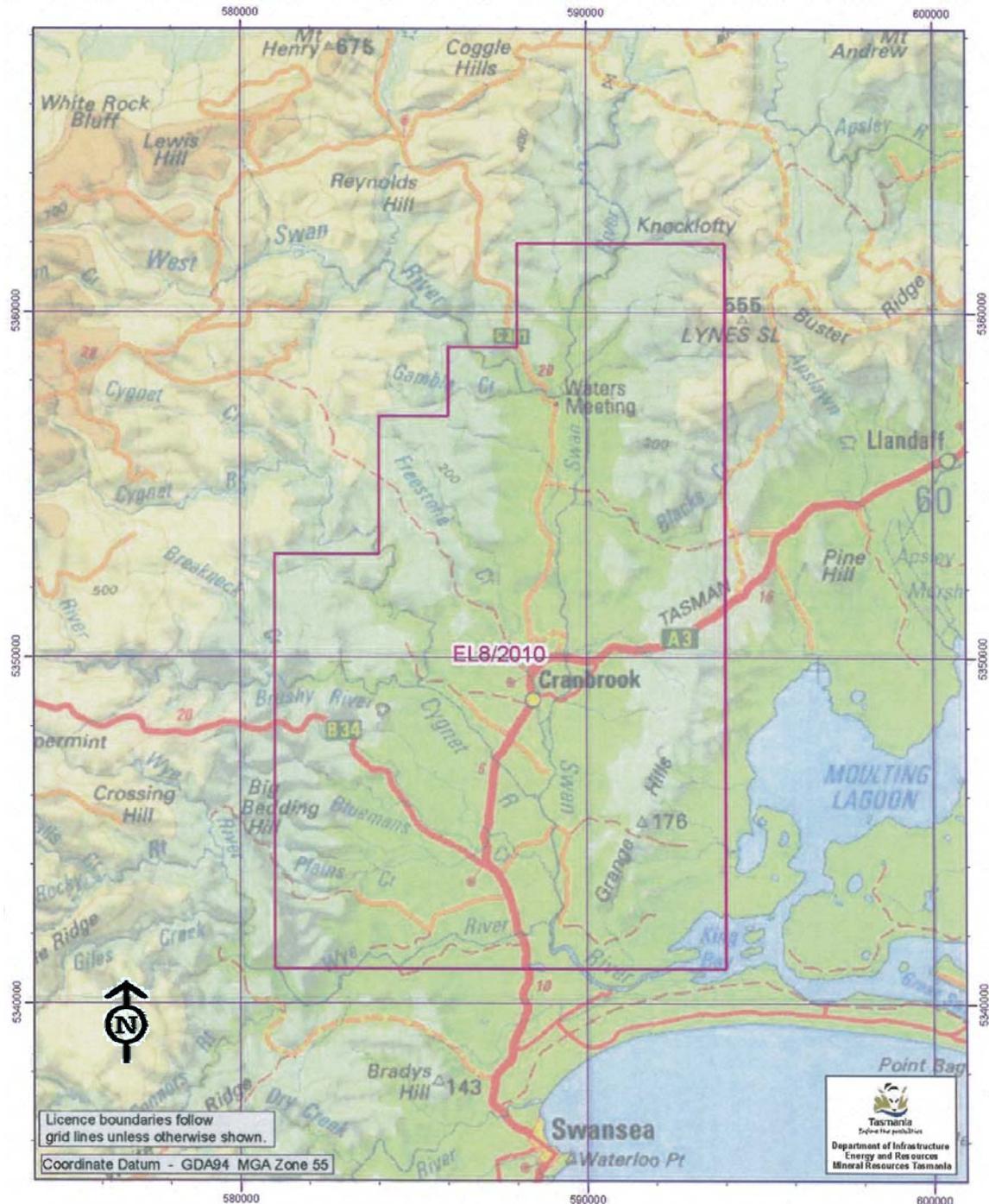
This is the Final Report for the reporting period 14 September 2010 - 13 August 2011 incorporating the results of work completed during the first year of tenure.

Total area of the Licence is 220 sq km and its Mineral Category is 1 – Metallic Minerals and Atomic Substances.

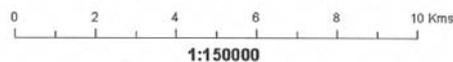
### **Location**

The Cranbrook Tenement is strategically located along a main highway within 50km to the railway. It also has access to multiple ports around Tasmania which are under capacity. South of the tenement is the town of Swansea which could offer a wide range of services and skilled work force.

**INTRODUCTION Cont**



**EL 8/2010 220 SKM  
Vicinity of Cranbrook**



Map 1 – Location Map of EL 8/2010 “Cranbrook”

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

EL 8/2010 “Cranbrook” 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 Cranbrook Tenement are reported by H.B. Owen in his book “Bauxite in Australia”, 1954, which was the basis for Initial exploration of the area.

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

#### **During current Tenement**

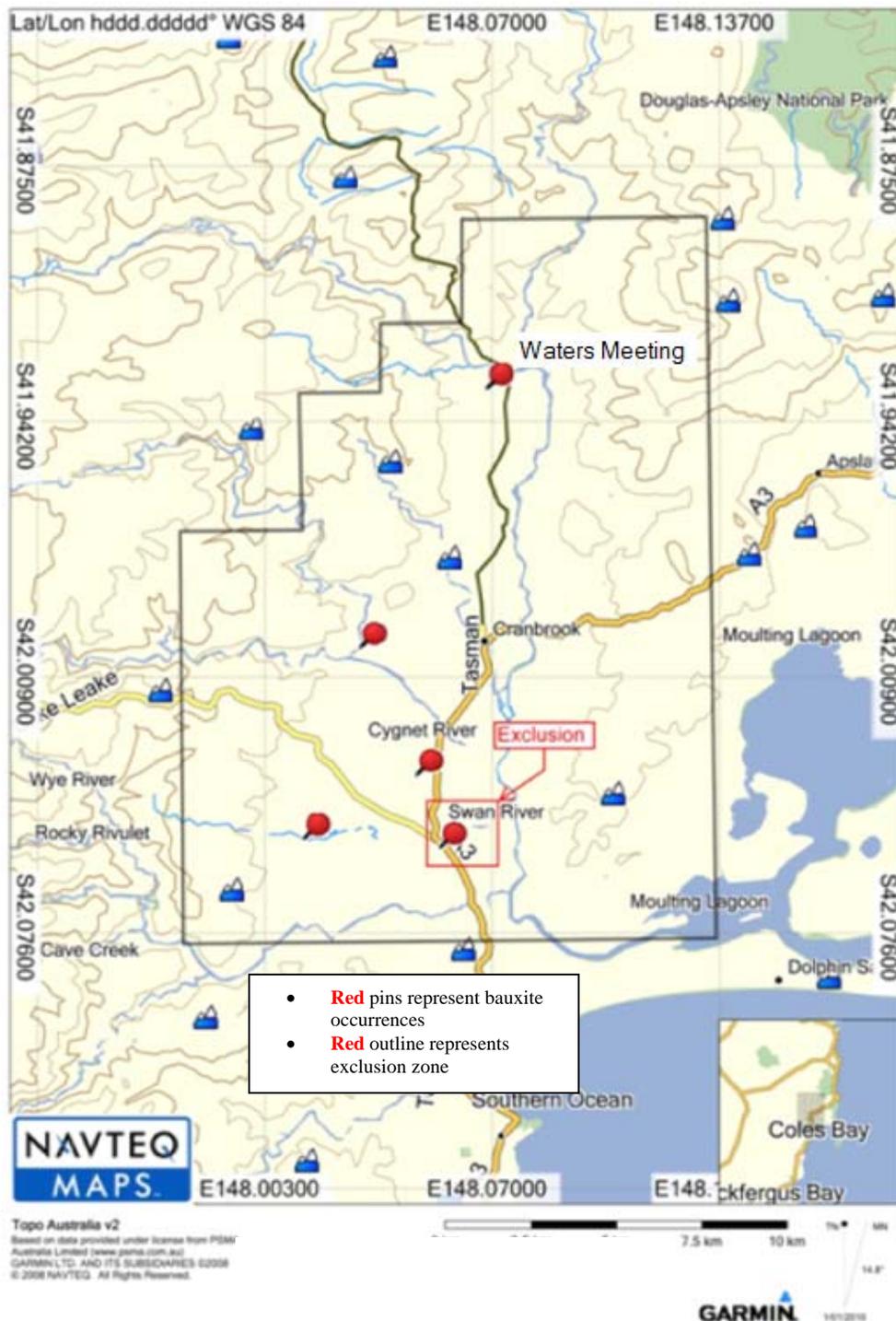
This is the first year of exploration in EL 8/2010.

