DIGBY WELLS
ENVIRONMENTAL

Proposed Open Pit Magnetite Mine and Concentrator Plant, Mokopane, Limpopo Province

Closure Cost Report

Project Number:

VMC3049

Prepared for:

Pamish Investments No. 39 (Pty) Ltd

July 2015

Digby Wells and Associates (South Africa) (Pty) Ltd
(Subsidiary of Digby Wells & Associates (Pty) Ltd). Co. Reg. No. 2010/008577/07. Turnberry Office Park, 48 Grosvenor Road, Bryanston, 2191. Private Bag X10046, Randburg, 2125, South Africa
Tel: +27 11 789 9495, Fax: +27 11 789 9498, info@digbywells.com, www.digbywells.com

This document has been prepared by Digby Wells Environmental.

Report Type:	**Closure Cost Report**
Project Name:	**Proposed Open Pit Magnetite Mine and Concentrator Plant, Mokopane, Limpopo Province**
Project Code:	**VMC3049**

Name	**Responsibility**	**Signature**	**Date**
Leon Ellis	Report Writer		May 2015
Renée van Aardt	1st Review		June 2015
Lucy Koeslag	2nd Review		July 2015

EXECUTIVE SUMMARY

Pamish Investments No. 39 (Pty) Ltd (hereafter the applicant) has commissioned Digby Wells Environmental (Digby Wells) to conduct an Environmental Impact Assessment (EIA) and provide an Environmental Management Plan (EMP) for the proposed open pit Magnetite Mine an concentrator plant, located approximately 45 km northwest of Mokopane in the Limpopo Province.

As part of the Mining Right application, the applicant is required to calculate their environmental closure liability based on their Mining Works Program (MWP). In terms of section 24P of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, the applicant is required to determine the quantum of provision for the demolishing and rehabilitation of its mining activities associated with the proposed project.

The environmental liability assessment only focused on the proposed mining activities and was calculated by means of the Department of Mineral Resources (DMR) standard method for assessment of mine closure. The DMR *“Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine”* as published by the DMR (previously known as the Department of Minerals and Energy (DME)), dated January 2005 was to be used to assess the applicant’s environmental liability. Activities incorporated into the calculation included the demolition and management of physical infrastructure and rehabilitation of the waste facilities and areas where infrastructure has been removed.

The areas of disturbance to be included in the current closure liability assessment were provided by the applicant. The proposed mine layout plan is attached to this report in Appendix A. These areas were assumed to be all that the applicant will be liable for and no investigations were conducted to determine whether the applicant is liable for any additional disturbed areas. The scope of work did not involve a legal due diligence process.

There are two open pits planned, which are separated by the D4380 Provincial Road, the approximate footprint of the north (Pit 1) and south (Pit 2) open pits are 129 ha and 66 ha respectively. Open pit mining is proposed to be undertaken outwards from the middle of the strike length advancing north and south to an initial depth of 20 m below the surface then to 40 m and thereafter to 60 m, and 80 m. A bench height of 10 m will be used to allow for the separate loading of the two ore layers and the parting. The Life of Mine (LoM) for the proposed project will be approximately 30 years with a Run of Mine (RoM) at 1 million tonnes per annum (tpa).

Two waste rock dumps (WRD) with a combined footprint of 11.5 ha will be developed. A Tailings Storage Facility (TSF) will be constructed which will have a footprint of 62 ha. Two low grade and two lower grade stockpiles will also be developed with the low grade stockpiles having a combined footprint of 130.5 ha and the lower grade stockpiles a combined footprint of 103 ha.

The required clean and dirty water separation systems will form part of the mine design as well as the required pollution control dams and clean water storage facilities. Dirty water trenches and storm water trenches with total lengths of 17 128 m 12 732 m respectively will be constructed. A solution trench with a total length of 3 557 m will be constructed around the TSF. Four pollution control dams (PCDs) each with a footprint of 1 ha will be constructed. Two storm water dams with a combined footprint of 5.3 ha will be constructed as well as a return water dam with a footprint of 0.1 ha next to the TSF.

Site roads will be constructed with a total length of 25 504 m. Fences around and within the project area will have a combined length of 34 581 m. Pipelines will also be constructed as part of the water reticulation network with a total length of 8 100 m.

The proposed concentrator plant including crushing and screening activities will be located within a footprint of 12.3 ha with a contractor's camp of 7.6 ha. Additional support infrastructures that will form part of the project include mine offices, workshops, stores, wash bay, conveyor systems, sewage treatment plant etc.

Mine closure is an ongoing programme designed to restore the physical, chemical and biological quality or potential of air, land and water regimes disturbed by mining to a state acceptable to the regulators and to post mining land users. The activities associated with mine closure are designed to prevent or minimise adverse long term environmental impacts, and to create a self-sustaining natural ecosystem or alternate land use based on an agreed set of objectives.

Rehabilitation can be divided into two different streams, namely concurrent rehabilitation and final rehabilitation. Concurrent rehabilitation must be carried out along with the operations on the mine, and will decrease the final liability that the mine will carry at the time of closure. This concurrent rehabilitation will be carried out within the context of the approved EMP. Current planning indicates that 80% of the waste rock material will continuously be placed back into the pit as mining progresses. Final rehabilitation will be carried out once the mine goes into its closure phase. This final rehabilitation will be carried out within the context of a closure plan.

Measurements that were taken from the mine layout plan have been standardised to ensure that the costs calculated are easily updatable. Quantities of steel and concrete structures/ buildings, fences and pipelines were received from the project engineers. Provision was only made for 2 – 3 years maintenance and aftercare as per the DMR guidelines, and exclude costs associated with the monitoring programmes as recommended in the report.

The environmental liability assessment associated with the proposed project as calculated using the DMR model is estimated to be R 154 840 434 (Incl. VAT) at the end of LoM. The main contributor to the environmental liability is the cost associated with the waste facilities which will be left on surface after mine closure. The cost associated with the rehabilitation of the open pit is also a significant contributor. The environmental liability after Year 1 of mining using the same calculation method is estimated to be R 26 323 960 (Incl. VAT).

The concrete and steel estimates associated with the concentrator plant are based on pre-feasibility study numbers; hence the numbers will have to be confirmed during detailed design in the feasibility phase.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF PLANS

1 Introduction

Pamish Investments No. 39 (Pty) Ltd (hereafter the applicant) has commissioned Digby Wells Environmental (Digby Wells) to conduct an Environmental Impact Assessment (EIA) and provide an Environmental Management Plan (EMP) for the proposed open pit Magnetite Mine an concentrator plant, located approximately 45 km northwest of Mokopane in the Limpopo Province.

As part of the Mining Right application, the applicant is required to calculate their environmental closure liability based on their current infrastructure plan and Mining Works Program (MWP). In terms of section 24P of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, the applicant is required to determine the quantum of provision for the demolishing and rehabilitation of its mining activities associated with the proposed project.

The environmental liability assessment only focused on the proposed mining activities and was calculated by means of the Department of Mineral Resources (DMR) standard method for assessment of mine closure. The DMR *"Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine"* as published by the DMR (previously known as the Department of Minerals and Energy (DME)), dated January 2005 was to be used to assess the applicant's environmental liability. Activities incorporated into the calculation included the demolition and management of physical infrastructure and rehabilitation of the waste facilities and areas where infrastructure has been removed.

The areas of disturbance to be included in the current closure liability assessment were provided by the applicant. The proposed mine layout plan is attached to this report in Appendix A. These areas were assumed to be all that the applicant will be liable for and no investigations were conducted to determine whether the applicant is liable for any additional disturbed areas. The scope of work did not involve a legal due diligence process.

2 Project Background

The applicant has submitted a Mining Right Application (MRA) to the DMR over the following farm portions:

- Remaining Extent (RE) of Farm Vogelstruisfontein 765LR;
- RE of Farm Vliegekraal 783LR;
- RE of Farm Vriesland 781LR;
- RE of Farm Schoonoord 786LR; and
- RE and Portions 1, 2, 3, 4, 5 and 6 of Farm Bellevue 808LR.

The combined area of the Mining Right area is 10 109 hectares (ha). The applicant is proposing the development of an open pit Magnetite Mine.

Digby Wells has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake an EIA process in support of the MRA for the project. The project will also include an application for a Waste Management Licence (WML) and Water Use Licence (WUL) for activities specific to the use and management of these environmental resources.

3 Project Description

The proposed infrastructure layout plan has been attached in Appendix A.

3.1 Mineral Resource

The project is located on the Bushveld Igneous Complex (BIC). The BIC consists of a lower sequence of layered mafic and ultramafic rocks known as the Rustenburg Layer Suite (RLS) and an overlying unit of granites known as the Lebowa Granite Suite. These layered rocks occur in three areas known as the Western, Northern and Eastern limbs. The project is located in the Northern Limb of the BIC.

Within the project site, two titano-magnetite zones have been identified, namely the vanadium-rich Main Magnetite Layer (MML) and the iron and titanium-rich P-Q zone. The MML consists of two massive titano-magnetite layers separated by a parting consisting of lower concentrations of titano-magnetite.

The target mineral for the proposed mine is vanadiferous titano-magnetite of the MML, which will be processed to produce magnetite concentrate which will ultimately be processed into Vanadium[1]. Other minerals which may be found in association with the MML and have been included in the Mining Right Application are: Vanadium, Titanium, Iron Ore, Phosphate, Platinum Group Metals, Gold, Cobalt, Copper, Nickel, Chrome and all minerals found in association with these elements. A second orebody, referred to as the P-Q Zone may also be potentially mined at a later stage. The MML resource occurs up to a depth of 120 m whilst the P-Q Zone occurs at a depth of 400 m.

The A, B and C zones are the zones determined as potential future resource zones with A and C being referred to as *low* grade hanging wall and Zone C being referred to as *lower* grade hanging wall.

[1] The processing of the magnetite concentrate into Vanadium has not been considered as part of this EIA process (the MWP makes provision for processing of ore to a magnetite concentrate only), and would subject to a separate environmental authorisation approval process, to be undertaken by the relevant applicant.

3.2 Mining Method

There are two open pits planned, which are separated by the D4380 Provincial Road, the approximate footprints of Pit 1 (north) and Pit 2 (south) are 129 ha and 66 ha respectively.

