



EXPLORATION LICENCE  
EL2/2007  
GLADSTONE, NORTH EAST TASMANIA

FINAL REPORT  
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## **1 EXECUTIVE SUMMARY**

This report is being submitted as a Final Report for EL2/2007 prior to the completion of the third year of tenure.

EL2/2007 forms part of Macquarie Harbour Mining Limited's Gladstone Project. Adjoining tenement EL3/2007 to the south comprises the remaining project area. The principal targets for exploration in EL2/2007 are gold-bearing quartz reefs, veins and stockworks within the Palaeozoic Mathinna Group metasediments (also known as the Mathinna Beds).

During the 2008 – 2009 reporting period, a major reverse circulation drilling programme, in conjunction with costeaning close to historical gold workings, was undertaken; details of this exploration were provided in the 2009 annual report. This exploration was aimed at examining the potential for near-surface economic gold resources within the area. Although anomalous gold mineralisation was intersected on several occasions, grades were generally low and erratic in distribution.

No exploration activities were undertaken in the licence area during the past year.

Over the past 12 months, the focus of MHML's exploration in NE Tasmania has narrowed to examining the potential for near-surface economic resources within its tenements in this region. It has been concluded that the gold anomalism within the tenement area is unlikely to support the type of deposit sought by MHML, and that the tenement therefore be surrendered.

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## 2 INTRODUCTION

EL2/2007 which is held in the name of Goldstock Mining Pty Ltd, a wholly owned subsidiary of Macquarie Harbour Mining Ltd. ("MHM"). After relinquishing some ground during 2009, the Exploration Licence now covers an area of 67 km<sup>2</sup> (Figure 1). The topography is one of low relief with gentle slopes towards the coasts. The area is covered by the Lyme Regis South, Musselroe, and Gladstone 1:25,000 map sheets.

The country covered by the EL has been subjected to erosion as a result of rising and falling sea levels which have left a wave cut platform gently sloping to the sea. This flat terrane is now drained by meandering rivers and the country rocks are often mantled in varying thicknesses of unconsolidated marine and terrestrial/alluvial sediments. The central area is underlain by metamorphosed Palaeozoic mudstones and greywacke sequences of the Mathinna Beds and these extend down to the south western and south eastern corners of the licence.

The geology of the EL2/2007 is shown in Figure 2. Published regional airborne magnetic data indicates the Mathinna metasediments have a dominant northerly fold trend but subdued topography and limited outcrop in the area provides little structural information on the ground. In the Ringarooma Bay area they are unconformably overlain by Lower Carboniferous to Triassic fluvio-lacustrine and shallow glacio-marine sediments which are referred to as the Parmeener Super Group. The upper part of this Supergroup is intruded by large volumes of Jurassic dolerite forming major sills, dykes, and irregular bodies. The Parmeener Super Group is unconformably overlain by terrestrial, alluvial, and minor marine sediments which locally contain basalt of Miocene age.

Several different granites occur on EL2/2007. In the mid southern parts of the tenement biotite hornblende granodiorite of the Blue Tier Batholith is present but the granitic rock is covered by Tertiary sands, gravels, and clays with rare outcrops. This granite is the northern portion of the Gardens Pluton which is part of the early George River Phase of the Blue Tier Batholith. South of Great Musselroe Bay and continuing to the west porphyritic coarse grained biotite granite/adamellite of the Eddystone Batholith intrudes the Mathinna Beds. The Mathinna Beds up to 2km from granite contacts have been metamorphosed producing contact metamorphic aureoles with classical spotted textures in slates.

Primary gold mineralization is found in reefs and veins in the Mathinna Beds, and is typically accompanied by sulphides, particularly arsenopyrite.

### **3 HISTORY OF GOLD WORKINGS ON EL2/2007**

Prospecting in the district NE of Gladstone following the opening up of the Waterhouse Goldfield further to the west led to the discovery of the Blue Bell reef in 1870. A few years later other promising indications close to the prospect led to ground being taken up over much of the area and during the 1880's the Portland and other reefs were being developed. Trial crushings gave values between 15 and 40 g/t Au; shafts were sunk to 35 metres and a battery erected. Actual production in these years has been difficult to determine.

A detailed description of the main gold deposits, compiled for the MHM prospectus (issued in October 2007), is shown below; a full list of references is found at the end of this report.

