6 DECOMMISSIONING AND REHABILITATION PLAN

6.1 INTRODUCTION

Open-cut mining operations and the associated removal and disposal of overburden and waste-rock can lead to significant changes to the topography and stability of the landscape. The preparation of a decommissioning and rehabilitation plan will ensure that rehabilitation activities achieve environmental stability, maintain public safety, provide compatible land use, and aim towards the establishment of sustainable ecosystems as a long-term goal.

Decommissioning and rehabilitation operations need to be progressive and flexible both during mining operations and following mine closure. Modifications or amendments may need to take into account any changes in site conditions and the results of monitoring or inspections.

6.2 OBJECTIVES

The objectives of the Decommissioning and Rehabilitation Plan (DRP) are to:

- Minimise environmental risk and the potential to cause environmental harm from the cessation of activities on the land, decommissioning, rehabilitation and further activities on the land once the land has been rehabilitated to an appropriate land use consistent with the appropriate standards for that land use;
- Reduce the potential environmental liability to the public, VDM and the Tasmanian Government;
- Provide an agreed process for planning, validation and reporting of decommissioning and rehabilitation actions;
- Provide an agreed system of environmental monitoring and reporting of environmental conditions on the site during and after the decommissioning and rehabilitation of the site; and
- Ensure that the full cost of decommissioning and rehabilitation is understood and full mechanisms for funding are available.

The DRP presented here is a conceptual mine closure plan. VDM will review this conceptual DRP following the first 12 months of operation, and develop an operational mine closure plan, which is endorsed by management and will be subsequently annually reviewed. Furthermore, the objectives of the mine closure plan will be reviewed to ensure that the objectives remain attainable and match regulatory and community expectations.

6.3 RELEVANT APPROVALS AND CONSULTATION

Following the cessation of mining operations, the mine area will be returned to an agreed land use. Prior to this land return, VDM will undertake a consultation program with the relevant stakeholders. These stakeholders will include the following:

- Department of Tourism, Arts, and the Environment – Environment Division;
- Department of Tourism, Arts, and the Environment – Parks and Wildlife Service;
- Department of Primary Industries and Water– Crown Land Services;
- Mineral Resources Tasmania;
- Dorset Council;
- Neighbouring property owners; and the
- Gladstone Township.

The consultation program will be commenced 2 years before the anticipated closure date to allow adequate time for effective input from stakeholders. In the case of unanticipated

closure, consultation would commence as soon as notification of closure was given to the Director of Environmental Management.

6.4 EXISTING ENVIRONMENT

The proposed mine redevelopment is located approximately 3km north of the township of Gladstone, northeast Tasmania. The area proposed to be mined has a number of open pits that are the result of previous tin mining operations during the early 20th Century. The largest open pit is the remnant of the Scotia Mine, and dominates the site. Remaining mine heritage features at the site include open pits and water races.

A detailed description of the current environment, the potential environmental impacts of the proposed mining operations and management measures is provided in the Environmental Management Plan (Section 5.0).

6.5 PREVIOUS MINING AND REHABILITATION OPERATIONS

The Scotia Mine was established by the Scotia Tin Mining Company that was formed in 1881 to develop the Scotia lead. By 1881, the Scotia Company had opened six working faces. During the 1890s, tin production gradually declined. In 1901, exploration located deeper deposits at the northern end of the workings and mining continued until 1905. Production began declining after 1905, with the mine closed in 1908.

Following the cessation of mining operations at the Scotia Mine, no rehabilitation operations were undertaken except for the removal of mining equipment. The open pit and associated disturbed areas have undergone natural revegetation, with the base of the Scotia open pit containing mature trees.

6.6 PROPOSED MINING ACTIVITIES

The major processes involved with the redevelopment of the Scotia Mine are by VDM include:

- Vegetation removal;
- Mining;
- Overburden and tailings disposal; and
- Mineral processing.

Environmental impacts associated with these activities and relevant management techniques have been addressed in detail in the Environmental Management Plan (Section 5.0). Maps, of topography and hydrology prior to mining operations, are provided in Section 2.0.

6.7 REHABILITATION PRINCIPLES AND PROCEDURES

Rehabilitation includes the activities required to create an environment suitable for the establishment of vegetation and the actual act of revegetation. Therefore, the long-term goal of rehabilitation is to stabilise disturbed areas and then provide an environment that assists and promotes ecological succession of native flora and fauna, whilst maintaining site stability.

The key objectives for the rehabilitation of the open cut mine following the cessation of mining operations therefore is to:

- Reshape the disturbed areas so that they are stable and adequately drained;
- Control erosion through appropriate drainage control and revegetation;
- Revegetate the disturbed area with local plant species where appropriate, and
- Monitor and manage the rehabilitated areas until the vegetation is self-sustaining or acceptable to regulatory authorities and the local community.

Community consultation during the rehabilitation process is essential to ensure that rehabilitation of the mine site fulfils environmental requirements and addresses the expectations of the local community. This is particularly important regarding the post-mining landforms and users. Prior to and during the rehabilitation process, VDM will consult the community, and in particular, people with a special interest, such as neighbours whose land may be affected by the mine or those who have strong preferences on the landforms and future uses of the site.

Progressive rehabilitation can be an important tool in minimising and managing environmental impacts associated with mining operations. VDM will undertake progressive rehabilitation wherever practical, and will list these activities in annual reports submitted to MRT and DTAE. Furthermore, the establishment of progressive rehabilitation targets by VDM and assessing the success of rehabilitation operations against these targets will ensure that the company is committed to rehabilitation works during and after mining operations.

Detailed cost estimates for decommissioning and rehabilitation will be developed during the operational phase of the mine, once waste material characteristics and earthmoving and other costs are known. In line with best practice, an effective means of calculating the cost of decommissioning various aspects of the operation is to develop a series of spreadsheets. This approach will allow for periodic updating of cost estimates to accommodate changes in operations and unit costs VDM will adopt this method.