Open pit mining is considered the optimal mining method based on the thickness and positioning of the mineral resource. The main magnetite layer is covered by 2 m of topsoil which will be stripped to expose the outcrop. Open pit mining is proposed to be undertaken outwards from the middle of the strike length advancing north and south to an initial depth of 20 m below the surface then to 40 m and thereafter to 60 m, and 80 m. A bench height of 10 m will be used to allow for the separate loading of the two ore layers and the parting.

Life of Mine (LoM) for the project will be approximately 30 years with a Run of Mine (RoM) at 1 million tonnes per annum (tpa).

3.2.1 Vegetation and Topsoil Stripping

The vegetation will be cleared with a dozer while larger trees will be felled and removed. Any protected tree or plant species that requires relocation, will be removed prior to this activity once the necessary authorisation has been received. Rocky outcrops may require surface blasting before being loaded and hauled away. Unless of some value e.g. as aggregate, this rock will be treated as waste and dumped into the Waste Rock Dump.

The MML is covered by 2 m of soil which will be stripped to expose the outcrop. Both topsoil and subsoil will be stripped and loaded onto trucks which will then be placed in designated soil stockpile areas. There are two topsoil stockpiles proposed as part of the project, a northern and southern stockpile which are approximately 32 ha and 8 ha respectively. The topsoil will be used in rehabilitation of the open pits and/or the cladding of the Waste Rock Dumps (WRD) which will remain on surface after closure.

3.2.2 Drill and Blast of Overburden and Target Material

To expose the mineral resource, the overburden or hard rock above the mineral resource must be broken up (blasted where necessary) and removed.

It is anticipated that the initial MML will be freely dug or ripped with a dozer to facilitate easier loading however in some cases blasting will be used particularly for the MML upper and MML lower as well as the parting between these layers (low grade material).

Blast holes will be drilled using a drill rig to the length of the bench/ bench height (10 m). A 4 m by 4 m pattern with 150 mm drill hole diameters has been selected. Once the drilling is completed, the blast-holes will be loaded with bulk explosives. The selection of the type of explosives and accessories will be determined by local conditions e.g. how ‘wet’ the drill holes are found to be. The explosive column will be detonated by a primer initiated with a non-electric detonating cord. To ensure proper blast sequencing and to minimise adverse effects, the blasts are typically controlled using in-hole delays and/or surface delays.

3.2.3 Truck and Shovel

As the open pit progresses and the depth increases the low grade hanging wall, which in effect becomes the overburden will be mined via the traditional truck and shovel method and stored as a lower grade ore stockpile. The parting between the MML upper and MML lower resource is also considered to be low grade material, which will be trucked and stored as a low grade stockpile.

The MML upper and MML lower and target material will be loaded onto 25 tonne dump trucks using Front End Loaders (FEL) and transported to the RoM tip.

3.3 Mineral Processing

Ore will be transported from the open pit to the concentrator plant by dump trucks. A concentrator plant will be constructed for initial processing. Ore processing will commence with crushing which is undertaken in three stages and produces material with a size of 44 millimetres (mm). Based on typical industry performance, the plant is assumed to perform for 5 500 operational hours per annum (i.e. 358 operating days per annum, with an 80% utilisation of 80% availability).

Material from the crushed material stockpile will then be reclaimed and processed through a conventional rodmill-ballmill combination to produce a product of 53 micrometres (µm). Following grinding, magnetite will be recovered through a three-stage low intensity magnetic separation circuit. The magnetic separation product will be dried by a filter press and stockpiled for further processing in a concentrate shed, while the non-magnetic waste will be thickened and disposed of at the proposed Tailings Storage Facility (TSF) through a tailings pipeline. The concentrator will also include a laboratory, plant office, water treatment plant, workshop/ yard and control room. Additional infrastructure will also include internal road network, piping and concentrate stockpile area.

3.4 Waste Rock Dumps and Low/ Lower Grade Stockpiles

Due to the nature of the resource the mining waste volumes are relatively low in that what would in a typical open pit mine be designated as overburden or waste is actually a potential resource.

The WRD will be created during the development of the open pits. It is proposed that approximately 80% of waste rock produced will be deposited on the working benches from mining activities. The remaining 20% of the waste rock dump will be disposed of at a waste rock dump, using Load Haul Dump (LHD) vehicles. There are two proposed WRDs, the northern WRD is located adjacent to the plant area and will be 4 ha in area, whilst the southern WRD will be approximately 7.5 ha in area. Both WRD are expected to reach a maximum height of 18 m.

Storm water diversion trenches or swales will be constructed around the upstream sides of the WRD to direct clean surface water run-off around and away from the WRD. A drainage trench around the WRD will be constructed to divert run-off from the side slopes of the WRD.

As discussed above, the A, B and C zones are the zones determined as potential Future Resource Zones with Zone A being referred to as low grade ore and Zone C being referred to as lower grade ore. Each pit therefore has an associated low grade and lower grade ore stockpile. The footprints of the low grade and lower grade ore stockpiles for Pit 1 are 70.5 ha and 59.5 ha respectively. The footprints of the low grade and lower grade ore stockpiles for Pit 2 are 60 ha and 43.5 ha respectively. The Low and Lower Grade stockpile areas will not exceed 70 m in height.

3.5 Tailings Storage Facility

The TSF will be constructed as a conventional upstream tailings dam. Tailings will be pumped to the tailings dam at 327 000 tpa. The slurry will contain 30% solids. The tailings material will have a particle size 80% smaller than 75 µm. The total volume of the tailings dam will be 9.8 million tonnes with a footprint of 62 ha and a height of 30 m.

A penstock system will decant water off the top of the tailings dam, which will then be pumped back to the plant via the return water dam. The tailings material has been classified as a Type 3 Waste (according to the NEM:WA Regulations) and will be lined with a Class C Liner.

Storm water diversion trenches or swales will be constructed around the upstream sides of the TSF to direct clean surface water run-off around and away from the TSF. Paddocks will be constructed around the perimeter of the TSF to contain run-off from the side slopes.

A 6 m wide waste rock road will be constructed around the perimeter of the TSF for access during operations, routine inspections and maintenance. A perimeter fence around the TSF will be installed.

3.6 Storm Water Management

Storm water will be managed as per GN R.704, regulations on use of water for mining and related activities aimed at the protection of water resources (GG 20119 of 4 June 1999).

A network of storm water drains have been designed around all areas of the operations where these drains are designed to cut-off surface run-off from entering mining and infrastructure areas as well as to convey clean storm water run-off originating from infrastructure areas to the nearest natural drainage areas. This includes the pit cut-off drains and tributary diversions to protect the pits from storm water ingress and divert natural drainage around the planned mining areas.

Drains and culverts are designed to contain the 1:50 year storm event for roads and infrastructure and 1:100 year storm event for pit cut-off drains and culverts. Storm water drains are typically unlined and will be designed to minimise flow velocities and resulting erosion. Either gabions or cement-grouted stone pitching must be allowed for at drops in invert, bends and intersections of drains.

3.7 Pollution Control Facilities

Process water will be returned to the concentrator plant for re-use. Furthermore, the required clean and dirty water separation systems forms part of the mine design as well as the required Pollution Control Dams (PCDs). There are four proposed PCDs, located within the mining area, adjacent to the low grade stockpiles and WRDs. The PCDs are 100 m x 100 m in size.

Pollution control drains will be included at all polluted areas and will be designed to convey polluted drainage to the PCDs. Concrete linings will be used for all pollution control drains. Silt traps have been included at all areas of silt origin and also at inlets to PCDs.

At areas of hydrocarbon pollution, oil traps and separator equipment will be included where the oil traps are always preceded by silt traps to ensure these do not silt up. In line with international good practice, all pollution control drains and culverts have been provisionally designed for the 1:50 year storm event and should be designed with an additional 0.8 m freeboard.

3.8 Road Infrastructure

The project site is divided by the D4380 Provincial Road. The northern section of the project site can be accessed via the D3534. The southern section of the project site can be accessed via the D3507. Both roads are secondary roads off the D4380 Provincial Road. These municipal roads are double-lane tarred roads which are at present, in a good condition.

The material from the proposed mine will either be transported via road, then onto rail in Mokopane and onwards to the nearest port; or via road, directly to Durban/Richards Bay for export.

The haul roads will be constructed between the open pits, WRDs, TSF and the concentrator plant. It is planned that there will be two haul road crossings over the D4380 Provincial Road to access Pit 2 to the south of this Provincial Road.

Haul roads will be constructed according to recognised mine haul-road specifications i.e. road widths, gradients and layer-works, including safety berms and storm water drainage arrangements. The mining haul roads will be 8 m wide for the Light Duty Vehicles (LDV) and 14 m wide for the Articulated Dump Trucks (ADT). The haul roads will be developed using crushed waste rock, which will be compacted and treated with a dust suppressant.

3.9 Other Support Infrastructure

Additional mine infrastructure that is anticipated to be constructed are described below. At premature- or final closure phase of the project, all infrastructure will be required to be dismantled, demolished and removed should no other beneficial use be identified or agreed with local authorities and/ or communities.

3.9.1 Sewerage Treatment Plant

It is anticipated that this plant will be used to process sewerage waste generated on the mine only.

3.9.2 Conveyors

A 600 m conveyor is required for the crushing and grinding components within the plant area and a 100 m conveyor system is required for the concentrate product. These conveyors will have a width of 45 cm to 60 cm. The conveyors will be closed top conveyors.

3.9.3 Pipelines

The piping network will be designed to suit the mining dewatering operations; this water will be fed to the PCDs using HDPE piping. The process water pipelines which will be located within the plant area will be approximately 2 km in length.

The piping will be supported on pre-cast sleepers. Where, piping is required to cross roadways/haulage roads these will be installed in sleeves installed during the construction of the roadways.

Clean water, assuming that it will be piped from the existing water abstraction networks, will have a pipeline/s with a combined length of 11 km and a capacity of 46 m^3/h. The tailings pipeline will be approximately 3 km in length (distance between the concentrator plant and the tailings dam), with a throughput capacity of 53 m^3/h.

All pipeline diameters are estimated to be approximately 5 cm to 20 cm.

3.9.4 Hazardous Material Storage

Various hazardous substances will be stored on site, including fuels, lubricants, gas, oils, and explosives. There will be emulsion type explosives that would be mixed on site in emulsion tanks with the detonators stored in an explosive magazine (building). These materials will be to be stored in secured buildings or with the necessary bunds (110% of volume of materials).