#### **BIG MUSSELROE**

This lode deposit is exposed in the western bank of the Great Musselroe River. The first reports were by Thureau (1881) and Twelvetrees (1916). The large quartz reef is exposed in a bank and forms a "cliff" with the reef exposed over a length of 25m and the true width was estimated to be 15m. The area contains numerous veins ranging in size down to fine veins. The Big Musselroe reef strikes N-S and contains a number of xenoliths of country rock. In places it is rich in pyrite, arsenopyrite, and galena. A selected sample assayed 3 g/t Au and 4 g/t Ag. A second reef a short distance to the north assayed 5 g/t Au and 7 g/t Ag. These selected samples would not be representative of the reef as a whole. (Leading reference Twelvetrees, 1916).

#### **BUTLERS**

This deposit is located 220m NNW of Big Musselroe. Although not named Twelvetrees (1916) describes mineralization in this area as being "a formation of quartz veins traversing indurated sandstone in a north and south direction". The assay of a sample gave 5 g/t Au, 7 g/t Ag. No other data has been found. (Leading reference Twelvetrees, 1916).

#### **GRAND FLANEUR**

This mine is located 1.4km north of the Blue Bell Mine and was discovered in 1870 by C.Hazell. The main workings are thought to have been carried out from 1881 to 1883 by the Grand Flaneur Gold Mining Co. who operated the mine and sank the main shaft to 19m. The reef is up to a metre thick, strikes E-W, and dips at 30° to the south. The quartz is vitreous with abundant arsenopyrite and some pyrite. In places vertical veins rise from the reef. The main shaft passed through the reef and a crosscut south was put in at 17m to access the reef. The company is believed to have carried out trial crushings and assaying but no reports of results obtained are extant. It would seem that it is typical of the area and that it carried good gold values in sulphide-rich patches which the miners could not treat. (Leading reference Keid 1946).

#### **THE BLUE BELL MINE**

This mine lies 8km NNE of Gladstone and was discovered by D. Campbell in 1870 starting a gold rush in the area. Two east-west reefs are present 40m apart. A 5m shaft was sunk on the Southern Reef which was 60cm wide and dipped north at 80°. Trial crushing of one tonne returned a grade of 44.4 g/t Au. A shaft was sunk to the north of the reef and at 10m depth a 12m cross cut to the south intersected the reef. Here it averaged 75cm and dipped south at 87°; a trial crushing returned 15.3 g/t Au. In 1881 the Blue Bell Mine Co. was formed. The company sunk a main shaft between the two reefs 3.35m by 1m to a depth of over 30m and prepared to drive north and south to intersect the reefs which were 25m apart. Water was encountered and a steam pumping plant installed together with a ten head battery at the same time. No detailed report is available but a crushing or crushings are believed to have been made (no grades reported) and the company was wound up in 1884. In later years some shallow

shafts were sunk in the vicinity but in this low-lying country water was a big deterrent. (Leading reference Nye 1933).

#### **PRINCE IMPERIAL MINE**

This mine is located 400m north of the Blue Bell Mine and was discovered shortly after it. A group of parallel reefs is present striking at 335°. A shaft was sunk on a reef and at a depth of 7m the reef split up into auriferous veins with arsenopyrite with some galena. The mineralization also penetrated the sandstone between the veins. In following years pits and trenches were dug at various places along strike. In 1907 it was taken up again as the New Imperial and the shaft was deepened by 2m still in the veins. A new prospecting shaft 8m deep was then sunk close to the old one. At the bottom of this shaft the rock underfoot was metamorphosed sandstone which was veined with quartz about 1m wide. A cuddy was cut into the west wall of the shaft and exposed 1.2m of slate then 45cm of quartz and 15cm of pyritic veining. The quartz in the floor of the shaft only carried 0.5 g/t Au. A sample from the cuddy assayed 20 g/t Au and 11 g/t Ag. A little further work revealed the ore was very pyritic with accessory arsenopyrite, galena, and cassiterite. A trial crushing in the early 1930s by prospectors Murray and Carney returned 3 g/t Au with some individual assays of selected samples from the dump at Murrays Shaft up to 31 g/t Au. (Leading reference Nye 1933).