## 4 EXPLORATION COMPLETED DURING THE REPORTING PERIOD

### Literature Review

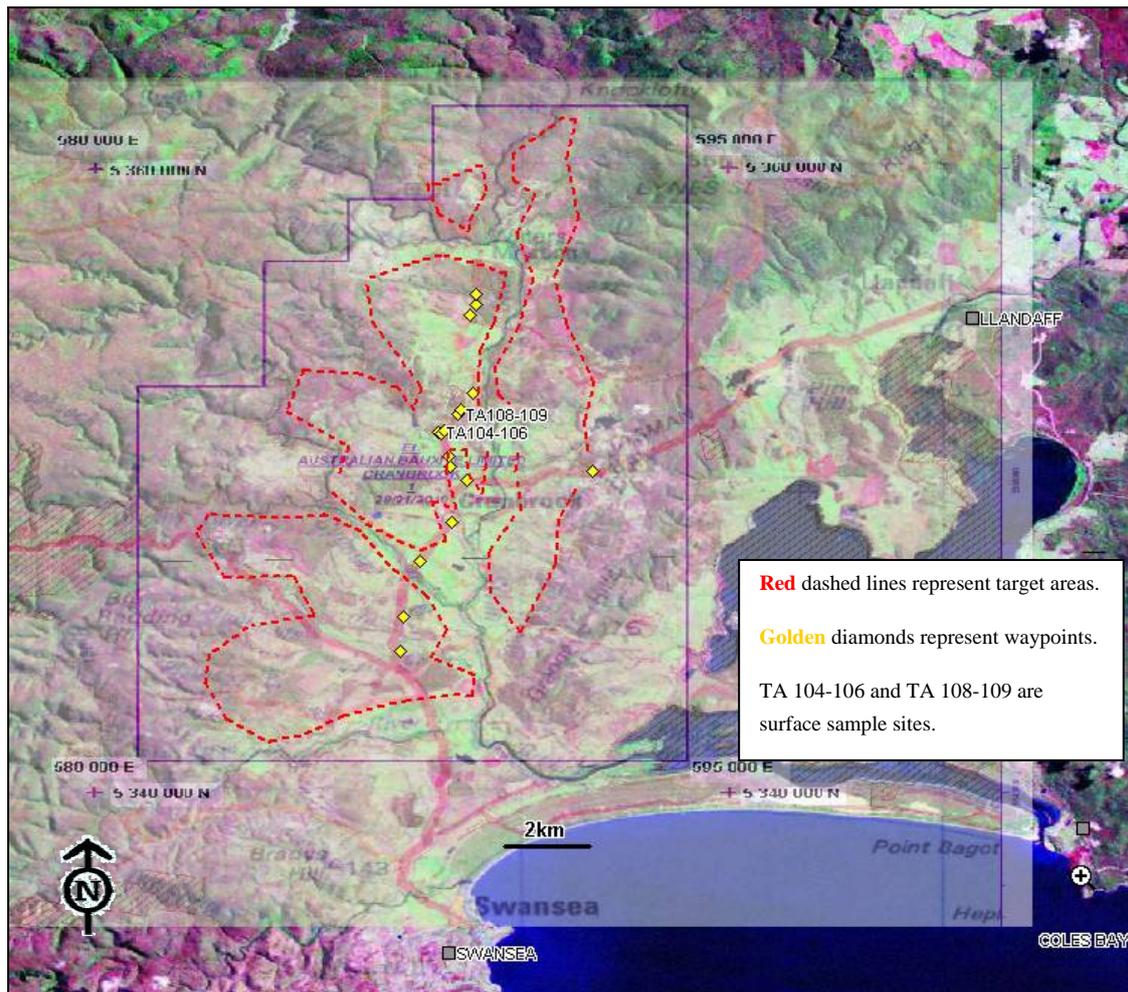
H.B. Owen, 1954, Bauxite in Australia, Bulletin 24.

### Regional Exploration Activities



Map 2 –EL 8/2010 Cranbrook, showing bauxite occurrences and an exclusion zone

**EXPLORATION COMPLETED DURING THE REPORTING PERIOD Cont**



Map 3 – Department GDA Map semi translucent over Landsat Map

Table 1 – Assay Results for Surface Samples TA 104-106 and TA 108-109

SAMPLE	Al <sub>2</sub> O <sub>3</sub> avl	Rx SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	LOI
DESCRIPTION	%	%	%	%	%	%
TA104	2	3.2	7.73	26.3	59.4	4.29
TA105	1.4	14.8	15.85	17.45	52	13.39
TA106	0.8	10.1	10.85	12.5	62.3	13.12
TA108	<0.1	5.1	3.99	44.6	46.8	2.16
TA109	0.4	4.2	7.1	31.8	53.6	5.64

Sample assay results were disappointing with silica and iron rich laterites.

**EXPLORATION COMPLETED DURING THE REPORTING PERIOD Cont**

Table 2 - Waypoints with GPS Coordinates, Elevations, Sample Data and Observations:

WP	Region	Easting	Northing	Elevation	Sample No.	Description
27	55S	588104.8	5351544	61.75	TA104-106	Laterite profile pale mustard to yellow TA104 yellow ochre colored laterite with shiny black ferruginous nodules TA105-106 Red and Yellow ochre color with brown speckles relic dolerite texture? Laterite
30	55S	588593	5352126	63.43	TA108-109	Small Quarry TA108 Mustard nodular vuggy laterite with small ferruginous pisolites TA109 Nodular vuggy pisolitic laterite (similar to Sandstone laterites in QLD)

**Waters Meeting**

Located on the old Coach Road north of Swansea, Waters Meeting had a very small bauxite hill right by the road side. Initially the adjacent hills were prospective but with exploration on foot the surrounding area was either laterized sediments or fresher dolerite. The deposit is only 150m in diameter and relatively thin. On the western side of the deposit it partitions to dolerite which suggests that particular deposit is likely to be laterized dolerite.

**Riversdale- Excluded from tenement**

This deposit was excluded from the tenement because of rare and endangered species that specifically grow on strongly leached sediments. This deposit is most likely larger than Waters Meeting target area but could not be more than 1-2Mt.

## **5 DISCUSSION OF RESULTS**

Bauxite deposits that occur on dolerite tend to be very small and not laterally continuous compared to bauxite occurring on volcanoclastic. The Cranbrook Tenement has the right setting for large bauxite deposits with heavy laterisation preserved across the whole area but the volcanics appear to be generally younger than the laterisation event and hence bauxite has only formed in small areas adjacent (or hosted by) to dolerite.

Sample assay results were disappointing with silica and iron rich laterites.

## 6 CONCLUSIONS AND RECOMMENDATIONS

Exploration of the Cranbrook tenement identified five locations where bauxite was either previously recorded and/or had a high probability of occurring. Bauxite was identified at two of these locations. At two other locations, bauxite could not be identified, and there was no access to the last location.

Bauxite deposits that occur on dolerite tend to be very small and not laterally continuous compared to bauxite occurring on volcanoclastic. The Cranbrook Tenement has the right setting for large bauxite deposits with heavy laterisation preserved across the whole area but the volcanics appear to be generally younger than the laterisation event and hence bauxite has only formed in small areas adjacent (or hosted by) to dolerite.

### **Recommendations for future work:**

A recommendation was made to management to relinquish EL 8/2010 Cranbrook based on results of exploration and management accepted the recommendation.

## **7 ENVIRONMENT**

### **Surface Disturbing Operations:**

ABx4's surface disturbing operations were minimal. Only surface samples were collected. No drilling was undertaken.

Travelling was done on existing tracks.

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

A botanical survey was conducted by Philip Milner Consultant Pty Ltd covering Cranbrook Target Areas within EL 8/2010.

Please refer to Appendix A for the complete Survey.

### **Rehabilitation:**

There was no drilling or track construction and therefore nothing to rehabilitate.

## 8 EXPENDITURE

Table 3 – 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		\$1,628
<b>Office Activities</b>			
<b>Field Activities</b>	Geological Mapping		
	Sampling		
	Equipment Hire		
	Accommodation/Field Camp	Days	\$2,293
	Travel	Vehicle Hire	\$1,413
	Land Holder Liaison		
	Field Supplies		\$1,765
	Other	Freight charges	\$469
	<b>Geophysics</b>		
	Airborne		
	Type	Line kms	
	Ground		
	Type	Line kms	
	<b>Drilling (program cost)</b>		
	RAB/AC	Holes/total metres	
	RC	Holes/total metres	
	Diamond	Holes/total metres	
	Other	Holes/total metres	
<b>Laboratory</b>	ME-XRF 13B, Reactive Silica, Available Alumina	5 samples	\$1,720
<b>Salaries / Wages</b>	Employees		
	Contractors	3 personnel Oct 2010	\$2,619
		<b>Grand Total</b>	<b>\$11,907</b>

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

## **9 REFERENCES**

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

**Final Report**

**on**

**EL 8/2010 – CRANBROOK**

**APPENDIX A – BOTANICAL SURVEY**

**ABx4 Pty Ltd**

**CRANBROOK TARGET AREAS**

**BOTANICAL & FAUNA HABITAT SURVEY OF PROPOSED DRILL  
SITES**

**For ABx4 PTY LTD**

**25<sup>th</sup> November 2010**



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BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS

**Introduction:** ABx4 Pty Ltd the holder of Exploration Licences 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 two locations near Cranbrook on the central east coast on the properties of “Waters Meeting” and “Riversdale”.

