ANNUAL REPORT EL 16/2009

REVIEW OF EXPLORATION WORK CARRIED OUT FOR HIGH GRADE SILICA AT JUNEE RIDGE

Duggans P/L
8420 Channel Highway
Cradoc Tas. 7109

D Hassell
(Dip. Applied Geology)
Reviewed April 2011

Abstract

Exploration work at Junee Ridge is aimed at delineation of a high grade lump silica resource sufficiently large enough to sustain a commercially viable silicon metal and/ or ferrosilicon smelter operation in Tasmania.
Previous work by 'Pioneer Silicon Industries' (PSI) has resulted in enough positive findings to encourage further work.

Product specification
The product specification supplied by PSI was as follows:

Size:
5% maximum less than 15mm
5% maximum greater than 100mm
Maximum size 120mm

Chemical analysis:
Al_2O_3 less than 0.12%
Fe_2O_3 less than 0.03%
TiO_2 less than 0.03%

The percentage chemical specification required by more recent proponents of a silicon smelter is as follows:

SiO_2>99.2, Fe_2O_3<0.12, Al_2O_3<0.12, CaO<0.1, P_2O_5<0.002, TiO_2<0.01, B<0.0005, C<0.02, MnO<0.03, K_2O<0.0095, Na_2O<0.014, MgO<0.008.

Chemical analysis results of surface sampling, test pitting and limited drilling as well as physical characteristics and thermal stability testing has indicated that such a resource may well be identified at this location.

In this report, previous field work results are collated, potential reserves estimated and recommendations made for further work.

Contents **Page**

Introduction / History

A search for high grade silica in Southern Tasmania was initiated in 1990 by Pioneer Silicon Industries (PSI), to support their silicon smelter at Electrona utilising the services of Mr M Forster (Prospector) who knew the Maydena area to be prospective for such a deposit.
Work initially focussed on the chert occurrences in the area and chert product was eventually supplied to PSI by 'Mount Weld Mining', (a partnership between Mr M Forster and Duggans P/L), from the so called 'Maynes Quarry' at Pine Hill, approximately 5 km South West of Maydena.
The material from Maynes Quarry, although suitable for the smelting operation, was of sporadic occurrence making mining difficult and an excess of overburden and interburden had to be handled by excavator with the operation becoming very dependent on selective mining techniques.
Further field reconnaissance was undertaken in the area to try to find a more consistent high grade silica resource.
Work focussed on an occurrence of so called 'Tim Shea Sandstone' which forms a prominent ridge known as Junee Ridge to the immediate North West of the township of Maydena.
The ridge is flanked largely to each side by Quarternary talus derived from weathering of the unit which in turn overlies Ordovician limestone to the South West and early Cambrian lithic sandstone to the North East.

As field work progressed interest was concentrated on the crest and North East flank of the Ridge and the prospect became known as the John Bull Prospect.
Throughout this exploration activity, TEMCO P/L, (a wholly owned subsidiary of BHP), was operating a ferrosilicon smelter as part of its operations at Bell Bay and kept abreast of the work with a view to economy of scale should both companies utilise the same resource.
Work on the prospect ceased when the PSI operation ceased in 1991.
Since that time there have been other proposals for a silicon smelter operation in Tasmania, most recently from Wacker Chemie AG.
This latest proposal has resulted in Duggans P/L having renewed interest in various silica prospects in Tasmania including Junee Ridge and, with the assistance of Mr D. Hassell, (ex TEMCO geologist – retired) these prospects are being evaluated.

This annual report is for the period ending 30 May 2011 and pertains to EL 16/2009 (Junee Ridge) held by Duggans P/L, near Maydena.

Geological unit of interest

The rock type of interest is designated the 'Tim Shea Sandstone' described as quartz sandstone and chert-clast conglomerate of late Cambrian/early Ordovician age.
The rock type is hard, resistant material striking North West/South East and dipping steeply to the South West at 65^{o} to 70^{o}. Facing is unknown from outcrop but when considered more regionally the outcrop forms the North Eastern arm of a North West pitching synclinal fold structure whose more westerly arm forms the so called 'Nichols Spur' approximately 3.5 km to the West of Junee Ridge and this would suggest the facing to be 'right way up'.