As the mining operation develops and matures, it is conceivable that it may be different from that described in the project-planning phase, and as a result, the conceptual DRP could be largely irrelevant to the actual operating project. Therefore, it is important that VDM reviews the DRP annually to take into account new rehabilitation issues that have come to light, and to where necessary, revise cost estimates to reflect changing circumstances and the timelines for rehabilitation.

The DRP and associated mine closure planning needs to be a dynamic process including regular review and updates. Furthermore, the location, timing, and parameters analysed in the monitoring program should be reviewed annually and adjusted where it is deemed appropriate.

New developments are continually being made into approaches, techniques, and technologies directly relevant to mine decommissioning. It is important that annual reviews of the DRP include assessment of any new developments that are applicable to the VDM Scotia Mine site. In line with mining best practice approaches, VDM will endeavour to maintain a research program aimed at better defining areas of uncertainty identified in risk analysis, and improving methodologies and specifications to achieve rehabilitation objectives. Furthermore, annual reviews conducted by VDM will assess cost liabilities and implications for the financial operations of the company and the proposed mine closure plan, and update the mine closure plan as necessary.

6.8 CONCEPTUAL DECOMMISSIONING AND REHABILITATION PLAN

Following mine closure, five broad rehabilitation tasks will need to be completed by VDM. These include:

- Sale and removal of equipment and buildings;
- Site preparation;
- Revegetation;
- Maintenance of the site; and
- Monitoring the success of the rehabilitation.

Table 36 indicates the main tasks involved in the rehabilitation of the mine site following mine closure, and provides an indicative timeframe over which they will be undertaken.

Table 36: Summary of Rehabilitation Tasks and Timing.

No.	Task	Timing
1	Closure of Mining Operations (including sale and removal of equipment)	~ 6 months
2	Site Preparation	~ 6 months Needs to occur at an appropriate time of the year to assist revegetation operations.
3	Revegetation	~ 3 months As soon as possible following site preparation, and at appropriate time of the year.
4	Maintenance	As required.
5	Monitoring	At least annually for 5 years following mine closure.

The site-specific strategic rehabilitation procedures that will be adopted for rehabilitation operations are outlined below. These will be reviewed annually, and developed as the mining operation matures.

6.8.1 Open Pits and Overburden

The overburden removed will be composed of Tertiary sediments of sands, sandy clays, sands, gravels and basal boulder deposits (refer to Section 5.4 for more detail). Furthermore, oversized tailings material (>19mm) will be disposed of with the overburden.

VDM will undertake progressive rehabilitation in conjunction with ore extraction. Overburden will be continuously returned to the pit behind the active mining face, topsoil, and mulch spread over the rehabilitated site and then revegetated, as described in Section 2.6, and illustrated in Figure 24. Erosion control measures will be installed where necessary.

Revegetation will occur naturally from the topsoil and mulches, and augmented by the direct seeding of local species, utilising seed collected from the site and from seed sourced locally.

6.8.2 Tailings Dams

The location of the tailings dam is an important component in the commencement of mining operations. The tailings dams will be located within the existing open pit that was developed during historical mining operations.

During the preparation of the old Scotia Mine pit for the commencement of tailings disposal operations and dam construction, the majority of the vegetation that has regrown following the end of historical mining operations will be disturbed. At this time, the vegetation will be mulched wherever practical with the mulch stockpiled following BPEM for use in future revegetation works.

Following the cessation of filling operations, the tailings dams will be allowed to drain, followed by recontouring and other earthworks if needed. Mulch will then be applied, followed by direct seeding of local species.

Considering the previous growth of native vegetation following the cessation of mining activities, without the presence of topsoil, and the nature of the tailings, establishment of native species on the tailings material is expected to be rapid.

6.8.3 Freshwater Dam

The construction of a freshwater storage dam is an essential element of the mining project, as without the provision of adequate water supplies and storage, the processing of ore cannot be undertaken.

During the construction of the freshwater storage dam, all vegetation within the dam site will be mulched and stockpiled for future rehabilitation works. The topsoil will also be stripped and stockpiled prior to dam construction.

Following the cessation of mining operation and the commencement of mine rehabilitation operations, the removal of the freshwater storage dam embankments, and recontouring of the creek channel and areas impacted by the presence of the freshwater dam will be undertaken. Recontouring will be aimed at returning the area utilised as a freshwater dam to blend in with the surrounding landform.

Once the recontouring works are complete, revegetation with native species and utilising stockpiled mulch will be undertaken.

6.8.4 Gravity Processing Plant

Gravity plant processing structures, buildings, and associated facilities are all effectively part of the gravity treatment site. The buildings and structures will be located on concrete slab foundations or hard-standing areas and will be composed of steel framing for the main structures. Contaminated materials that will be on site include oils, grease, and lubricants.

Following mine closure and the initiation of rehabilitation operations, all buildings and equipment associated with the gravity treatment site will be dismantled for sale and removal by the purchasers or prepared for disposal. All hazardous materials and refuse will be cleared from the site and disposed of appropriately. It is possible that a large amount of scrap and general refuse will remain on site after salvage operations. Some of this material may be impractical to transport and handle, and as a result may need to be disposed of on site. It this is required, it will be buried and revegetated.

After the site has been cleared of all external structures, the remaining concrete slabs and foundations will be removed to a designated refuse disposal site. The general areas will then be graded, profiled, and compacted surfaces ripped to a depth of 20cm. Drainage control through ripping, profiling, or the provision of erosion control structures will be undertaken. Revegetation of this area will consist of application of a fertiliser and then native seed mix. Mulch will be applied if available prior to seeding operations.

6.8.5 Mineral Concentrate Processing Facility – Gladstone

Following the cessation of ore processing operations at the mineral concentrate clean-up facility in Gladstone, site preparation for rehabilitation will follow the same procedure previously outlined for the rehabilitation of the gravity treatment plant site.

After the relevant earthworks have been undertaken, the site will be revegetated with native plant species.