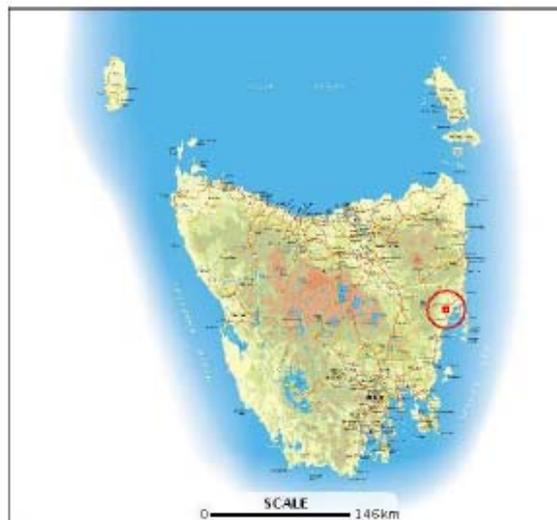
The exploration program will involve numerous shallow drill holes which will not require the clearing and/or leveling of drill pad sites and so is expected to have a minimal impact on the ground surface and adjacent vegetation.

A botanical and fauna habitat survey is required 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. 5834, Cranbrook

BIOREGION: South-east

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS

**Location Description:**

Target area No.1 on the “Waters Meeting” property is located off and to the west of the Old Coach Road about 2 km north of the Tasman Highway and to the immediate south of the West Swan River.

Target area No.2 is located on the “Riversdale” property to the east of the Tasman Highway and opposite the Lake Leake Main Road junction. Grange Road forms a boundary to the south-east.

**CRANBROOK TARGET AREA No.1:**

The following proposed drill sites are located on the property of “Waters Meeting”.

GRID REF: DRILL No. CB14: 588855E – 5357610N  
CB17: 588277E – 5357044N  
CB18: 588899E – 5357556N  
CB19: 588787E – 5357646N  
CB23: 588813E – 5357571N  
CB25: 588858E – 5357575N  
CB26: 588197E – 5357088N  
CB28: 588806E – 5357503N

**CRANBROOK TARGET AREA No.2:**

The following proposed drill sites are located on the property of “Riversdale”

GRID REF: DRILL No. CB1 : 587610E – 5344255N  
CB2 : 587307E – 5344354N  
CB3 : 587440E – 5344229N  
CB4 : 587845E – 5344370N  
CB5 : 587348E – 5344244N  
CB6 : 587666E – 5344317N  
CB7 : 587734E – 5344413N  
CB8 : 587757E – 5344474N  
CB9 : 587572E – 5344347N  
CB10: 587684E – 5344457N  
CB11: 587485E – 5344371N  
CB12: 587779E – 5344376N  
CB13: 587782E – 5344298N  
CB15: 587319E – 5344134N  
CB16: 587648E – 5344409N  
CB20: 587492E – 5344428N  
CB21: 587421E – 5344295N  
CB22: 587381E – 5344403N  
CB24: 587712E – 5344498N  
CB29: 587502E – 5344276N

(All Grid References MGA Zone 55 GDA94)

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS

**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 each 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:** GRID REF: 588277E – 5357044N

**Target Area No.2:** GRID REF: 587661E – 5344511N

**Desktop Survey Results:**

**VEGETATION COMMUNITIES:**

The following vegetation communities are mapped under the TasVeg mapping program as occurring within 1,000 metres of the two target 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”	3 large areas across Target Area No.2. None in Target Area No.1.
<i>Eucalyptus amygdalina</i> Forest & Woodland on Dolerite	DAD / bright green with horizontal lines	In north and SE & other scattered remnants in Target Area 1. One area in the east of Target Area No.2.
<i>Bursaria – Acacia</i> Woodland & Scrub	NBA / Olive green with “z”	Four localized areas in SE and NW of Target Area No.1.
<i>Melaleuca squarrosa</i> Scrub	SMR / Dark pink with diagonal lines	Along a creek-line in east of Target Area No.1.
Inland Heathland (undifferentiated)	SHU / Pink with “z”	One localized area in the SE of Target Area No.2.
Lowland <i>Poa labillardierei</i> Grassland	GPH / yellow with diagonal lines	Extends along creek-lines through Target Area No.2.
Lowland Grassland Complex	GCL / yellow	Two small localized areas in east and NW of Target Area No.1. Extensive in Target Area No.2
Regenerating Cleared Land	FRG / cream with diagonal lines	The predominant vegetation type in Target Area 1.
Agricultural Land	FAG / cream	In NE quadrat of Target area No.1. and 4 areas around periphery of Target Area No.2.
Weed Infestation	FWU / cream with “x”	Localized areas near west periphery of Target Area 2.

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

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
AREAS

*Eucalyptus amygdalina* Inland Forest and Woodland on Cainozoic Deposits is a community usually dominated by the Black Peppermint *Eucalyptus amygdalina*. Dry sclerophyll shrubs, often low or prostrate species, Bracken *Pteridium esculentum* or grassland with graminoids and 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 in the Fingal Valley and its main area of distribution is in the northern Midlands. Some outlying localities include the 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 and in the Cranbrook area at the time of white settlement however much of it has been cleared for agriculture. Large areas of the northern midlands on the less fertile soils were cleared in the 1960's following the introduction and widespread use of superphosphate.

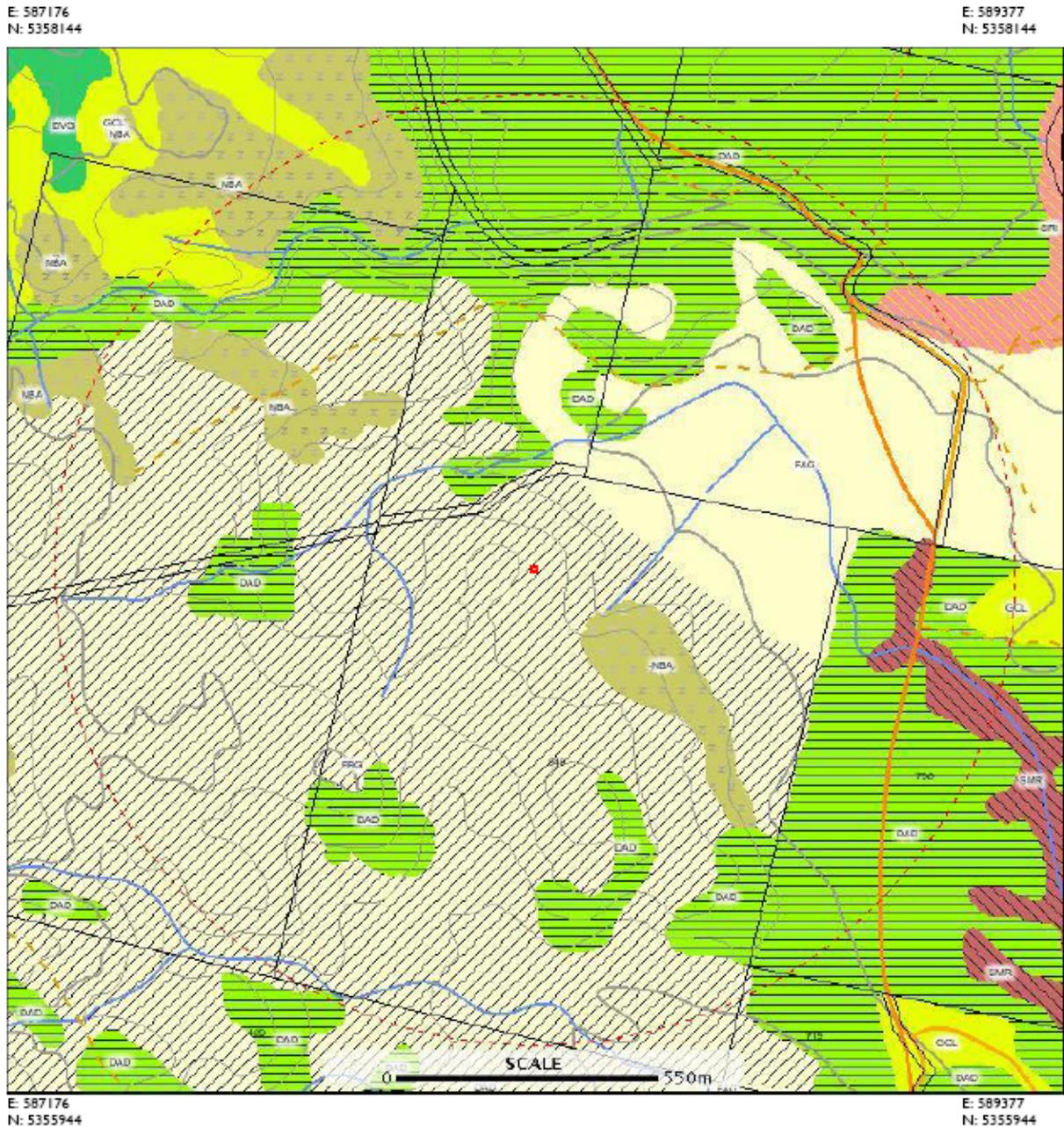
The community is of high conservation value and is listed as a threatened native vegetation community under the Tasmanian *Nature Conservation Act 2002*.