A strike length of approximately 3.0 km is mapped and topographically the outcrop forms a prominent ridge rising some 160 metres above the surrounding plain level.
Width of the unit at surface is mapped varying between 350 and 500 metres, however the stratigraphic make-up of the unit is unknown and the topography suggests that the harder section of the unit (the material of primary interest), is likely to be of the order of 130 metres in width.

Location, access and land tenure

Junee Ridge is located immediately North West of the township of Maydena on the Northern side of the Tyenna River, approximate co-ordinates 684677 (Maydena 4626 1:25000 Geological Map Series).
Access is via forestry roads and John Bull Road to the North Eastern flank of the Ridge.
Land tenure is 'State Forest' managed by Forestry Tasmania and subject to exploration licence No 16/2009 held by Duggans P/L.

Review of previous work prior to current tenement

Work carried out in 1991 consisted of surface reconnaissance, construction of access tracks, sampling of hand specimen 'type' samples, excavation of test pits in the scree material and surface outcrop and limited drilling.
Bulk samples of material from the test pits were generated and analysed while drill cuttings were generally sampled and analysed every 1.5 metres.
Analysis work was carried out by the PSI laboratory.
The TEMCO laboratory carried out an 'in house' thermal stability test designed to evaluate silica feed for the ferrosilicon smelting process.
While the results of these tests have remained in 'as reported' laboratory sheets, to date they have not been assembled into a comprehensive report as an evaluation of the resource.
Work stopped short of any furnace trial.

Exploration completed during the report period

Literature review
This review has resulted in collation of previous field work results to provide clearer objectives for any further work.

Test results on the material sampled are summarised on the following pages.

While limited notation was made in the field on physical characteristics, it is noted that the material intersected in bore holes did vary in hardness to some degree.

The material tested at TEMCO for thermal stability easily passed the test.

Summary of surface and pit sample analyses from John Bull prospect Junee Ridge

Scree samples from lower slopes of Junee Ridge, John Bull prospect (North eastern side of ridge) (Sampled by M Forster)
P.S.I. Electrona Laboratory number 910106 Analysis issued date 21/03/91

Samples	Al_2O_3	Fe_2O_3	TiO_2	CaO	Comment
1561 (JBs 1)	0.30	0.047	0.042	0.008	North Track at end of John Bull road
1562 (JBs 2)	0.091	0.032	0.037	0.009	(TiO_2 & CaO illegible on Fax)
1563 (JBs 3)	0.091	0.030	0.055	0.008	New access track cutting
1564 (JBs 4)	0.16	0.050	0.063	0.011	Old scree pit near s----------
Average	**0.16**	**0.04**	**0.05**	**0.009**	(Al_2O_3 average inaccurate at 0.12)

(Note: ------ denotes missing information)

Pit samples Junee Ridge, John Bull prospect. (Sampled by M Forster)
P.S.I. Electrona Laboratory number 910057 Analysis issued date 26/02/91

Samples	Al_2O_3	Fe_2O_3	TiO_2	CaO	Comment
6	0.12	0.036	0.067	0.006	John Bull lower pit 1 North east track
7	0.11	0.030	0.050	0.006	Pit 1a
8	0.077	0.027	0.050	0.006	Upper pit 2
Average	**0.10**	**0.031**	**0.056**	**0.006**	

Pit samples (Bulk samples ?) Junee Ridge, John Bull prospect

Sample	Location	Depth	Al_2O_3	Fe_2O_3	TiO_2	CaO
1142	Near pit 2	0-3m	0.140	0.061	0.06	-
1143	Near pit 2	3-4.5m	0.096	0.050	0.07	-
Average			**0.12**	**0.056**	**0.065**	
1144	Pit 2	0-2m	0.091	0.040	0.06	-
1145	Pit 2	2-3m	0.100	0.076	0.07	-
1146	Pit 2	3-4.5m	0.110	0.079	0.08	-
1147	Pit 2	4.5-5.5m	0.120	0.140	0.08	-
Average			**0.105**	**0.084**	**0.07**	**-**
1385 (Bulk No 1)	Pit 2	2m	0.13	0.12 (?)	0.067	0.006
1386 (Bulk No 2)	Pit 2	2m	0.13	0.043	0.071	0.006
Pit 1a		2m	0.12	0.036	0.067	0.006
Pit 1		2m	0.11	0.030	0.050	0.006
Pit 2		2m	0.077	0.027	0.050	0.006
Average			**0.113**	**0.05**	**0.06**	**0.006**