6.8.6 Refuse Disposal

General refuse that is likely to need to be disposed of following mine closure will include building frames and non-hazardous general refuse. Refuse will be removed from site and disposed of in an appropriate landfill.

Any hazardous material produced or used during mining and processing operations will be disposed of appropriately following mine closure. This is likely to be off-site, but could also occur on site, where appropriate environmental measures would be undertaken by VDM to ensure that there are no detrimental environmental impacts.

Rehabilitation of any refuse disposal sites on site will include compaction, covering with general fill, and then capped with clay before revegetation is undertaken. Revegetation will be with native seed mix.

6.8.7 Access Roads

Generally speaking, roads are compacted and tend to have a low rehabilitation potential. Through ripping, drainage construction, and application of soil or clay, the revegetation potential can be increased.

Access roads on the mine site will be assessed in consultation with Parks and Wildlife Service (PW&S) for which roads will remain as permanent access, roads nominated for closure, and roads to remain open for rehabilitation operations and then closed. Road surfaces, which are to be rehabilitated will then be ripped, have drainage measures installed and then spread with topsoil (if available). Minor tracks will be re-soiled by the recovery of any windrows of material adjacent to the trackside. Revegetation of the roads will be related to the treatment of the surrounding site, with appropriate seed mixes and hydromulching and/or hydroseeding undertaken (if necessary).

6.9 REHABILITATION ASSESSMENT

Rehabilitated areas need to be monitored and managed as the rehabilitation success can be compromised by the invasion of feral and stock animals, weeds, and human activities. Maintenance, which may be required of VDM following the initiation of rehabilitation activities, could include:

- Replanting failed or unsatisfactory areas;
- Repairing any erosion problems;
- Fire management;
- Pest and weed control;
- Fertiliser applications, and
- Control of native and introduced fauna.

In order to determine that the rehabilitation program has been successful, defining success or completion criteria is a key component. Through using completion criteria, monitoring can be used to demonstrate that rehabilitation requirements have been met and the site is safe, stable and has achieved the land use objectives set during the planning process (EPA 1995; ANZMEC 2000). It is unlikely that such conditions can be demonstrated in less than 5 years following the cessation of mining (ANZMEC 2000). Components recommended for inclusion in completion criteria include:

- Physical (e.g. stability, resistance to erosion, re-establishment of drainage);
- Biological (e.g. species richness, plant density, canopy cover, seed production, fauna return, weed control, productivity, establishment of nutrient cycles);
- Water quality standards for drainage water, and
- Public safety issues.

Completion criteria, which may be adopted for VDM rehabilitation operations are given in Table 37.

Table 37: Completion Criteria that may be adopted by VDM during Mine Rehabilitation.

Area	Issue	Criteria
Remaining open pit	Safety	Physical barriers in place to prevent entry if necessary.
	Stability	As determined by geotechnical assessment.
	Landform	Pit rehabilitated and stable.
	Revegetation	Transects, plant cover, density and diversity. Vegetation communities established in line with surrounding communities.
	Water Quality	No indication of mining operations having an adverse impact on water quality (if discharging).
Tailings dam	Safety	Physical barriers in place to prevent entry if necessary.
	Stability	As determined by geotechnical assessment.
	Landform	Tailings dams rehabilitated and stable.
	Revegetation	Transects, plant cover, density and diversity. Vegetation communities established in line with surrounding communities.
	Water Quality	No indication of mining operations having an adverse impact on water quality (if discharging).
Freshwater dam	Safety	Physical barriers in place to prevent entry if necessary.
	Stability	As determined by geotechnical assessment.
	Landform	Freshwater dam site rehabilitated and stable.
	Revegetation	Transects, plant cover, density and diversity. Vegetation communities established in line with surrounding communities.
	Water Quality	No indication of mining operations having an adverse impact on water quality (if discharging).
Weeds and diseases	Control	Ensure that the levels of weed infestation remain low and no greater than the surrounding areas.
Buildings and machinery	Removal	All items to be removed from site. Areas to be cleaned up to a level which is non-toxic to flora and fauna.
	Timing	Within 12 months on mine closure/
	Revegetation	Transects, plant cover, density and diversity. Vegetation communities established in line with surrounding communities.
Roads and tracks	Landform	Tracks are stable with no or minimal signs of erosion.
	Revegetation	Transects, plant cover, density and diversity. Vegetation communities established in line with surrounding communities.

Rehabilitation can also be considered successful when the site can be managed for its designated land use without any greater management inputs than other land in the area being used for a similar purpose (EPA 1995).

The effects of mining on altering elevations, slopes, moisture regime and soil characteristics will invariably impose changes, possibly to the extent that none of the land can return to its pre-mining use. However, it is important that the post-mining landform, drainage, and vegetation associations are stable and self-sustaining, visually compatible with the surrounding land and meet community expectations. Progressive rehabilitation can be an important tool in achieving these objectives. Where possible, VDM will concurrently rehabilitate worked out or disused areas with activities on other sections of

land. The rehabilitation endpoints will be agreed on by VDM, MRT, and DTAE, and DTAE will be notified of the cessation of mining activities in the area.

6.10 POST-DECOMMISSIONING MONITORING RECOMMENDATIONS

An indicative approach will be used by VDM for post-decommission monitoring of all rehabilitation works undertaken. Newly rehabilitated areas will be monitored monthly for the first 6 months, then at 12 months (year 1), and then annually from then on for 5 years. Further details of the monitoring programs are provided in Section 7.0.

It is also important that the local community has the opportunity to contribute to the program outlined in Table 38. Furthermore, VDM will endeavour to regularly present reports of the monitoring results to the local community and invite external comments and assessments.

Reports on the progress of rehabilitation works will be provided to management and a summary of findings included in the Annual Review Report to DTAE. Parameters for assessment of rehabilitation works for sign off after 5 years of monitoring will be agreed on with DTAE and MRT and a close out inspection organised with these parties.