*Eucalyptus amygdalina* Forest and Woodland on Dolerite 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 25 metres in height and with a variable understorey ranging from grassy to heathy or shrubby.

All native grasslands in Tasmania are of high conservation value although just one of the grassland communities which is listed as threatened under both the State and the Commonwealth Acts, namely Lowland *Poa labillardierei* was mapped as occurring in the survey areas. The grassland community Lowland Grassland Complex was also widespread in the locality and much of the native and semi-improved pastures through the midlands and Cranbrook are mapped as this community. This community can be of high conservation value where it occurs with a high diversity of herbs and forbs.

The regenerating cleared land which predominates target area 1. On the TasVeg map could also be described as Lowland Grassland complex although the original vegetation community over the area was almost certainly *Eucalyptus amygdalina* Forest and Woodland on Dolerite.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS



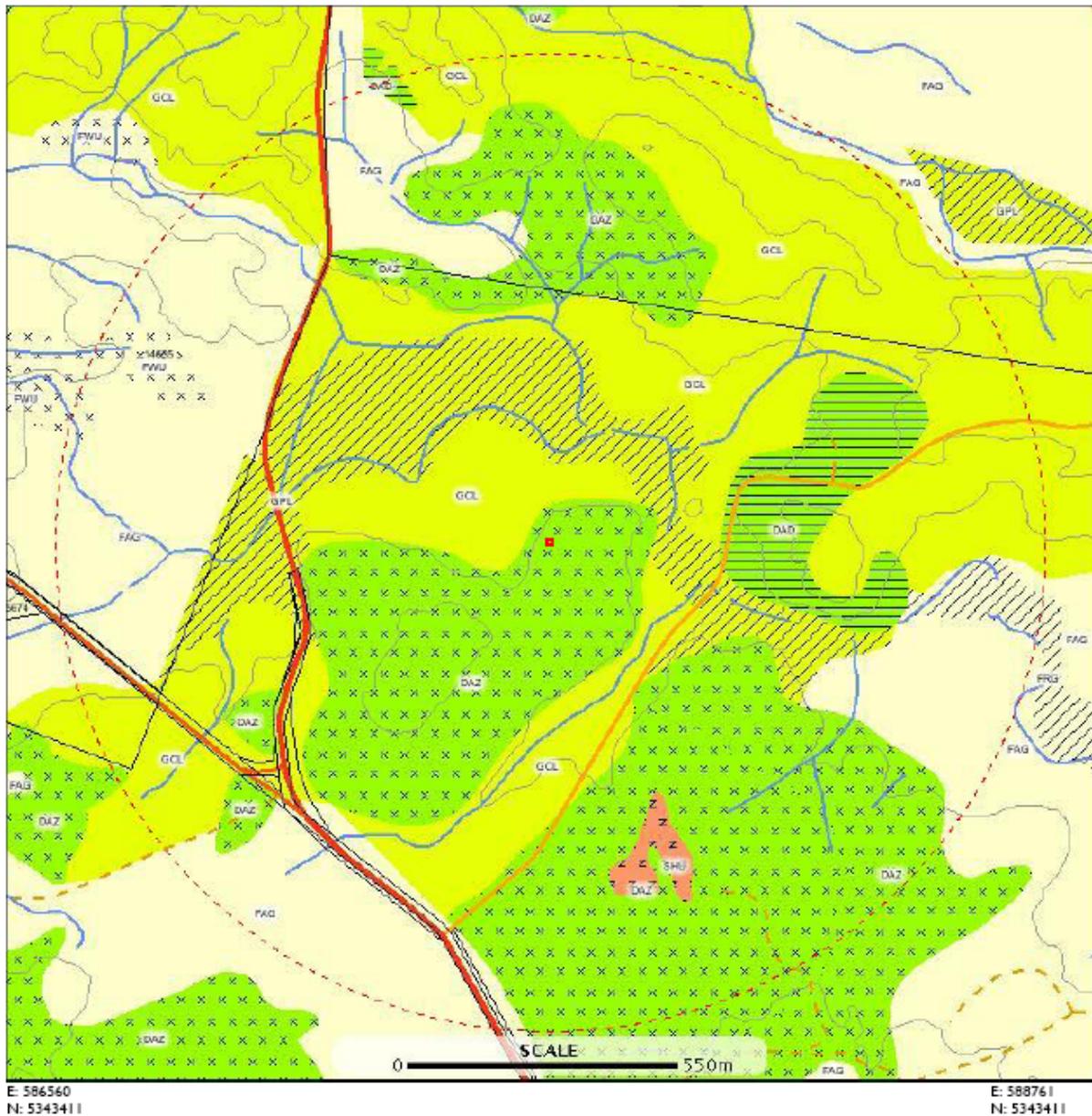
**FIGURE 1: Vegetation communities as per TasVeg mapping program within 1,000 metres of reference Point Target Area No.1: GRID REF: 588277E – 5357044N**

- CODE:** DAD .....*Eucalyptus amygdalina* Forest & Woodland on Dolerite  
 NBA ..... *Bursaria - Acacia* Woodland and Scrub  
 SMR ..... *Melaleuca squarrosa* Scrub  
 GPL ..... Lowland *Poa labillardierei* Grassland  
 GCL ..... Lowland Grassland Complex  
 FRG ..... Regenerating Cleared Land  
 FAG ..... Agricultural Land

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS

E: 586560  
N: 5345611

E: 588761  
N: 5345611



**FIGURE 2: Vegetation Communities as per TasVeg mapping program within 1,000 metres of reference Point Target Area No.2, GRID REF: 587661E – 5344511N**

- CODE: DAZ ..... *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits**  
**DAD ..... *Eucalyptus amygdalina* Forest & Woodland on Dolerite**  
**GCL ..... Lowland Grassland Complex**  
**GPL ..... Lowland *Poa labillardierei* Grassland**  
**SHU ..... Inland Heathland (Undifferentiated)**  
**FAG ..... Agricultural Land**  
**FWU ..... Weed Infestation**

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
AREAS

THREATENED VEGETATION COMMUNITIES:

One of the two forest communities mapped within the study area is listed as threatened under the Tasmanian *Nature Conservation Act 2002*.

- *Eucalyptus amygdalina* Inland Forest & Woodland on Cainozoic Deposits (DAZ) is listed as a vulnerable community under the Act as it has been subject to extensive clearing and fragmentation throughout its range. This is the predominant vegetation community across target area No.2.

One of the two native grassland communities mapped within the study area is listed as nationally threatened ecological communities under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, as well as being listed as an endangered community under the Tasmanian Act.

- Lowland *Poa labillardierei* Grassland (GPL) was declared a critically endangered ecological community in Tasmania in June 2009. This community follows the lower slopes and creek-lines through target area No.2.

VEGETATION COMMUNITIES OF CONSERVATION SIGNIFICANCE

- *Eucalyptus amygdalina* Forest and Woodland on Dolerite (DAD) is relatively widespread in the drier areas of eastern Tasmania and the midlands.
- Lowland Grassland Complex (GCL) is considered to be relatively widespread however it is often considered to be disturbance induced and the diversity of species particularly herbs and other forbs can be greatly influenced by the disturbance history of a location. Areas of this community which have a high diversity of herbs and forbs are of high conservation significance. It is widespread within Target Area No.2 and the area shown as regenerating cleared land could also be described as this community.

THREATENED FLORA:

Target Area No.1. "Waters Meeting"

Four 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 500 metres of the study area reference point.

- *Callitris oblonga* subsp *oblonga* the South Esk Pine is listed as being vulnerable under the Tasmanian Act and endangered nationally. There is one 1980 record of the species from the locality. There are a further 12 records from within 3,000 metres.
- *Cyphanthera tasmanica* the Tasmanian Rayflower is rare in Tasmania. There is one 1980 record from the locality and a further three from within 3,000 metres.
- *Eucalyptus barberi* Barbers Gum is a rare species restricted to the central east coast between Swansea and Cranbrook. There is one 1980 record from the area and a further three from within 3,000 metres.
- *Melaleuca pustulata* the Warty Paperbark is restricted to the central east coast area and is considered to be rare in Tasmania. There is one 1980 record from this locality and a further 28 from within 3,000 metres.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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A further eleven species of threatened flora are recorded from within 3,000 metres of the target area No.1. reference point.