Summary of drilling sample analyses from John Bull prospect Junee Ridge

P.S.I. Electrona Laboratory number 910085 Analysis issued date 29/05/91

Sample	Hardness	Depth	Al_2O_3	Fe_2O_3	TiO_2
21-2876	-	0-1.5m	0.66	0.25	0.046
21-2877	-	1.5-3.0m	0.27	0.072	0.055
21-2878	-	3.0-4.5m	0.13	0.050	0.067
21-2879	-	4.5-6.0m	0.18	0.065	0.042
21-2880	-	6.0-7.5m	0.66	0.097	0.050
21-2881	-	7.5-9.0m	0.32	0.065	0.055
21-2882	-	9.0-10.5m	0.20	0.043	0.04-
21-2883	-	10.5-12.0m	0.32	0.061	0.04-
21-2884	-	12.0-13.5m	0.51	0.11	0.03-
21-2885	-	13.5-15.0m	0.85	0.12	0.05-
21-2886	Sand	15.0-16.5m	0.90	0.20	0.06-
21-2887	Sand	16.5-18.0m	0.44	0.087	0.03-
25-2888	Medium	0-1.5m	0.18	0.072	0.038
25-2889	Hard	1.5-3.0m	0.17	0.068	0.042
25-2890	Hard	3.0-4.5m	0.091	0.054	0.050
25-2891	Soft	4.5-6.0m	0.091	0.050	0.042
30-2892	-	0-1.5m	0.091	0.050	0.050
30-2893	-	1.5-3.0m	0.077	0.036	0.055
30-2894	-	3.0-4.5m	0.086	0.050	0.05-
30-2895	-	4.5-6.0m	0.13	0.094	0.04-

(Note: It is assumed that the prefix to the laboratory sample number, ie 21,25 & 30 are part of a bore hole numbering system. It is not known at this stage how many bores were drilled, what type of rig was used, their location or inclination).

Regional exploration activities

No regional exploration activities were undertaken as the prospect is identified.

Prospect based activities

Site reconnaissance was undertaken aimed at verifying the location of previous bore holes and test pits. These site disturbances are now largely overgrown making the above aim difficult or impossible to achieve given the limited field notes to hand from previous work.

Conclusions (Potential reserves)

Work to date has not delineated a resource compliant with the target grade.
However results are sufficiently encouraging to further evaluate the occurrence with the aim of proving up such a resource.
Any reserve estimates at this stage must be considered 'potential reserves' in nature and any projected grade figures for those reserves must be considered to be based on perceived trends for the various categories of the resource rather than any absolute values or even averages of such values.
The total 'in situ' reserve of mapped outcrop and underlying material is considered irrelevant for the purpose of this review. Mapped outcrop from the crest of the ridge down the South Western flank is ignored and assumed to be softer material at this stage but must be considered a potential extension of reserves and may well assist in delineating a minable reserve in a later stage of evaluation, (see 'Recommendations').

The reserve figure of critical interest is the potentially recoverable product figure after mining and processing losses and physical and chemical grade considerations.
This determination can only be made after 'in pit' reserves are estimated.
Appendix 1 contains a scaled generalised cross section of Junee Ridge, (approximate coordinates of ends of section line 468300E/5267600N and 468600E/5267800N, Maydena 1:25000 geological map sheet 4626), which was used to generate pit profiles and therefore to estimate, on a bench by bench basis, 'in pit' reserves.
For the purpose of the exercise the bench height and berm width used were 10 metres each and the profile was designed to minimise overburden removal.
Specific gravity of silica was taken as 2.65 while bulk density of scree material was taken to be 1.5 tonnes/m^3.
Strike length of the pit was taken to be 2000 metres to allow for a potential buffer zone between the mining operation and the Maydena township.
Mining, processing and grade consideration losses were taken to be 30%, 40% and 50% and listed separately.

