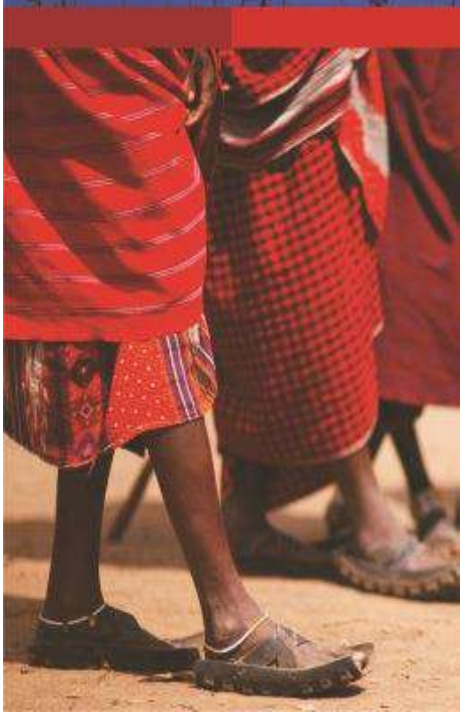


DIGBY WELLS
ENVIRONMENTAL

Environmental Impact Assessment for the Proposed Temo Coal Rail Loop, Road Diversion and Pipeline Project, near Lephalale, Limpopo Province

Rehabilitation and Closure Plan

Project Number:

NAM5335

Prepared for:

Temo Coal (Pty) Ltd

February 2019

Digby Wells and Associates (South Africa) (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 11 069 6801, info@digbywells.com, www.digbywells.com

This document has been prepared by Digby Wells Environmental.

Report Type:	**Rehabilitation and Closure Plan**
Project Name:	**Environmental Impact Assessment for the Proposed Temo Coal Rail Loop, Road Diversion and Pipeline Project, near Lephalale, Limpopo Province**
Project Code:	**NAM5335**

Name	Responsibility	Signature	Date
Christine Reinecke	Report Writing		January 2019
Siphamandla Madikizela	1st Review		February 2019
Justin du Piesanie	2nd Review		February 2019

EXECUTIVE SUMMARY

Introduction

Temo Coal Mining (Pty) Ltd (hereinafter Temo) propose to construct ancillary infrastructure associated with their approved coal mining operation, the Temo Coal Mine ("Temo Mine"), near Lephalale in the Limpopo Province ("the Project"). The proposed ancillary infrastructure includes a road diversion, a rail loop and a water pipeline.

The Project requires Environmental Authorisation (EA). To this effect, Temo appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake a Scoping Environmental Impact Assessment (EIA) process in compliance with:

- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The NEMA EIA Regulations, 2017 (Government Notice Regulations [GN R] 982 as amended by GN R 326); and
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA).

This report constitutes the Rehabilitation and Closure Plan (RCP) report to inform the EIA and Environmental Management Plan (EMP). The main aim in developing the Rehabilitation, Decommissioning and Mine Closure Plan (RCP) for Temo is to minimise and mitigate the impacts caused by construction activities and to restore land back to a satisfactory standard. It is best practice to develop the RCP as early as possible so as to ensure the optimal management of rehabilitation and closure issues that may arise. It is critical that Temo's RCP is defined and understood from before construction progresses and is complimentary to the objectives and goals set.

Even though the proposed project is not a mine, the rehabilitation principals contained within the Chamber of Mines Guidelines are relevant and have assisted with the compilation of this plan. 'Effective rehabilitation', is defined as "rehabilitation that will be sustainable, in the long term, under normal land management practices" (Chamber of Mines, 2007; Department of Minerals and Energy, 2008). Rehabilitation therefore must be considered as an on-going process aimed at restoring 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 (Whitehorse Mining Initiative, 1994).

Project Area

The Temo mine is located approximately 60 kilometres (km) from Lephalale in the Limpopo Province on various farm portions, namely, Verloren Valey 246 LQ, Duikerpan 249 LQ, Japie 714 LQ, Hans 713 LQ and Kleinberg 252 LQ. Temo proposes to extract coal using open pit mining methods and the open pit will be situated entirely within the farm portion Verloren Valey 246 LQ.

Closure Objectives

The purpose of identifying closure objectives prior to closure of the project is to ensure that long-term plans can be generated to accommodate the end use proposals, where necessary. The factors that influence the closure of a mine change through time, the closure plans must always adhere to the environmental and socio-economic requirements at the time of closure.

The following points outline the main objectives for rehabilitation and closure:

- Make all areas safe for both humans and animals;
- Make all areas stable and sustainable;
- Utilise approved sites for the safe disposal of all waste either onsite or off site;
- Follow a process of closure that is progressive and integrated into the short and long term plans, and that will assess the closure impacts proactively at regular intervals throughout project life;
- Rehabilitation should strive to rehabilitate the soil and land capability to emulate pre-disturbance land capability;
- Minimise negative impacts and maximise positive benefits on the local community;
- Maintain and monitor all rehabilitated areas following re-vegetation and, if this monitoring shows that the objectives have been met, make an application for closure;
- Prevent soil and surface/groundwater contamination by managing all water on site to acceptable and agreed standards;
- Comply with local, district and national regulatory requirements;
- Promote active partnerships with local communities, where possible;
- Monitoring of key environmental variables (i.e. soils, erosion, vegetation, groundwater, surface water and air quality) to demonstrate stability of rehabilitated areas, this will be done for two years after closure or up until such a time all areas create a sustainable cover and ecosystem;
- Maintain or restore biodiversity at levels that are sustainable in the long term; and
- Follow a comprehensive consultation and communication process with all stakeholders.

Current and Proposed Land Use

The present land use was identified using satellite imagery and visual observations during the site visit. The main land uses in the area are grassland for grazing. The land is confined almost exclusively to low intensity livestock grazing and game farming.

Land capability was determined by assessing a combination of soil, terrain and climate features. The land classes were identified based on soil forms, texture and fertility. The low

rainfall of this area limits the utilization potential of the project area to low intensity grazing and wildlife conservation. The land capability class was identified as Class VI, as summarised in Table 1. Land in Class VI has limitations that make land unsuited for cultivation and its use largely to pasture, wildlife and range. Limitations that cannot be corrected include severe erosion hazard and low water holding capacity.

Table 1: Land Capability Classification

Land Type	Land Capability Class	Agricultural Potential
Ae252	VI – Grazing	Low.
Ae257	VI – Grazing	Low.
Ah86	VI – Grazing	Low.
Bc44	VI – Grazing	Low.
Bd46	VI – Grazing	Low.

The region is characterised by low rainfall which contributes to low natural arable agricultural potential. The predominant land use in this region is agriculture, dominated by grazing and game farming. The railway loop will be demolished and the area will be rehabilitated. The pipeline will either remain or be demolished. This will be confirmed closer to the project's end. The road diversion will remain post-closure. Refer to Figure 7-2 and Figure 7-3 below.

Financial Provision Estimation

The closure cost estimate presented below was calculated to align with GN R1147. The estimated closure cost for the two scenarios are presented in Table 2 below.

Table 2: Summary of Cost Estimates based on GN R1147

	Digby Wells Environmental	
	Temo Coal Mining (Pty) Ltd, Temo Coal - LP30/5/1/2/2/199MR (Ancillary Infrastructure), NAM5339 Revision: 0	
Area and Description	**End of life 2043**	
Infrastructure and Rehabilitation	**Scenario 1: Pipeline and Railway Removed Post-Closure**	**Scenario 2: Pipeline Remains Post Closure, Railway Removed**
Area 1: Rail Loop Extension	R5,856,858	R5,856,858
Area 2: Pipeline	R6,155,463	R74,554
Sub-total	**R12,012,321**	**R5,931,413**
Monitoring and Maintenance		
Monitoring Costs (Vegetation)	R24,811	R23,676
Maintenance Costs (Vegetation)	R898,554	R821,562
Sub-total	**R923,365**	**R845,238**
Project Management (12%)	R1,441,479	R711,770
Contingency (10%)	R1,201,232	R593,141
GRAND TOTAL (Excl. VAT)	**R15,578,397**	**R8,081,561**

Recommendations

The following is recommended to assist Temo in successfully carrying out the rehabilitation and closure:

- All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel;
- Ensure that as far as possible all decommissioned infrastructures are placed outside of freshwater areas and their associated 32 m zone of regulation;
- Unnecessary crossing of the freshwater features and their associated buffers should not take place and the substrate conditions of the ephemeral drainage lines and downstream stream connectivity must be maintained;
- Wherever possible, restrict decommissioning activities to the drier winter months to avoid sedimentation of the freshwater resources further downstream;

- Limit the footprint area of the decommissioning activities to what is absolutely essential to minimise impacts as a result of disturbances to soils, compaction of soils and loss of natural vegetation;
- Ensure that sound environmental management is in place during the proposed decommissioning phase;
- No material may be dumped or stockpiled within any freshwater areas (or the buffers) in the vicinity of the proposed decommissioning footprint;
- No vehicles or heavy machinery may be allowed to drive indiscriminately within any freshwater areas and their associated zones of regulation. All vehicles must remain on demarcated roads and within the decommissioning area footprint;
- All vehicles must be regularly inspected for leaks;
- Re-fuelling must take place on a sealed surface area away from freshwater systems to prevent ingress of hydrocarbons into topsoil;
- All spills should be immediately cleaned up and treated accordingly;
- Appropriate sanitary facilities must be provided for the duration of the decommissioning activities and all waste must be removed to an appropriate waste facility;
- All erosion noted within the decommissioning area footprint should be remedied immediately and included as part of the ongoing rehabilitation plan;
- If it is absolutely unavoidable that any of the freshwater areas present will be affected, disturbance must be minimised and suitably rehabilitated;
- Permit only essential personnel within the zones of regulation for all freshwater features identified;
- Ensure that no incision and canalisation of the freshwater resources present takes place as a result of the proposed decommissioning activities;
- A suitable AIP control programme must be put in place for both the decommissioning and closure phases so as to prevent further encroachment as a result of disturbance to the surrounding terrestrial zones; and
- Monitor all systems for erosion and incision.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS

AIP	Alien Invasive Plants
BPGs	Best Practice Guidelines
°C	Degrees Celsius
CARA	The Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983)
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
GN R1147	Financial Provisioning Regulations, 2015 (Government Notice No. 1147 published in GG 39425)
HGM	Hydrogeomorphic
km	kilometres
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LLM	Lephalale Local Municipality
LoM	Life of Mine
LUP	Land Use Plan
LWDM	Limpopo Waterberg District Municipality
m	meters
mamsl	metres above mean sea level
MAR	Mean Annual Runoff
mm	millimetre
MPRDA	Mineral and Petroleum Resources Development Act. 2002 (Act No. 28 of 2002)
MR	Mining Right
NEM: AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEMA	The National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMA EIA	The NEMA EIA Regulations, 2017 (Government Notice Regulations [GN R] 982 as amended by GN R 326)

NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	The National Water Act, 1998 (Act No. 36 of 1998)
SANS	South African National Standards
SHEQ	Safety, Health, Environment and Quality
RBCT	Richards Bay Coal Terminal
RE	Remaining Extent
RCP	Rehabilitation, Decommissioning and Mine Closure Plan
SoW	Scope of Work
VAT	Value Added Tax
WUL	Water Use Licence
WMA	Water Management Areas
WWTW	Waste Water Treatment Works

1 Introduction

Temo Coal Mining (Pty) Ltd (hereinafter Temo Coal), proposes to construct ancillary infrastructure associated with their approved coal mining operation, the Temo Coal Mine ("Temo Mine"), near Lephalale in the Limpopo Province ("the Project"). The proposed ancillary infrastructure includes a road diversion, rail loop and water pipeline.

Digby Wells Environmental (Digby Wells) was commissioned by Temo Coal to perform a fauna and flora field survey to compile a report for the inclusion in an Environmental Impact Assessment (EIA) for Environmental Authorisation for Listed Activities as detailed in the EIA Regulations, under the National Environmental Management Act No. 7 of 1998 (NEMA).

This report constitutes the Rehabilitation and Closure Plan (RCP) report to inform the EIA and Environmental Management Plan (EMP). The main aim in developing the Rehabilitation, Decommissioning and Mine Closure Plan (RCP) for Temo is to minimise and mitigate the impacts caused by construction activities and to restore land back to a satisfactory standard. It is best practice to develop the RCP as early as possible so as to ensure the optimal management of rehabilitation and closure issues that may arise. It is critical that Temo's RCP is defined and understood from before construction progresses and is complimentary to the objectives and goals set.

Even though the proposed project is not a mine, the rehabilitation principals contained within the Chamber of Mines Guidelines are relevant and have assisted with the compilation of this plan. 'Effective rehabilitation', is defined as "rehabilitation that will be sustainable, in the long term, under normal land management practices" (Chamber of Mines, 2007; Department of Minerals and Energy, 2008). Rehabilitation therefore must be considered as an on-going process aimed at restoring 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 (Whitehorse Mining Initiative, 1994).

1.1 Project Background and Description

Temo currently has an approved mining right (MR) which was authorised by the Department of Mineral Resources on 27 September 2013 (Reference Number: LP 30/5/1/2/2/199 MR). That Project was also authorised in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations thereunder, dated 18 June 2010 (which have since been repealed). The Environmental Authorisation was granted by the Limpopo Department of Economic Development, Environment and Tourism (LEDET) on 13 July 2015 (Reference Number: 12/1/9/2-W55).

Temo Mine is located approximately 60km from Lephalale in the Limpopo Province. This project considers applying for Environmental Authorisation, in terms of NEMA, and a Water Use Licence (WUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) to construct a rail loop, road diversion and pipeline.

The farm portions on which the Temo Mine is situated comprise Verloren Valey 246 LQ, Duikerpan 249 LQ, Japie 714 LQ, Hans 713 LQ and Kleinberg 252 LQ. Temo proposes to mine coal using open pit methods and the open pit will be situated entirely within the Farm Verloren Valey 246 LQ.

In reference to this assessment, Temo proposes to divert the dirt road (D175) around the approved mining right area for mining to continue, to construct a rail loop for transportation of coal and construct a water pipeline to service the Temo mine. As detailed below:

- **Diversion of road D175:** The approved open pit area has a road, the D175, which transects the south-western corner of the future pit area and continues to exit the Mining Right boundary near the north-western corner. To facilitate continued mining and maximise the minable area at the Temo Mine, Temo proposes that the D175 be diverted around the mining area;
- **Proposed Rail Loop:** The purpose of the rail loop is to allow Temo to transport export-grade coal product to the Richards Bay Coal Terminal (RBCT), as well as for domestic use. The rail loop will include a loading loop which will be within the approved Mining Right boundary of the Temo Mine; and
- **Proposed Bulk Water Pipeline:** Construction of a bulk water pipeline (for which three different pipeline routes are proposed) connecting the Temo mine.

The abovementioned proposed developments requires an EIA Report and Environmental Management Programme, in terms of the new EIA Regulations, published in GN R982 dated 04 December 2014 (as amended December 2017).

This infrastructure is required for the continuous operations of Temo Mine, however, it does not serve to include or assess the infrastructure and disturbance forming part of the original EA of Temo Mine.

As such, Temo proposes to divert a road around the approved MRA for mining to proceed efficiently which will remain post-closure, as well as construct a rail loop for transportation aiding in logistical performance. In addition to the rail loop and road diversion, a pipeline is proposed to be constructed to transport water from the municipally-owned WWTW to Temo Mine. Although the EA application considers three alternative pipeline routes, this report considers solely the closure cost for the preferred pipeline alternative (Option 2). For clarification, the maps of the planned activities are displayed in Appendix A of this report.

At present, the status of the pipeline post-closure has not been confirmed (i.e. will it be removed or remain in place). Digby Wells has therefore included two alternative costing scenarios in the assessment, where the pipeline is decommissioned, and alternatively, where it remains post-closure:

- Scenario 1: Road remain post closure, railway and pipeline removed; and
- Scenario 2: Road and pipeline remain post closure, railway removed.

1.2 Project Alternatives

At present, Temo Coal are considering three pipeline routing options. Table 1-1 presents summarised descriptions of these options.