- *Acacia axillaris* the Midlands Wattle is listed as being vulnerable under both Acts. There is one 2001 record from the area.
- *Acacia ulicifolia* the Juniper Wattle is rare in Tasmania and there is one 2001 record from the area.
- *Austroanthonia induta* The Tall Wallaby Grass is rare in Tasmania. There is one 1988 record on the database.
- *Bertya tasmanica* subsp. *tasmanica*. Tasmanian *Bertya* is an endangered species under both state and commonwealth Acts. There is one 2004 record from the locality.
- *Heirochloe rariflora*. Cane Holygrass is rare in Tasmania. There is one 1980 record.
- *Hovea tasmanica*. Rockfield Purplepea is a rare Tasmanian species. There is one 1980 record from the area.
- *Lasiopetalum micranthum* the Tasmanian Velvetbush is a rare Tasmanian species which is restricted to the east coast and hinterland. There are 13 records from the locality dated between 1980 and 2001.
- *Ozothamnus lycopodioides* the Clubmoss Everlasting Daisybush is listed as being rare under the Tasmanian Act. There is one 1990 record from the area.
- *Spyridium lawrencei* The Small-leaf Dustymiller is listed as being vulnerable under the Tasmanian Act and endangered nationally. There are nine records from the locality dated between 1980 and 2004.
- *Stenanthemum pimeleoides* the Propeller Plant is listed as being vulnerable under both state and commonwealth Acts. There are four records on the database dated from 1980 to 1996.
- *Viola cunninghamii* the Alpine Violet is rare in Tasmania. There is one record from the locality dated 1984.

Target Area No.2. "Riversdale"

Six 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 500 metres of the study area reference point.

- *Caesia calliantha* the Blue Grasslily is listed as being rare under the State Act. There is one 1990 record on the database.
- *Callitris oblonga* subsp. *oblonga* the South Esk Pine is listed as vulnerable in Tasmania and endangered nationally. There are three records from 1986 and 1990 and a further 16 records from within 3,000 metres. The species has a very restricted distribution in the east of the state.
- *Cryptandra amara* the Pretty Pearlflower is endangered in Tasmania. There are three 1990 records from within 500 metres and a further 4 records from within 3,000 metres.
- *Lasiopetalum micranthum* the Tasmanian Velvetbush is a rare eastern species with 4 records dated between 1990 and 2006 and a further four from within 3,000 metres.
- *Stenanthemum pimeleoides* the Propeller Plant is listed as being a vulnerable species under both state and commonwealth Acts. There are 6 records from within 500 metres dated between 1993 and 2006 and a further 31 records from within 3,000 metres.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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- *Vittadinia cuneata* var *cuneata* the Fuzzy New-Holland Daisy is rare in Tasmania. There is one 1993 record.

A further nine species of threatened flora are recorded within 3,000 metres of the target area No.2.

- *Acacia axillaris* the Midlands Wattle is a vulnerable species under both State and Commonwealth Acts. There are three records dated between 1985 and 1996.
- *Acacia sicutiformis* the Dagger Wattle is rare in Tasmania with one 1996 record.
- *Austrodanthonia induta* the Tall Wallaby Grass is rare in Tasmania with one 1991 record.
- *Brachyscome rigidula* the Cutleaf Daisy is vulnerable in Tasmania with 3 records dated 1991, 1996 and 2006.
- *Calocephalus lacteus* is rare in Tasmania and recorded in the nearby Tasman Highway road reserve.
- *Eucalyptus barberi* Barbers Gum is a rare species in Tasmania with two records from 1970 and 1990. This species is restricted to the area between Cranbrook and Swansea.
- *Grevillea australis* var *linearifolia* Narrowleaf Grevillea. This variety of *Grevillea australis* is rare in Tasmania with one 1992 record.
- *Melaleuca pustulata* the Warty Paperbark is rare under the Tasmanian Act and is restricted to this central east coast area. There are 24 records on the database dated between 1974 and 2006.
- *Pultenaea humilis* The Dwarf Bushpea is considered to be vulnerable in Tasmania. There is one 2006 record on the database.

FLORA OF CONSERVATION SIGNIFICANCE:

The following species of non-threatened flora which have been recorded in the locality are considered to be of conservation significance.

- *Olearia ciliata* the Fringed Daisy Bush was previously listed as being rare under the Act but has since been downlisted. It is still not a common species.
- *Olearia ericoides* the Heathy Daisybush was also previously listed as being rare under the Act but has since been downlisted.
- *Viola hederaceae* subsp. *cleistogamoides* (Syn. *Viola cleistogamoides*) was previously listed as being rare under both Acts however the subspecies has been incorporated into *Viola hederaceae* without subspecies status.

THREATENED FAUNA:

One species of threatened fauna listed under the above Acts is recorded on the database as occurring within 1,000 metres of the target area No.2. No species have been recorded from within 500 metres of either target area reference point.

- The Tasmanian Devil *Sarcophilus harrisii* is now listed as being endangered under both State and Commonwealth Acts. There is one record of the species from within 1,000 metres from the target area reference point 2, from about 1973.

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One further species has been recorded from within 3,000 metres of target area No.1 and two further species from within 3,000 metres of target area 2.

- The Eastern-barred Bandicoot *Parameles gunnii* is relatively widespread in Tasmania but considered to be vulnerable nationally. Three records from target area 2 dated between 1986 and 1993.
- 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 5 records from within 3,000 metres of target area No.1. Each recorded location is approximate.
- The White-bellied Sea-eagle *Haliaeetus leucogaster* has one undated record on the database within 3,000 metres of target area 2.. The species is vulnerable in Tasmania.

The following seven 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 novaehollandiae* 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.
- New Holland Mouse *Pseudomys novaehollandiae* is endangered in Tasmania and vulnerable nationally.
- Australian Grayling *Prototroctes maraena* is a fish which is listed as vulnerable both in Tasmania and nationally.
- 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.

ENVIRONMENTAL WEEDS:

One significant environmental weed is mapped as occurring within 1,000 metres of the target area No.2.

- Gorse *Ulex europaeus* is considered to be a weed of national significance under commonwealth legislation and a declared weed in Tasmania. Small infestations are mapped as occurring to the east of the Tasman Highway but within 1,000 metres of target area 2.

CONSERVATION STATUS:

Target area No.2. on the "Riversdale" property is located within an area covered by a conservation covenant under the Tasmanian *Nature Conservation Act 2002* and as such is a dedicated nature reserve for conservation purposes.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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**Field Survey:**

The field survey was undertaken on Friday 5<sup>th</sup> November 2010.

Methodology: Both target areas were surveyed on foot utilizing the random meander technique and focusing on the locations proposed for exploratory drilling.

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 spring when many grassland species are in flower, however there are numerous species which flower later in the spring, and 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:**

Two separate target areas were surveyed.

**TARGET AREA No.1:**

Waters Meeting property.

GRID REF: 588277E – 5357044N

This survey focused on two sites, the first located on a low hill to the immediate west of the Old Coach Road where 6 or 7 drill holes are proposed and the second on a hill a further 900 metres towards the south-west, where 2 drill holes are proposed.

The vegetation on the first site was a grassy woodland community which had a dense grassy sward composed of exotic grasses and remnant native grasses and forbs, with some patches of Bracken and a species of *Lepidosperma*. The canopy consisted of occasional trees of Black Peppermint *Eucalyptus amygdalina* and White Gum *Eucalyptus viminalis* and smaller trees of Prickly Box *Bursaria spinosa*, Forest She-oak *Allocasuarina littoralis*, Black Wattle *Acacia mearnsii* and Native Cherry *Exocarpus cupressiformis*. There were numerous dead standing trees in the locality, indicative of a declining vegetation community. The community is described as Grassy *Eucalyptus amygdalina* Woodland on Dolerite.

No threatened species of plants were observed in this locality. Some hollow trees were observed in the locality which are potential fauna habitat, however there was no evidence of the presence of any species of threatened fauna. Weeds observed included some Gorse bushes and Spear Thistle.

The vegetation of the second site was a very sparse, open and short grassland composed of mainly indigenous grass species and a range of forbs. There was an occasional shrub of *Acacia genistifolia* but no remnant trees in the locality. The vegetation community is an open facie of Lowland Grassland Complex.

The threatened species *Stenanthemum pimeleoides* was present in very low numbers, two plants were observed. There was no potential habitat for threatened species of fauna. Some Gorse was observed in the locality.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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TARGET AREA No. 2.

Riversdale property.

GRID REF: 587661E – 5344511N

VEGETATION COMMUNITIES:

The survey area focused on the low hill and its upper slopes located to the north-east of the Tasman Highway - Lake Leake Main Road junction, and was accessed from this location as well as from Grange Road. An abandoned gravel pit / quarry full of water was located on top of the hill which was accessed from Grange Road.

The predominant vegetation community throughout Target Area 2. is a relatively open forest of *Eucalyptus amygdalina*, the Black Peppermint which had a variable ground layer stratum from heathy to grassy depending on the location. In areas where the tree canopy was very open or absent the community became a grassland community described as Lowland Grassland Complex (GCL) and is mapped as such by TasVeg. The community *Eucalyptus amygdalina* Inland Forest and Woodland on Cainozoic Deposits (DAZ) extended across the site and along the upper slopes either side of the ridgeline. This was the target geology of the exploration program and is a threatened vegetation community. There was a high level of diversity in the ground stratum vegetation .

The threatened species *Stenanthemum pimeleoides* was observed to be widespread in the locality.