6.11 PROVISIONS FOR SUDDEN OR TEMPORARY MINE CLOSURE

Sudden unplanned or temporary closures can occur in the mining industry. These events are often due to changing economic, technical, and political circumstances and are most often unforeseen. This has resulted in many mine closures being poorly managed, with considerable environmental consequences and legacies worldwide. Temporary closures can occur while projects are re-evaluated, awaiting changes in market conditions or whilst being offered for sale.

As a provision for sudden or temporary mine closure, VDM will develop contingency plans to ensure that all aspects of the operations are stabilised and will not result in pollution or a public health and safety hazard should a temporary mine closure occur. VDM will also develop plans for the circumstance in which a temporary closure becomes a permanent closure.

In order to protect the public's interests and minimise ongoing liabilities in the event of an unplanned permanent mine closure, VDM will provide a bond to the Tasmanian Government. This bond will be sufficient to meet the costs of closure and aftercare, and will protect the Government and community from closure liabilities.

The current bond system is designed to encourage progressive rehabilitation during mining operations. Furthermore, the bond will be regularly reviewed to ensure that it reflects current liabilities and estimated costs of rehabilitation. It is possible, that the bond may be reduced based of successful progressive rehabilitation operations. The bond will be administered by MRT, and will be consistent with those in other Australian jurisdictions.

7 MONITORING, REPORTING, AND REVIEW

7.1 SUMMARY OF MONITORING REQUIREMENTS

Environmental management will include focussed and responsible management, control, and ongoing review of all environmental management issues. The effectiveness of processes in place will be regularly evaluated. Environmental and process managers with a knowledge and understanding of issues such as water quality and regulatory representatives will be involved in the mine management team.

VDM will develop a documented monitoring program that will include monitoring of groundwater quality, discharges from tailings/ore stockpiles, discharges from hazardous waste storage facilities and regular site inspections to investigate the integrity of the system. Regular reviews of environmentally hazardous materials managed and used at the Scotia Mine will be undertaken to identify any shortcomings in the management systems and undertake any corrective action required. Internal audits will be undertaken annually. The results from these audits will be shared with the relevant stakeholders to ensure that the environmental measures undertaken by VDM are meeting expectations.

Monitoring procedures are detailed in Section 5 of this report, and are briefly summarised in Table 38.

Table 38: Environmental Monitoring Procedures.

Environmental Considerations	Procedures for:
Construction	Diffuse dust monitoring.
	Sediment control measures.
Land Management	Sediment control measures.
	Land stability and erosion.
Water Quality	Stormwater monitoring.
	Monitoring of dam discharge water.
Flora	Weed management monitoring.
	Monitor to ensure that mine site footprint is not exceeded.
	Regular inspections for Phytophora cinnamomi outbreaks.
	Rehabilitation monitoring.
Fauna	Monitor to ensure that mine site footprint is not exceeded.
	Rehabilitation monitoring.
Aboriginal & European Heritage	No monitoring of cultural values is required during mine operations.
Air Quality	Diffuse dust monitoring.
	Greenhouse gas emissions (including NPI).
Noise & Vibration	Noise monitoring after commissioning of the Campbell St Facility
Solid Waste	Maintain records of waste volumes, uses, and off site destinations.
Building & Demolition Waste	Maintain records of waste volumes, uses, and off site destinations.
Overburden & Tailings	Land stability, erosion.
	Revegetation success.
Hazardous Materials	Maintain information (MSDS) for all hazardous substances used, generated, or disposed during construction and operation and ensure no gaps.

	Review annually to determine cleaner production options and signage are compliant.
	Monitor storage tanks and bunds.
Hazards & Risks	Maintain compliant equipment for emergency situations.
	Update staff (including contractors) training and responsibilities annually.
	Document and practice contingency and emergency response plans.
	Audit transport, storage, and use of hazardous materials annually.
Visual Considerations	Record public complaints relative to visual amenity.
Traffic	Record public complaints relative to traffic and resolve through community consultation.

The recording of public complaints is mentioned throughout Section 5. All public complaints or staff and/or contractor complaints will be recorded in the corrective action register (CAR). The register will include but not be limited to the following information:

- Incident date;
- Person raising CAR;
- Incident location;
- Classify the event (e.g. environmental, safety, audit or other);
- Categorise the event (e.g. fatality, injury, near miss, fuel/oil spill etc);
- Name on complainant and contact details;
- Work area;
- Witness name and contact details;
- Immediate Supervisors name and contact details;
- Details of the extent of the incident and immediate corrective or preventative actions taken;
- Proposed further corrective actions and risk assessment;
- Responsibility for achieving corrective action and target date with sign off once complete;
- Need for further accident/incident investigation; and
- Need for further risk assessment.

If properly managed, the CAR will ensure all incidents are recorded and actions are taken to prevent them from being repeated. In addition, it provides an integrated approach to continuous improvement.

7.2 REPORTING AND REVIEW

Annual reports summarising the monitoring results, complaints, results of any audits and incidents will be provided to DTAE for review. A summary of any procedural changes in environmental management or process will be included.

The annual reports will present results graphically and provide measures for improvement where appropriate. In addition, a comparison to the DPEMP commitments will be provided to ensure the commitments have been implemented.

Finally, a review of the DRP will be undertaken after the first year of operations, and included in the annual report.

8 SOCIAL AND ECONOMIC ENVIRONMENT

8.1 EXISTING ENVIRONMENT

8.1.1 Population

Gladstone is Tasmania's most northeasterly township and was established in 1870 after tin was discovered in the area. Following the cessation of mining operations in the 1900's, the population of Gladstone has gradually declined. Today tourism and dairy farming and associated farm grazing have overtaken the mining industry as principal economic activities in the region.

Gladstone is located within the 7264 postcode region, which on the night of the 2001 Census contained a population of 771 people. At the time of the 2001 Census, residents of the postcode region 7264 represented approximately 0.17% of all Tasmanian residents.

The current population of Gladstone is estimated to be 100 people.