A diesel fuelling station will be constructed at a central point and it shall comprise of a diesel storage tank within a self-contained bund, and will include all equipment required for fuel dispensation.

3.9.5 Buildings

Building layouts will be designed with a focus on ergonomics and use of space, aesthetics, constructability and energy efficiency. These buildings typically constitute conventional steel support structures with steel cladding and minor use of brick where this brickwork will be non-structural and can be sourced from local sources. Table 3-1 list the structures envisaged for the mining operations.

Table 3-1: Building Structures Envisaged for the Project

Item
Boilermaker / Welding Workshop
Cable Repair Workshop
Control and Instrumentation Workshop
Diesel Fuelling Station
Electrical Workshop
Earth Moving Vehicle (EMV) Workshop Office and Rest Areas Building
EMV Hard Park
EMV Wash Bay
EMV Workshop building
Fire Fighting and Water Storage Pump Station
Main Central Change House
Mechanical Workshop
Mine Stores Building
Mine Stores Office and Rest Areas Building
Piping Workshop
Trades Workshop Office and Rest Areas Building
Tyre Store and Workshop

Source: Worley Parsons May 2015

3.10 Project Schedule

The planned project schedule is as follows and is dependent on receipt of all regulatory approvals:

- Construction : March 2016 – March 2018 (2 years);
- Topsoil and Pre-stripping : 2018 -2019 (1 year);
- Production: 2019 – 2049 (30 years);
- Decommissioning Phase: 2050 – 2055 (5 years); and
- Post-closure Phase: 2055 – 2058 (3 years).

4 Terms of Reference

Section 41 (1) of the Mineral and Petroleum Resources Development Act (MPRDA), (28 of 2002) states that, "*an applicant for a prospecting right, mining right or mining permit must, before the Minister approves the environmental management plan or environmental management programme in terms of section 39(4), make the prescribed "financial provision" for the rehabilitation or management of negative environmental impacts*."

In terms of Section 24P of NEMA, as amended by the National Environmental Management Laws Amendment Act, 2014 (Act No 25 of 2014) (NEMLA) provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts[2].

The methodology used to calculate the environmental liability was based on the DMR "*Guideline Document for the Evaluation of the Quantum of Closure- related Financial Provision provided by a Mine*" (DME, 2005), as per the MPRDA.

5 Details of the Specialist

Leon Ellis achieved a Bachelor of Science and Honours in Geography and Environmental Management at the University of Johannesburg (UJ) and is an environmental consultant specialising in mine closure assessments. Experience includes various environmental liability assessments and mine closure planning projects within the resource industry of Africa.

6 Receiving Environment

6.1 Soils

The land type data gathered suggested that the dominant soils on the pit locations would be black clayey soils and that the rock dumps would fall within mixed red soils.

The project area is dominated by the Arcadia soil form with small portions of Oakleaf soils to the west, and Shallow Glenrosa/Mispah soils on the hills towards the east

The land capability is dominated by the Class IV (moderate grazing) land capability, the Class IV land capability coincides with the Arcadia soils, and although these soils are deep their high clay percentage and shrink/swell properties make them very difficult to manage from an agricultural perspective.

The Class III (moderate cultivation/intensive grazing) land capability coincides with the Oakleaf soils, which are better drained and more easily managed in comparison with the

[2] It should be noted that draft Regulations dealing with the financial provision for the closure of a mine and the calculation of the quantum of that provision are currently circulating for comment. These Regulations will have a significant impact on the provision for closure but this report is based on the Regulations applicable as at 1 December 2014.

Arcadia soil. They are situated to the west of the site and the low/lower grade stockpiles would be situated on them.

The Class VIII (wilderness) land capability can be found in the eastern portion of the project site and is linked to the shallow/steep Glenrosa/Mispah soils.

The land use categories are split into:

- Cultivated;
- Natural;
- Mines;
- Urban Built-Up; and
- Waterbodies.

The land use that is dominant within the project area is the natural veld land type with a small portion in the north east being used for subsistence agriculture.

These land uses are driven by climate and land capability. The dominant soil in the area is the Arcadia soil form. These soils are very difficult to cultivate and as a result have been left to natural veld. The Oakleaf soils are high in clay but do not have the same restrictions as the Arcadia soils and has therefore been used for subsistence agricultural fields.

The two major soil groups in the project area will be stripped separately.

The Arcadia soils are heavy black clay soils with shrink/ swell properties. These soils are to be stripped and stockpiled as follows:

- The top 30cm of these soils are to be stripped and stockpiled in one stockpile (S1).
- The remaining 90cm (up to depth 120cm) are to be stripped separately and stockpiled in another stockpile (S2).

The Oakleaf soils are red and somewhat freely draining. These soils are to be stripped and stockpiled as follows:

- The top 30cm of these soils are to be stripped and stockpiled in one stockpile (S3).
- The remaining 90cm (up to depth 120cm) are to be stripped separately and stockpiled in another stockpile (S4).

The top 30cm of soil is stripped separately to conserve the natural seed bank as well as the natural fertility that has been accumulated in this layer. This layer is also to be replaced last to increase the chances of rehabilitation success.

These soils are stockpiled separately as to maintain their natural structures, and cannot be mixed under any circumstances. This would compromise their ability to rehabilitate.

These soils are to be stripped in the dry season only.

6.2 Flora and Fauna

The proposed Project is situated in the Savanna Biome, within the Makhado Sweet Bushveld and Central Sandy Bushveld regional vegetation types. Habitat classified within the site included three vegetation units, namely: *Acacia borleae – Eragrostis rigidior* Black Turf Savanna; *Acacia tortilis – Eragrostis rigidior* Savanna and *Commiphora marlothii – Heteropogon contortus* Rocky Woodland.

A total of 75 plant species were recorded on site, three of which hold a conservation status, namely: *Combretum imberbe* (Leadwood) – nationally protected, *Scadoxus puniceus* (Royal Paint Brush) – provincially protected and Sclerocarya birrea (Marula) –nationally protected.

17 mammal, 102 bird, 8 reptile and 11 herpetofaunal species were recorded on site. A Baboon Spider *(Harpactirinae sp)* was found in low-lying areas associated with the *Acacia borleae – Eragrostis rigidior* Black Turf Savanna. This species has not yet been positively identified but its nesting site has been recorded. All Baboon Spider’s have been assigned protected status by the National Environmental Management Biodiversity Act of 2004 (Act No.10 of 2004) (NEMBA).

With regard to sensitivity, the study area is not situated within any protected area earmarked for future protection, threatened ecosystems or Important Bird Areas. The site-specific sensitivity assessment showed that the *Commiphora marlothii – Heteropogon contortus* Rocky Woodland was assigned high sensitivity. This habitat was intact and supported species that are restricted to rocky outcrops.

6.3 Surface Water

The Project area is located within the boundaries of the quaternary catchment A61G and A62B found in the Limpopo River catchment which is Water Management Area number one (WMA 01).

The Project area consists of perennial and non-perennial streams which traverse through the project area. The identified non-perennial streams were found to be dry during the site visit conducted on the 15th of January 2015. A river named Mogalakwena which is a tributary to the Limpopo River is found on the western side of the project site flowing towards the northern side into the Limpopo River. Another river called Sterkriver also traverses through the Project area on the western side of Mogalakwena River. Sterkriver is a tributary to Mogalakwena River. A non-perennial stream called Borobela exist on the east side of the Mogalakwena River and it flows from the eastern side towards the west feeding into the Mogalakwena River, this stream was dry at the time of site visit.

The Mogalakwena River is one of the 13 tributaries in South Africa of the main Limpopo River basin (LBPTC Scoping Study, 2010).

The surface water uses which was obtained from the Department of Water and Sanitation (DWS) water use registration data base (WARMS) were irrigation, mining, urban and rural supply. Other water uses that were identified on site were livestock watering, domestic uses on other villages and irrigation. Water sources include dams and boreholes.

6.4 Groundwater

The general surface slope in the project area is in a west south-westerly direction with groundwater flowing in a south-westerly direction towards the Mogalakwena River, which in turn flows to the north towards the Limpopo. The average water level for the proposed project area was 5.5 m below ground level (bgl), ranging between 0.72 and 25.06 m bgl. The Project area is located within the boundaries of quaternary catchments A61G and A61B, found in the Limpopo River catchment.

The project area is located on a part of the northern limb of the Bushveld Complex. Groundwater occurrence of the Rustenburg Layered Suite of the Bushveld Igneous Complex (BIC) is associated mainly with deeply weathered and fractured mafic rocks. The groundwater yield potential is classified as poor since most of the boreholes produce less than 2 L/s. Faulting in the Lebowa Granite Suite plays a very important role in the transmission and recharge of groundwater. The granites of the Lebowa Suite are crystalline such that they have a poor permeability and water is only stored in areas of deep weathering and in faulted zones. The average transmissivity for the project area was measured to be 33 m^2/day, varying between 0.2 m^2/day and 56 m^2/day.

During the hydrocensus it was possible to sample 36 open and accessible boreholes. Six groundwater samples collected during the hydrocensus and five samples collected during aquifer testing. Groundwater samples collected during a recent (i.e. 2014) hydrocensus presented generally the regional geogenic/ambient groundwater quality with a Ca -Mg- -HCO_3 water type as represented by literature of the DWS groundwater samples for the region.

The Ca -Mg- -HCO_3 facies suggests weathering of silicate and ferro-magnesian minerals as a major source of mineralization. The Ca- Mg--HCO_3 water facies indicates a relatively young groundwater (HCO_3 instead of Cl dominance for older, more evolved water).

6.5 Social

The project area falls in the Mogalakwena Local Municipality (MLM). The area comprises a land surface area of 6 166 km^2 and is administered by the Mogalakwena Municipal Council. The MLM comprise 32 municipal wards, the population within each ward is represented by a ward committee and councillors, who are responsible for representing the needs of the people within the respective wards on the Council.

In addition to municipal administration, several areas within the MLM are under the administration of Traditional Authorities (TA). Each TA is headed by a Kgoshi and his subordinate headmen. There are nine traditional authorities within MLM. The relationship between the municipality and most traditional authorities is sound (MLM, 2012).

The local study area (1389 km^2) is defined as Ward 9, 10, 11, 15, and 16 of MLM as well as Ward 18 of Aganang Local Municipality (ALM).