THREATENED VEGETATION COMMUNITIES:

One threatened native vegetation community listed under the Tasmanian *Nature Conservation Act 2002* was the observed during the survey. *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits (DAZ) was the predominant community within Target area No.2.

VEGETATION COMMUNITIES OF CONSERVATION SIGNIFICANCE:

The area of low open native grassland (Lowland Grassland Complex, GCL) within target area No.1 and in target area No. 2 where it extends into and forms the ground stratum understorey of the forest community has a high diversity of species, including herbs, forbs, grasses and orchids, including one threatened species.

The community in this location is considered to be of high conservation value.

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 during the field survey.

- *Stenanthemum pimeleoides* the Propeller Plant was present in Target Area No.1 in very small numbers but was widespread within Target Area No.2.  
None of the other threatened species known to occur within 3,000 metres of the study area and referred to in this report under the desktop survey section were observed during the survey.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS



**PHOTO 1: *Stenanthemum pimeleoides* showing flower detail**



**PHOTO 2: *Stenanthemum pimeleoides* showing growth habit.**

**FLORA OF CONSERVATION SIGNIFICANCE:**

Two species of non-threatened orchids were observed during the survey of target area 2 on the Riversdale property.

- *Caladenia clavigera* the Clubbed Spider Orchid. Three plants of the species were observed in a location remote from planned drill sites but could occur elsewhere in the target area..
- *Duiris sulphurea* the Tiger Orchid was relatively widespread across the survey area. The field crew should avoid this plant where ever possible.

Images of both species have been provided to the field crew to aid recognition.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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**THREATENED FAUNA:**

No species of threatened fauna listed under the above Acts, which have been recorded in the locality or have the potential to occur in this geographical area were observed during the field survey.

**THREATENED FAUNA HABITAT:**

The mature old-growth Eucalypts which occur as occasional trees throughout the survey area No.2 are important potential habitat for many species of fauna including a number of threatened species. Such trees are critical habitat for mammals and birds which require large trees or trees with hollows for part of their life cycle and includes threatened species such as the Masked Owl (requires large hollows) and the Wedgetailed Eagle which requires large trees for nest support. Neither location however was considered to provide suitable nesting habitat for Wedge-tailed Eagles. Tasmanian Devils and Spotted-tailed Quolls can also utilize basal tree hollows as dens. The exploration program as proposed will not impact on any standing trees or threaten any such potential fauna habitat, and no evidence was observed during the survey that either of the two species were present in the locality.

The more dense areas of grasslands particularly in target area No.2 would provide suitable habitat and cover for a number of species of fauna including the Eastern-barred Bandicoot although no evidence of the species presence was observed during the survey.

**ENVIRONMENTAL WEEDS:**

The principal environmental weed observed during the field survey was Gorse *Ulex europeaus*. Gorse was observed as an occasional plant in both target areas.

It is a widespread and extensive weed throughout the district and is having a serious impact on both agricultural land and remnant natural vegetation.

Gorse is recognized as being a weed of national significance.

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

**Survey Conclusions:**

No.1. exploration target area at Waters Meeting is located within areas of remnant grassland which will require further botanical survey should the exploration program proceed to a more intensive and extensive level.

Target area No.2 on the Riversdale property is located within a significant area of remnant forest which is listed as a threatened native vegetation community in Tasmania. There is a high diversity of heath and grassland species within the ground stratum and a number of mature old-growth trees including trees with hollows are present in the tree canopy.

The area of native grassland within the target area is not listed as a threatened community however it is of high conservation value due to the high diversity of ground stratum species. This area of the Riversdale property is covered by a conservation covenant which recognizes the conservation value of the location. Further botanical survey will be required in this location prior to any further extension or expansion of the drilling program.

The proposed exploratory drilling program is of a low impact nature involving shallow drill holes. The drilling program as proposed will have a minimal impact of the ground layer

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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vegetation providing the threatened species are avoided. There will be no impact on the standing trees.

**Recommendations:**

**VEGETATION COMMUNITIES:**

The proposed drilling program is located within vegetation with an open understorey so no clearing of woody vegetation will be necessary. The drilling method being used will ensure that there will be minimal impact on the native vegetation community present and a minimal impact on the ground stratum vegetation. No mature trees will need to be felled to allow access to any of the drill sites.

Ensure the adequate containment within each drill pad site of all silt, 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 across the Riversdale survey and exploration target area No.2, however there will be minimal impact on this community with the proposed exploration program and 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.

Ensure that field staff are able to recognize *Stenanthemum pimeleoides* in order to avoid impacting on the plant. Some drill sites may need to be relocated a short distance in order to avoid plants of 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:**

The key potential habitat for threatened species in the target area are the mature old-growth Eucalypts and dead standing trees which possess hollows. The exploration program will not impact on any established trees and so will not impact on potential habitat for threatened species of fauna.

The denser native grassland on the Riversdale property is potential habitat for the Eastern-barred Bandicoot however the proposed drilling program will have minimal impact to the ground stratum vegetation and therefore will have little impact on terrestrial species of fauna such as the bandicoot.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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ENVIRONMENTAL WEEDS:

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 the exploration area.

Gorse was present in the vicinity of both target areas and in the wider area. Care should be taken with drill sites in the vicinity of existing gorse infestations to minimize ground disturbance and to avoid moving potentially contaminated soil to sites which are clear of the weed.

Ensure that all machinery and equipment is cleaned of extraneous soil before leaving this property and moving to a new exploration 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.

FUTURE EXPLORATION ACTIVITIES:

Should either of the Waters Meeting or Riversdale Target areas warrant further exploration or more concentrated exploration as a result of this initial drilling program then a more thorough botanical survey over an extended season will be necessary in order to more fully determine the conservation value of the ground stratum vegetation, particularly with mapping the locations and extent of the threatened species of plants observed in the Riversdale locality.

Philip Milner

Vegetation Consultant

**Appendix 1: Vegetation Communities and Plants Recorded**

**Vegetation Communities and Species Recorded within the Exploration Target Area No.1.**

- 1. *Eucalyptus amygdalina* Woodland on Dolerite. (TasVeg Code DAD)**
- 2. Lowland Grassland Complex (TasVeg Code GCL)**

DOMINANT TREES

*Eucalyptus amygdalina*  
*Eucalyptus viminalis*

UNDERSTOREY TREES / LARGE SHRUBS

<i>Acacia mearnsii</i>	Black wattle	woodland only
<i>Allocasuarina littoralis</i>	Black She-oak	woodland only
<i>Bursaria spinosa</i>	Prickly Box	occasional
<i>Exocarpus cupressiformis</i>	Native Cherry	woodland only

MEDIUM SHRUBS

<i>Acacia genistifolia</i>	Spreading Wattle	occasional
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SMALL SHRUBS

<i>Astroloma humifusum</i>	Cranberry Heath	occasional
<i>Gonocarpus teucrioides</i>	Forest Raspwort	uncommon
<i>Goodenia lanata</i>	Creeping Native-primrose	occasional

HERBS & HERB-LIKE PLANTS

<i>Acaena echinata</i>	Sheeps Burr	occasional
<i>Crassula sieberiana</i>	Rock Stonecrop	occasional
<i>Dichondra repens</i>	Kidney weed	occasional
<i>Euchiton sp</i>	A Cottonleaf	occasional
<i>Hypericum gramineum</i>	Small St Johns Wort	occasional
<i>Lagenophora stipitata</i>	Bluebottle Daisy	uncommon
<i>Oxalis perennans</i>	Grassland woodsorrel	common
<i>Poranthera microphylla</i>	Small Poranthera	occasional
<i>Scleranthus biflorus</i>	Twinflowered Knawell	occasional
<i>Stenanthemum pimeleoides</i>	Propeller Plant	localized
<i>Viola hederacea</i>	Ivy-leafed Violet	occasional

GRASSES & GRAMINOIDS

<i>Austrodanthonia spp.</i>	Wallaby Grasses	common
<i>Juncus procera</i>	Tall rush	localized
<i>Lepidosperma inops</i>	Fan Sedge	occasional
<i>Lepidosperma sp.</i>	A Swordsedge	occasional
<i>Lomandra longifolia</i>	Matrush	occasional
<i>Luzula sp.</i>	A Woodrush	uncommon

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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APPENDIX 1 (cont)

FERNS & ALLIED PLANTS

<i>Pteridium esculentum</i>	Bracken	woodland only
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ENVIRONMENTAL WEEDS

<i>Cerastium fontanum</i>	Mouse-eared Chickweed	occasional
<i>Cirsium vulgare</i>	Spear Thistle	occasional
<i>Ulex europaeus</i>	Gorse	occasional