Reserve categories were taken to be as follows:

- Scree material
- Near surface material (considered to be within the oxidised zone)
- Total in pit

Potential reserve and grade figures may be tabulated as follows:

Category	Recoverable product (tonnes)	Chemical grade (%)		
		Al2O3	Fe2O3	TiO2
Scree	0.9 mill at est. 50% recovery	0.16	0.04	0.05
Near surface	2.0 mill at est. 50% recovery	0.14	0.06	0.07
Total in pit	27.8 mill in situ			
Product In pit	13.9 mill at est. 50% recovery	0.5	0.06	0.06
Product In pit	16.7 mill at est. 60% recovery	0.5	0.06	0.06
Product In pit	19.5 mill at est. 70% recovery	0.5	0.06	0.06

Notes

Scree material:
From the mapping, an area of scree material of approximately 1.5 km^2 (both sides of the ridge combined), is shown. If a nominal depth of 1.0 metre is considered then a reserve of about 900,000 tonnes after mining, processing and grade losses is indicated.
The possible chemical grade of this material could be Al_2O_3 0.16%, Fe_2O_3 0.04%, TiO_2 0.05% (Average of scree samples 1561 to 1564).

However it is likely that this material will be contaminated with other rocktypes and if this turns out to be the case then the reserve would have to be downgraded, possibly to zero.

Near surface material:
The depth of the oxidised zone has not been determined but for the purpose of this exercise it will be taken to be approximately half way down bench 'A' giving a recoverable product reserve of approximately 2 million tonnes at Al_2O_3 0.14%, Fe_2O_3 0.06%, TiO_2 0.07%.

Deep material
Taken to be the sum of lower bench 'A' and all other benches down to and including bench 'F'. The indicated recoverable product reserve for this material varies between 13.9 and 19.5 million tonnes (depending on recovery percentage) at something like Al_2O_3 0.5%, Fe_2O_3 0.06%, TiO_2 0.06% (This analysis must be considered highly suspect due to the lack of information on this deeper material).

It is concluded, based on the limited work done that Junee Ridge is prospective for high grade silica suitable for the smelting of silicon metal and/or Ferrosilicon at commercial quantities.
It is further concluded that the potential resource could be sufficiently large enough to support such a smelting operation for a period of around 100 years at an annual consumption rate of 100,000 tonnes.

Discussion of results

Surface and pit samples present the rock type of interest as a uniformly hard, competent material capable of being handled with minimal physical breakdown.
It is likely that the same material at depth will exhibit similar or better properties given that at surface the material must be considered weathered to some extent.

The Tim Shea sandstone unit is obviously variable in nature within and this is not understood at this stage. It may be that the deposit could be 'high graded' by selective mining of higher grade material.

The nature of the rock type should lead to continuous properties along strike and therefore some consistency and predictability in the eventual mining operation.

The key to proving up a minable reserve of suitably high grade is to understand the variability of grade within the Tim Shea unit due to stratigraphic variations.

The potential reserve figures generated combined with the indicated chemical grade approximating the required specification leads to the area remaining prospective for high grade lump silica.

The potential to upgrade marginal material by selective mining and/or simple washing has not been tested but may result in significant cleaning of the lump product depending on the nature of inclusion of the impurities.

Recommendations

The following actions are recommended:

- Confirm specification of product required and acceptable variability. Confirm annual tonnage required.
- Attempt to secure all relevant data generated from the work carried out in 1991. It is obvious that information regarding the number of bores and pits and their locations as well as bore orientation, etc. is incomplete as it stands in this review. Suggest access to M. Forster records may be of benefit.
- Re-evaluate the scree material to determine the amount of other rock type contamination likely to be encountered if mined and try to better estimate probable chemical grade.
- Surface trench/chip sample across the Tim Shea unit from the South Western edge of crest toward the North East. Log and analyse any obvious changes in lithology, (aim to delineate minable width of high grade material). Repeat at intervals along strike to establish consistency.
- If the surface sampling above does not identify a potential minable width of high grade material, extend chip sampling or trenching to the South West down the outcrop on the South Western flank of the ridge to test for extension of reserves.
- Re-evaluate proposed pit profile.
- Confirm surface sampling by diamond drilling from South West to North East across strike at 45 degrees declination or as close to crossing dip at right angles as possible, (drill collar to be sited below the ridge crest on the South Western side so as to penetrate roughly centrally through the proposed pit profile.
- Carry out chemical analysis and petrographic examination on selected core intervals.
- Determine potential upgrading by washing.
- Collate results and recalculate recoverable product reserves.
- If resource appears viable from a grade and minability viewpoint, develop preliminary logistical proposal and costing.

Environment

No new surface disturbance was created during the period and therefore no rehabilitation was required.

Acknowledgements

All data used in this review was supplied by Duggans P/L

Field work carried out by Mr M Forster (Deceased) is acknowledged.