#### **PORTLAND MINE**

Also known as the Brisbane mine, this mine was discovered in 1880 by prospectors Moore and King 5km south of the Blue Bell Mine and 6.5km NE of Gladstone. The Portland Gold Mining Company was not formed until 1896 when a main shaft was sunk to 64m with levels at 24m, 46m, and 60m. Some ore was raised but had to be sent away for treatment so it was not profitable. Operations were renewed in 1902 then in 1903 the Brisbane Consols G.M.Co. was formed to work it. No further reports have been located so this company appears to have been unsuccessful. The reef strikes at 320° and dips steeply to the SW with a typical width of 30cm and extends over at least 30m. It carried a fair proportion of free gold down to the No.1 Level but was narrow varying from 15cm to 30cm thick.

#### 4 REVIEW OF PREVIOUS EXPLORATION

A revival of interest in gold exploration in the latter part of last century saw modern methods being applied to the Gladstone area.

##### **Placeco (Australia) Pty Ltd, 1986-1989**

Airborne magnetic and radiometric surveys were flown by Placeco in 1987 to delineate structural trends within their EL while a trial ground survey (magnetics/SP/Resistivity) was conducted over the Portland mine.

Soil sampling was also carried out at Portland. Little follow-up work was done in the final two years that the tenement was held.

##### **Anglo Australian Resources NL, 1995-1999**

- (a) Several interpretations of NETGOLD geophysical data supplied and processed by MRT were undertaken and included Total Magnetic Intensity (TMI), Residual Bouguer Anomaly gravity data and Total Count Radiometrics. The interpreted data is available in two plans, one by Leaman Geophysics at 1:50,000 (Annual Report 1996 - EL 15/95, Report 96-3924) and the other at 1:25,000 by Southern Geoscience Consultants Pty Ltd (Annual Report 1998 - EL 15/95, Report 98-4245).
- (b) Interpretation of Landsat imagery (TM data) at 1:100,000 (Report 96-3929) showing linear features and areas of iron and clay enhancement.
- (c) Approximately 500 hand augured soils samples in the area between the Blue Bell and Grand Flaneur workings and north of Grand Flaneur.
- (d) Trenching in the vicinity of the Portland and Blue Bell mines and at the Empress prospect.
- (e) Detailed ground magnetic surveys at Portland and Blue Bell.
- (f) A programme of soil sampling for Mobile Metal Ion (MMI) analysis at Empress and Blue Bell. After collecting the samples it was decided not to proceed with the analyses and the tenement was voluntarily surrendered.

## 5 EXPLORATION COMPLETED DURING PERIOD OF TENURE

### Year 1 (May 2007 - April 2008)

- (a) Extensive literature research of published and unpublished material available from Mineral Resources Tasmania, mainly via the online database.
- (b) General reconnaissance of the EL including inspections of the gold prospects. Collection of nineteen rock samples from mullock heaps and surface exposures at Portland, Big Musselroe/Butlers/Ross's Reef (this area is referred to by MHM as Bluebell East), Grand Flaneur and Blue Bell. Only seven of the samples were 0.15g/t Au or higher with one being 15.70g/t Au from a mullock sample with visible sulphides at Portland. It also contained 9.3g/t Ag as well as very high arsenic and lead. A sample from Bluebell East assayed 1.93g/t Au and 45.6g/t Ag together with very high arsenic and anomalous copper and lead.
- (c) Gridding in all areas to assist in positioning drill collars for the planned RC programme to test the extent of mineralization close to the existing prospects.
- (d) Commencement of drilling and costeaning in March 2008. Only a few results from this work were available prior the submission of the 2008 Annual Report and none were reported at that time.

### Year 2 (May 2008 - April 2009)

#### (a) **Reverse circulation drilling:**

Forty-eight holes (drilling details shown in Appendix 1) were drilled over the Big Musselroe (Bluebell East grid), Grand Flaneur, Bluebell, Prince Imperial and Portland prospects (the extent of the grids are shown in Figure 2) for a total of 1865m by Stacpoole Enterprises Pty Ltd. These were designed to test for vertical/lateral extensions of recorded historical mineralization that may have bulk-mineable potential. Holes varied in length from 22m to 52m but were generally in the 30-40m range. Depending on structural information derived from earlier reports the holes were either vertical or declined, with an azimuth chosen to intersect the interpreted structure, normally a vein filled shear zone, at right angles. During the drilling program costeans were excavated across strike at each prospect to find any supporting evidence for the structural setting of the mineralisation.

Split samples from bulk drill cuttings were taken over one metre intervals and sent to ALS-Chemex for fire assay using method Au-AA25. They were also analysed for base metals in the field using the company's hand-held Niton XRF analyser to compare with gold assays once they had been received from the laboratory. Complete assay and geological logs were reported in the 2009 Annual Report (Richardson, 2009).