**Vegetation Communities and Species Recorded within the Exploration Target Area No.2.**

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

**2. Lowland Grassland Complex (GCL)**

DOMINANT TREES	COMMON NAME	FREQUENCY
<i>Eucalyptus amygdalina</i>	Black Peppermint	abundant
<i>Eucalyptus viminalis</i>	White-gum	common
UNDERSTOREY TREES / LARGE SHRUBS		
<i>Acacia dealbata</i>	Silver Wattle	uncommon
<i>Allocasuarina littoralis</i>	Black She-oak	common
<i>Bursaria spinosa</i>	Prickly Box	occasional
<i>Exocarpus cupressiformis</i>	Native Cherry	common
MEDIUM SHRUBS		
<i>Acacia genistifolia</i>	Spreading Wattle	occasional
<i>Melaleuca pustulata</i>	Warty Paperbark	localized
<i>Persoonia juniperina</i>	Prickly Geebung	uncommon
<i>Pomaderris elliptica</i>	Yellow Dogwood	uncommon
<i>Pultenaea daphnoides</i>	Heartleaf Bushpea	uncommon
SMALL SHRUBS		
<i>Acrotriche serrulata</i>	Ants Delight	occasional
<i>Astroloma humifusa</i>	Cranberry Heath	occasional
<i>Bossiaea prostrata</i>	Creeping Bossia	occasional
<i>Clematis gentianoides</i>	Ground Clematis	occasional
<i>Davesia ulicifolia</i>	Spiky Bitterpea	uncommon
<i>Einadia nutans</i>	Climbing Saltbush	uncommon
<i>Epacris impressa</i>	Common Heath	occasional
<i>Gompholobium huegelii</i>	Wedgepea	occasional
<i>Gonocarpus tetragynus</i>	Common Raspwort	occasional
<i>Goodenia lanata</i>	Trailing Native-primrose	common
<i>Hibbertia prostrata</i>	Prostrate Guineaflower	uncommon

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
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APPENDIX 1 (cont)

Target Area No.2 (cont)

SMALL SHRUBS (cont)

<i>Hibbertia riparia</i>	Erect Guineaflower	common
<i>Hovea heterophylla</i>	Winter Purplepea	occasional
<i>Kennedia prostrata</i>	Running Postman	uncommon
<i>Leucopogon virgatus</i>	Twiggy Beardheath	occasional
<i>Lissanthe strigosa</i>	Peachberry Heath	occasional
<i>Ozothamnus scutellifolius</i>	Buttonleaf Everlastingbush	uncommon
<i>Pimelea humilis</i>	Dwarf Riceflower	occasional
<i>Platylobium obtusangulum</i>	Common Flatpea	common
<i>Pultenaea pedunculata</i>	Matted Bushpea	occasional
<i>Rhytidosporum procumbens</i>	Starry Appleberry	occasional
* <i>Stenanthemum pimeleoides</i>	Propeller Plant	occasional
<i>Styphelia adscendens</i>	Golden Heath	uncommon
<i>Tetratheca pilosa</i>	Lilac Bells	uncommon

HERBS & HERB-LIKE PLANTS

<i>Acaena echinata</i>	Sheeps Burr	occasional
<i>Asperula conferta</i>	Common Woodruff	uncommon
<i>Chrysocephalum apiculatum</i>	Common Everlasting	occasional
<i>Coronidium scorpioides</i>	Curling Everlasting	occasional
<i>Convolvulus angustissimus</i>	Blushing Bindweed	uncommon
<i>Drosera peltata</i> subsp. <i>auriculata</i>	Tall Sundew	uncommon
<i>Hypericum gramineum</i>	Small StJohns Wort	occasional
<i>Leptorhynchus squamatus</i>	Scaly Buttons	occasional
<i>Linum marginale</i>	Native Flax	occasional
<i>Oxalis perennans</i>	Grassland Woodsorrel	common
<i>Poranthera microphylla</i>	Small Poranthera	common
<i>Scleranthus biflorus</i>	Twinflower Knawell	uncommon
<i>Veronica calycina</i>	Hairy Speedwell	localized
<i>Viola hederaceae</i>	Ivy-leafed Violet	occasional
<i>Wahlenbergia gracilentia</i>	Annual Bluebell	occasional

ORCHIDS

<i>Caladenia carnea</i>	Pink Fingers	common
<i>Caladenia clavigera</i>	Clubbed Spider-orchid	localized
<i>Diuris sulphurea</i>	Tiger Orchid	occasional

GRASSES & GRAMINOIDS

<i>Austrodanthonia</i> spp.	Wallaby Grasses	common
<i>Burchardia umbellata</i>	Milkmaids	uncommon
<i>Caesia parviflora</i>	Grasslily	occasional
<i>Dianella revoluta</i>	Spreading Flaxlily	occasional
<i>Ehrharta stipoides</i>	Weeping Grass	common
<i>Elaeocharis acuta</i>	Common Spikesedge	localized

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET  
AREAS

APPENDIX 1 (cont)

Target Area No.2 (cont)

GRASSES & GRAMINOIDS (cont)

<i>Elaeocharis sphacaelata</i>	Tall Spikesedge	localized
<i>Juncus sp</i>	A Rush	localized
<i>Lepidosperma concavum</i>	Sand Swordsedge	occasional
<i>Lepidosperma inops</i>	Fan Sedge	occasional
<i>Lomandra longifolia</i>	Mat-rush	common
<i>Lomandra nana</i>	Dwarf Mat-rush	occasional
<i>Poa rodwayi</i>	Velvet Tussockgrass	common
<i>Poa labillardierei</i>	Silver Tussockgrass	common
<i>Schoenus apogon</i>	Common Bogsedge	occasional
<i>Themeda triandra</i>		
<i>Thysanotus patersonii</i>		

FERNS & ALLIED PLANTS

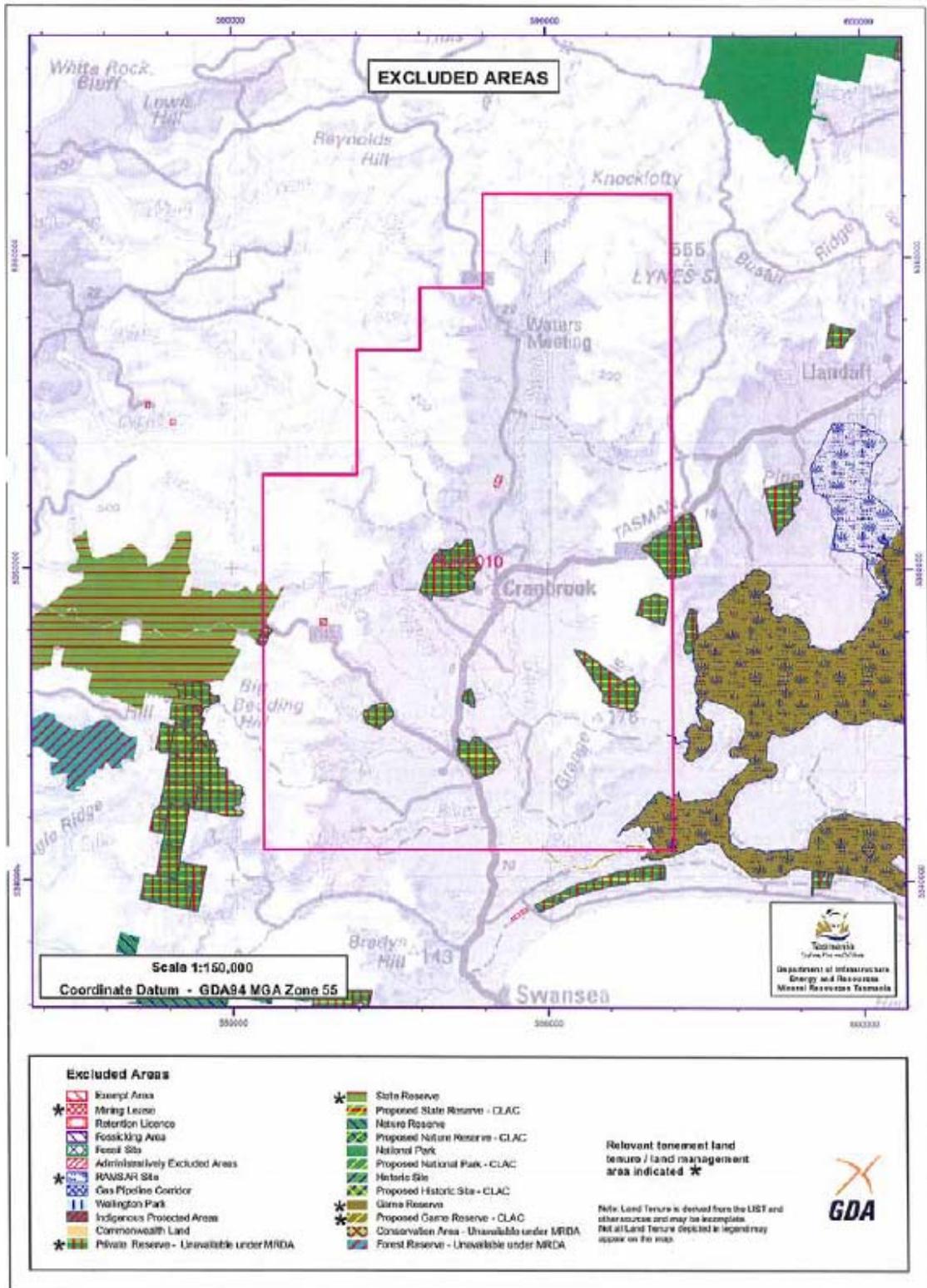
<i>Pteridium esculentum</i>	Bracken	common
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APPENDIX 1 (cont)