Laboratory work carried out by P.S.I. is acknowledged.

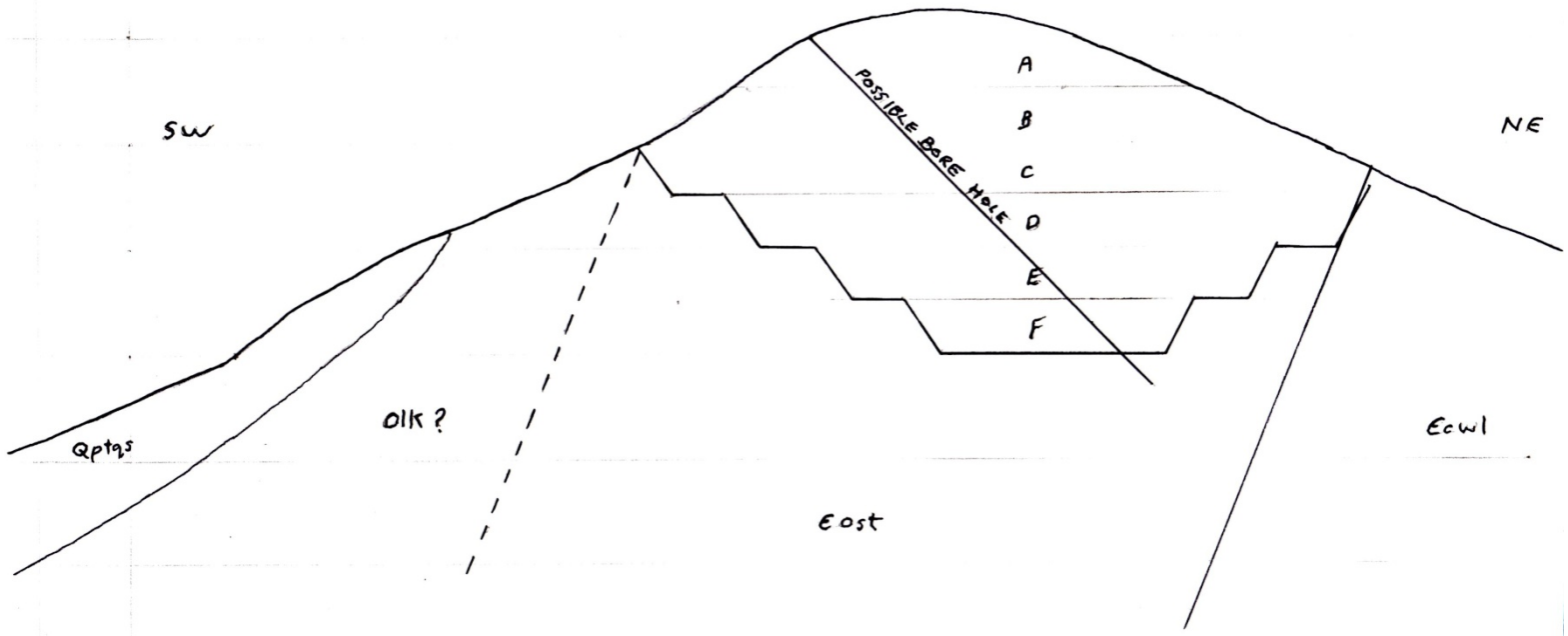
Thermal stability testing carried out by the TEMCO laboratory is acknowledged.

Access to the area via Forestry Tasmania roads is acknowledged.