Table 6-1 below provides a summary of the baseline profile. It highlights features and trends across all three study areas that might have relevance for the applicant in terms of possible opportunities/ benefits and constraints/ challenges.

Table 6-1: Summary of the social baseline profile

Socio-economic attribute	Supporting data	Relevance to the project
Opportunities and benefits		
From a development perspective the project is in line with National, Regional and Local Development planning	National Development Plan, Accelerated and Shared Growth Initiative for South Africa, Industrial Policy Action Plan, New Economic Growth Path, Limpopo Development Plan, Waterberg District's LED Plan, and MLM LED	Pamish will be able to garner legitimate support from National, Provincial and Local Government for the proposed project as it is in line with their development trajectory.
Provincial and Local development plans are in place; however on a district level no up to date LED Plan is available	Local and District municipal IDPs are readily available as well as LED Plans for MLM and the Province	Opportunity for Pamish to align socio-economic development programmes contained in future iterations of their Social and Labour Plan (SLP) with existing development plans; this will increase sustainability and relevance of initiatives.
Several large mining operations are located within the local study area	District and Local Municipal SDFs; Field investigations; investigation of available spatial data	Opportunity to synergise any LED as part of the SLP with existing initiatives of other mines
Most people within the local and site-specific study area only have a relatively basic skill level	Only 14% of the MLM and 20% of the local study area have completed secondary school; those within the more rural outskirts of these study areas tend to have even lower levels of education; findings from the household survey	Opportunity for Pamish to contribute to community development through skills development programmes during construction and operational phases; however, low education levels usually have negative implications for the employment potential of the population and also for the feasibility of LED initiatives.
Mining is one of the dominant economic sectors in the MLM	Mining and quarrying sector employed a considerable number of people in the MLM; Mining is one of the primary contributors to the Municipal GDP 32%	Procurement could potentially be from suppliers located within the MLM who are currently servicing mines in the area

Socio-economic attribute	Supporting data	Relevance to the project
Large potential labour force	The youth comprises a large proportion of the population within the regional, local and site-specific study area; high unemployment, especially among rural households; findings from the household survey	Pamish can likely meet any local recruitment targets for un-and semi-skilled positions
Surrounding communities have limited access to public infrastructure	Field investigations, findings from the household survey and MLM IDP: - Rural households within the local study area mostly rely on pit toilets for sanitation purposes; - Clinics in the surrounding towns is often short staffed; - Most rural roads are deteriorated; - Housing shortages is noted for the regional study area; and Intermittent shortages of groundwater supply.	Provides opportunities to make a significant contribution to local development as part of LED and CSI (but may also hinder the productivity of the local workforce). In this regard Pamish could collaborate with existing municipal SLP and LED forums as well as the Bakenberg TA.
Gender disparity in employment rates – financial vulnerability among females	StatsSA (2013) and household survey - Unemployment amongst females is significantly higher than males across all study areas	Pamish could contribute to gender equity by implementing female employment targets – this requirement, if feasible, could be formalised by incorporating it into the construction contractor's conditions of contract.
High degree of poverty and socio-economic vulnerability among site-specific population	StatsSA (2013); Socio-economic survey	Any LED, CSI or local employment will likely contribute significantly to socio-economic development among the site-specific and local population
Constraints and challenges		
Land claims on Schoonoord 786 LR, Bellevue 808 LR, Vriesland 781 LR and Vogelstruisfontein 765 LR	MLM and WDM IDPs; Field investigation	Land claims may have development implications for Pamish as it may delay and complicate land acquisition

Socio-economic attribute	Supporting data	Relevance to the project
Land speculation and illegal residential land use in the vicinity of mine infrastructure	Field investigation	Settlement in close proximity to Pamish's operation could result in: - Health and safety implication in terms of the Mine Health and Safety Act; - Downstream displacement of land users; - Potential issues from households settling in the area as result of potential negative impacts on them; and - If settlements establish itself next to the proposed mine, it could set a precedent, which could stimulate additional informal settling in the area
Large sections of the site-specific study area is administered by the TA, but also held in private ownership by the TA	Desktop review	Could result in tensions between local municipalities and traditional leaders, especially during implementation of LED plans Could complicate the mitigation of displacement impacts when these arise, as resource ownership might be disputed between land users and owners (TA).
Substantial housing shortage throughout the regional study area	The 2012/2013 MLM IDP estimates the housing backlog within the municipality at 33 000 units Both the District and Local Municipality are experiencing increasing pressure to launch new housing development Field investigation – informal expansion of current communities; land grabs	Any project-induced influx to communities within the site-specific study area may place additional pressure on limited housing
The land area which will be mined hosts subsistence agricultural fields, grazing areas, natural resources (e.g. medicinal plants and firewood)	Field investigations; household economic survey; spatial data	Agricultural activities and collection of natural resources will be directly affected by the proposed project, which will result in economic displacement of various households

Socio-economic attribute	Supporting data	Relevance to the project
The proposed project area is currently zoned for tourism uses by the Waterberg EMF	Waterberg EMF	Suggests that mining activities in this area are potentially undesirable from the District's perspective, as tourism and conservations are the preferred activities in this zone
General hostility against existing mining houses in the regional study area	Desktop review	May create a context for future volatility especially if stakeholder expectations in terms of local employment, LED and CSI are not met, within reason
This regional economy is dependent on mining	Mining contributes to almost 8% of employment within the District and 32% to its GDP	The Project will likely contribute to increasing dependency on mining among local communities LED activities should preferably be aimed at establishing economic development outside the mining sector
Severe problems with water security in the regional and local study area	MLM IDP and field investigation	The project might jeopardise water security in the area, which can instigate volatility among local communities

7 Post-mining Land Use

The post-mining land use is essentially the end land use to which the applicant would like to return the land affected by mining activities. The closure objectives set as part of the mine closure planning process aims to ensure that the end land use is achieved and that the area is sustainable in the long-term from an environmental and social point of view.

The post-mining land use should be restored to either grazing and/or cultivation and should represent the pre-mining land use, if possible (Digby Wells, 2015a)

8 Closure Objectives

The main aim in developing a closure plan is to minimise and mitigate the impacts caused by mining and industrial activities and to restore land back to a satisfactory standard. It is best practice to develop the closure plan as early as possible so as to ensure the optimal management of rehabilitation issues that may arise. It is critical that a mine's closure plan is defined and understood from before mining progresses and is complimentary to the rehabilitation goals.

In accordance with applicable legislative requirements for mine closure, the holder of a prospecting right, mining right, retention permit or mining permit must ensure that:

- The closure of a prospecting or mining operation incorporates a process which must start at the commencement of the operation and continue throughout the life of the operation;
- Risks pertaining to environmental impacts must be quantified and managed proactively, which includes the gathering of relevant information throughout the life of a prospecting or mining operation;
- The safety and health requirements in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) are complied with;
- Residual and possible latent environmental impacts are identified and quantified;
- The land is rehabilitated, as far as is practicable, to its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development; and
- Prospecting or mining operations are closed efficiently and cost effectively.

The preliminary closure objectives for the proposed project have been defined as the following:

- To remove and/or stabilise surface infrastructure, rehabilitated land and mining residue according to the planned land use plan after closure;
- To manage the impact of physical effects and chemical contaminants on the environment such that the environmental quality is not adversely affected after closure;

- To limit, as far as reasonably possible, health and safety risks to humans accessing the reclaimed mine site after closure;
- To encourage the re-establishment of native and/or appropriate flora and fauna on the reclaimed mine site such that the biodiversity is largely re-instated by natural succession over time;
- To adhere to the implementation of the approved SLP that should contribute towards the socio-economic sustainability of the local communities;
- Comply with local and national regulatory requirements;
- To follow an appropriate stakeholder engagement process with all interested & affected parties and authorities; and
- To maintain and monitor all rehabilitated areas following re-vegetation or capping.

As part of an EIA application, the applicant is required to calculate their environmental closure liability based on their MWP. In terms of section 24P of NEMA, as amended, the applicant is required to determine the quantum of provision for the demolishing and rehabilitation of its mining activities associated with the proposed project.

9 Decommissioning and Closure

Mine closure is an ongoing programme designed to restore the physical, chemical and biological quality or potential of air, land and water regimes disturbed by mining to a state acceptable to the regulators and to post mining land users. The activities associated with mine closure are designed to prevent or minimise adverse long term environmental impacts, and to create a self-sustaining natural ecosystem or alternate land use based on an agreed set of objectives. The objective of mine closure is to obtain legal (government) and community agreement that the condition of the closed operation meets the requirements of those entities, whereupon the companies' legal liability is terminated.

Rehabilitation can be divided into two different streams, namely concurrent rehabilitation and final rehabilitation. Concurrent rehabilitation must be carried out along with the operations on the mine, and will decrease the final liability that the mine will carry at the time of closure. This concurrent rehabilitation will be carried out within the context of the approved EMP. Current planning indicates that 80% of the waste rock material will continuously be placed back into the pit as mining progresses. Final rehabilitation will be carried out once the mine goes into its closure phase. This final rehabilitation will be carried out within the context of a closure plan.

A mine will obtain a closure certificate only once it can prove that rehabilitation is satisfactory, and that if any residual pollution effects exist they can be adequately managed. It is recommended that, whatever form of rehabilitation is used, a post-closure monitoring programme is implemented before the mine applies for closure. The institution of this monitoring programme will enable the mine to identify and rectify any residual pollution impacts.

This report and its associated costing have been based upon the DMR guidelines. The guidelines outline the methods for infrastructure removal and rehabilitation required for closure, and the actions which are described below follow these guidelines.

9.1 Steel Structures, Carports and Workshops

All steel should be removed and sold. Carports and workshops need to be demolished to 1m below ground level. The remaining rubble (if not polluted) may be buried adjacent to the building sites or used as backfill material as part of the rehabilitation of the open pit. Once the area is demolished the area needs to be covered with 300mm of topsoil and vegetated.

9.2 Processing Plant

All plant infrastructure needs to be stripped and broken down to natural ground level. This includes any foundations and any concrete between buildings. Steel can be sold and concrete or any other inert material can be used as backfill material as part of the rehabilitation of the open pit. Rehabilitation requires 300mm of topsoil over the disturbed areas on top of which vegetation needs to be established.