Whilst generally disappointing, assay results nonetheless confirmed that all prospects with the exception of Bluebell East contained anomalous gold. Costeaning also confirmed structural interpretations of magnetic data by previous workers, and demonstrated that ground magnetics is a valuable tool for delineating structures conducive to gold mineralisation.

Historic mining operations must have targeted isolated mineralised veins systems. Assays of drill chips were very poor across the board, indicating that the majority of the quartz was unmineralised. In no case did any significant intersection extend beyond one sample interval (1m). As RC drilling was used for the entire program, any strong structural relationship between vein orientation and mineralisation was impossible to determine. Further diamond drilling and highly selective sampling

would be necessary to detect any structural relationships. Anecdotal evidence based on rate of drilling progress and observations by the head driller suggest that the majority of gold mineralisation and old mines were centred on fault structures.

A description of the drilling/costeaning for the different areas is presented below.

### **Big Musselroe (Bluebell East)**

This "reef" is a wide N-S striking structure that outcrops on the western bank of the Great Musselroe River and is mappable for a least 100m to the north. Rather than being a distinct solid reef, the structure is a zone of stockworked, silicified siltstone containing a variable amount of vein quartz. Arsenopyrite and pyrite are visible in small amounts at river level and Twelvetrees (1916) reports grades of 3g/t Au and 4.2g/t Ag from a sample taken from this area.

MHM drilled eight shallow RC holes and excavated two costeans across the structure to evaluate mineralisation potential. The Big Musselroe "reef" appeared to be a lens of silicified material contained within steeply east dipping Mathinna Beds. The lens contains patches of green arsenic rich (scorodite?) weathering product and appears to be faulted off at a depth of ~18m. Assays from the Big Musselroe prospect were extremely disappointing with nothing to support Twelvetrees' statements. The best assay from sampling and drilling at Big Musselroe was 0.05 g/t Au with the majority of samples recording below the labs detection limit of 10ppb.

### **Grand Flaneur**

Grand Flaneur prospect was discovered in 1870 and lies on the same N-S trending lineament that Bluebell, Prince Imperial and Portland prospects lie on. The reef apparently strikes E-W and dips at 30° to the south although this is hard to confirm. Historic grades are reported at between 6g/t Au and 42g/t Au (Twelvetrees, 1916 & Nye, 1932) with no record of production. Silicified grey siltstone with prominent outcrops of quartz stockwork occurs to the north of the mine. The quartz is vitreous and white and sometimes contains trace sulphides.

A total of thirteen RC holes were drilled across the prospect and a single E-W costean was excavated 20m to the south of the observed workings. One intercept gave the most promising assay for the entire campaign with 17.7g/t Au. Another nine samples (split from one metre samples) contained more the 0.5g/t Au. Costeaning exposed promising stockwork within sub vertical to steeply east dipping grey siltstone beds plus larger vein sets with a similar dip and trend to the originally mined reef.

### **Bluebell/Prince Imperial**

These two mines were discovered in 1870 and various activities continued in the area until at least 1933. The workings occupy a narrow NNE trending belt which shows up in a ground magnetic survey conducted by the University of Tasmania (prior to MHM tenure) as a zone of demagnetization. Soil sampling by Anglo Australian in 1997 demonstrated both arsenic and gold anomalies around the Bluebell and Prince Imperial prospects. Historic documents (Nye 1933 & Twelvetrees, 1916) reported grades between 3g/t Au and 38.3 g/t Au. Also reported was a zone of mineralized, indurated sandstone which assayed 2g/t Au. These reports indicated good potential for securing a low grade open pittable resource.

MHM drilled a total of 18 shallow RC holes across the prospect to a maximum depth of 52m which is well below any historic workings. A large amount of vein quartz was present in many samples and both pyrite and arsenopyrite were abundant, particularly at around the 18m level. Unfortunately only six samples assayed in excess of 1g/t Au with the best sample assaying 11.3g/t Au. Three E-W costeans were dug across the site. These identified a silicified anticline with quartz stockwork

running roughly N-S through the prospect, with the majority of the old workings lying on or adjacent to interpreted fault structures.