8.1.2 Distribution and Structure

The bulk of that population live outside Gladstone either on rural properties such as Rushy Lagoon or in small villages such as Musselroe Bay, Ansons bay, Pioneer and Herrick. The Gladstone township supports mainly an aging population, although in recent years there has been an influx of younger people who work away from the town in centres such as Bridport and Scottsdale or locally in the rural industries.

8.1.3 Characteristics of the Local and Regional Economy

Lifestyle Characteristics

Mining has been an important driver in the Gladstone economy in the past, and the community has witnessed a dramatic increase and later decrease of residents with the opening and closing of mines within the area over the years. Mining has not been a dominant driver of the Gladstone economy since the early 1900's. Tin mining within the region has been a driving force for the regional economy throughout the 1900's, until the cessation of mining at the Pioneer and South Mount Cameron mines in the 1980's.

Currently, rural activities, dairy farming, and general livestock grazing dominate the local Gladstone economy. Tourism is seasonal and transitory with few tourists stopping in Gladstone other than to purchase fuel and food supplies. The opening of the old school as a backpacker hostel may encourage more tourists to stop in the town. Increased traffic through Gladstone to Anson's and Musselroe Bays during summer months contributes to increased retail trade at the store and hotel.

Mining History of Gladstone

The Scotia deposit (or lead) was one of the first located in northeast Tasmania and is considered part of the Gladstone Tin Field, which produced from the very earliest days of tin mining in Tasmania, with uninterrupted production up until at least the mid-1910s.

The Scotia Mine was established by the Scotia Tin Mining Company, which was formed in 1881 to develop the Scotia lead. By 1981, the Scotia Company had opened six working faces. During the 1890s, tin production gradually declined. In 1901, exploration located deeper deposits at the northern end of the workings and mining continued until 1905. Production began declining after 1905, with the mine closed in 1908. There has been no renewal of mining at the Scotia Mine since closure (McConnell 2005).

Other mines in the area have exploited the Scotia lead or tributaries of this main lead. These include the Newhaven Mine, the Lochaber Mine, and Mallinson's Workings (McConnell 2005).

Mining within the Mt Cameron district also took place at the same time as mining was occurring within the immediate vicinity of Gladstone.

Government / Community Facilities and Services

Following the decline of mining, the township of Gladstone has continued to decline. Services within the town are limited and are summarised in Table 39. The re-opening of the Scotia Mine may provide a stimulus for the local economy and result in an increase in services.

Table 39: Services Available within Gladstone.

Activity	Service Available	Comment
Shop / Hotel	Store and Service Station Hotel Earthmoving Contractor	General store and hotel are principal businesses Store supports Post Office
Office	VDM Mining Office	-
Tourist Facility	Backpacker Hostel No caravan park or campground	-
Educational	No school or pre-school	School age children bused to Winnaleah School
Place of Worship	Yes	Services not regular, usually once monthly
Services	Rural Fire Station Police Station Community Hall Health Centre	Volunteer Not. Permanently Manned. Public Use Dorset Council. Public Use Dorset Council. VDM First Aid Centre available for emergency use.

Existing Employment Trends

In 2001, the unemployment rate within the postcode area 7264, was estimated to be 6.37%, which was considerably higher than the Tasmanian average unemployment rate of 5.68%.

Figure 31 illustrates that a large percentage (48%) of the workforce within the postcode area 7264 was employed in agriculture, forestry and fishing. At 9%, the second most common industry to work in was education. At the time of the 2001 Census, no workers identified themselves as working in the mining industry. The proposed development of the Scotia Mine by VDM has the potential to impact on this statistic.

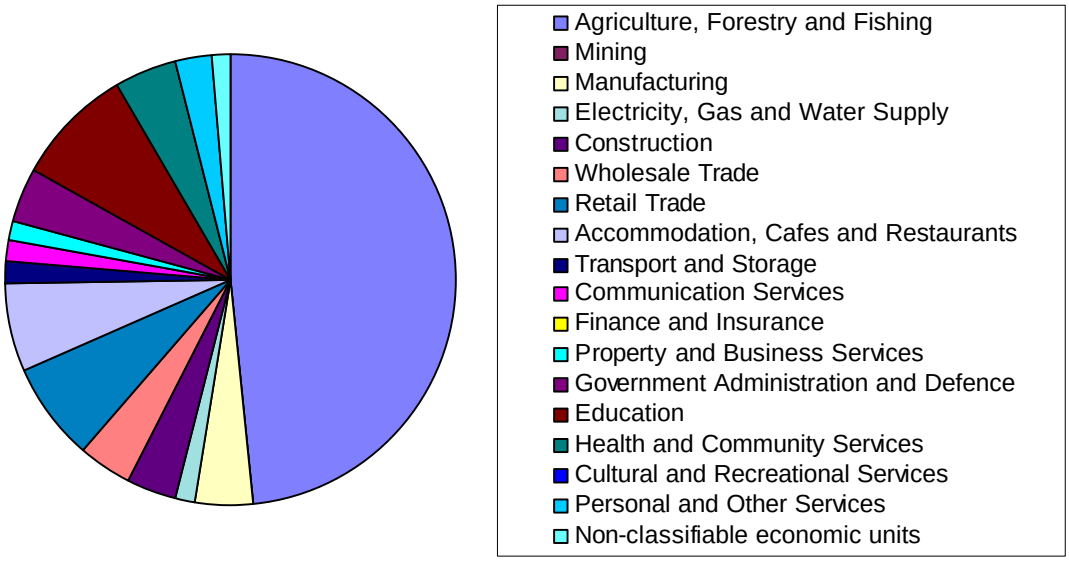

Figure 30: Industry of Employment 2001 (ABS Census 2001).

8.2 IMPACT OF MINE ON EXISTING INFRASTRUCTURE

VDM recognise that the mine development may affect the existing infrastructure for sewage, water supply, power, and roads in the Gladstone area. VDM will therefore work with the Dorset Council to ensure that the mining operation does not impact on the provision of adequate infrastructure for the residents of Gladstone.