Table 1-1: Summary of the three pipeline routing options

Pipeline	Description	Length
1	The pipeline would run along the western side of the Onverwacht Road reserve towards Nelson Mandela Drive from the WWTP pump station before changing direction at the intersection of Onverwacht Road and Nelson Mandela Drive. From here, the pipeline would run along the southern side of the Nelson Mandela Drive road reserve. At the intersection with the D1675, the pipeline will run along the northern side of the D1675 road reserve towards Steenbokpan. At the intersection of the D1675 and D175, the pipeline will run along the eastern side of the road reserve to the Temo Mine.	64.5 km
2	This pipeline route is similar to Option 1, until the intersection of the D1675 and D175. For option 2, the pipeline would divert before the intersection and will travel along the eastern side of the railway reserve instead. In this option, the water will be pumped for the first 31.8 km and will then gravitate the rest of the way to the mine.	62.4 km
3	This option moves from the WWTP pump station through the farm Paarl to join Palala Drive on the western side. The pipeline will change alignment at the intersection of Palala and Nelson Mandela Drives to run along the southern side of the Nelson Mandela Drive road reserve. This option would then follow the same layout at Option 2 until it reaches the mine.	61.1 km

Another option to be considered is the “no-go” alternative. Should the Project not obtain approval, the potential environmental impacts associated with the construction, installation and utilisation of the proposed infrastructure would not occur. However, the potential benefits associated with the Project would also not occur.

1.3 Project Area

The Temo mine is located approximately 60 kilometres (km) from Lephalale in the Limpopo Province on various farm portions, namely, Verloren Valey 246 LQ, Duikerpan 249 LQ, Japie 714 LQ, Hans 713 LQ and Kleinberg 252 LQ. Temo proposes to extract coal using open pit mining methods and the open pit will be situated entirely within the farm portion Verloren Valey 246 LQ. The location details of Temo is presented in Table 1-2, and illustrated in Figure 1-1, and Figure 1-2, with the infrastructure layout of the site shown in Figure 1-3.

Table 1-2 : Summary of Project Location Details

Province		Limpopo Province		
Magisterial District / Local Authority		▪ Lephalale Magisterial District ▪ Ellisras Magisterial District		
District Municipality		Waterberg District Municipality		
Local Municipality		Lephalale Local Municipality		
Nearest Town		▪ 60 km west of Lephalale ▪ 4 km south of Steenbokpan Settlement		
Property Name and Number	**Road Diversion**	▪ Swelpan 245LQ: Remaining Extent (RE) ▪ Draai Om 244LQ:RE ▪ Verloren Valey 246LQ: RE ▪ Dalyshope 323LQ: RE ▪ Nazarov 685LQ: RE		
	Rail Extension	▪ Verloren Valey 246: RE ▪ Duikerpan 249:RE:RE ▪ Swelpan 24:RE ▪ Kleinpan 269:RE ▪ Wildebeesvlakte 268:RE ▪ Groote-Zwart-Buld 290:RE		
	Pipeline	▪ Draai Om 244: Re ▪ Swelpan 245: Re ▪ Verloren Valey 246:Re ▪ Nieuw Holland 247:Re ▪ Wildebeestvlakte 268:1 ▪ Kleinpan 269 :Re ▪ Houwhoek 270:Re ▪ Groot-Zwart-Bult 290:Re ▪ Grootdoorn 292:Re,1,2 ▪ Theunispan 293:Re/19,20,22,25 ▪ Vangpan 294:Re & 1	▪ Steenbokpan 295:Re,1&3 ▪ Slangkop 296:2 ▪ Zandbult 300 Re ▪ Loopleegte 302:2 and 3 ▪ Vetleegte 304:Re ▪ Vaalpensloop 313:1 ▪ Hooikraal 315:Re ▪ Vergulde Helm 321:Re ▪ Hieromtrent 460:Re ▪ Turfvlakte 463:Re ▪ Waterkloof 502:4	▪ Waterkloof 502:Re/53,57,149,158,165, ▪ Onverwacht 503:Re,3,17,28,30, ▪ Groothoek 504:Re ▪ Eendracht 505:Re ▪ Altoostyd 506:Re ▪ Hanglip 508:1,3,5,9,10 ▪ Naauw Ontkomen 509 :Re &1 ▪ Paarl 522:Re &1 ▪ Schaapplaats 524:Re/23,25,26,27,37, ▪ Eenzaamheid 687:Re & 1 ▪ Pontes Estates 712:Re ▪ Pontes Estate 744:Re
GPS Co-ordinates (relative centre point of project area)		23° 35' 14.631" South 27° 17' 37.788" East		

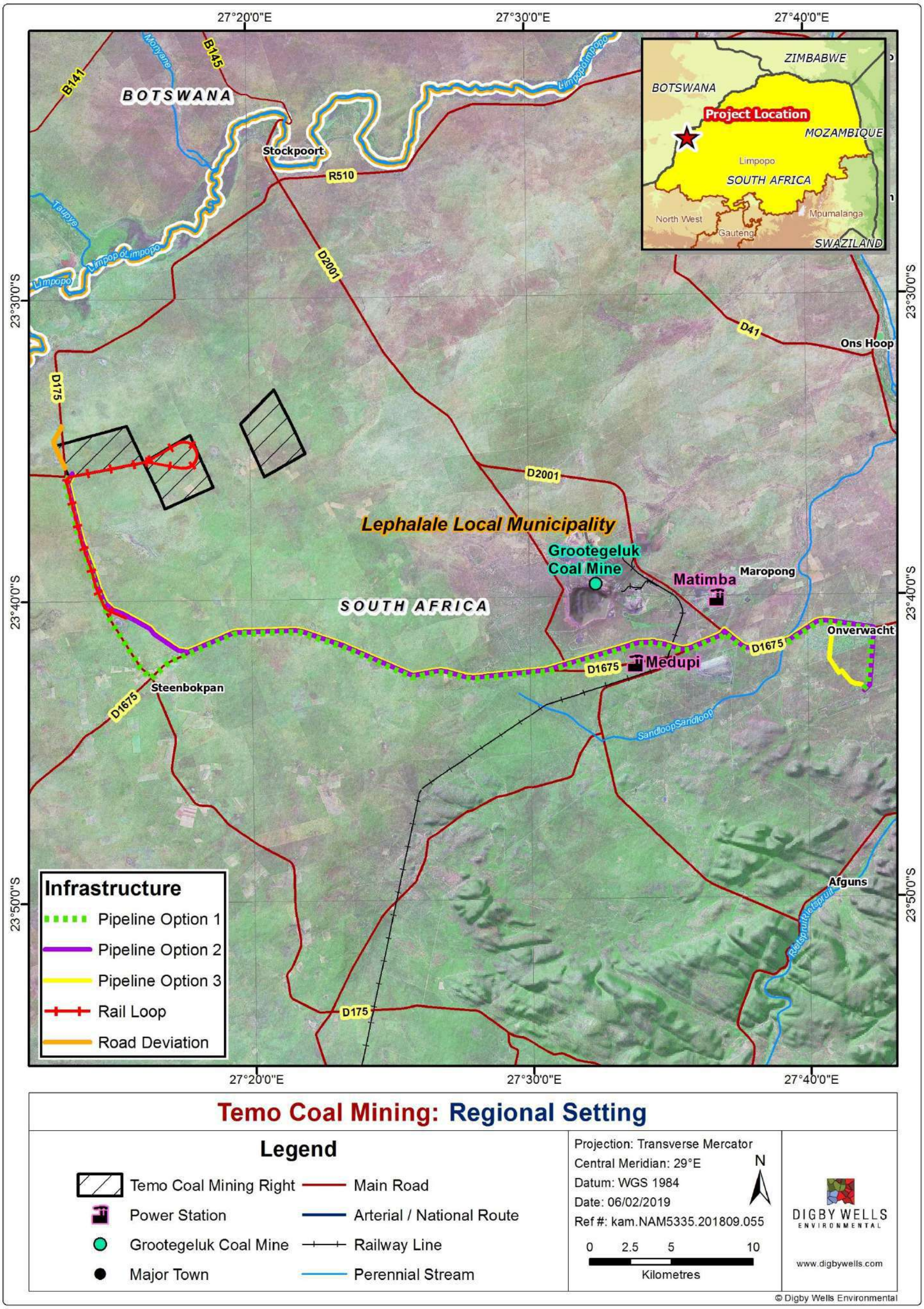


Figure 1-1: Regional Setting

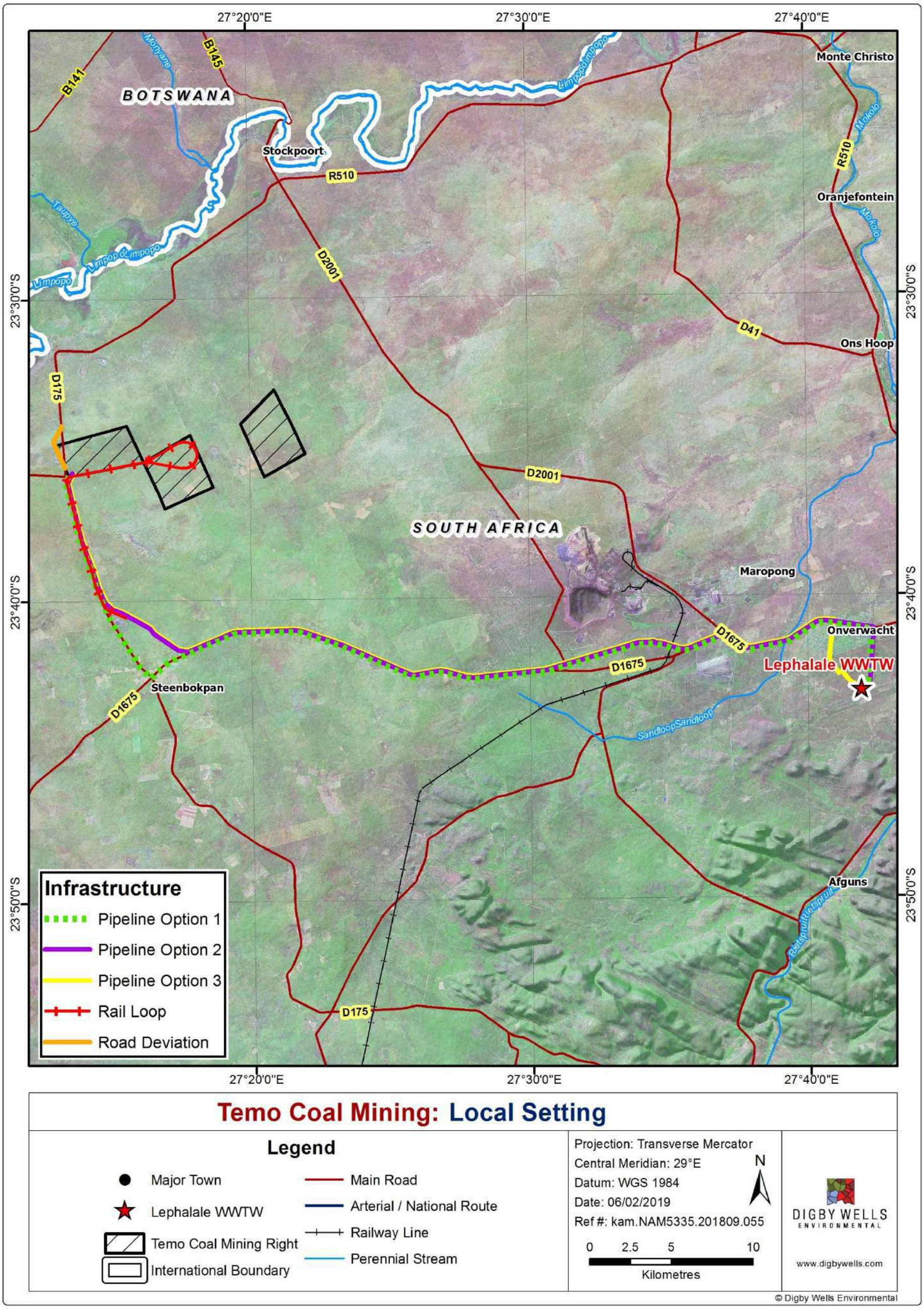


Figure 1-2: Local Setting

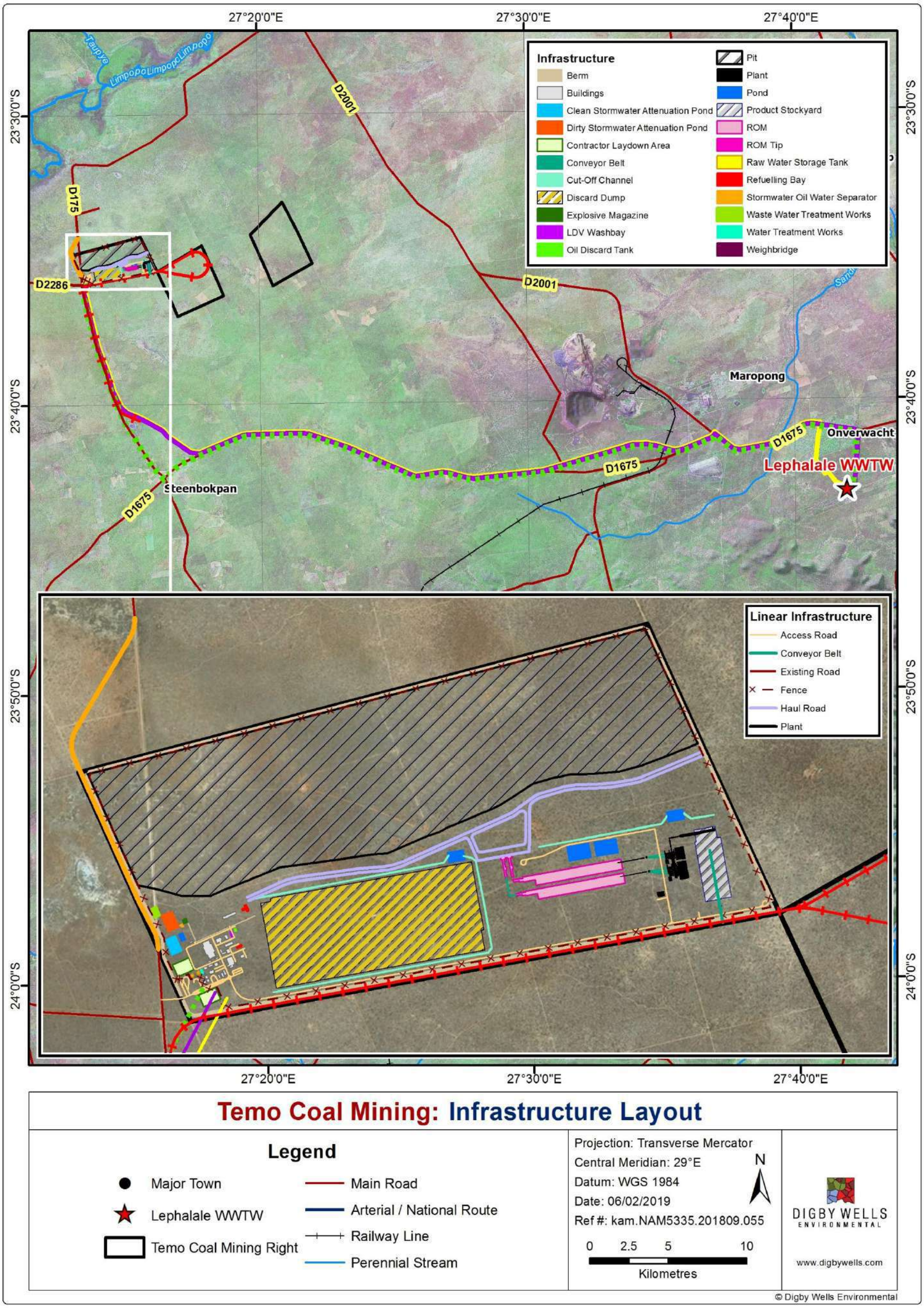


Figure 1-3: Infrastructure Layout

1.4 Details of Author(s)

Christine Reinecke has her Bachelor of Science (BSc) (Hons) degree in Geography and Environmental Science, specialising in Mining Rehabilitation, from Monash South Africa. She joined Digby Wells in March 2017 as an Assistant Rehabilitation Consultant within the Mine Closure and Rehabilitation Services Division. Since her appointment, Christine has been involved in compiling Rehabilitation and Closure Plans, Risk Assessments, Annual Rehabilitation Plans and Rehabilitation Audits to meet the requirements of the South African regulatory framework.