9.3 Open Pit Rehabilitation

The applicant proposes to mine two pits i.e. Pit 1 (north) with a footprint of 129 ha and Pit 2 (south) with a footprint of 66 ha. The Open Pit Magnetite mine operations will not employ concurrent rehabilitation. Current planning indicates that there will be an open void at the end of LoM to ensure resources are not inaccessible for future exploitation. Current planning indicates that 80% of the waste rock material will continuously be placed back into the pit as mining progresses.

As part of the Rehabilitation Plan completed by Digby Wells for the proposed project, a material balance analysis was completed for the mining blocks. The results are discussed below in the bulking factor and profiling section, to determine if it is possible to return the landscape back to original ground level with the amount of material left post-mineral extraction. This information and planning is largely driven by the need to manage water on the site and across the impacted areas. The topographical design is directly related to the water management.

9.3.1 Bulking Factor and Profiling

A critical factor in the calculations of material volumes, and final landform design, is the swell/bulking factor of the removed materials, and thereafter the replaced materials.

Both pits will be minded to extract the Target Ore. This will entail mining and stockpiling of waste rock material, low grade and lower grade ore. The low grade and lower grade ore will be stockpiled for potential processing in the future and thus will not be put back into the open void during the mining operations. It is assumed that 80% of the waste rock will be backfilled into the pit onto the benches that will be established during the mining process.

The material balance has been calculated based on the assumed bulking factor (~30%). For Pit 1 approximately 44 million cubic meters of material will be removed. Of the total volume of material removed from the pit the waste rock component is 6 166 186 cubic meters. 80% of this material will be placed back into the pit and the remaining 20% will be stockpiled on surface, which will remain at the LoM. Pit 2 will consist of approximately 36 million cubic meters of material being removed, of which 5 087 681 will be waste rock material. As noted above 80% of this material will be placed in the pit and the remainder stockpiled (Digby Wells, 2015a).

Based on the preliminary calculations done thus far and assuming an average depth of the pit at closure (80 meters), the final void size for Pit 1 and 2 will be approximately 125 ha and 59 ha in size respectively. Thus there will be a deficit of material and two final voids will remain, which will need to be managed at closure and post closure. There is potential that underground mining could be undertaken at a later stage however the feasibility of such still needs to be assessed (Digby Wells, 2015a).

The section of the pit backfilled with waste rock material should be rehabilitated by spreading topsoil or soft overburden (should there be a lack of topsoil). Once placed, the “growth medium” should then be fertilised and re-vegetated. A small topsoil stockpile should be left for remedial work.

9.3.2 Topography Design and Post Closure Land Use

In terms of a post mining landscape, a sustainable topography should be created. Having two final voids left and a deficit of material to full these voids, other options need to be considered with respect to the final post mining topography, which will ultimately affect the post mining land use and capability. Several options have been considered as part of the Rehabilitation Plan done by Digby Wells regarding the post mining land use and topography of the proposed project site.

The following has been considered:

- Ensure that the side walls of the pit are stable, create a berm using overburden (waste rock) around the pits and then fence off the pits with signage;
- Potentially consider the option to utilise the voids as land fill sites (required approval will need to be sought and impacts associated with utilising the voids as landfill sites need to be assessed); and
- Sourcing waste rock material from other mines/quarries in the area that have a surplus and using this material to fill the voids left at closure.

None of the options have been selected as a preferred option as the feasibility of each option needs to be investigated.

Further details on the post mining land use potential are described in the rehabilitation plan for the proposed project.

9.4 Overburden and Spoils

As a result of only 80% of waste rock material being placed back into the pit as benches are created, the remaining 20% waste rock material will be placed on surface at two dedicated WRD areas with a combined footprint of 11.5 ha. These WRDs will be rehabilitated *in-situ* and shaping would be required to maintain a safe slope. A layer of topsoil would need to be placed over these facilities and then vegetated and monitored to minimise the risk of erosion.

Two low grade stockpiles and two lower grade stockpiles will also be constructed and left on surface after closure. The rehabilitation cost for these facilities has been included in the closure cost assessment. After the end of LoM, these facilities can however be reprocessed depending on market conditions at that time. Should these facilities not be reprocessed, they should be rehabilitated *in-situ* (i.e. shaped, top soiled and vegetated).

9.5 Process Plant Waste

Contour walls should be constructed as part of the operation of the TSF, after which additives should be applied in order that favourable conditions for plant growth can occur. Once this has been achieved, vegetation should be planted on top and on the sides of the tailings to stabilise the tailings against wind and water erosion. When the vegetation has been established, maintenance and monitoring of the TSF should take place. The vegetation maintenance should take place over a period of three years, while the monitoring should take place over a period of five years on a quarterly basis by analysing samples for pollutants.

All the pollution control facilities, such as the storm water dams, PCDs, trenches and return water dam, should be rehabilitated.

9.6 Access Roads

All access and haul roads constructed as part of the mine operation should be ripped and vegetated except those needed to access the facilities for inspection after closure. Roads that can and will be used by other users post closure should however be left provided this is agreed upon by all parties (i.e. applicant, Department of Roads, Municipality, Tribal Authority, etc.) concerned.

9.7 Rehabilitation of Disturbed Areas

This Rehabilitation Plan is comprised of five major components:

- Re-shaping of the landforms (topography plan);
- Operational and Post-closure water management;
- Replacement of Soils and stripping;
- Re-vegetation of the landscape; and
- Monitoring and Maintenance.

General rehabilitation guidelines were prepared as part of the Rehabilitation Plan done by Digby Wells for the proposed project. The rehabilitation guidelines discuss the following:

- Land preparation;
- Vegetation establishment; and
- Monitoring and maintenance.

9.8 Maintenance and Aftercare

Maintenance and aftercare must be planned for 2-3 years after the land preparation and replanting of vegetation has been completed.

Maintenance will specifically focus on fertilizing the rehabilitated area annually, control of wattle and all other alien plants and general maintenance, including rehabilitation of cracks, subsidence and erosion gullies. Continuous erosion monitoring of rehabilitated areas and slopes should be undertaken and zones with excessive erosion should be identified. The cause of the erosion should be identified, and rectified. Zones where erosion is prevalent need to be repaired to ensure long term sustainability.

9.9 Environmental Management Plan

An EMP is generally considered an environmental management tool that is implemented with the objective of mitigating the undue, or reasonably avoidable adverse impacts, associated with the development of a project. It is also considered a tool to enhance any potential positive impacts that could be realised due to the development of a project. According to the United Nations Environment Programme (UNEP), “An environmental management plan builds continuity into the EIA process and helps to optimize environmental benefits at each stage of project development. The key objectives of environmental management plans are to:

- Identify the actual environmental, socio-economic and public health impacts of the project and check if the observed impacts are within the levels predicted in the EIA;
- Determine that mitigation measures or other conditions attached to project approval (e.g. by legislation) are properly implemented and work effectively;

- Adapt the measures and conditions attached to project approval in the light of new information or take action to manage unanticipated impacts if necessary;
- Ensure that the expected benefits of the project are being achieved and maximized; and
- Gain information for improving similar projects and EIA practice in the future.

The EMP must consider each activity and its potential impacts during the construction, operational, decommissioning and post closure phases. The EMP must address all potentially significant impacts during these phases. The closure plan serves as a closure EMP.

10 Long-Term Water Issues

10.1 Numerical Model

The numerical modelling exercise done by Digby Wells was completed using data supplied by the client and included data from the site hydrocensus, drilling, aquifer testing and geochemical investigations as completed by Digby Wells' hydrogeological unit.

The lateral extents of the model domain were 37 800 m X and 44 600 m Y, with 649 rows and 489 columns. The cell dimensions at the site area were set at 25x25 m, expanding to 50x50 m and 100x100 m with distance from the site. The model was constructed to represent the upper weathered unit and lower fractured rock unit and consisted of two (2) model layers, with a total model thickness of 100 m. Using the initial parameters as described above, a steady state model was constructed for the period of January 2015 to June 2015 using head observations from the hydrocensus and drilling campaign. The steady state calibration achieved a 75% correlation between calculated and observed hydraulic heads, however the results were not considered representative for the site and further transient state calibration was conducted using the same dataset thus transient state calibration was performed. The transient state calibration achieved a 97% correlation between calculated and observed head values, with a root mean square error of 5.2 which is acceptable for the site extent.

No specific contaminant of concern was identified at the project area, thus a value of 100% concentration was applied to the TSF area to simulate potential contamination plume migration at the site. No chemistry data was available for the site, thus no calibration was possible for the contaminant transport model.

The following scenarios were run using the transport model for the LoM (i.e. 30 years) and closure phase (i.e. 100 years):

- Base Case scenario, where the TSF facility is lined using a class C liner and rehabilitated and capped during closure phase;
- Scenario 1, where the TSF is unlined and rehabilitation and capping takes place in the closure phase;

- Scenario 2, where the TSF is unlined and no rehabilitation or capping takes place in the closure phase; and
- Scenario 3, where the TSF is lined and no rehabilitation takes place in closure phase.

10.2 Findings

Based on the numerical modelling results, a hydrogeological impact assessment was completed for the site where the potential impacts on the groundwater quantity and quality were quantified both before and after the implementation of management and mitigation measures.

During the construction phase the groundwater quantity may be impacted, locally, by groundwater abstraction (if groundwater is used for water supply). The impact was low and no mitigation was possible. The borehole abstraction should be monitored and water levels at the abstraction borehole and nearby boreholes monitored regularly for any negative water level trends. During the construction phase the groundwater quality may be impacted on by localized hydrocarbon spills that may occur at workshop and yellow metal laydown areas, as well as hydrocarbon storage zones. The impact rating was high as the magnitude and probability of occurrence were both relatively high. Possible mitigation measures include the training of staff working in these areas on appropriate response actions to hydrocarbon spillages and ensuring that each area is supplied with appropriate spill response kits which reduced the activity to a low impact rating.

Another potential risk to groundwater quality at the site is domestic waste generated by the construction phase contractors and client staff that may contaminate the groundwater resource. This was a low impact activity and mitigation measures were to dispose of all domestic waste at a dedicated, suitably constructed landfill site.