8.2.1 Sewage

Currently the Gladstone township operates using septic tanks. VDM have already installed septic tanks at the Gladstone site office in accordance with the requirements of the Dorset Council, and will also install septic tanks at the Scotia Mine site. These facilities will be maintained in accordance with Council requirements.

The proposed mining operation will not have an adverse impact on the existing sewage services within Gladstone.

8.2.2 Water Supply

The Ringarooma River will be the principle water source for mining operations at the Scotia Mine. Mineral processing operations that occur at the mineral concentrate clean-up facility in Gladstone will utilise stormwater collected and stored in two 11,000L water tanks, and stormwater overflow collected in a small dam.

The Gladstone office will use limited amounts of water from the existing town water services. Potable water for the Scotia Mine site will be sourced from bottle water and stormwater collected on site.

The proposed mining operation will not affect the water supply for the Gladstone township.

8.2.3 Power Supply

The power supply in Gladstone is considered sufficient for the additional developments required by the proposed mining and processing operations. The power supply to the Scotia Mine will be installed by Aurora Energy.

8.2.4 Access and Internal Roads

Road access to the mine is currently from Cape Portland Road via an existing track which in unsealed, while access to the mineral concentrate clean-up facility is provided via Campbell St within Gladstone.

A limited amount of traffic associated with the mining operation will utilise the Cape Portland Road and the route through Gladstone to the mineral concentrate clean-up facility. Heavy vehicles associated with the mine will generally be restricted to the Scotia Mine site. The roads proposed to be utilised during the mining operation and associated support activities are considered adequate. Refer to Section 5.16 for details of the traffic impact assessment.

The existing network of internal roads on the mine site will be utilised wherever possible. The current main access route to the intersection with the Cape Portland Road will need to be upgraded prior to the commencement of mine development operations. VDM propose to undertake site access and upgrades to the bridge across the Pig & Whistle Lagoon prior to the initiation of mining development to improve site safety and access.

8.2.5 Telecommunications

Telecommunication within the immediate Gladstone area are moderate to poor.

Telecommunications at the Scotia Mine site will consist of radio, satellite, and mobile phone communications rather than establishing the infrastructure for a land based telecommunications system.

Telecommunications at the Gladstone site office will consist of radio, satellite and land based phone communications system.

8.3 EMPLOYMENT IMPACTS

Employment trends locally are dependant to a large extent on seasonal rural activities. There have been no new industries or projects commenced locally for several years and trends are taken as static.

8.3.1 Direct Impacts of the Development during Construction

Projected employment levels directly associated with the mine will vary during the construction and operational phases. The final timeline for the construction of the mine will be dependent on the Development Approval process. The timelines indicated in this section are therefore independent of the construction starting date.

The construction phased will take approximately three months. The workforce will comprise of a range of staff, including tradespersons, skilled, and unskilled employees. VDM will require workers with a range of skills including infrastructure, concrete/steel, electrical and instrumentation, mechanical, and building. Where local residents are available, they will be employed. Table 40 summarises the labour requirements for the different components of the construction phase.

Table 40: Predicted Labour Requirements during the Construction Phase.

Construction Phase	Labour #	Labour Source
Communications and OH&S		
	2	Contract
Road Access		
Delivery Earthmoving Equipment	4	2 VDM Staff Escorts
		1 Heavy Vehicle Operator
		Contract
Site Works	1	Contract D4 Dozer
	4	VDM Staff
Bridge Works	2	VDM Staff
Culverts and Drains	2	VDM Staff

Entry Sealing	2	Contract
Earth Moving Equipment Deliveries		
Transport	3	2 VDM Staff Escorts 1 Heavy Vehicle Operator
Commissioning	2	Contract
Mine Site Amenities		
Location and Connection	3	VDM Staff
Electrics	2	Contract
Water and Sewerage	2	Contract
Pre-Mining Earthworks		
Survey Layout	2	VDM staff
Vegetation Clearing	3	Contract
Earthworks	6	VDM Staff
Haul Road Formation	2	1 VDM Staff 1 Contract
In-Pit Conveyor		
Delivery	2	Contract
Unpack and Erect	4	Contract
Electrics	2	Contract
Treatment Plant		
Pre-Construction		
Clearing	3	Contract
Site Layout	3	VDM Staff
Foundations and Site Works	6	VDM Staff
Footings	2	Supplier
Pre-Commissioning		
Crane to Site	1	Supplier
Building Delivery	2	Contract
Site Works	4	VDM Staff
Plant Electrics	8	Contract
Water Reticulation Pipework	3	VDM Staff
Water Reticulation		
Site Survey Laydown	2	VDM Staff
Dam Vegetation Clearing	2	Contract
Dam Construction	4	Contract
Installation of Pumps and Pipes	3	VDM Staff
Power Reticulation		
Aurora Energy	TBA	Contract

8.3.2 Direct Impacts of the Development during Operation

The proposed mining operation will require the following skills:

- Heavy earthmoving equipment operators;
- Process plant operators;
- Plant & equipment maintenance fitters;

- Truck driver/general hand; and
- Site clerk/administration.

VDM intend to employ local staff wherever possible, or if the skills are not available locally, then from elsewhere in Tasmania. VDM will be seeking to employ experienced equipment operators and will provide cross over training where an experienced operator does not have experience with the particular items of equipment utilised in the VDM operation. The company intends to embark on a comprehensive training regime and aim to have all its employees certified to Australian Standard operator proficiency. Since the processing plant is specifically designed for VDM, operators will also be given training in its operation.

The total number of employees, excluding management, required to operate the active mining operation is approximately 12 people. Two are to be employed at the Gladstone office and 2 to 3 at the mineral concentrate clean-up facility.

Ongoing services such as fuel supplies, freight services, maintenance of equipment and spare parts supplies, shipment overseas of the ore will be contracted to local companies.