### **Portland**

The Portland prospect has attracted the most historic exploration activity. Soil sampling by Anglo Australian identified gold and arsenic anomalies. Students from the University of Tasmania conducted a ground magnetic survey and interpreted the prospect to lie in a small alteration zone. The prospect was also the focus of a study by David Leaman (1987) to test whether a number of geophysical techniques showed any promise for gold exploration in this area. Historical records indicate that the workings followed a single narrow (average width ~0.3m) sub-vertical reef striking at 320°. Apparently the reef was mined to a depth of 60m where decreasing gold values and increasing sulphide content made the workings unviable. Grades at shallower levels apparently ranged from 30.6-61.2g/t Au.

MHM drilled a total of 9 holes across the Portland Mine to test for eastern and western extensions of the Portland reef and to test the reef beneath the mined out area. Due to ground conditions it was not possible to drill deep enough to test beneath the old workings. Holes to the east and west intersected a continuation of the reef however assays indicated that the quartz in these sections was un-mineralised. No significant vein quartz was recorded in any of the other drill holes and no samples had significant gold levels. All work indicates that the Portland prospect was a single isolated vein with no disseminated mineralisation or associated quartz stockwork.

(b) **Soil survey:**

Four hundred and forty-one soil samples were collected along twenty-one lines, the most northerly of which is approximately 1.7km south along strike from the Portland Prospect. A sample grid (see Figure 2) spacing of 50m along E-W lines spaced 100m was chosen with the logic that any mineralisation slipping through this net would be unlikely to produce an economic deposit. A 100mm hand auger was used to excavated a hole deep enough to sample the C horizon (generally between 0.3 & 1.2m), guaranteeing a sample representative of the bedrock. In a small number of cases it was not possible to sample the C horizon by augering due to either thick clay or a transported sediment layer. In these cases the sample was taken from as deep as it was possible to excavate with the hand auger. A nominal 1kg un-sieved soil sample was taken and location recorded with a handheld GPS with a stated accuracy of +/- 7m. The samples were then analysed with a NITON portable XRF and set aside for dispatch to a commercial laboratory for gold analysis, however after reviewing the poor NITON values for As, Pb, Zn and Cu (many were below the Level of Detection and the remainder were not considered anomalous). After completing the survey it was decided to not proceed with the laboratory assays.

No obvious anomalies were identified in this survey and no links between magnetic structures and metal concentrations, or correlations between enrichments in different metals, were apparent.

(c) **Alluvial tin exploration:**

In the latter part of 2008 Geological Consultant Revel Munro was contracted to investigate the economic potential of alluvial tin deposits on MHM's Gladstone tenements and provide a report that was able to rank their relative prospectivity. This review involved sourcing literature not only in the public domain but also from his personal collection and includes old mining plans, company correspondence and uncirculated reports. A third of his time was spent in the field using a 4WD and "Quad-bike". He noted that "access to the many mines on the eastern side of the Ringarooma River are now slow tedious journeys over non maintained degrading

tracks restrictive to vehicle type and weight. Five out of the eight significant bridges servicing the area are now gone, while the other three have weight limits”.

Only two localities were considered to hold good potential for further serious investigation: the Cybele-Tracey’s area on the boundary of EL2/2007 and EL3/2007, and Amber Hill which lies within EL3/2007.

### **Year 3 (May 2009 - April 2010)**

The work that was undertaken on this license during the past year consisted of a review of exploration by MHML and previous explorers, and a 1-day reconnaissance field visit by technical staff new to MHML during February 2010.

Over the past 12 months, the focus of MHML’s exploration in NE Tasmania has narrowed to examining the potential for near-surface economic gold resources within its tenements in this region. It has been concluded that the gold anomalism within the license area is unlikely to support the type of deposit sought by MHML, and that the tenement be surrendered.

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## 7 EXPENDITURE

Total annual expenditure for EL2/2007:

<b>Geoscientific Costs</b>	
Geology	25,770.18
Geochemistry	17,717.41
Geophysics	
Remote sensing	
<b>Drilling &amp; Gridding Costs</b>	
Gridding	
Drilling	413.22
Earthmoving	
<b>Land Access Costs</b>	
<b>Rehabilitation Costs</b>	
<b>Feasibility Costs</b>	
<b>Other Costs</b>	14,159.73
Rental fees	
Vehicular track Construction	
Surveying, contract drafting etc	
Capital equipment purchase	
<b>Administration Costs</b>	
(note: not to exceed 10% of annual expend)	
Legal	
Office & Admin	6,103.09
<b>Total</b>	<b>64,163.63</b>