The simulated, cumulative inflows into pit 1 and pit 2 range between 3000 and 7000 m^3/day, using a confidence range of 20%. The final drawdown cone extent from the open pit mining at the site extends approximately 1 km from the pit areas in the northern, southern and eastern directions, limited by the hills located east and west of the pit areas. The dewatered extent at LoM extends approximately 1.5 km north-west of pit 1, but does not impact on any groundwater users. The maximum drawdown at the mining area is ~90 m in the central pit areas. The impact rating for the dewatering of the groundwater resource is medium, as the impact is highly probable and no mitigation is possible. During the operational phase waste material will be generated at the site. The waste material will be disposed of at two WRDs and one TSF. These waste facilities, along with the low grade ore stockpiles at the site, may release poor quality seepage into the groundwater environment. The WRDs and stockpile areas are both low impact during mining, as both are kept relatively small and will not result in large amounts of seepage. The material at the stockpile areas should be stored there for as short a time span possible to avoid oxidation of the material and the waste rock dumps should be maintained in such a manner to ensure minimal infiltration of rainwater and runoff. The TSF is likely to generate poor quality seepage, however no parameter of concern has been identified at the site and the TSF contaminant plume was modelled using 100%

concentration of a generic contaminant. The contaminant plume migrates towards the open pit area through the operational phase and is captured by the resultant drawdown cone at the pit, thus limiting the extent of the TSF contaminant plume to the site area only. This scenario is true for the base case, scenario 1, scenario 2 and scenario 3 contaminant migrations. The impact rating for the TSF was medium due to the high probability of occurrence and extended duration of the impact. The wet beach of the TSF should be maintained at as small an extent as possible during operations and the water reclaimed for use at the plant. The TSF walls should also be continuously vegetated during the operational phase, to prevent seepage of rainfall into the TSF. Should these management measures be in place at the TSF the impact rating would be low.

During the closure phase groundwater levels will recover towards their original state. The probability of decant occurring at the site is low, however should decant occur it would be at the north western corner of Pit 1. The decant volume would be in the order of 0.5 l/s (maximum). There are no mitigation measures for groundwater level rebound and the impact would be low. The WRD slopes should be vegetated and graded to allow runoff and prevent infiltration of rainwater to the material. The overall impact rating for these features is low. The simulated contaminant migration plume for the TSF in the base case scenario remained contained at the pit area and concentrations decreased to less than 5% after 25 years. The base case TSF impact rating for the closure phase was medium, however should the TSF be suitably vegetated and capped during closure the impact rating would be low. The simulated contaminant migration plume for the TSF in scenario 1 remained contained at the pit area, remaining at the Pit 2 area for the full closure simulation period, and concentrations decreased to less than 10% after 25 years. The simulated contaminant migration plume for the TSF for scenario 2 remained contained at the pit area for 50 years into the closure phase, but began migrating south from 50 years onwards. The concentrations were simulated to remain at ~50% for the full closure phase. The simulated contaminant migration plume for the TSF in scenario 3 remained contained at the pit area, migrating slightly south of Pit 2 after 75 years, and concentrations decreased to less than 20% after 25 years. The TSF impact rating for the closure phase was medium due to the continued migration of contaminant simulated for scenarios 2 and 3. However, should the TSF be suitably vegetated and capped during closure the impact rating would be low.

The environmental liability cost includes provision for water management as required by the DMR method of calculation. It does not take these specific scenarios into consideration.

11 Post Closure Monitoring

Monitoring provides information on whether rehabilitation methods employed are functioning correctly or not. Monitoring should provide an early indication of problems arising so that corrective management actions can be taken.

The post closure monitoring period will begin once scheduled decommissioning and rehabilitation activities for the site have been completed. The duration of post closure monitoring will be determined based on environmental performance and until it can be demonstrated that the rehabilitation work has achieved the agreed endpoints. It is important that the data obtained during monitoring is used to gauge the success of rehabilitation. Negative monitoring findings should be clearly linked to specific corrective actions.

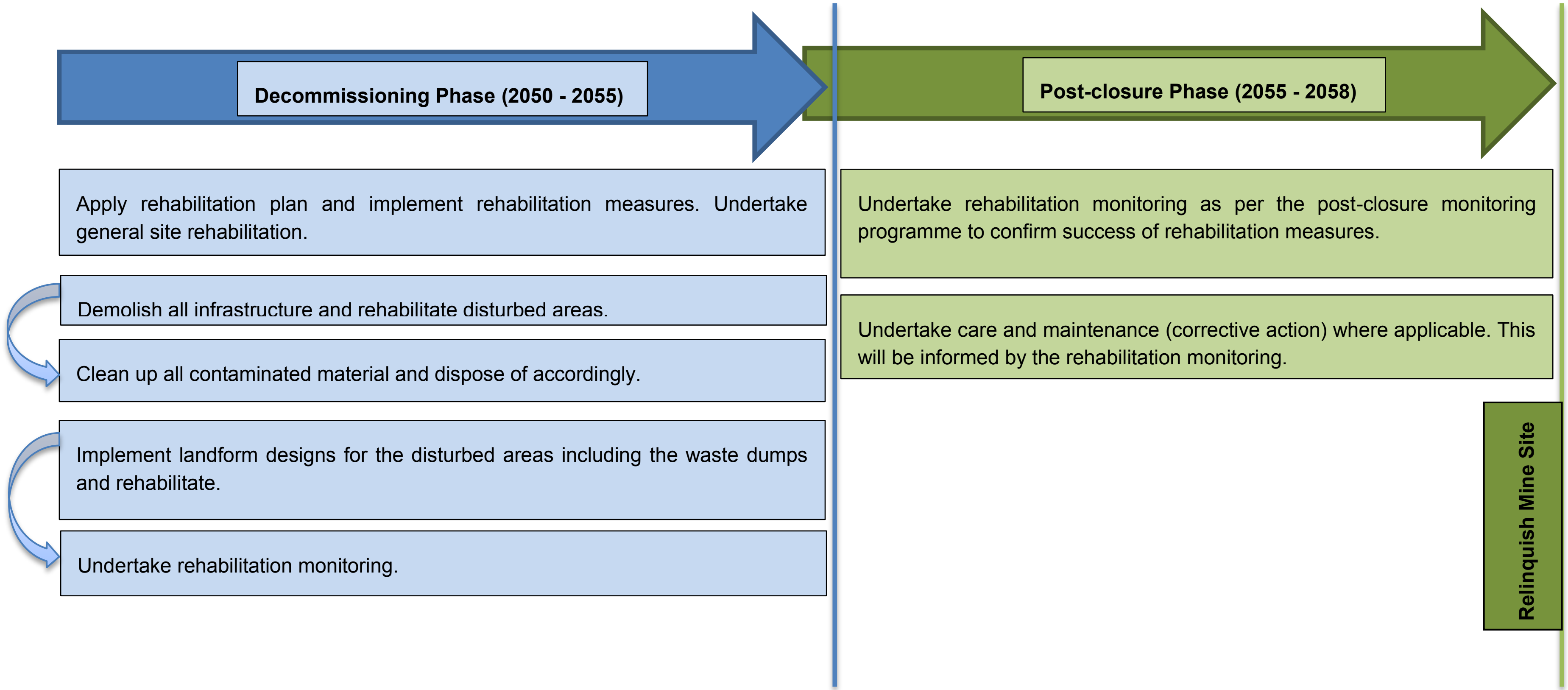
The following monitoring should be undertaken to demonstrate the achievements of the closure and rehabilitation objectives:

- Soil fertility;
- Erosion control;
- Surface subsidence;
- Vegetation establishment on disturbed areas;
- Alien invasive plant species;
- Bio-monitoring to determine aquatic health; and
- Surface water and groundwater quality and quantity.

The specific costs associated with each of these monitoring programmes have been excluded from the closure liability assessment. Provision was only made for two to three years maintenance and aftercare of the entire mine site, as per the DMR guidelines.

12 Preliminary Mine Closure Schedule

The preliminary mine closure schedule addresses the timing of rehabilitation and closure activities performed during the decommissioning and post-closure phases of the mine. The schedule presented is high level and identifies the key activities required during the decommissioning and post closure phases.



13 Financial Provision Methodology

The "*Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine*" will be used to assess the applicant's environmental liability. The DMR (formerly known as the Department of Minerals and Energy) Guideline Document format makes use of a set template for which defined rates and multiplication factors are used. The multiplication and weighting factors which ultimately define the rate to be used are determined by amongst others the topography, the classification of the mine according to mineral mined, the risk class of the mine and its proximity to build up or urban areas.

The methodology described below details how the final closure liability was estimated for the proposed mine using the DMR methodology.

13.1 Infrastructure Measurement

The infrastructure areas and other areas affected by mining activities were measured from plans provided by the applicant and the layout plan is attached in Appendix A. Measurements that were taken have been standardised to ensure that the costs calculated are easily updatable. Quantities of steel and concrete structures/ buildings, fences and pipelines were received from the project engineers. The concrete and steel estimates associated with the concentrator plant are based on pre-feasibility study numbers; hence the numbers will have to be confirmed once the feasibility study is complete.

Table 13-1 indicates the infrastructure that has been included in the liability assessment.

Table 13-1: Infrastructure and Areas Included

Component No.	Description	Included in Liability
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	▪ Concentrator Plant infrastructure.
2 (A)	Demolition of steel buildings & Structures	▪ Not applicable
2 (B)	Demolition of reinforced concrete buildings & structures	▪ Concrete areas of the entire mine site.
3	Rehabilitation of access roads	▪ Access and haul roads associated with the plant and mining area.
4 (A)	Demolition & rehabilitation of electrified railway lines	▪ Not applicable
4 (B)	Demolition & rehabilitation of non-electrified railway lines	▪ Not applicable
5	Demolition of housing &/or administration facilities	▪ Administration buildings.

Component No.	Description	Included in Liability
6	Opencast rehabilitation including final voids & ramps	▪ Final void area after backfilling Pit 1 and Pit 2 with waste rock material[3].
7	Sealing of shafts, adits & inclines	▪ Not applicable
8 (A)	Rehabilitation of overburden & spoils	▪ WRD 1 and WRD 2.
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	▪ Low grade stockpiles; ▪ Lower grade stockpiles; ▪ Four PCDs; ▪ Two storm water dams; ▪ Return Water Dam; and ▪ Concentrator emergency pond.
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	▪ TSF.
9	Rehabilitation of subsided areas	▪ Not applicable
10	General surface rehabilitation	▪ Area of void which has been backfilled[4]; ▪ Topsoil dumps; ▪ Contractors Camp area; ▪ Concentrator Plant area; and ▪ Trenches.
11	River diversions	▪ River diversions will remain after closure[5].
12	Fencing	▪ Fences associated with mine site.
13	Water management	▪ Entire open pit area, including backfilled areas.
14	2 to 3 years of maintenance & aftercare	▪ All areas affected by mining associated with the activities mentioned above.
15 (A)	Pipelines	▪ All pipelines associated with the Project[6].