8.3.3 Indirect Impacts of the Development during Construction and Operation

Although the project has not yet commenced, the initial activities being conducted by the company have seen a change in the local demographics. The community demographic effects of the project relate in the main to employment and incomes although there will be associated flow on to local spending levels and land values.

The trend upwards in the population numbers, land values, and money being spent locally are encouraging for the town and district generally. The company currently employs eight local people and the workforce will expand to approximately twenty-five within the next twelve months to facilitate the construction and mining phases of the project.

The development of the Scotia Mine will provide a major boost to the local community, and also has the potential to indirectly impact on local employment levels during construction and operations through the increase in the number of people working within the Gladstone area. This will potentially be felt in the food and beverage industry, and also other community service industries.

8.4 ECONOMIC IMPACTS

8.4.1 Direct Impacts of the Mine Development during Construction and Operation

Capital Investment

The total capital investment by VDM in the Scotia Mine project is estimated at A$8.0 million (Table 41).

Table 41: Estimate Capital Expenditure for the Scotia Mine Project.

Description	Capital Expenditure($'s)
Mining Equipment and Processing Plant Earthmoving, haulage, processing, etc.	7,100,000
Infrastructure Power, roads, communications, etc.	620,000
Administration Offices, depot, vehicles, etc.	370,000
Total	8,000,000

Mine Royalties

The Mine Royalty payment to the Crown is expected to contain both production and 'profit' based components. The amounts paid will vary each year, but are likely to be in the range of $300,000 up to $400,000. These payments go into State Treasury to be spent on services in Tasmania.

Wages and Salaries

Annual wages and salaries to VDM employees and contractors are estimated between $1.6-$1.8 million. A large portion of this is likely to spent within the Gladstone community on food, goods, and services. This expenditure has the potential to be a large boost to the Gladstone economy.

It is estimated that the direct financial input from the Scotia Mining operation into the local and regional economies will be between $3.5 and $5.0 million per annum.

Extended Mine Life

The mine life has the potential to be extended beyond the proposed 7-year plan. This would be subject to mineral resource investigations and relevant State government approvals.

8.4.2 Indirect Impacts of the Mine Development during Construction and Operation

The flow on effects of the redevelopment during both construction and operation will be numerous. Industries such machinery appliances, equipment, construction, trade, mechanical repairs and maintenance, finance, business services, transport and communication are all likely to experience growth at both the construction and operational stages of the Scotia Mine.

8.5 SOCIAL IMPACTS

8.5.1 Housing and Accommodation

VDM has purchased a 4ha property on the outskirts of Gladstone (Campbell Street). This property forms part of ML 15M / 2004 and will be used as a depot facility and offices. VDM have also purchased a house in Gladstone for accommodation of employees.

Given the small number of employees involved in the project and that the majority are expected to be local or from the region there is not expected to be a significant change in the demand for land and housing in the area. There has been some increase in land values in line with general increases throughout Tasmania.

8.5.2 Water Supply

As previously described, the proposed processing operations are predominantly self-sufficient, and are considered unlikely to have an adverse impact on water supplies with Gladstone.

8.5.3 Roads and Safety

A Traffic Impact Assessment (TIA) has demonstrated the minimal impact the development of the Scotia Mine will have on road safety within Gladstone. Section 5.16 detail the findings of the TIA.

8.5.4 Aesthetic Values

The mine development and associated infrastructure have a number of visual elements that could potentially have a visual effect if poorly screened. However, through the careful management of vegetation clearing and due the local topography, the proposed mine

development is considered highly unlikely to have an adverse on the visual amenity within the area.

8.5.5 Employee Code of Conduct

VDM are aware for the need for mine personnel to integrate into the Gladstone community and to recognise existing community values. As such, VDM will implement an employee/contractor code of conduct to ensure these values are recognises. This code will be developed in close consultation with the Dorset Council and the community.

9 CONCLUSIONS AND COMMITMENTS

9.1 CONCLUSIONS

The timely development and commissioning of the proposed mine development will enable VDM to contribute to the local Gladstone and Tasmanian economies and enter a competitive mineral resource market at a stage when there is a market need for tin concentrate.

Detailed geology, hydrology, terrestrial flora and fauna, mine heritage, noise and vibration, visual and traffic assessments have been conducted to identify potential issues and related environmental best practice management measures. The redevelopment is considered unlikely to cause significant adverse effects to the surrounding environment due to the:

- Nature of the overburden and mineral processing involved;
- Design and management measures; and
- Operational management measure and mitigation measure for the development.

Overall, it is considered that the positive benefits of this project far outweigh any possible adverse effects.

9.2 SUMMARY OF COMMITMENTS

VDM is committed to developing and operating the proposed mine development in a responsible manner with respect to the environment and the local community. This includes no only meeting specific regulatory requirements of the relevant agencies, but where possible and appropriate, achieving best practice environmental management.

The potential environmental impacts that may arise from the mine development have been detailed in the environmental management plan section of the DPEMP (Section 5), and actions and procedures have been committed to as appropriate, which will be implemented to prevent and/or minimise these impacts.

The environmental commitments made by VDM throughout the DPEMP are summarised in Table 42 below. This table summarises each commitment and identifies the responsible party for its implementation during construction and operation. The table also references the page number of the DPEMP where the commitment is detailed and additional relevant information can be obtained. The Construction Site Manager (CSM) referred to in the table will be responsible for the implementation of commitment during construction, but since they will be directly employed by VDM, VDM is ultimately responsible for ensuring the implementation of commitments.

Table 42: Summary of Environmental Commitments Made Throughout the DPEMP.