Siphamandla Madikizela is a Soil Scientist, completed his MSc in Soil Science at University of KwaZulu-Natal and is a Professional Natural Scientist. Prior to his employment at Digby Wells Environmental, Siphamandla worked as an Assistant Plantation Manager at EcoPlanet Bamboo SA. He is the part of the Closure, Rehab and Soils Division at Digby Wells Environmental. His role involves conducting soil surveys; soil, land capability and land use environmental impact assessments; soil and agricultural potential studies; soil contamination assessments; interpreting results of soil samples; soil management plans and writing detailed scientific reports in accordance to local legislation and with the International Finance Corporation (IFC). Siphamandla has worked in projects in South Africa, Democratic Republic of the Congo and Mali.

1.5 Report Structure

The remainder of the RCP is structured as follows.

Table 1-3: Minimum Requirements of RCP

Reference	Requirement	Report Section
3a	Details of- (i) the person or persons that prepared the plan; (ii) the professional registrations and experience of the preparers	Section 1.4
3b	The context of the project, including— (i) material information and issues that have guided the development of the plan; (ii) an overview of— (aa) the environmental context, including but not limited to air quality, quantity and quality of surface and groundwater, land, soils and biodiversity; and (bb) the social context that may influence closure activities and post-mining land use or be influenced by closure activities and post-mining land use; (iii) stakeholder issues and comments that have informed the plan;	Section 6

Reference	Requirement	Report Section
	(iv) the mine plan and schedule for the full approved operations, and must include— (aa) appropriate description of the mine plan; (bb) drawings and figures to indicate how the mine develops; (cc) what areas are disturbed; and (dd) how infrastructure and structures (including ponds, residue stockpiles etc.) develops during operations;	
3c	Findings of an environmental risk assessment leading to the most appropriate closure strategy, including— (i) a description of the risk assessment methodology including risk identification and quantification, to be undertaken for all areas of infrastructure or activity or aspects for which a holder of a right or permit has a responsibility to mitigate an impact or risk at closure; (ii) an identification of indicators that are most sensitive to potential risks and the monitoring of such risks with a view to informing rehabilitation and remediation activities; (iii) an identification of conceptual closure strategies to avoid, manage and mitigate the impacts and risks; (iv) a reassessment of the risks to determine whether, after the implementation of the closure strategy, the residual risk has been avoided and / or how it has resulted in avoidance, rehabilitation and management of impacts and whether this is acceptable to the mining operation and stakeholders; and (v) an explanation of changes to the risk assessment results, as applicable in annual updates to the plan;	
3d	Design principles, including— (i) the legal and governance framework and interpretation of these requirements for the closure design principles; (ii) closure vision, objectives and targets, which objectives and targets must reflect the local environmental and socio-economic context and reflect regulatory and corporate requirements and stakeholder expectations; (iii) a description and evaluation of alternative closure and post closure options where these exist that are practicable within the socioeconomic and environmental opportunities and constraints in which the operation is located; (iv) a motivation for the preferred closure action within the context of the risks and impacts that are being mitigated; (v) a definition and motivation of the closure and post closure period, taking cognisance of the probable need to implement post closure monitoring and maintenance for a period	Section 3; 4; 8; & 15

Reference	Requirement	Report Section
	sufficient to demonstrate that relinquishment criteria have been achieved; (vi) details associated with any on-going research on closure options; (vii) a detailed description of the assumptions made to develop closure actions in the absence of detailed knowledge on site conditions, potential impacts, material availability, stakeholder requirements and other factors for which information is lacking;	
3e	A proposed final post-mining land use which is appropriate, feasible and possible of implementation, including— (i) descriptions of appropriate and feasible final post-mining land use for the overall project and per infrastructure or activity and a description of the methodology used to identify final post-mining land use, including the requirements of the operations stakeholders; (ii) a map of the proposed final post-mining land use;	Section 7.1 with Figure 7-2 and Figure 7-3
3f	Closure actions, including— (i) the development and documenting of a description of specific technical solutions related to infrastructure and facilities for the preferred closure option or options, which must include all areas, infrastructure, activities and aspects both within the mine lease area and off of the mine lease area associated with mining for which the mine has the responsibility to implement closure actions; (ii) the development and maintenance of a list and assessment of threats and opportunities and any uncertainties associated with the preferred closure option, which list will be used to identify and define any additional work that is needed to reduce the level of uncertainty;	Section 8 and 10
3g	A schedule of actions for final rehabilitation, decommissioning and closure which will ensure avoidance, rehabilitation, management of impacts including pumping and treatment of extraneous water— (i) linked to the mine works programme, if greenfields, or to the current mine plan, if brownfields; (ii) including assumptions and schedule drivers; and (iii) including a spatial map or schedule, showing planned spatial progression throughout operations;	Section 11
3h	An indication of the organisational capacity that will be put in place to implement the plan, including— (i) organisational structure as it pertains to the plan; (ii) responsibilities;	Section 12

Reference	Requirement	Report Section
	(iii) training and capacity building that may be required to build closure competence;	
3i	An indication of gaps in the plan, including an auditable action plan and schedule to address the gaps;	Section 16
3j	Relinquishment criteria for each activity or infrastructure in relation to environmental aspects with auditable indicators;	Section 10
3k	Closure cost estimation procedure, which ensures that identified rehabilitation, decommissioning, closure and post-closure costs, whether on-going or once-off, are realistically estimated and incorporated into the estimate, on condition that— (i) cost estimates for operations, or components of operations that are more than 30 years from closure will be prepared as conceptual estimates with an accuracy of ± 50 per cent. Cost estimates will have an accuracy of ± 70 per cent for operations, or components of operations, 30 or less years (but more than ten years) from closure and ± 80 per cent for operations, or components of operations ten or less years (but more than five years) from closure. Operations with 5 or less years will have an accuracy of ± 90 per cent. Motivation must be provided to indicate the accuracy in the reported number and as accuracy improves, what actions resulted in an improvement in accuracy; (ii) the closure cost estimation must include— (aa) an explanation of the closure cost methodology; (bb) auditable calculations of costs per activity or infrastructure; (cc) cost assumptions; (iii) the closure cost estimate must be updated annually during the operation's life to reflect known developments, including changes from the annual review of the closure strategy assumptions and inputs, scope changes, the effect of a further year's inflation, new regulatory requirements and any other material developments; and	Section 13 and Appendix A
3l	Monitoring, auditing and reporting requirements which relate to the risk assessment, legal requirements and knowledge gaps as a minimum and must include— (i) a schedule outlining internal, external and legislated audits of the plan for the year, including— (aa) the person responsible for undertaking the audit(s); (bb) the planned date of audit and frequency of audit; (cc) an explanation of the approach that will be taken to	Section 14

Reference	Requirement	Report Section
	address and close out audit results and schedule; (ii) a schedule of reporting requirements providing an outline of internal and external reporting, including disclosure of updates of the plan to stakeholders; (iii) a monitoring plan which outlines— (aa) parameters to be monitored, frequency of monitoring and period of monitoring; (bb) an explanation of the approach that will be taken to analyse monitoring results and how these results will be used to inform adaptive or corrective management and/or risk reduction activities; and	
3m	Motivations for any amendments made to the final rehabilitation, decommissioning and mine closure plan, given the monitoring results in the previous auditing period and the identification of gaps as per 2(i).	Section 14.1

2 Terms of Reference

The terms of reference for the Rehabilitation and Closure Plan for Temo are discussed below.

2.1 Revise and Update Rehabilitation and Closure Plan

In general, the RCP must contain information relating to the following:

- Providing vision, objectives, targets and criteria for final rehabilitation;
- Legal and governance framework;
- Baseline environment, including social context, which will influence the closure objectives and post-mining land use;
- Assessment of post-closure options that are practical and within the socio-economic and environmental opportunities;
- Motivation for the preferred closure option;
- Proposed final land use and mapping;
- Ongoing research on closure and rehabilitation options;
- Detailed description of assumptions made;
- Stakeholder issues and comments;
- Outline of design principles for closure, including designs and drawings of how the mine will develop, including a schedule of actions for final rehabilitation, which is linked to the mine works programme;

- Risk assessment approach and outcomes and linking this to closure activities;
- Detail on closure actions to mitigate/manage identified risks and describe the nature of residual risks that will need to be managed and monitored post-closure;
- Scheduling, budget, roles and responsibilities to be assigned for final rehabilitation;
- Identification of knowledge gaps and how these will be addressed;
- Detail of full financial provision for the life of the project;
- Information on the organisational capacity to implement the rehabilitation plan;
- Auditable action plan for audits and update of the annual rehabilitation plan;
- Relinquishment criteria for infrastructure; and
- Outline of monitoring, auditing and reporting requirements.

3 Assumptions and Limitations

The compilation of this RCP is based on the following assumptions and limitations:

- The RCP is based on the current information available;
- This report is based on a desktop assessment and no site visit was undertaken by the specialist;
- An Environmental Risk Report was excluded from the Scope of Work (SoW) for this project;
- The information contained within this RCP is based on the current plans provided. If there is a significant change or addition of other infrastructure areas the rehabilitation plan will need to be updated to cater for this change;
- Vegetation monitoring and maintenance will take place for two years post-closure and groundwater and surface water for four years post-closure;
- This report must be considered as a living document and will be updated as additional information becomes available, and as monitoring and rehabilitation progresses; and
- For post-closure monitoring costs, of vegetation monitoring and maintenance will take place for three years.

4 Mine Closure Overview

Historically, closure plans mainly focused on the environment and physical aspects, such as land rehabilitation and asset removal while overlooking the cultural, social and economic aspects. However, it is now accepted that considering closure at an early stage allows mining companies to reduce the level of dependency from communities with regards to economic benefits and community services.

Successful closure depends on setting, continually reviewing and validating and finally meeting closure goals that align with company and stakeholder requirements. There must be minimal residual risk to the company, and the community must realise benefits that will continue to exist without further input from the company.

The vision of closure must be to ensure that a process is established to guide all decisions and actions during a mine's life such that:

- Future public health and safety are not compromised;
- Environmental resources are not subject to physical and chemical deterioration;
- The post-mining use of the site is beneficial and sustainable in the long-term;
- Any adverse socio-economic impacts are minimised; and
- The opportunity is taken to maximise socio-economic benefits.

It is recommended that the closure plan be revised as demolition progresses; this will ensure the operation take advances in technology and rehabilitation methods into consideration.

Figure 4-1 below depicts a general approach to closure planning.

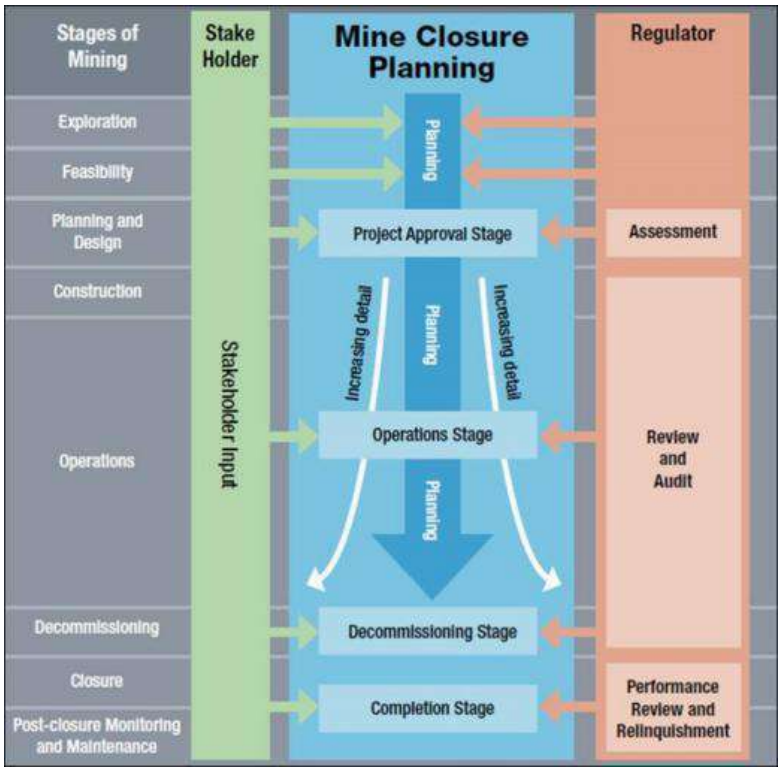


Figure 4-1: Integrating Stages of Mining and Closure Planning

[Source: (DMP & EPA, 2015)]

4.1 Closure Design Principles

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 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 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 continue to be carried out along with mining. Concurrent rehabilitation activities should decrease the final closure costs that the will carry at the time of closure. This concurrent rehabilitation must be carried out within the context of the approved EMP as well as the RCP. Final rehabilitation will be carried out once the goes into its decommissioning and closure phase.

The primary concerns for decommissioning and rehabilitation are to ensure public safety and health, and environmentally stable conditions compatible with the surrounding environment, and consequently minimise the environmental impacts caused by mining. The overall objective is to have socially, economically, and environmentally sustainable development. The objectives of closure as set out in the DMR policies are:

- Safety and health of animals and humans must be safeguarded;
- Environmental damage and residual impacts must be minimised to a level acceptable to all parties, i.e. avoidance of future pollution;
- Land must be rehabilitated to as close to natural state as possible, i.e. creation of a stable land surface;
- Physical and chemical stability of remaining structures must be such that they are not affected by natural elements;
- Mines are closed effectively and cost efficiently; and
- Mines are not abandoned, but closed in terms of policy.

4.2 Closure Objectives

Closure and rehabilitation is a continuous series of activities that begin with planning prior to the project's design and construction, and end with achievement of long-term site stability and the establishment of a self-sustaining ecosystem. Not only will the implementation of this concept result in a more satisfactory environmental outcome, but it will also reduce the financial burden of closure and rehabilitation.

The purpose of identifying closure objectives prior to closure of the project is to ensure that long-term plans can be generated to accommodate the end use proposals, where

necessary. The factors that influence the closure of a mine change through time, the closure plans must always adhere to the environmental and socio-economic requirements at the time of closure.

The following points outline the main objectives for rehabilitation and closure:

- Make all areas safe for both humans and animals;
- Make all areas stable and sustainable;
- Utilise approved sites for the safe disposal of all waste either onsite or off site;
- Follow a process of closure that is progressive and integrated into the short and long term plans, and that will assess the closure impacts proactively at regular intervals throughout project life;
- Rehabilitation should strive to rehabilitate the soil and land capability to emulate pre-disturbance land capability;
- Minimise negative impacts and maximise positive benefits on the local community;
- Maintain and monitor all rehabilitated areas following re-vegetation and, if this monitoring shows that the objectives have been met, make an application for closure;
- Prevent soil and surface/groundwater contamination by managing all water on site to acceptable and agreed standards;
- Comply with local, district and national regulatory requirements;
- Promote active partnerships with local communities, where possible;
- Monitoring of key environmental variables (i.e. soils, erosion, vegetation, groundwater, surface water and air quality) to demonstrate stability of rehabilitated areas, this will be done for two years after closure or up until such a time all areas create a sustainable cover and ecosystem;
- Maintain or restore biodiversity at levels that are sustainable in the long term; and
- Follow a comprehensive consultation and communication process with all stakeholders.

Rehabilitation and closure objectives have been tailored to the project at hand and are aligned with the EMP. This Rehabilitation Plan aims to assist Temo in carrying out successful rehabilitation.

5 Legal Requirements

Section 41 (1) of the Mineral and Petroleum Resources Development Act (MPRDA) has been repealed and in terms of Section 24P of the NEMA (1998), as amended, which provides that the holder of a MR must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the following:

- Rehabilitation of the adverse environmental impacts of the listed or specified activities;
- Rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water;
- Decommissioning and closure of the operations;
- Remediation of latent or residual environmental impacts which become known in the future;
- Removal of building structures and other objects; or/and
- Remediation of any other negative environmental impacts.

In addition to Section 24(P), the Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations were promulgated on 20 November 2015 (GN R1147) (2015). For the purposes of this report, the financial provision estimate and respective reports are in line with the requirements of the Financial Provision Regulations.

In addition, an amendment to the Financial Provision Regulations promulgated in terms of the NEMA was gazetted on 21 September 2018 by the Department of Environmental Affairs (DEA). Essentially, the only change to the Financial Provisioning Regulations is to delay the implementation date from 19 February 2019 for a further year, until 20 February 2020.

Regulation 11 of the Financial Provision Regulations, 2015 requires a holder of a MR to determine the quantum of the financial provision through detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for:

- Annual rehabilitation as reflected in the Annual Rehabilitation Plan (ARP) as per the minimum content prescribed by Appendix 3 as per the Regulations;
- Final rehabilitation, decommissioning and closure as reflected in the RCP as per the minimum content prescribed by Appendix 4 as per the Regulations; and
- The remediation of latent or residual environmental impacts including but not limited to the pumping and treatment of polluted or extraneous water, as reflected in an Environmental Risk Assessment Report (ERR), as per the requirements of Appendix 5 as per the Regulations.