[3] According to information currently available, 80% of waste rock material will be placed back into the pits with the remaining 20% placed on dedicated waste rock dumps. The calculation assumed a pit of 80 metres deep.

[4] The area of the void backfilled with waste rock material

[5] Cost to remove river diversions excluded from environmental liability as these will remain after closure (Refer to DMR Guideline, 2005).

[6] Rate for removal of pipelines received from contractor

Component No.	Description	Included in Liability
15 (B)	Groundwater Assessment at Closure	▪ Groundwater assessment report to be completed at mine closure.

13.2 Rates

The DMR rates were published in 2005 and, due to inflation, are thus no longer accurate. As per the DMR Guideline Document, the Master Rates have been updated based on new rates released by the DMR in 2012. An inflationary figure of 4.2% (Average CPI for 2015[7]) was then added to the 2014 rates to reflect the current 2015 rates.

13.3 DMR Classification

The DMR Guideline Document classifies a mine according to a number of factors which allows one to determine the appropriate weighting factors to be used during the quantum calculation. The following factors are considered:

- The mineral mined;
- The risk class of the mine;
- Environmental sensitivity of the mining area;
- Type of mining operation; and
- Geographic location.

Once the risk class (Class A, B or C) and the sensitivity of the area where the mine is located (Low, Medium or High) had been determined using the appropriate tables (Table 13-2, Table 13-3, Table 13-4 and Table 13-5) the unit rates for the applicable closure components were identified.

[7] http://www.statssa.gov.za/publications/P0141/P0141April2015.pdf

Table 13-2: Primary Risk Class for Type of Mineral Mined (Applicant's Risk Class Highlighted in Red)

Mineral	Ore	Size: large if > than (tpm)	Primary risk class			
			Large mine		Small mine	
			Mine and Mine waste	Mine, mine waste, plant and plant waste	Mine and Mine waste	Mine, mine waste, plant and plant waste
Antimony		1000	A	A	C	C
Asbestos		0	A	A	A	A
Base metals (Copper, Cadmium, Cobalt, Iron ore, Molybdenum, Nickel, Tin, Vanadium)	Sulphide	10 000	A	A	C	A
	Oxide	10 000	C	A	C	A
Coal		0	A	A	A	A
Chrome		10 000	C	A	C	C
Diamonds and precious stones		10 000	C	B	C	C
Gold, silver, uranium		10 000	B	A	B	A
Phosphate		10 000	C	B	C	C
Platinum		10 000	C	B	C	B
Mineral sands (Ilmenite, Titanium, Rutile, Zircon)		10 000	C	B	C	C

Mineral	Ore	Size: large if > than (tpm)	Primary risk class			
			Large mine		Small mine	
			Mine and Mine waste	Mine, mine waste, plant and plant waste	Mine and Mine waste	Mine, mine waste, plant and plant waste
Zinc and Lead		10 000	C	A	C	A
Industrial Minerals (Andalusite, Barite, Bauxite, Cryolite, Fluorspar)		10 000	C	C	C	C

Table 13-3: Criteria used to determine the Area Sensitivity

Sensitivity	Sensitivity criteria		
	Biophysical	**Social**	**Economic**
Low	▪ Largely disturbed from natural state, ▪ Limited natural fauna and flora remains, ▪ Exotic plant species evident, ▪ Unplanned development, ▪ Water resources disturbed and impaired.	▪ The local communities are not within sighting distance of the mining operation, ▪ Lightly inhabited area (rural).	▪ The area is insensitive to development, ▪ The area is not a major source of income to the local communities.
Medium	▪ Mix of natural and exotic fauna and flora, ▪ Development is a mix of disturbed and undisturbed areas, within an overall planned framework, ▪ Water resources are well controlled.	▪ The local communities are in the proximity of the mining operation (within sighting distance), ▪ Peri-urban area with density aligned with a development framework, ▪ Area developed with an established infrastructure.	▪ The area has a balanced economic development where a degree of income for the local communities is derived from the area, ▪ The economic activity could be influenced by indiscriminate development.

Sensitivity	Sensitivity criteria		
	Biophysical	**Social**	**Economic**
High	▪ Largely in natural state, ▪ Vibrant fauna and flora, with species diversity and abundance matching the nature of the area, ▪ Well planned development, ▪ Area forms part of an overall ecological regime of conservation value, ▪ Water resources emulate their original state.	▪ The local communities are in close proximity of the mining operation (on the boundary of the mine), ▪ Densely inhabited area (urban/dense settlements), ▪ Developed and well-established communities. ▪	▪ The local communities derive the bulk of their income directly from the area, ▪ The area is sensitive to development that could compromise the existing economic activity

Table 13-4: Weighting Factor 1- Nature of Terrain

	Flat	Undulating	Rugged
Weighting factor 1: Nature of the terrain/ accessibility	1.00	1.10	1.20

Note:

- Flat - Generally flat over the mine area;
- Undulating - A mix of sloped and undulating areas within the mine area; and
- Rugged - Steep natural ground slopes (greater than 1:6) over the majority of the mine area.

Table 13-5: Weighting Factor 2 - Proximity to Urban Area

	Urban	Peri-urban	Remote
Weighting factor 2: Proximity to urban area where goods and services are to be supplied	1.00	1.05	1.10

Note:

- Urban - Within a developed urban area;
- Peri-urban - Less than 150 km from a developed urban area; and
- Remote - Greater than 150 km from a developed urban area.

The classification of the project site has been summarised in Table 13-6. This is used in the calculation of the closure liability using the DMR methodology. It must be noted, however, that of the 18 closure components that exist only 3 are influenced by the risk class and sensitivity, the remaining 15 have a standard multiplication factor, irrespective of the class or sensitivity.

Table 13-6: Mine Classification

Mine	Risk Class	Sensitivity	Terrain	Proximity to Urban Area
Magnetite Mine	A	Medium	Flat	Peri-urban

14 Summary of Liabilities

As part of ongoing accounting practices and specifically for mine closure, the applicant requires a closure cost estimate aligned to the requirements of the NEMA and good practice measures.

The environmental liability calculated for the proposed project using the DMR method of calculation is estimated to be R 154 840 434 (Incl. VAT) at the end of LoM. The main contributor to the environmental liability is the cost associated with the waste facilities which will be left on surface after mine closure. The cost associated with the rehabilitation of the open pit is also a significant contributor. The environmental liability after Year 1 of mining using the same calculation method is estimated to be R 26 323 960 (Incl. VAT).

A final groundwater assessment should be completed at mine closure and an estimated cost of completing such an assessment has been included in the environmental liability cost. A project management fee of 6% (subtotal is more than R 100 000 000) and a contingency of 10% was added to the capital expenditure as per the DMR requirements. A detailed breakdown of the costs is included in Appendix B of this report.

A ten year forecast was also calculated based on the project schedule and is also included in Appendix B.

15 Assumptions and Limitations

The concrete and steel estimates associated with the concentrator plant are based on pre-feasibility study numbers; hence the numbers will have to be confirmed during detailed design in the feasibility phase.

It should also be noted that the draft Regulations dealing with the financial provision for the closure of a mine and the calculation of the quantum of that provision are currently circulating for comment. These Regulations will have a significant impact on the provision for closure but this report is based on the Regulations applicable as at 1 December 2014. The draft Regulations have not been considered in this report or cost calculation.

The full analytical evaluations of materials (material that will be stripped, such as topsoil, softs and overburden is based on information provided by the client and could change if the Open Pit Magnetite Mine mining plan alters with respect to volumes of material extracted (specifically for the open pit mining operations). In the event of this occurring the analytical evaluation of materials and the topography plan will need to be updated to cater for this.

An abandoned granite mine is situated on the applicant's proposed mining right area towards the east. The applicant is in the process of excluding that section from their proposed mining right area and will not be responsible for the rehabilitation of the granite mine.

16 Recommendations

Digby Wells would recommend the following:

- This report should be updated annually to reflect more recent knowledge of events and as a requirement of the NEMA;
- Should the layout plan and built infrastructure become more defined (i.e. type and heights of buildings), the cost assessment should be updated using a more accurate method of calculation (i.e. using updated market related rates);
- A closure plan is a living document and needs to be informed by accurate and up to date information. As soon as updated information becomes available, the closure plan and closure costs should be updated;
- A detailed mine closure plan should be prepared during the operational phase, including a risk assessment and water resource impact prediction as stipulated in the DWS Best Practice Guidelines. The implementation of the mine closure plan and the application for the closure certificate can be conducted during the decommissioning phase; and
- A final groundwater assessment report should be completed at mine closure.