No.	Commitment Description	Responsible party and period of implementation:		Page No.
		Construction	Operation	
Construction Issues				
1	Develop a Construction Environmental Management Plan.		VDM	61
2	Erect and maintain a visible construction boundary at the perimeter of the proposed work area.	CSM		61
3	Implement rehabilitation and/or stabilisation works during construction to limit erosion.	CSM		62
4	Erect and maintain sediment control fences to contain sediment to designated areas.	CSM		62

5	Provide an effective system for managing sewage during construction.	CSM		62
6	Prepare and enforce a dust minimisation strategy for the construction phase.	CSM		62
7	Monitor dust generation, implement suppression measures as required and ensure that no visible dust leaves the site during construction.	CSM		62
8	Ensure noise emissions comply with allowable levels and restricted hours of construction are observed.	CSM		63
9	Maintain all vehicles regularly and ensure appropriate safety signage is displayed.	CSM		63
10	Minimise clearing of vegetation, and ensure any material removed is stockpiled appropriately.	CSM		63
11	Remove refuse regularly and recycle all wastes where possible.	CSM		63
Land (geology, topography, and soils)				
12	Company will actively discourage employees from constructing unnecessary tracks.		VDM	68
13	Strip topsoil and stockpile for later use.		VDM	68
14	Avoid disturbing topsoil stockpiles in order to protect soil structure and prevent erosion.		VDM	68
15	Prevent the spread of *P. cinnamomi* by use of soil and plants free of the disease.		VDM	68
16	Prevent the spread of *P. cinnamomi* by use of soil free machinery and staff training.		VDM	69
Hydrology (stormwater, watercourses, groundwater)				
17	Minimised stormwater entering the site through construction of diversion drains.		VDM	74
18	Upgrade existing road and track access with suitable stormwater management measures.		VDM	75
19	Drainage from undeveloped areas will continue to flow in natural drainage lines.		VDM	75
20	Continue to monitor groundwater outflow from sample site S2.		VDM	76
21	Collect water quality samples during overflow events from the freshwater storage dam.		VDM	76
22	Establish and maintain septic tanks at the mine site and Campbell St facility.		VDM	77
Flora				
23	Minimise vegetation clearing on the mining lease.		VDM	85
24	Mulch and stockpile native vegetation where possible.		VDM	86
25	Collect viable seed and store for future site rehabilitation.		VDM	86

26	Vegetation removal will be approved by the FPA.		VDM	86
27	Use only native and endemic species for rehabilitation.		VDM	86
28	Develop a seed collection program to assist in future revegetation operations.		VDM	86
29	Develop and implement a Weed Management Plan.		VDM	87
Fauna				
30	Minimise clearing of native vegetation that is considered to be good habitat for threatened fauna.		VDM	92
Aboriginal and European Cultural Heritage				
31	Employ an Aboriginal Heritage Consultant to survey areas prior to the initiation of construction operations at the Scotia Mine.		VDM	97
32	Wherever practical, avoid disturbance to mine heritage sensitive areas during mining operations.		VDM	97
33	Ensure the Lochaber Fossil Flora site is not impacted on during mine development.		VDM	99
34	Make available any study any fossil material uncovered during mining operations.		VDM	99
Meteorology and Air Quality				
35	Ensure visible dust from the mine pit operations and reclamation does not cross the mining lease boundary.		VDM	85
36	Maintain water cart on site for dust suppression.		VDM	103
37	Establish and run a site management system that integrates dust control provisions.		VDM	104
38	Train staff in the site management system.		VDM	104
39	Regularly service vehicles to ensure particulate emissions are within allowable limits.		VDM	105
Noise and Vibration				
40	Undertake noise emission monitoring of the operational mineral concentrate clean-up facility to identify if it will be a source of adverse noise emissions.		VDM	108
Solid Waste				
41	Implement the waste management hierarchy for solid waste.		VDM	109
42	Separate bins will be provided for the collection of recyclable wastes.		VDM	109
43	General refuse will be regularly collected and stored in landfill.		VDM	109
44	Train staff in solid waste handling and management.		VDM	110
45	Erect suitable No Smoking signs in designated non-smoking areas.		VDM	110
Hazardous Materials				

46	Hazardous materials will be stored with appropriate signage, bunds, and fire control measures.		VDM	116
47	MSDS will be displayed with hazardous materials and appropriate OH&S equipment provided.		VDM	116
48	Bunds will be inspected daily and any spilt material cleaned up promptly.		VDM	116
49	Hazardous waste fluids released during operations will be collected for reuse of appropriate disposal.		VDM	116
50	Spill kits will be maintained on site an staff will be trained in spill kit use.		VDM	116
51	Establish an emergency response and train staff in procedures and responsibilities.		VDM	116
52	Maintain an inventory of all hazardous materials stored and handled on site.		VDM	116
53	Prepared a disposal and long-term storage plan for all hazardous materials.		VDM	116
Hazards and Risks				
54	Develop a mine system for environmental management to reduced hazards and risks, and annually audit the system.		VDM	119
Visual Considerations				
55	Minimise all vegetation clearing operations to retain vegetation as a visual buffer where practical.		VDM	123
Traffic				
56	Upgrade the road surface at Campbell St.		VDM	125
57	Upgrade the access point to the mine site at Cape Portland Rd to improve sight distances.		VDM	125

10 REFERENCES

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11 APPENDICES

Appendix A: *Guidelines for the Preparation of a DPEMP – Van Dieman Mines Pty Ltd*
DPIWE, 2005

Appendix B: *Community Information Bulletin*
SEMF Pty Ltd, 2006

Appendix C: *Preliminary Geotechnical Report*
Coffey Geosciences Pty Ltd, 2006

Appendix D: *Detailed Water Balance Calculations*
SEMF Pty Ltd, 2006

Appendix E: *Water Quality Sampling Results*
Van Dieman Mines Pty Ltd, 2006

Appendix F: *Reports from Flora and Fauna Surveys at the Scotia Mine*
A. Welling, 2005, 2006a, b, c

Appendix G: *Aboriginal Heritage Survey*
R. Sainty, 2005

Appendix H: *European Heritage Survey*
A. McConnell, 2005

Appendix I: *Details of Greenhouse Gas Emission Calculations*
Van Dieman Mines Pty Ltd, 2006

Appendix J: *Traffic Impact Assesment*
T. Eaton, 2006