Applicable legislation is outlined in Table 5-1.

Table 5-1: Applicable Legislation

Applicable legislation and guidelines	Details
Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that – a) Prevent pollution and ecological degradation; b) Promote conservation; and c) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development
The Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983) (CARA)	CARA states that the degradation of the agricultural potential of soil is illegal; and The Conservation of Agricultural Resources Act 43 of 1983 requires that protection of land against soil erosion and the prevention of water logging and salinization of soils means of suitable soil conservation works to be constructed and maintained.
Mineral and Petroleum Resources Development Act. 2002 (Act No. 28 of 2002) (MPRDA)	The MPRDA sets out the requirements relating to the development of the nation's mineral and petroleum resources. It also aims to ensure the promotion of economic and social development through exploration and mining related activities; Section 41 (1) of Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) has been repealed and in terms of Section 24P in the NEMA as amended which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the- a) Rehabilitation of the adverse environmental impacts of the listed or specified activities; b) Rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water; c) Decommissioning and closure of the operations; d) Remediation of latent or residual environmental impacts which become known in the future; e) Removal of building structures and other objects; and/or f) Remediation of any other negative environmental impacts. In addition to Section 24(P), the Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations were promulgated on the 20 November 2015 (Government Notice No. 1147 published in GG 39425). Regulation 6 of the Financial Provision Regulations requires a holder of a Mining Right to determine the quantum of the financial provision through detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for: a) Annual rehabilitation, as reflected in Annual Rehabilitation Plans (ARPs); b) Final rehabilitation, decommissioning and closure of the mining operations as per the RCPs which includes the findings of the Environmental Risk Assessment Report (ERR); and Remediation of latent or residual environmental impacts as identified in the ERR.
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	The NEMA, as amended was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that: *The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.*

Applicable legislation and guidelines	Details
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)	NEMBA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. This Act works in accordance to the framework set under NEMA. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: ▪ Alien and Invasive Species Lists, 2014 published (GN R.599 in GG 37886 of 1 August 2014) ; ▪ National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations; and ▪ National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GN R.1002, 9 December 2011).
National Water Act, 1998 (Act No. 36 of 1998) (NWA)	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA)	According to the NEM: AQA the Department of Environmental Affairs (DEA), the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured.

There are several guideline documents which provide recommendations on how rehabilitation and closure must be undertaken. For the purpose of the plan, the following guideline documents were considered:

- Guidelines for the Rehabilitation of Mined Land. Chamber of Mine of South Africa/ Coaltech. November 2007 (Beukes, Mohr-Swart, & Tanner, 2007);
- Financial Provisions for Rehabilitation and Closure in South African Mining (2012); and
- Best Practice Guidelines (BPGs) series developed by the Department of Water Affairs (DWA) (2007).

6 Baseline Environmental and Socio-Economic Setting

This section provides a summary of the baseline environment at Temo which was derived from the Digby Wells specialist studies undertaken for the project.

6.1 Climate

This section provides the climatic conditions (temperature, rainfall and evaporation) of the Temo project area

6.1.1 Regional Climate

Lephalale experiences hot summers and mild winters. During the winter, temperature can drop to 3.7°C on average in July. The average annual rainfall is between 350 mm and 400 mm, normally occurring during the mid-summer period

6.1.1.1 Temperature

Annual mean temperature for the area is 31°C. The monthly maximum and average temperatures are depicted in Figure 6-1 and Table 6-1 respectively. The month of November recorded the highest temperature with 36°C and the month of July recording the lowest (24°C).

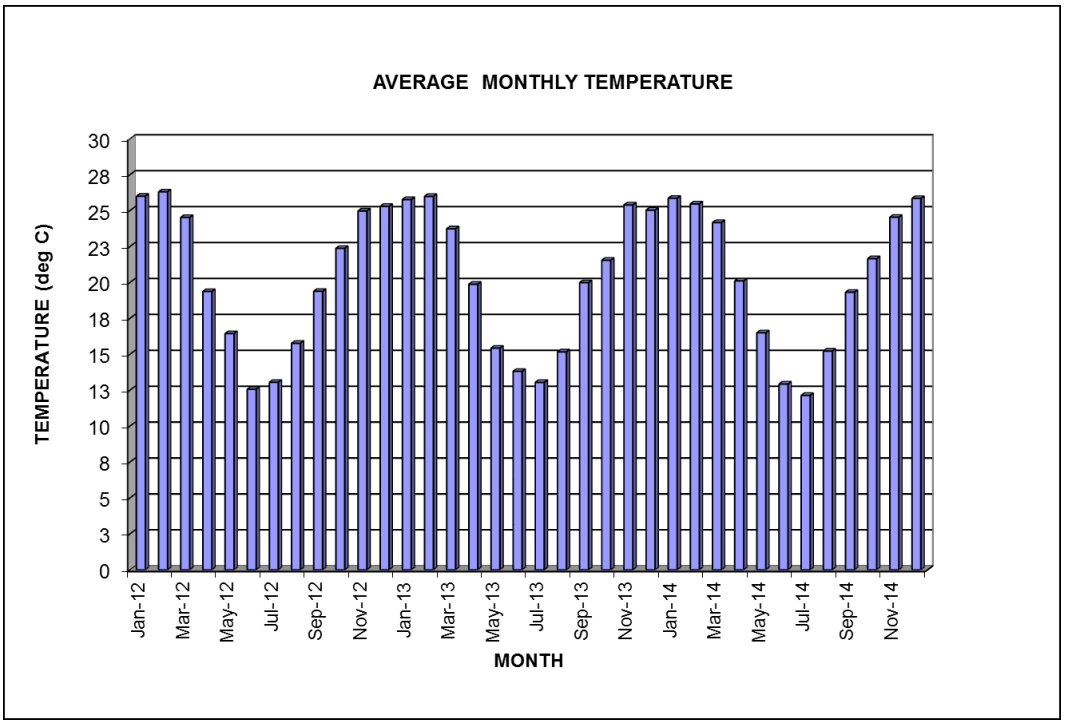


Figure 6-1: Average Monthly Temperature (2012-2014 – Digby Wells)

Table 6-1: Average Monthly Temperature (2012-2014 – Digby Wells)

Temp(°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Monthly Maximum	34	35	34	31	28	25	24	28	32	34	36	34	31
Monthly Average	26	26	24	20	16	13	13	15	20	22	25	25	20

6.1.1.2 Rainfall

The wet season ranges from October to April, while the period from September to May represent the dry season. The Mean Annual Precipitation (MAP) for A41E, A42J and A42H quaternary catchments, are 440.07 mm, 427.75 mm and 517.69 mm, respectively (Table 6-2). Corresponding Mean Annual Runoff (MAR) for the aforementioned quaternaries are 121 mm, 1254 mm and 145 mm, respectively. The rainfall and runoff averages are based on rainfall data for the period from 1920 to 2009 (WRC, 2015).

The monthly distribution of rainfall and runoff, on average, are also indicated in Table 6-2.

Table 6-2: Monthly rainfall-runoff for A41E, A42J and A42H quaternary catchments

Month	Quaternary Catchment					
	A41 E		A42J		A42H	
	Rainfall	Runoff	Rainfall	Runoff	Rainfall	Runoff
	(mm)					
January	80.36	2.10	84.77	5.64	102.59	3.85
February	76.38	2.70	69.35	7.26	83.94	4.95
March	57.13	2.26	54.04	6.09	65.40	4.15
April	30.85	1.03	28.38	2.76	34.35	1.88
May	10.11	0.29	9.54	0.77	11.54	0.52
June	3.78	0.13	3.91	0.34	4.73	0.23
July	1.97	0.10	2.09	0.27	2.53	0.19
August	2.38	0.08	2.11	0.23	2.55	0.15
September	8.07	0.07	8.20	0.18	9.92	0.12
October	31.41	0.14	30.58	0.37	37.01	0.25
November	61.86	0.48	59.35	1.30	71.83	0.89
December	75.76	1.24	75.43	3.33	91.29	2.27
Totals	**440.07**	**10.61**	**427.75**	**11.36**	**517.69**	**19.47**

6.1.1.3 Evaporation

Quaternaries A41E, A42 J and A42H are under 1D evaporation zone. The higher evaporation rates are expected to be during the month of January whilst the lower evaporation rates are expected to be around September.

The average annual potential evaporation for the 3-quaternary catchments is 1949 mm, thereby rendering the area as a semi-arid environment, as indicated in Table 6-3. The evaporation rates are higher than the average annual rainfall.

Table 6-3: Summary of Evaporation Data

Months	Symons Pan Evaporation	Lake Evaporation
	(mm)	
January	226	190
February	210	185
March	210	185
April	209	184
May	174	152
June	165	140
July	129	107
August	110	89
September	91	73
October	102	83
November	137	112
December	186	155
Totals	**226**	**190**

6.2 Soils

Information related to the soils associated with the project area is discussed in this section. The land type data gathered suggested that the dominant land type on site were Ae252, Ae257, Ah86, Bc44 and Bd46 characterised by red yellow Apedal, freely drained and upland duplex and margalitic soils rare; respectively, as illustrated in Figure 6-2.

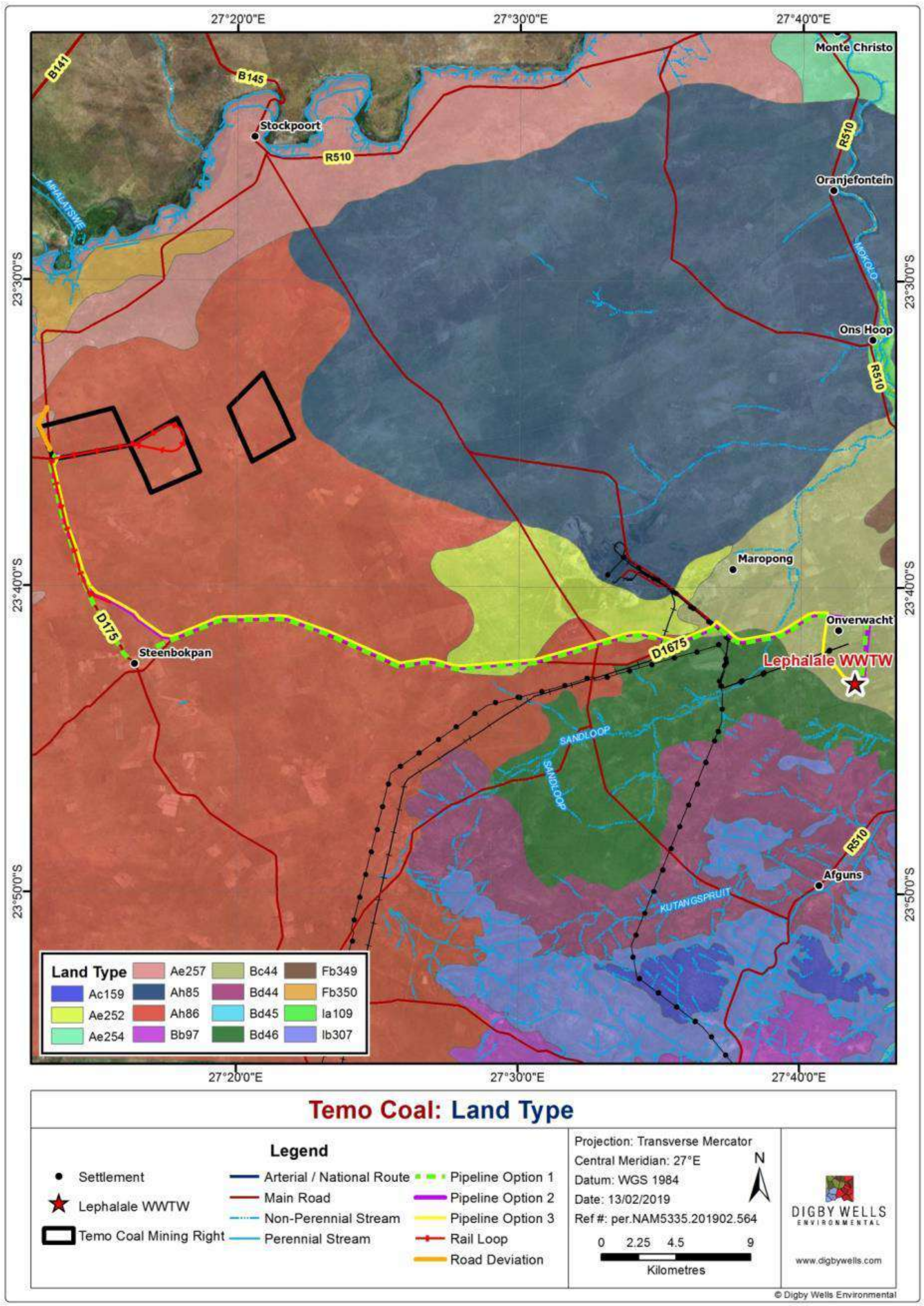


Figure 6-2: Land Type at Temo Coal

6.2.1 Land Type and Soil Forms

Table 6-4 shows dominant land types and soil forms found along the road diversion, railway loop and pipeline.

Table 6-4: Dominant Land Types and Soils

Land Type	Description	Agricultural Potential
Ae252	Red, structureless and sandy soils. Mainly used for grazing due to climatic constraints for crop production.	Low due low rainfall and high evaporation.
Ae257	Red, structureless and sandy soils. Mainly used for grazing due to climatic constraints for crop production.	Low due low rainfall and high evaporation.
Ah86	Red and yellow, deep sandy soils. Mainly used for grazing due to climatic constraints for crop production.	Low due low rainfall and high evaporation.
Bc44	Red, plinthic soils and well drained. Unleached soils with plinthite.	Low due low rainfall and high evaporation.
Bd46	Yellow, plinthic soils with variable depth. Mainly used for grazing due to climatic constraints for crop production.	Low due low rainfall and high evaporation.

6.2.2 Sensitivity

Figure 6-3 shows the site sensitivities based on the soils investigation and land capability assessment. Further input and discussion should be considered with the wetlands scientists regarding the “Highly Sensitive” and “No Go” areas in terms of the ecology and wetland status and the legal implications and process that are to be followed. The concerns around the soil and land capability are varied. They range from soil rooting depths and restrictions due to the deep sandy profiles with little to no clay, low nutrient levels, poor water holding capabilities and high erosion indices. The mitigation and management will require forward planning and a long term strategy based on the proposed end land use and results of the baseline findings.