17 Reference

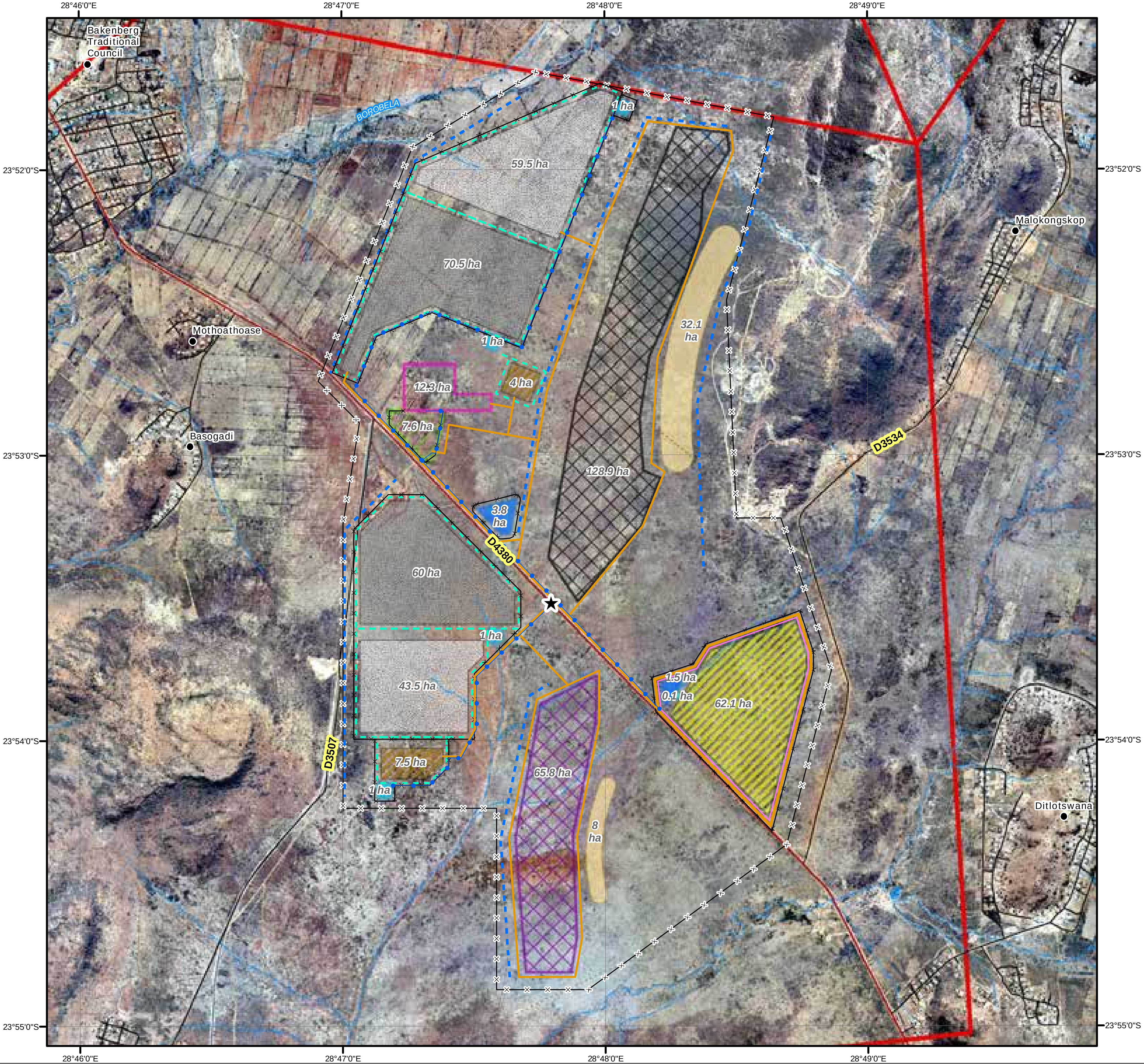
Department of Minerals and Energy (DME), 2005: Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine, Pretoria.

Digby Wells, 2015a: Rehabilitation Plan for a Proposed Open Pit Magnetite Mine and Concentrator Plant, Mokopane, Limpopo Province.

Statistics South Africa (StatsSA), 2015: Consumer Price Index (CPI) April 2015, Statistical Release P0141. (http://www.statssa.gov.za/publications/P0141/P0141April2015.pdf)

Appendix A: Infrastructure Layout

Plan 1: Mine Layout Plan



Plan 1

Pamish Investments Magnetite Mine EIA

Infrastructure Layout

Legend

- Project Area
- Settlement
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Dam Wall
- Dam / Lake

Infrastructure

- Access Point
- Dirty Water Trench (17128 m)
- Fence (18103 m)
- Perimeter Fence (16478 m)
- Pipeline (8100 m)
- Site Road (25504 m)
- Solution Trench (3557 m)
- Storm Water Trench (12732 m)
- Contractor's Camp (7.6 ha)
- Low Grade Stockpile (130.5 ha)
- Lower Grade Stockpile (103 ha)
- PCD (4 ha)
- Pit 1 (128.9 ha)
- Pit 2 (65.8 ha)
- Plant Area (12.3 ha)
- Return Water Dam (0.1 ha)
- Stormwater Dam (5.3 ha)
- Tailings Dam (62.1 ha)
- Topsoil Stockpile (40.1 ha)
- Waste Rock Dump (11.5 ha)

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: scm.VMC3049.201506.001
Revision Number: 6
Date: 29/06/2015

N

0 0.25 0.5 1
Kilometres
1:25 000

www.digbywells.com

Appendix B: Detailed Cost Breakdown

CALCULATION OF THE QUANTAM							
Mine:	Pamish Investments No. 39 (Pty) Ltd	**Location:**	Mokopane				
Evaluators:	Digby Wells Environmental	**Date:**	24-Aug-15				
No.:	**Description: Class C (Low Risk)**	**Unit:**	**A Quantity**	**B Master rate**	**C Multiplication factor**	**D Weighting factor 1**	**E=A*B*C*D Amount (Rands)**
			Step 4.5	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	m^3	59622.0	12.33	1.00	1.00	R 734 870
2 (A)	Demolition of steel buildings & Structures	m^2		171.73	1.00	1.00	R 0
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	13580.6	253.07	1.00	1.00	R 3 436 790
3	Rehabilitation of access roads	m^2	220250.0	30.74	1.00	1.00	R 6 769 416
4 (A)	Demolition & rehabilitation of electrified railway lines	m		298.26	1.00	1.00	R 0
4 (B)	Demolition & rehabilitation of non electrified railway lines	m		162.69	1.00	1.00	R 0
5	Demolition of housing &/or administration facilities	m^2	1625.0	343.45	1.00	1.00	R 558 110
6	Opencast rehabilitation including final voids & ramps	ha	184.0	180 040.68	**0.52**	1.00	R 17 226 292
7	Sealing of shafts, adits & inclines	m^3		92.19	1.00	1.00	R 0
8 (A)	Rehabilitation of overburden & spoils	ha	11.5	120 027.12	1.00	1.00	R 1 380 312
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha	243.2	149 491.60	1.00	1.00	R 36 356 358
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	62.1	434 194.49	**0.80**	1.00	R 21 570 782
9	Rehabilitation of subsidised areas	ha		100 504.63	1.00	1.00	R 0
10	General surface rehabilitation	ha	78.0	95 081.72	1.00	1.00	R 7 413 686
11	River diversions	ha		95 081.72	1.00	1.00	R 0
12	Fencing	m	34581.0	108.46	1.00	1.00	R 3 750 649
13	Water management	ha	195.0	36 152.75	**0.67**	1.00	R 4 723 356
14	2 to 3 years of maintenance & aftercare	ha	578.8	12 653.46	1.00	1.00	R 7 323 466
15 (A)	Pipelines*	km	8.1	**18 597.94**	**1.00**	1.00	R 150 643
15 (B)	Groundwater Assessment at Closure	SUM	1.00	**120 000.00**	**1.00**	1.00	R 120 000
						Sub Total 1	**R 111 514 731**
						(Sum of items 1 to 15 Above)	
	Weighting Factor 2 (step 4.4)			**1.05**		**Sub Total 1**	**R 117 090 467**
	Preliminary and General			6% of Sub Total 1			**R 7 025 428**
	Contingency			10% of Sub Total 1			**R 11 709 047**
						Sub Total 2	**R 135 824 942**
	VAT (14%)						**R 19 015 492**
							R 154 840 434

CALCULATION OF THE QUANTAM		10 YEAR FORECAST									
Mine:	Pamish Investments No. 39 (Pty) Ltd	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Evaluators:	Digby Wells Environmental										
No.:	**Description: Class C (Low Risk)**										
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	R 367 435	R 367 435								
2 (A)	Demolition of steel buildings & Structures										
2 (B)	Demolition of reinforced concrete buildings & structures	R 1 718 395	R 1 718 395								
3	Rehabilitation of access roads	R 2 256 472	R 2 256 472	R 2 256 472							
4 (A)	Demolition & rehabilitation of electrified railway lines										
4 (B)	Demolition & rehabilitation of non electrified railway lines										
5	Demolition of housing &/or administration facilities	R 558 110									
6	Opencast rehabilitation including final voids & ramps			R 2 153 286	R 2 153 286	R 2 153 286	R 2 153 286	R 2 153 286	R 2 153 286	R 2 153 286	R 2 153 286
7	Sealing of shafts, adits & inclines										
8 (A)	Rehabilitation of overburden & spoils			R 172 539	R 172 539	R 172 539	R 172 539	R 172 539	R 172 539	R 172 539	R 172 539
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636	R 3 635 636
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078	R 2 157 078
9	Rehabilitation of subsidised areas										
10	General surface rehabilitation	R 3 706 843	R 3 706 843								
11	River diversions										
12	Fencing	R 3 750 649									
13	Water management		R 524 817	R 524 817	R 524 817	R 524 817	R 524 817	R 524 817	R 524 817	R 524 817	R 524 817
14	2 to 3 years of maintenance & aftercare	R 732 347	R 732 347	R 732 347	R 732 347	R 732 347	R 732 347	R 732 347	R 732 347	R 732 347	R 732 347
15 (A)	Pipelines*	R 75 322	R 75 322								
15 (B)	Groundwater Assessment at Closure										R 120 000
	Sub Total 1										
	(Sum of items 1 to 15 Above)	R 18 958 286	R 15 174 345	R 11 632 175	R 9 375 703	R 9 375 703	R 9 375 703	R 9 375 703	R 9 375 703	R 9 375 703	R 9 495 703
	Weighting Factor 2 (step 4.4)	R 19 906 200.63	R 35 839 263	R 48 053 047	R 57 897 535	R 67 742 024	R 77 586 513	R 87 431 001	R 97 275 490	R 107 119 979	R 117 090 467
	Preliminary and General	R 1 194 372	R 2 150 355.76	R 2 883 183	R 3 473 852	R 4 064 521	R 4 655 191	R 5 245 860	R 5 836 529	R 6 427 199	R 7 025 428
	Contingency	R 1 990 620	R 3 583 926.27	R 4 805 305	R 5 789 754	R 6 774 202	R 7 758 651	R 8 743 100	R 9 727 549	R 10 711 998	R 11 709 047
		R 23 091 193	R 41 573 545	R 55 741 534	R 67 161 141	R 78 580 748	R 90 000 355	R 101 419 962	R 112 839 569	R 124 259 175	R 135 824 942
	VAT (14%)	R 3 232 766.98	R 5 820 296	R 7 803 815	R 9 402 560	R 11 001 305	R 12 600 050	R 14 198 795	R 15 797 540	R 17 396 285	R 19 015 492
		R 26 323 960	R 47 393 841	R 63 545 349	R 76 563 701	R 89 582 053	R 102 600 405	R 115 618 756	R 128 637 108	R 141 655 460	R 154 840 434