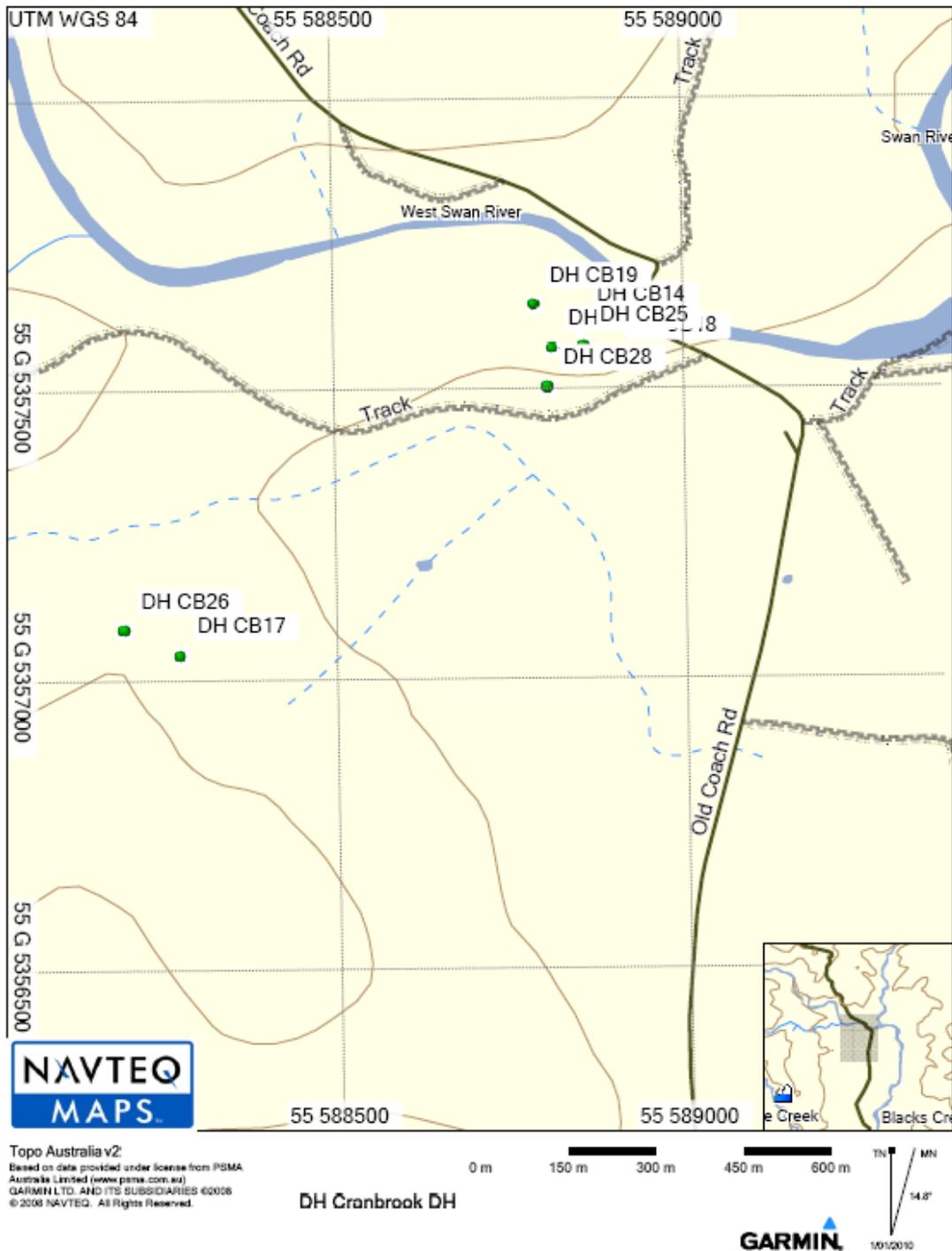
ENVIRONMENTAL WEEDS (cont)

<i>Briza minor</i>	Shivery Grass	occasional
<i>Centaureum erythraea</i>	Centaury	occasional
<i>Cerastium fontanum</i>	Mouse-eared Chickweed	occasional
<i>Ulex europaeus</i>	Gorse	occasional

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS

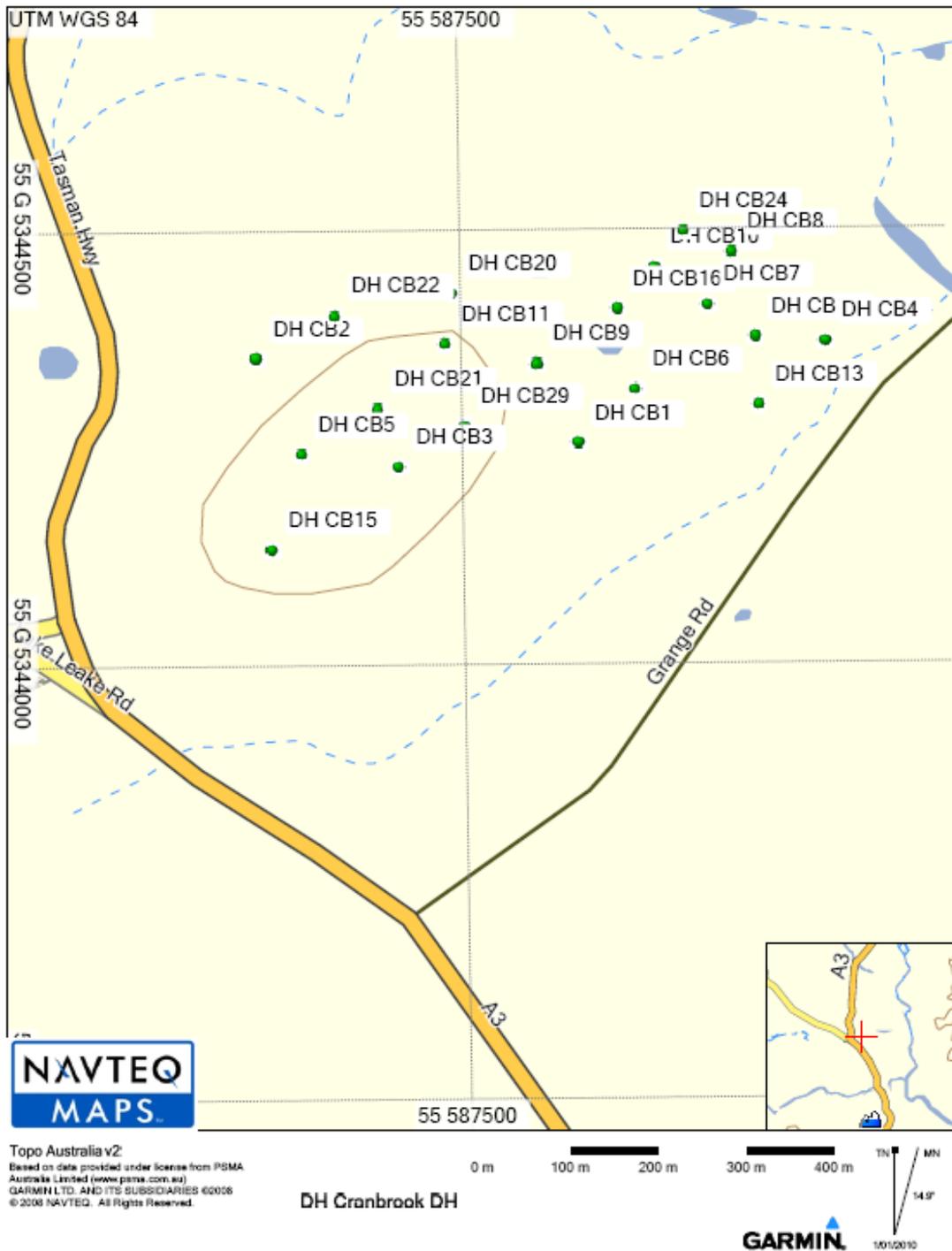


BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS



MAP 2: Water Meeting Target Area: proposed drill site locations.

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS



MAP 3: Riversdale Target Area, Proposed drill site locations

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS



**PHOTO 3 .....** Grassy Woodland vegetation. Waters Meeting vicinity Drill site CB25.



**PHOTO 4 .....** Lowland Grassland Complex, Waters Meeting, vicinity Drill site CB26

BOTANICAL AND FAUNA HABITAT SURVEY FOR ABx4 PTY LTD: CRANBROOK TARGET AREAS



**PHOTO 5 .....** *Eucalyptus amygdalina* Inland Forest on Cainozoic Deposits within Riversdale study area, vicinity Drill site CB6.



**PHOTO 6 ...** Lowland Grassland Complex and *Eucalyptus amygdalina* Woodland within Riversdale, vicinity Drill site CB3