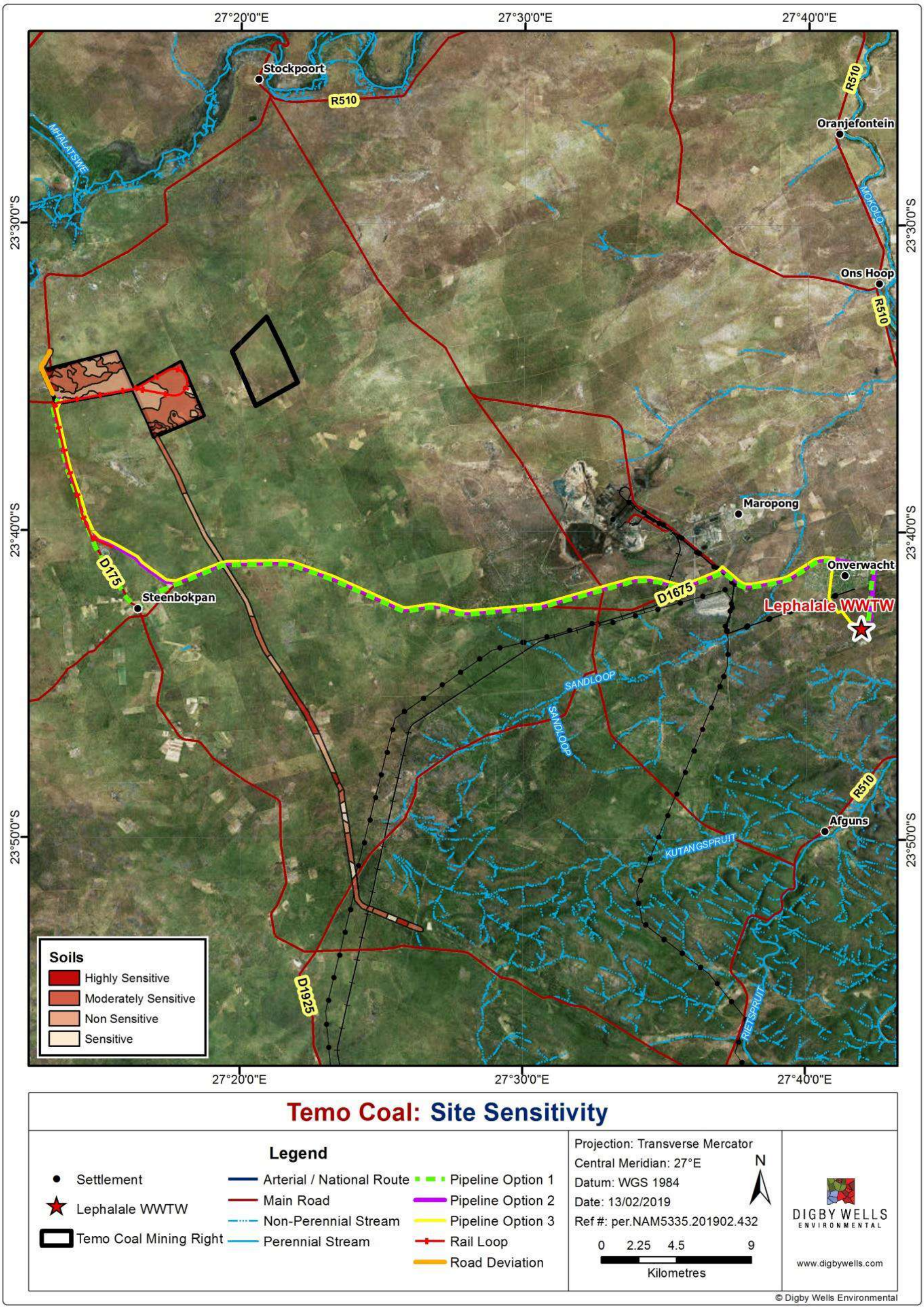


Figure 6-3: Sensitivity Analysis at Temo Coal

6.3 Flora, Fauna and Wetlands

6.3.1 Flora

A total of 46 sample plots/relevés were sampled for this study. Bushveld vegetation does not typically show large variation and therefore communities were similar with an abundance of some cosmopolitan species such as *Boscia* spp. and *Grewia* spp. However, dominance of some species varied throughout the project area and this led to the identification of eight broad terrestrial vegetation habitats, wetland habitats associated with the ephemeral pans and transformed areas associated with large agricultural fields.

Local and small-scale changes will occur within these habitats but these are not captured at this time of the project. These changes can be associated with different management techniques of the multiple land owners, local changes in soil, variations in faunal activity and more. The vegetation habitats are briefly summarised in Table 6-5.

Table 6-5: Vegetation Habitats Main Tree and Grass Species

Vegetation Habitat		Area (ha)	Main trees and shrubs present	Main grasses present
1	Commiphora bushveld	39.6	*Commiphora angolensis; C pyrocanthiodes; Combretum apiculatum; Peltophorum africanum; Senegalia erioloba; Elephantoriza elephantina*	*Aristida rhinochloa; Panicum maximum*
2	Combretum thornveld	721.6	*Combretum apiculatum; Dichrostachys cinera; Grewia bicolor, G. flava; G. flavescens; Boscia foetida subsp rehamnniana; Boscia albitrunca*	*Aristida rhinochloa; A. diffusa; A. stipitada*
3	Combretum/Marula thornveld	204.7	*Combretum apiculatum; Sclerocarya birrea; Senegalia erioloba; S. nigrescens Dichrostachys cinera; Terminalia sericea; Boscia foetida subsp rehamnniana; Grewia bicolor, G. flava; G. flavescens*	*Aristida spp; Panicum spp; Urochloa mosambicensis; Tragus berteronianus; Schmidtia pappophoroides; Panicum sp.; Tricholaena monachne*

Vegetation Habitat		Area (ha)	Main trees and shrubs present	Main grasses present
4	Terminalia/Marula bushveld	1322.2	*Terminalia sericea; Sclerocarya birrea; Combretum apiculatum; Peltophorum africanum; Bauhinia petersiana; Combretum molle; Combretum hererorense; Senegalia erioloba; Grewia bicolor, G. flava; G. flavescens;*	*Aristida congesta subsp congesta; A. stipitada; Digitaria eriantha; Urochloa masambicensis; Scmidtia pappophoroides; Stipagrostis uniplumis; Panicum maximum; P. coloratum; Eragrostis rigidior; E. pallens; E. lehmaniana*
5	Tamboti Grove	76.2	*Spirostachys Africana; Sclerocarya birrea; Senegalia erioloba; Combretum imberbe; Commiphora pyrocnathiodes; C. angolensis; Grewia bicolor, G. flava; G. flavescens; Peltophorum africanum*	*Aristida congesta subsp congesta; A. stipitada; Panicum sp; Stipagrostis uniplumis; Eragrostis lehmanniana*
6	Terminalia/Pterocarpus bushveld	805.8	*Terminlia sericea; Pterocarpus rotundifolius; Combretum apiculatum; Commiphora pyrocanthiodes; C. angolensis; Sclerocarya birrea; Boscia foetida subsp rehmanniana; Senegalia nigrescens; Dichrostachys cinera; Grewia bicolor, G. flava; G. flavescens;Senegalia burkei; Peltophorum africanum*	*Urochloa masambisensis; Panicum coloratum; P. maximum; Schmidtia pappophoroides*
7	Knobthorn Woodland	15.7	*Commiphora pyrocanthiodes; Sclerocarya birrea; Senegalia nigrescens*	

Vegetation Habitat		Area (ha)	Main trees and shrubs present	Main grasses present
8	Combretum/Senegalia thornveld	765.3	*Combretum apiculatum; C. hererorense; ; C. zeyheri; Terminalia sericea; Senegalia erubescens; S. nigrescens; Vachellia gerrardia; V. robusta; V. karoo; Ziziphus mucronata; Peltophorum africanum; Burkea africana; Commiphora pyrocanthiodes; Grewia bicolor, G. flava; G. flavescens; Senegalia burkei; Boscia foetida subsp rehmanniana*	*Panicum maximum; Aristida stipitada; Eragrostis sp's*
9	Transformed Areas	234.6	*Dichrostachys cinera; Senegalia melilfera ; S. toritillis;*	*Aristida stipitada; Eragrostis sp's; Stipagrostis uniplumis*
10	Ephemeral Pans	40.7	*Senegalia melilfera ; S. toritillis; Ziziphus mucronata; Combretum imberbe*	*Dactyloctenium aegyptium; Ammocharis coranica; Urochloa mosambicensis*

6.3.2 Fauna

6.3.2.1 Mammals

A total of 12 mammal species is located within the project area. Of those, five red data species cited by the representatives occur on the property namely the Brown Hyena *(Hyaena brunnea)*, Bat Eared Fox *(Otocyon megalotis)*, Cheetah, (*Acinonyx jubatus)* Leopard (*Panthera pardus)* and the Sable Antelope *(Hippotragus niger niger),* a species introduced.

The landowner captured and removed the majority of the game and intended to remove the remaining, large mammals, such as sable, kudu, impala and gemsbok.

6.3.2.2 Birds

The avifaunal survey conducted over three days on the farm Duikerpan and the areas immediately surrounding Duikerpan. A total of 100 species are recorded. Three Red Data species are found to occur in the vicinity of Duikerpan namely, the Cape Vulture *(Gyps coprotheres)* Kori Bustard *(Ardeotis kori*) White-backed Vulture *(Gyps africanus).*

6.3.2.3 Reptiles and frogs

Three herpetofauna species observed in the project area. During the survey, no frog species was encountered. No Red Data or protected species were found during the survey.

6.3.2.4 Invertebrates (Spiders, Scorpions, Beetles and Butterflies)

Four invertebrate species are observed while surveying the project area; three butterfly species and one beetle species.

The low numbers of large and small mammals, herpetofauna and invertebrates that occurred during the field survey may be ascribed to numerous factors:

- The low and late rainfall this season has delayed the production of food sources for the small mammals such as rodents. It is possible that they have either moved away or have died, as no captures and very little ground activity, such as tracks or sightings, were noted during the survey period;
- The capture of game on the property has decreased the large mammal numbers; however the self-regulating species such as the common duiker and steenbok are plentiful; and
- Disease such as hartswater, a tick borne disease, may be responsible for the decline in the populations.

6.3.3 Wetlands

It was found that pan wetlands characterise the area; no hillslopes seeps or valley bottom systems are present. This finding is in agreement with the desktop assessment as pan wetlands are dominant in this area. The pan or depression wetland Hydrogeomorphic (HGM) setting is described as a basin shaped area with a closed elevation contour that usually is not connected to the drainage network (Ellery, et al., 2009). Pans can receive water both from surface and groundwater flows, which then accumulates in the depression owing to a generally impervious underlying layer which prevents the water draining away (Goudie & Thomas, 1985); (Marshall & Harmse, 1992).

There are a total of 11 pans within the project area (500 m from infrastructure footprint), totalling 40.7 ha (Figure 6-4). Only three of the 11 pans are designated as National Freshwater Ecosystem Priority Areas (NFEPA) wetlands. The pans show great variation in size, as they range from 0.1 to 9.1 hectares (ha), and also vary greatly in their position in the landscape and their underlying forming strata. This is summarised in Table 6-6 below. The hydroperiod[1] of the pans is designated as ephemeral in the project area as, within this climate (low rainfall, high evapotranspiration), the wetlands are intermittently flooded from episodic rainfall events. The surface of the pan is generally exposed but open water is present for short periods (Ellery, et al., 2009). Some pans are artificially fed with borehole

[1] The hydrological signature describing the seasonal pattern of water level fluctuations in a wetland (Ellery *et al*, 2009)

water and therefore unnaturally seasonally saturated. The changes in vegetation associated with the pans was more of a compositional one that a complete change in species. These systems are intermittently saturated and therefore the vegetation associated with these wetlands must be suited to the arid conditions typical of the greater area. The wetlands are grouped according to their underlying material and discussed in greater detail in the sub-sections that follow.

Table 6-6: Summary list of Wetlands Delineated

No.	Wetland base	Wetland Area (ha)	Locality (Farm name)	NFEPA Pan status
1	Calcrete pan	9.1	Duikerpan	Natural Depression; Rank 5
2	Calcrete pan	8.6	Twistpan	-
3	Calcrete pan	2.7	Vlakfontein 264 ptn RE	-
4	Calcrete pan	2.9	Vlakfontein 264 ptn RE	-
5	Calcrete pan	6.9	Mooipan 325 ptn RE	Natural Depression; Rank 5
6	Ferricrete pan	1.2	Zandheuwel 356 ptn 1	-
7	Ferricrete pan	4.3	Zandnek 358 ptn RE	Natural Depression, Rank 5
8	Clay based pan	0.1	Lieliefontein 672 ptn 1	-
9	Not assessed	0.7	Rhenosterpan 361 ptn 6	-
10	Not assessed	1.8	Rhenosterpan 361 ptn 2	-
11	Clay based pan	0.1	Klipkloof 365 ptn 2	-