`

Appendix 1

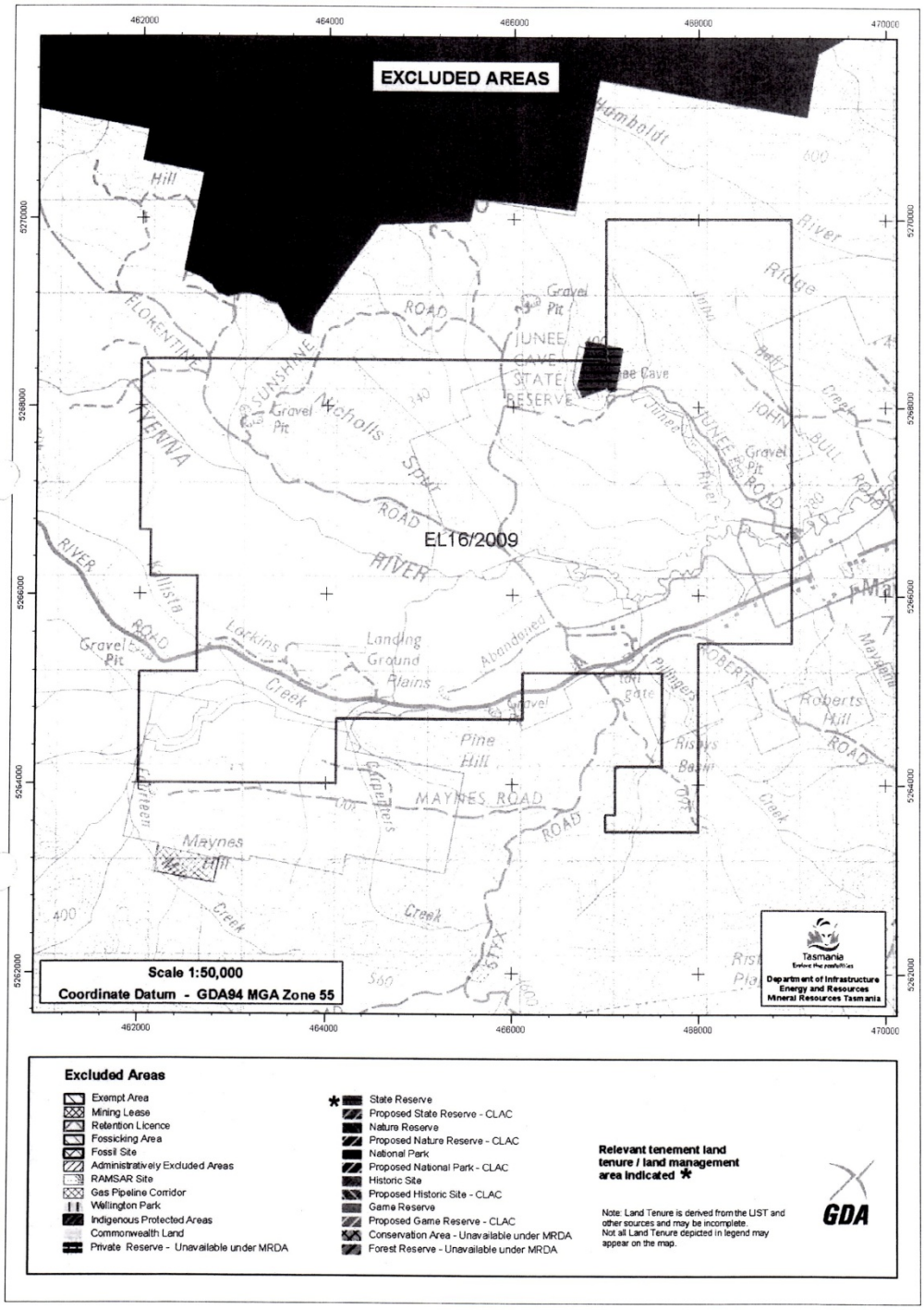
Sketch cross section of Junee Ridge



Sketch SW/NE cross section JUNEE RIDGE Scale 1 : 1000

Appendix 2

Location of tenement


EXCLUDED AREAS
EL16/2009
Scale 1:50,000
Coordinate Datum - GDA94 MGA Zone 55
Department of Infrastructure Energy and Resources
Mineral Resources Tasmania
462000
464000
466000
468000
470000
5270000
5268000
5266000
5264000
5262000
Excluded Areas
Exempt Area
Mining Lease
Retention Licence
Fossicking Area
Fossil Site
Administratively Excluded Areas
RAMSAR Site
Gas Pipeline Corridor
Wellington Park
Indigenous Protected Areas
Commonwealth Land
Private Reserve - Unavailable under MRDA
State Reserve
Proposed State Reserve - CLAC
Nature Reserve
Proposed Nature Reserve - CLAC
National Park
Proposed National Park - CLAC
Historic Site
Proposed Historic Site - CLAC
Game Reserve
Proposed Game Reserve - CLAC
Conservation Area - Unavailable under MRDA
Forest Reserve - Unavailable under MRDA
Relevant tenement land tenure / land management area indicated *
Note: Land Tenure is derived from the LIST and other sources and may be incomplete. Not all Land Tenure depicted in legend may appear on the map.
GDA