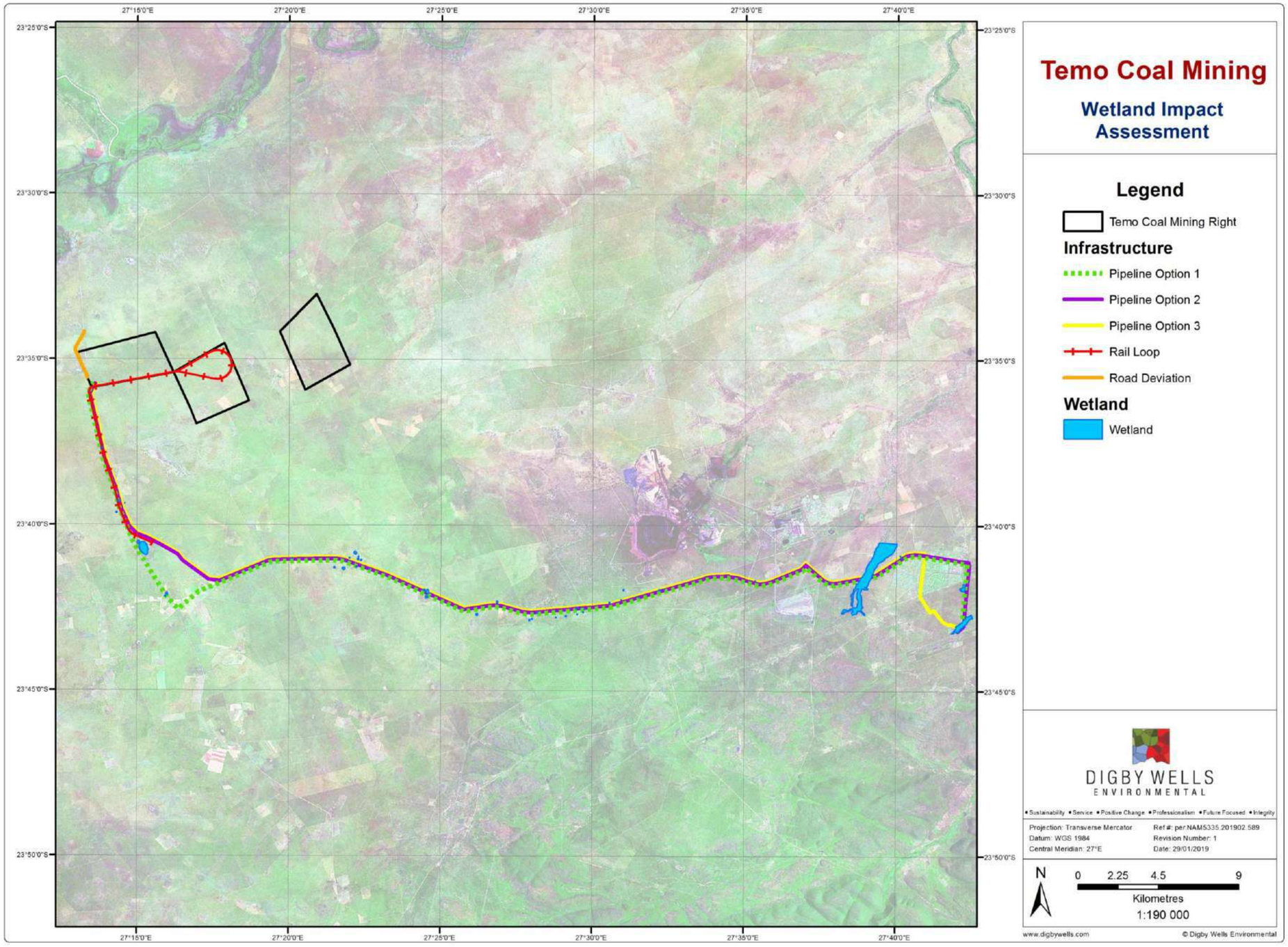


Figure 6-4: Wetland Delineation Overview

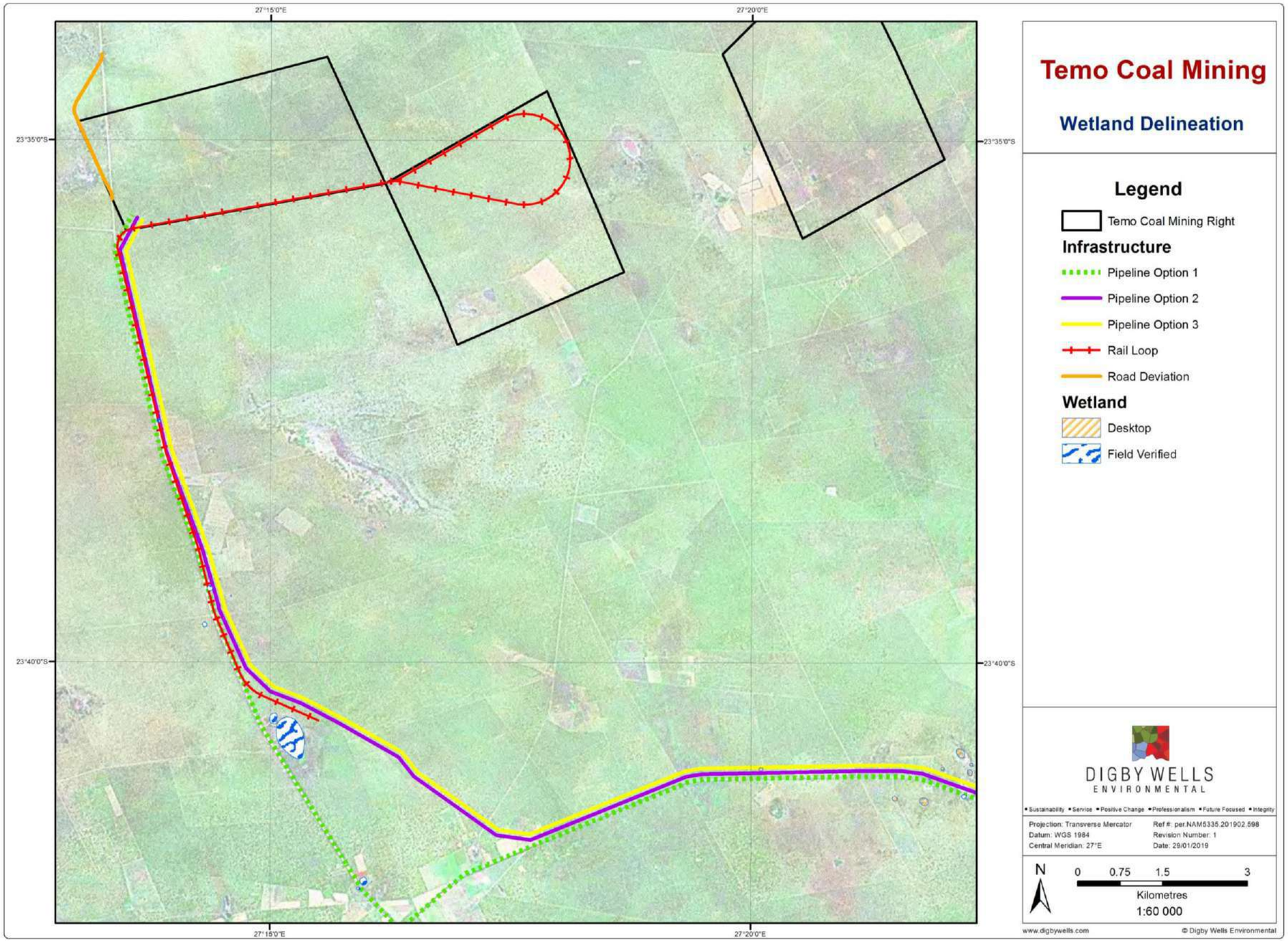


Figure 6-5: Wetland Delineation (Northern Cluster)

6.4 Surface Water

This section provides the hydrological baseline description. This includes descriptions of catchment characteristics, Water Management Areas (WMA), rivers and drainage, climate (rainfall and evaporation), and topography of the area.

Table 6-7: Summary of the Surface Water Attributes of the A41E, A42J and A42 H Quaternary Catchment

Catchment	Area (km^2)	MAP (mm)	MAR m^3* 10^6	MAE (mm)
A41E	816	440.07	6.59	1 950
A42J	1027	427.75	5.37	1949
A42H	1057	517.69	27.51	1901

The quaternary catchment A41E has a net area of 816 km^2 and an MAR of 5.29 million cubic meters (Mm^3). Runoff emanating from this quaternary catchment drains in a north-westerly direction via the existing drainage lines towards the Limpopo River.

Several pans have been identified within the quaternary with few drainages existing along the Limpopo River.

6.5 Topography and Slope

The Elevations in the A41E quaternary catchment range from 990 metres above mean sea level (mamsl) at the highest point to 830 mamsl at the lowest point. This is a small height difference (160 m) and symbolises a relatively flat topography.

The project area and surrounds are relatively flat. Within the demarcated project area, the topographical model indicates that the elevation decreases from 871 mamsl in the south-east to 858 mamsl in the north-west.

The project area has gentle slopes of less than 1° in a north-westerly direction towards the Limpopo River. (Topography and Visual Specialist Report, Digby Wells 2015).

6.6 Groundwater

Based on the Groundwater Assessment conducted the following can be concluded:

- The water table is approximately 25 m deep. All the activities during the construction phase are expected to take place above this and no impact on the groundwater is envisaged as a result.

6.7 Baseline Socio-Economic Setting

The Limpopo province is located in the north-eastern part of South Africa and borders Mozambique, Zimbabwe and Botswana. The province includes approximately 125 806 km^2

of land, or 10.23% of the land within South Africa and represents the median point compared to other provinces. Limpopo is divided into five district municipalities which include a total of 22 local municipalities. Of these, Limpopo Waterberg District Municipality (LWDM) is the largest district municipality, comprising 35.71% of the province (Wazimap, 2017). LWDM is divided into five local municipalities: Bela-Bela, Lephalale, Modimolle-Mookgophong, Mogalakwena and Thabazimbi. Lephalale Local Municipality is the largest of the local municipalities within Waterberg District Municipality.

The project area is located within Wards 3 and 4 and may potentially cross into Ward 13 (this depends on the chosen pipeline routing). The Project may also have impacts reaching beyond these municipal areas. These effects are considered within the secondary project area.

The ward boundaries within Lephalale Local Municipality have regularly changed since 2001. For example, the Project would have been located in Ward 2 if this study was undertaken in 2006 or 2009 and in Ward 1 in 2000. This has implications for the socio-economic data as the shapes, sizes and populations of the wards have changed and the past datasets aggregated to ward level are not readily compatible. The socio-economic baseline profile presented here focuses on the project area. Table 6-8 summarises these project areas.

Table 6-8: Primary and Secondary Project Areas

<table>
<tr><th>Primary Project Area</th><th colspan="3">Secondary Project Areas</th></tr>
<tr><td>Ward 3</td><td rowspan="3">Lephalale Local Municipality (LLM)</td><td rowspan="3">Limpopo Waterberg District Municipality (LWDM)</td><td rowspan="3">Limpopo Province</td></tr>
<tr><td>Ward 4</td></tr>
<tr><td>Ward 13</td></tr>
</table>

7 Land Use Plan

The final Land Use Plan (LUP) is essentially the end land use to which Temo would like to return the land affected by mining activities. The closure objectives set as part of the closure planning process aims to ensure that the final LUP is implemented and that the area is sustainable in the long-term from an environmental and social point of view.

7.1 Land Use

The present land use was identified using satellite imagery and visual observations during the site visit. The main land uses in the area are grassland for grazing, as illustrated in Figure 7-1. The land is confined almost exclusively to low intensity livestock grazing and game farming.

Land capability was determined by assessing a combination of soil, terrain and climate features. The land classes were identified based on soil forms, texture and fertility. The low rainfall of this area limits the utilization potential of the project area to low intensity grazing and wildlife conservation. The land capability class was identified as Class VI, as

summarised in Table 7-1. Land in Class VI has limitations that make land unsuited for cultivation and its use largely to pasture, wildlife and range. Limitations that cannot be corrected include severe erosion hazard and low water holding capacity.

Table 7-1: Land Capability Classification

Land Type	Land Capability Class	Agricultural Potential
Ae252	VI – Grazing	Low.
Ae257	VI – Grazing	Low.
Ah86	VI – Grazing	Low.
Bc44	VI – Grazing	Low.
Bd46	VI – Grazing	Low.

7.1 Proposed Future Land Use

The region is characterised by low rainfall which contributes to low natural arable agricultural potential. The predominant land use in this region is agriculture, dominated by grazing and game farming. The railway loop will be demolished and the area will be rehabilitated. The pipeline will either remain or be demolished. This will be confirmed closer to the project's end. The road diversion will remain post-closure. Refer to Figure 7-2 and Figure 7-3 below.

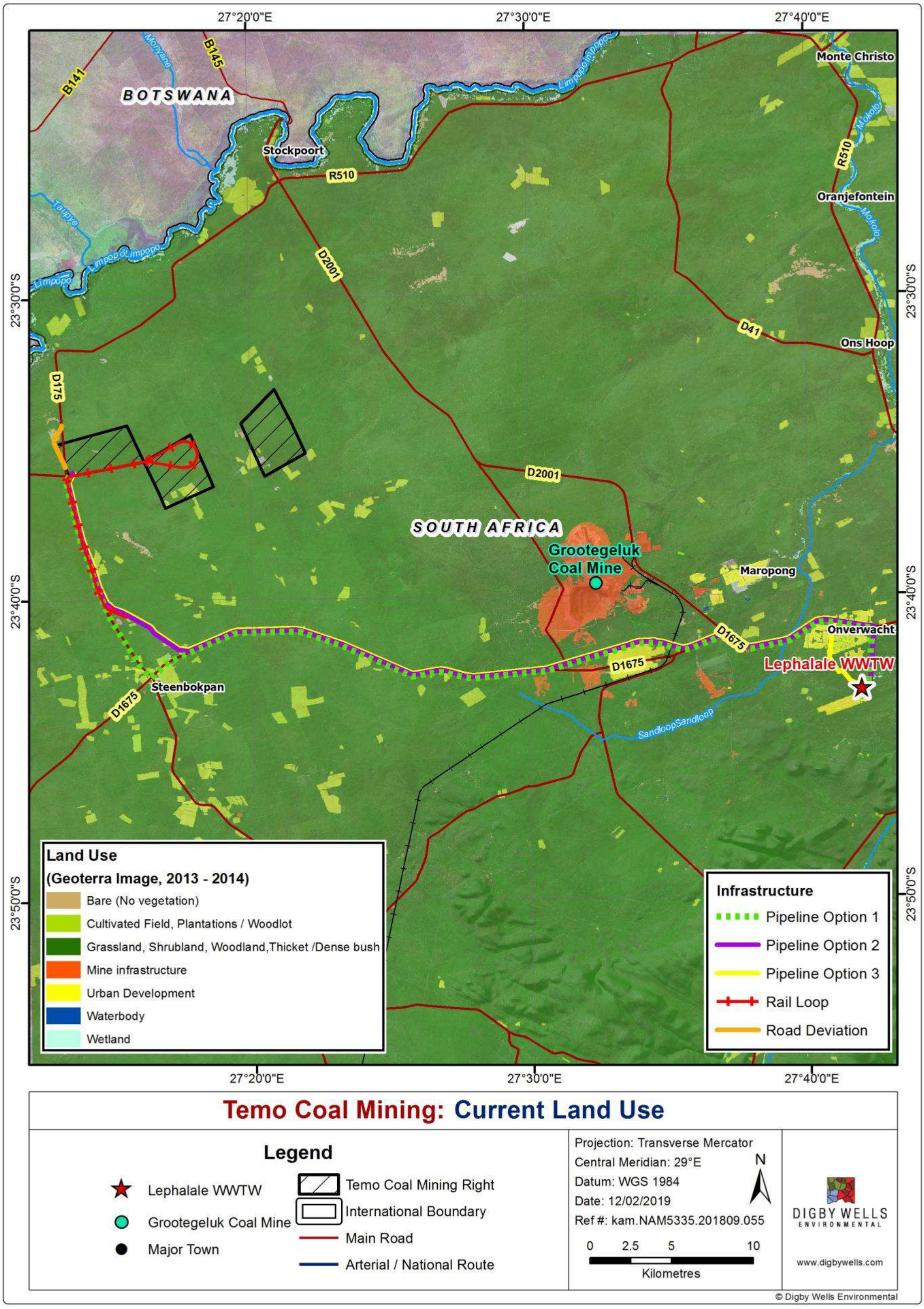


Figure 7-1: Current Land Use at Temo Coal

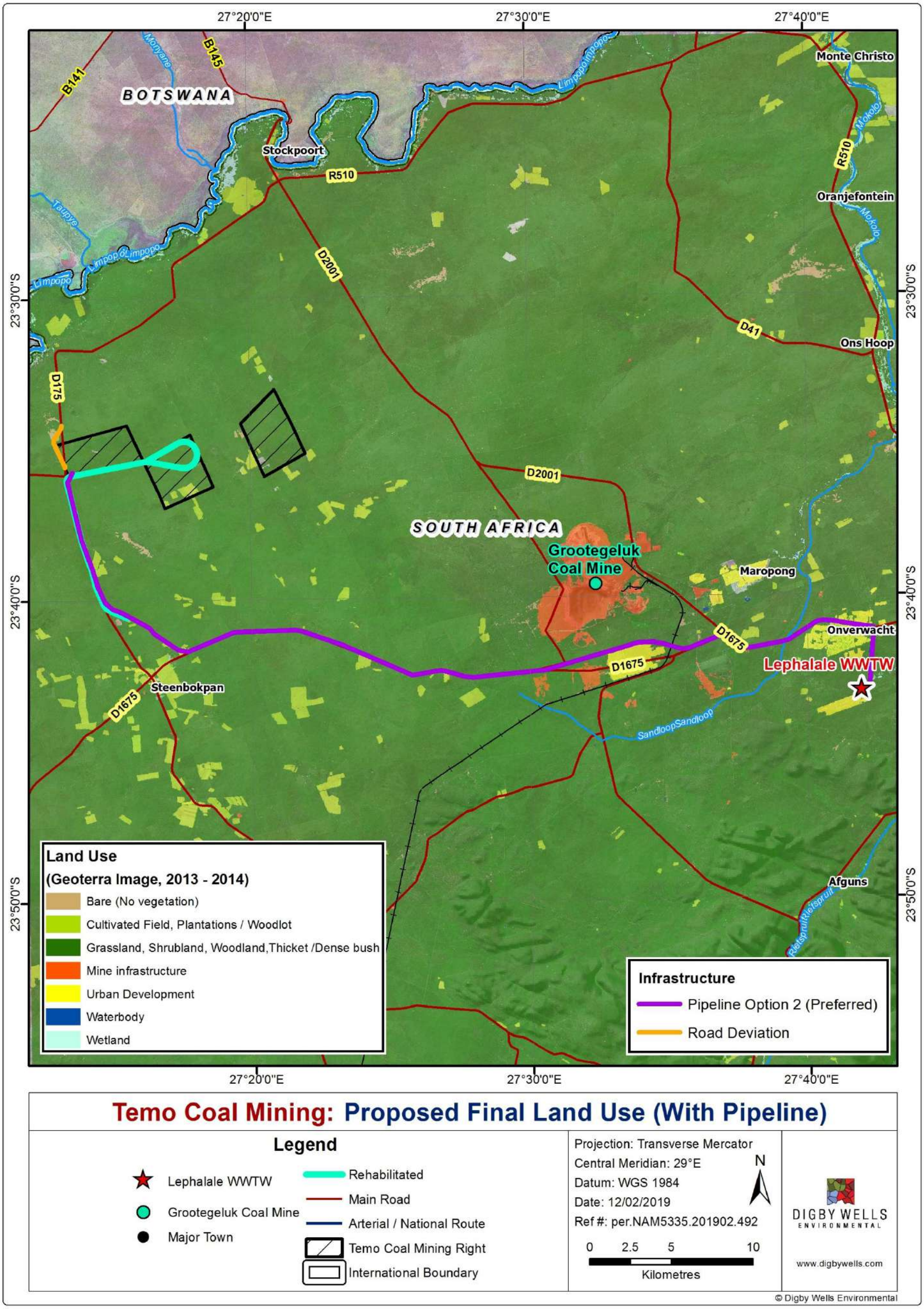


Figure 7-2: Proposed Future Land Use (With Pipeline)

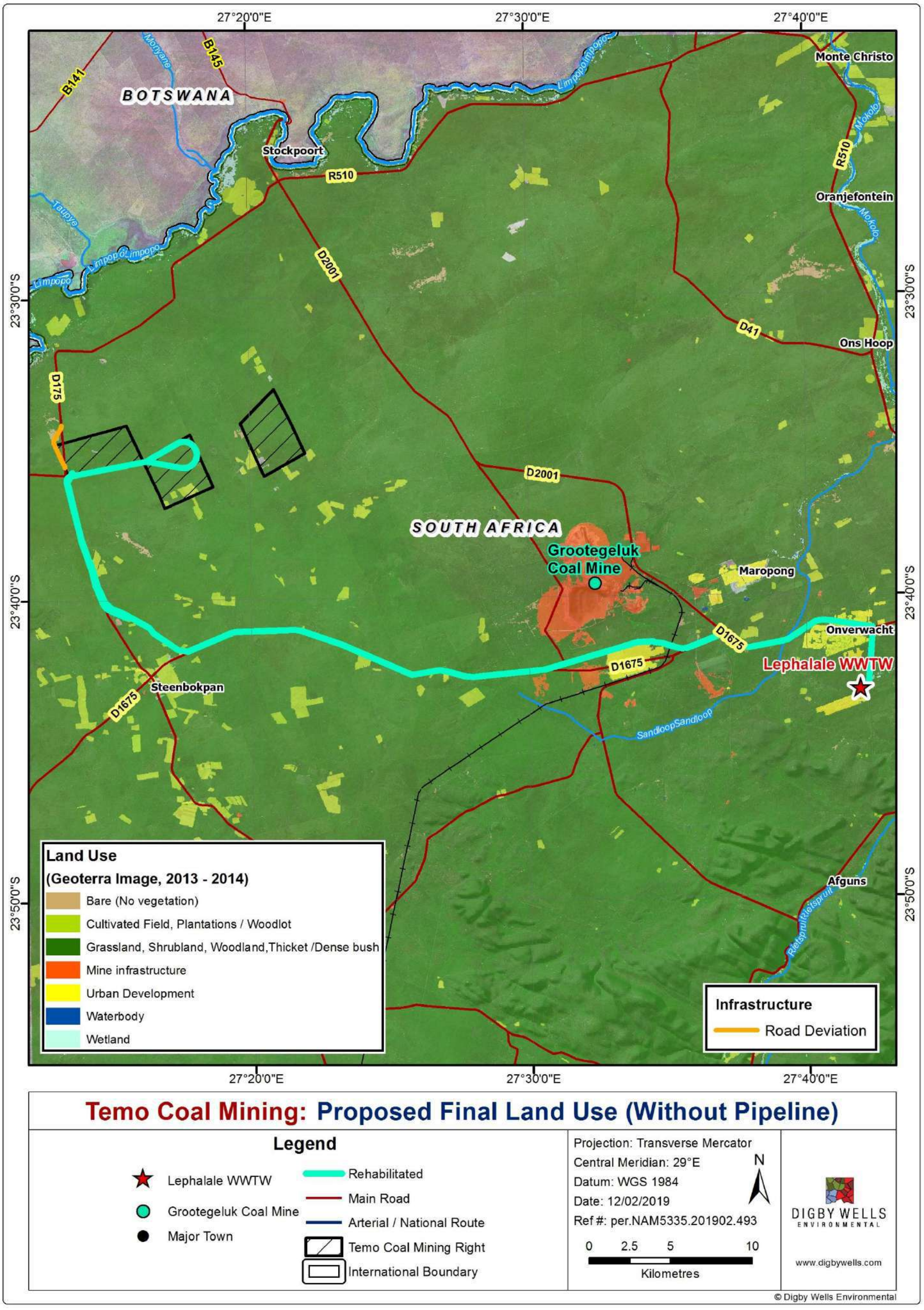


Figure 7-3: Proposed Future Land Use (Without Pipeline)

8 Closure Environmental Management Plan

The main aim in developing the RCP is to minimise and mitigate the impacts caused by mining activities and to restore land back to a satisfactory standard. It is best practice to develop the RCP as early as possible so as to ensure the optimal management of rehabilitation and closure issues that may arise (Pulles Howard & de Lange Inc., 2006). It is critical that a mine's RCP is defined and understood from before mining progresses and is complimentary to the objectives and goals set.

Table 8-1 below sets out the rehabilitation and closure actions required at the various areas related to the mine.

Table 8-1: Summary of Rehabilitation and Closure Actions

Target Area	Main Actions
Diversion of road D175	■ To remain after construction.
Proposed Rail Loop	■ Surfaces should be ripped to alleviate compaction; ■ Monitor and maintain vegetation establishment; and ■ Remove alien invasive vegetation.
Proposed Bulk Water Pipeline	■ Option to remove pipeline: ▪ General surface rehabilitation must involve the shaping of the surface topography to match the surrounding landscape, followed by ripping, adding topsoil and revegetating; ▪ During the process of shaping the landscape, drainage lines must be properly reinstated into the topography; and ▪ Any heaps of excess material also need to be removed, this all so that effective re-vegetation can take place.
	■ Option for pipeline to remain after construction: ▪ To remain after construction.

9 Monitoring and Maintenance

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the operational phase as well as during the progress of establishment of the desired final ecosystem.

The following items must be monitored continuously:

- Alignment of actual final topography to agreed planned landform;
- Depth of topsoil stripped and placed;

- Chemical, physical and biological status of replaced soil;
- Erosion status;
- Surface drainage systems and surface water quality;
- Groundwater quality at agreed locations;
- Vegetation basal cover;
- Vegetation species diversity;
- Faunal re-colonisation (Sherman and pitfall trapping); and
- Proportion of land that has been fully rehabilitated.

9.1 Final Topography

The topography that is achieved during rehabilitation should be monitored and compared to the planned topography. The final profile achieved should be acceptable in terms of the surface water drainage requirements and the end land use objectives.

9.2 Erosion

Erosion monitoring of rehabilitated areas should be undertaken and zones with excessive erosion should be identified. Erosion can either be quantified or the occurrence there-of simply recorded for the particular location. Soil erosion is a major environmental problem confronting land and water resources in South Africa. Although soil erosion is a natural process, it is often accelerated by human activities, for example by the clearing of vegetation, soil tillage or overgrazing.

You can monitor your soil with the Northern Rivers Soil Health Card, a set of ten straightforward visual tests using simple equipment, which will help you detect improvement or deterioration in your soil's condition over time. These tests are:

- Groundcover;
- Penetrometer;
- Infiltrometer;
- Diversity of soil life;
- Root development;
- Soil structure;
- Slaking or aggregate stability;
- Earthworm count;
- Soil pH; and
- Leaf colour

9.3 Surface Water

9.3.1 Drainage Systems

The functionality of the surface water drainage systems should be assessed on an annual basis. This must preferably be done after the first major rains of the season and then after any major storm. An assessment of these structures will ensure that the drainage on the recreated profile matches the rehabilitation plan as well as to detect early on when any drainage structures are not functioning efficiently. These can then be repaired or replaced before it causes significant erosion damage.

9.4 Vegetation Basal Cover

Basal cover refers to the proportion of ground at root level which is covered by vegetation and by the rooting portion of the cover plants. The line-transect (or the quadrat bridge) method can be used to establish sampling positions. A target of at least 15% basal cover should be set for fully established vegetation. It is important to note the difference between basal cover and canopy cover, shown in Figure 9-1.

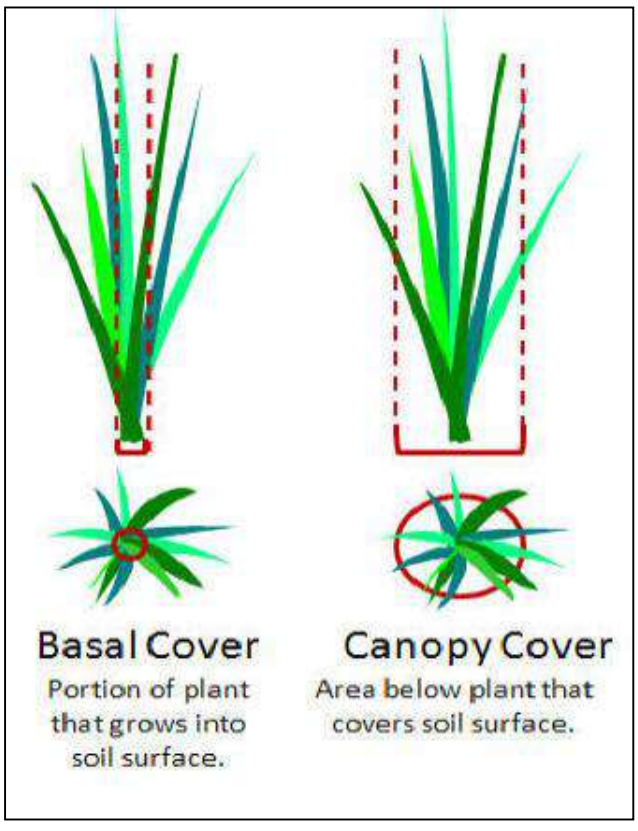


Figure 9-1: Diagram comparing Basal cover and Canopy cover[2]

[2](Image from Principles of Vegetation Measurement and Assessment and Ecological Monitoring & Analysis http://www.webpages.uidaho.edu/veg_measure/index.htm)

9.4.1 Vegetation Species

Biodiversity assessments and surveys must be undertaken by external experts to establish the full range of plants that have become established. Summer and winter samplings must be done during these assessments.

9.4.2 Alien Invasive Control Plan

Alien invasive species tend to out-compete the indigenous vegetation; this is due to the fact that they are vigorous growers that are adaptable and able to invade a wide range of ecological niches (Bromilow, 1995). They are tough, can withstand unfavourable conditions and are easily spread.

Invasive alien plant species are difficult to control. Methods should be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When performing the controlling methodology for weeds and invaders, damage to the environment must be limited to a minimum. The methodology must be performed for at least three growing seasons to ensure the seed bank is depleted. Continual monitoring will be needed for seeds that are likely to be blown in from adjacent areas.

There are a variety of control methods that can be used to manage invasive plants. These are explained separately below.

9.4.2.1 Prevention

Prevention, early detection and eradication of weed species is the most economical and effective means of invasive plant management. It is important to ensure new weed species or vegetative reproductive plant parts are not introduced into a new area.

9.4.2.2 Mechanical Control

Mechanical control usually refers to the mowing or mechanical cutting of an invasive plant infestation to limit seed production. With mowing, timing is essential. Invasive plants must be removed before the plants go to seed in order to be an effective method of control. Plants should be cut as close to the ground as possible and may have to be treated more than once in a growing season to achieve desired results.

9.4.2.3 Manual Control

Manual invasive plant control usually refers to hand-pulling or digging. Manual control works well for dealing with single plants or small infestations that can be eradicated with a small amount of labour. It is most effective if invasive plants are shallow rooted and the soil is loose or moist. One should be aware this type of control may not be effective for invasive plants that also reproduce by roots and rhizomes. In these instances, limited hand-pulling or digging may actually increase the size of the infestation.

9.4.2.4 Cultural Control / Competition

Cultural control and competition includes re-vegetating, irrigating or fertilizing to encourage the establishment of a healthy ground or crop cover to resist invasive plants. When natural vegetation or soil is disturbed, cultural control can be an effective tool in invasive plant management. Re-vegetated or intensively managed plant communities can offer competition for invasive plants. In some cases where invasive plant species are found in soils deficient in sulphur, fertilization of these sites can help to create competition of natural plant communities, or cultivated crops to decrease the invasive plant population (i.e. ox-eye daisy infestations).

Quit often, the removal of invasive plants results in exposed bare ground. In these cases, cultural control (i.e. re-vegetation) should be used as part of a long-term management strategy. Re-vegetation can assist in preventing the return of an invasive plant or the introduction of new invasive species in an area.

9.4.2.5 Chemical Control

Various herbicides are approved for treatment of invasive plants within British Columbia and, used properly, can be the most effective option for certain persistent invasive plants. The type of herbicide and application method will vary, depending on the target weed species and environmental considerations.

Large infestations, infestations near water, or infestations on steep slopes may be too costly or too environmentally sensitive to control by chemical means. In these situations, it is important to look at other management options. Also, if chemical control leaves a site bare, it is important to re-vegetate the site so that control is achieved over the long-term.

9.4.2.6 Biological Control

Another approach to biological controls is the inundative or bioherbicide method which usually involves native, naturally occurring pathogens applied in a manner that can cause death or significant damage to the target weed. Since indigenous pathogens are subject to natural controls, impacts much beyond the target plants are unlikely. Simply spraying cultures of the pathogen onto target weeds is not necessarily effective as conditions for infection are often very complex, involving the pathogen, the host and the environment. Additional treatments to the weed hosts to lower resistance to infection, e.g. through wounding or off-season treatment, may be necessary.

9.4.3 Alien Invasive Species Management

To manage alien invasive species the following must be done:

- Mechanical methods including tree felling, hand pulling & ring barking will be implemented;
- Chemical control methods including selective/ non-selective, contact/ systemic herbicides as per regulations will be implemented;

- Category 1, 2 & 3 of the CARA listed species will be target for eradication;
- Preventative measures must be undertaken within the project area where natural vegetation occurs to combat bush encroachment and invasion of alien species which may result in the deterioration of natural resources; and
- Regular monitoring of all sites must take place.

9.4.4 Additional Measures

The following additional measures are recommended to prevent the future introduction or spread of alien species, and to ensure the rehabilitation of transformed areas:

- There must be no planting of alien plants (e.g. black wattle, eucalyptus and pampas grass) anywhere within the project area;
- Annual surveys, aimed at updating the alien plant list and establishing and updating the invasive status of each of the alien species, must be carried out (can be done by Temo staff);
- The transportation of soils or other substrates infested with alien species must be strictly controlled; and
- It is considered essential that appropriate veld management (particularly appropriate grazing levels and burning frequencies) must be applied to areas of secondary indigenous vegetation (e.g. secondary grassland of historically cultivated areas), and especially the grassland and wetland vegetation of untransformed habitats. Appropriate grazing levels and burning frequencies will not only ensure that good vegetation condition and biodiversity levels are maintained, but will also serve to control the spread and increase in cover of palatable alien species such as *Paspalum dilatatum*.

10 Relinquishment Criteria

Relinquishment requires formal acceptance from the regulatory authority to ensure that all obligations associated with closure are achieved, prior to a closure certificate being issued. To achieve relinquishment, criteria need to be set, measured and met for all parties to understand what needs to be done to obtain a closure certificate. This provides all parties involved in the process a target that needs to be achieved and sets the standards that closure and rehabilitation are measured against. Table 10-1 provides the respective environmental relinquishment criteria.

Table 10-1: Environmental Relinquishment Criteria

Environmental Aspect	Closure criteria	Monitoring Requirement	Reporting Requirement
Biodiversity	Ensure establishment of vegetation has a basal cover of a reference site two years post-closure and that it is self-sustaining and can be measured over a five year period after closure, indicating that natural succession has occurred.	Bi-annual vegetation monitoring and rehabilitation monitoring	Vegetation Monitoring Reports.
Groundwater	Groundwater qualities after closure need to comply with the qualities as stipulated in the approved Water Use Licence (WUL) and the appropriate standards set by the Department of Water and Sanitation (DWS) and South African National Standards (SANS).	Quarterly groundwater monitoring for two years after closure.	Groundwater Monitoring Reports.
Surface Water	Surface water qualities after closure need to comply with the qualities as stipulated in the approved WUL and the appropriate standards set by the DWS and SANS.	Quarterly surface water monitoring for two years after closure.	Surface Water Monitoring Reports.
Social	Engagement with stakeholders and employees regarding closure related aspect and formulisation of a retrenchment and downscaling policy demonstrating training initiatives and skills development assisting in employees being upskilled, which would help individuals to seek for alternative employment at the time of closure.	Engagement, training and skills development policies during operational phase.	Records of correspondence, training matrices and records of training.
Air Quality	Dust, PM_{10} and $PM_{2.5}$ must comply with the minimum standards and limits as set by the NEM:AQA and applicable regulations and guidelines.	Monthly air quality monitoring during the decommissioning and rehabilitation phase.	Air Quality Monitoring Reports
Soil, Land Capability and Land Use	Post land use mining assessment to determine status of rehabilitated areas with respect to soil quality and that rehabilitated areas have been rehabilitated to an agreed upon land use. In addition to the above, inspections must be undertaken to identify areas of erosion and that erosion measures have been constructed.	Yearly soil chemistry and physical properties analysis during the rehabilitation phase. Daily soil erosion monitoring during the rehabilitation phase.	Soil Quality and Erosion Monitoring Reports.
Safety	Ensure dangerous mining areas, such as open quarry areas, have been appropriately bunded and appropriate signage erected.	Visual inspections and sign off report by a registered engineer.	Signed off report by registered engineer.

11 Preliminary Closure Schedule

The closure schedule addresses the timing of rehabilitation and closure activities performed during the decommissioning and post-closure phases of Temo. The schedule presented is high level and identifies the key activities Temo will conduct during the decommissioning and post-closure phases. The closure schedule addresses the timing of rehabilitation and closure activities performed during the decommissioning and post-closure phases of Temo. The schedule presented is high level and identifies the key activities Temo will conduct during the decommissioning and post closure phases. The schedule is depicted in Figure 11-1 below:

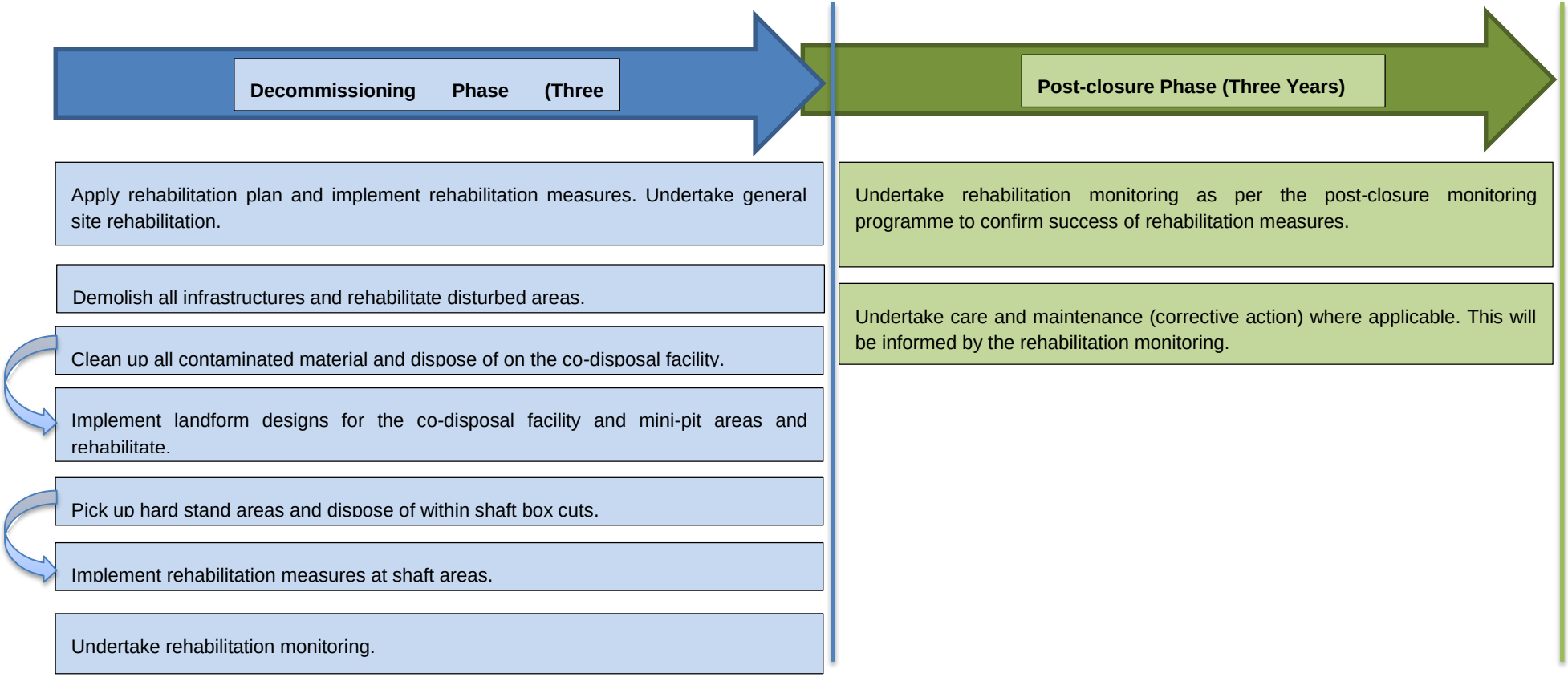


Figure 11-1: Closure Schedule

12 Organisational Capacity

Human resource programmes and annual financial provisions for Temo, over a five year period, are provided in the EMP. The EMP covers:

- Environmental Awareness Plan, which includes;
  - Shift meetings (once a month);
  - Divisional meetings (monthly);
  - Induction courses (annually);
  - Open days (ad hoc); and
  - Environmental awareness courses (*ad hoc*).
- Human Resource Development programme, which includes;
  - Skills development;
  - Career progression plans;
  - Bursaries, and
  - Employment equity.
- Local Economic Development programme, which includes;
  - Infrastructure and poverty alleviation projects;
  - Measures to improve nutrition and living conditions;
  - Procurement progression plan; and
  - Process for the management of downscaling and retrenchment towards the end of the project life, which includes; and
  - Establishment of a future forum.
- Mechanisms to save jobs, provide alternative solutions and ameliorate negative social and economic impacts.

12.1 Training and Capacity Building

Training requirements for each employee must be planned as follows:

- The departmental managers are responsible for identifying personnel whose work directly impacts the health, safety, quality, and environment;
- The Environmental and Risk Managers are responsible for identifying Safety, Health, Environment and Quality (SHEQ) training needs of all persons working for or on behalf of the company;
- A training matrix is used to schedule training for all persons working for or on behalf of the operation;

- The Organisational Performance department processes, analyses and co-ordinates the required training schedule as per the training matrix for each person working for or on behalf of the operation;
- The training programmes for all persons working for or on behalf of the operation will at least cover, but not necessarily be limited to:
    - Conformance to policies, procedures and work instructions;
    - Emergency procedures and response;
    - Non-conformance reporting;
    - Legislation requirements for site (management and supervisory personnel) work place area or tasks (operational personnel);
    - Knowledge of hazards and impacts (actual and potential) in relevant areas for relevant activities or tasks;
    - Required measuring and monitoring to ensure compliance;
    - Handling, use and disposal of hazardous chemicals in relevant areas/functions;
    - Competence regarding health, safety, quality, environmental, and railway safety issues pertaining to specific tasks;
    - General SHEQ awareness;
    - Contractors;
    - Visitors; and
    - ISO 14001:2004 and ISO 9001/2000.

13 Financial Provision

13.1 Financial Provision Model

Digby Wells calculated the closure cost associated with the proposed infrastructure additions in accordance with the legislative requirements presented in Section 5 above. The closure cost assessment model was compiled using Microsoft Excel, and comprises of the following:

- An input sheet, containing measurements of the infrastructure;
- A standard rate sheet; and
- A summary sheet, which summarizes the costs for closure.

This model calculates the cost of demolishing, removing and rehabilitating each component of the mining area infrastructure. For ease of reference, the estimates are provided for the components listed below, detailing the infrastructure contained within them[3]:

- Rail Loop;
- Road Deviation; and
- Pipeline

13.2 Rates

The rates used were from the Digby Wells rates data base, these rates were updated by quotes from demolition and civil contractors and professionals wherever possible. The rate formulations of Digby Wells take into consideration the total labour costs, plant costs, fuel costs and construction costs thus providing a more accurate, defendable rate.

13.3 Infrastructure measurement

The infrastructure areas and other areas affected by mining activities were measured from plans provided by the client. All measured areas and infrastructure were mapped using Geographic Information System (GIS) software and the overall Temo ancillary infrastructure layout is attached in Appendix A.

Digby Wells made the following assumptions and noted limitations as part of the closure cost assessments, as reflected in Table 13-1 below:

Table 13-1: Assumptions and Limitations

Description	Consequence
Assumptions	
General	
The calculations do not account for any value recovered from sale of plant, steel or other material.	Value recovered from sale of the mine`s operational infrastructure can be used for any other purpose.
The Temo Mine's Life of Mine is scheduled until 2043.	A Life of Mine (LoM) assessment has been undertaken for the purpose of this assessment. The closure cost estimate, however, must be seen as a living document to be updated annually.

[3] The infrastructure and other areas which will be affected by mining activities were measured from plans provided by Temo Mine. All measured areas and infrastructure were mapped using GIS software and a reference and layout plan is attached in Appendix A

Description	Consequence
The closure cost assessment is based on the latest infrastructure layout plans and information received from Temo.	Any change (addition or removal) in the infrastructure layout plans or information will have implications on the closure cost estimate, and the assessment must be updated accordingly.
Methodologies for calculation include both the DMR rules-based approach, and the Financial Provision Regulations (2015) approach.	The DMR currently still accepts the DMR methodology for calculating financial provisioning; however by 2020 GN R1147 must be adhered to. The DMR calculation is included in this report for comparative purposes, although at the time of construction and / or operation, the mandatory time limit for compliance to the NEMA regulations will likely have passed, making this methodology compulsory.
General surface rehabilitation must involve the shaping of the surface topography to match the surrounding landscape where necessary. During the process of shaping the landscape and drainage lines must be properly reinstated into the topography. Any heaps of excess material also need to be removed so that effective revegetation can occur; Topsoil should be placed to a thickness of 0.15 m on the shaped and ripped footprints; and Topsoiled areas should be revegetated to achieve the final land use of Temo Mine.	Ability to effectively implement the final Land Use.
The Financial Provision Regulations (2015) estimate does not include VAT.	N/A
The DMR methodology includes 15 % VAT as required by the DMRs rules based method.	N/A
Digby Wells allowed for a contingency of 10% on the closure cost assessments as required by the DMR guideline document.	Price fluctuations with regard to plant hire, fuel prices and possible omissions from the assessment have been accounted for.
Digby Wells included a 12% allowance for project management fees at closure as required by the DMR guideline document.	The costs required to manage the closure and rehabilitation phase as well as provision for personnel to monitor and maintain the rehabilitated areas after closure has been account for.

Description	Consequence
Rail Loop	
At LoM it is assumed that the rail loop and extension will be decommissioned and demolished, and appropriately rehabilitated. The rail loop has been measured at 22,241.10 m in length, and assumed to have a 1.5 m wide footprint.	Ability to effectively implement the final Land Use.
For purposes of the DMR guideline assessment, it is assumed the railway is electrified.	N/A
Pipeline	
Digby Wells calculated costs assuming the pipeline is decommissioned and rehabilitated at closure, and where it is set to remain post-closure. The pipeline is assumed to be 0.35 m in width, covering a distance of 62,525 m, and is assumed to be supported by concrete plinths occurring at 5 m intervals over the distance of the pipeline.	Upon the decision of post-closure management of the pipeline (i.e. remove or remain) by Temo and relevant authorities, the closure cost assessment must be updated accordingly.
For purposes of the DMR guidelines assessment, it is assumed the pipeline is made from steel, and is considered as processing / plant infrastructure.	N/A
Monitoring and Maintenance	
Vegetation monitoring and maintenance on rehabilitated areas is assumed to take place for three years after closure.	Establish sustainable vegetation on rehabilitated area and early detection of, and early corrective measures on, areas that are failing to establish vegetation.
Digby Wells included the costs for travel in the monitoring and maintenance costs in the GN R1147 methodology.	N/A
Limitations	
No due diligence was undertaken to determine Temo's extent of responsibility.	Areas outside of those specified in this closure cost assessment report may influence the accuracy of the presented cost estimate.
No engineering drawings or designs were provided, hence Digby Wells based the calculation on plausible assumptions.	The assessment should be updated once these are made available to ensure a most accurate costing.

13.4 Calculation Summary

The closure cost estimate presented below was calculated to align with GN R1147. The estimated closure cost for the two scenarios are presented in Table 13-2 below.

Table 13-2: Summary of Cost Estimates based on GN R1147

	Digby Wells Environmental	
	Temo Coal Mining (Pty) Ltd, Temo Coal - LP30/5/1/2/2/199MR (Ancillary Infrastructure), NAM5339 Revision: 0	
Area and Description	**End of life 2043**	
Infrastructure and Rehabilitation	**Scenario 1: Pipeline and Railway Removed Post-Closure**	**Scenario 2: Pipeline Remains Post Closure, Railway Removed**
Area 1: Rail Loop Extension	R5,856,858	R5,856,858
Area 2: Pipeline	R6,155,463	R74,554
Sub-total	**R12,012,321**	**R5,931,413**
Monitoring and Maintenance		
Monitoring Costs (Vegetation)	R24,811	R23,676
Maintenance Costs (Vegetation)	R898,554	R821,562
Sub-total	**R923,365**	**R845,238**
Project Management (12%)	R1,441,479	R711,770
Contingency (10%)	R1,201,232	R593,141
GRAND TOTAL (Excl. VAT)	**R15,578,397**	**R8,081,561**

14 Post-Closure Monitoring

The management measures for the post closure phase at specific areas of Temo are provided in Table 14-1 and primarily consist of environmental 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; however, at present, it has been assumed that post closure monitoring will not continue for more than two years. 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 purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation must be carefully monitored during the operational phase as well as during the progress of establishment of the desired final land use.

Table 14-1: Post-Closure Monitoring Programme

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
Soil Management				
Soil fertility	▪ Undertake a visual assessment and delineate areas where poor vegetation growth has occurred; ▪ Submit soil samples to an accredit soil laboratory to conduct soil fertility analysis.	Yearly until soil fertility supports the final land use or for at least two years post-closure	▪ Soil analysis results comply with remediation targets at a 95 percentile level; and ▪ Self-sustaining vegetation establishment.	▪ Apply amelioration where required as informed by sampling undertaken.
Erosion	▪ Conduct a visual assessment to determine areas of potential erosion; and ▪ Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site	Twice yearly for at least two years post-closure.	▪ No evidence of significant erosion; and ▪ Good vegetation cover and species composition.	As required: ▪ Re-shape areas to ensure that they are free-draining; ▪ Establish vegetation on bare patches; and ▪ Repair and stabilisation of erosion gullies and sheet erosion.
Post-mining end land use	▪ Assess activities completed, as well as legal and related documentation completed and signed-off; and ▪ Ensure rehabilitation measures are aligned to the LUP.	Once off, at closure.	▪ Area has been rehabilitated to an aesthetic quality not to compromise potential tourism; ▪ Transfer to third party operator has taken place once the area has been proven to be safe for redevelopment; ▪ Legal and zoning issues have been addressed; and ▪ Vegetation re-establishment, cover and composition are sustainable.	▪ Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
Topography	▪ Conduct a visual assessment to determine areas of potential erosion; and ▪ Undertake regular digital surveys of rehabilitated areas to confirm that final topography is aligned with landform designs.	During rehabilitation phase	▪ No evidence of significant erosion. ▪ No evidence of water ponding on rehabilitated areas. ▪ The final profile achieved must be acceptable in terms of surface water drainage requirements and the end land use objectives.	As required: ▪ Re-shape areas to ensure that they are free-draining; and ▪ Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
Vegetation establishment	▪ Determine whether re-established vegetation communities are on a trajectory of achieving a stable self-sustaining community dominated by species typical of the climax-species present in the adjacent areas: ▪ Inspect rehabilitated areas to assess vegetation establishment and provide for early detection of erosion in recently planted/seeded areas (monthly); ▪ Undertake fixed point photography at specific points at the rehabilitated sites to obtain a long term directly comparable method of determining changes in the landscape; and ▪ Conduct evaluation of rehabilitated areas by means of field inspections. During these assessments measurement of growth performance and species abundance will be carried out to determine: i. Plant basal cover and species abundance in the grassed areas. Estimates of vegetation canopy and ground cover as well as height; ii. Distribution, growth and survival of woody species; iii. Dominant plant species (woody and herbaceous); iv. Presence of exotic invasive species, and degree of encroachment; v. Browsing or grazing intensity; vi. Notes regarding erosion, such as, type, severity, degree of sediment build-up; and vii. Species composition and richness.	Yearly for at least two years post-closure.	▪ Limited to no erosion; and ▪ Self-sustaining vegetation ecosystem.	As required: ▪ Re-vegetate poorly established rehabilitated areas; ▪ Re-seed bare patches; and ▪ Apply additional fertiliser and/or organic matter, depending on the condition of the vegetation and the initial organic material application.
Invasive alien species	▪ Visually inspect areas where invasive species have been previously eradicated and areas prone to invasive species (e.g. eroded/degraded areas, along drainage lines, etc.); and ▪ Undertake surveys on relevant sites where bush encroachment has previously been identified to determine the status quo of invasive vegetation.	Yearly for at least two years post-closure.	▪ Limit and/or prevent identified invader species establishing; ▪ Minimise extended threat to ecosystems, habitats or other species; ▪ Increase the potential for natural systems to deliver goods and services; and ▪ Minimise economic or environmental harm or harm to human health.	▪ Revisit mitigation measures; and ▪ Continue control and management.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
General site status	▪ Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat and tidy, and that no health or safety risks exist on site.	Once-off following implementation of rehabilitation measures.	▪ Waste/rubble free sites.	As required: ▪ Clear remnant rubble and dispose of in open quarry as backfill material.
Surface Water Quantity	▪ Visually assess the functionality of the surface water drainage systems feeding surface water runoff from rehabilitated areas. ▪ Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site.	After the first major rains of the season and after any major storm.	▪ No evidence of significant erosion; and ▪ No evidence of water ponding on rehabilitated areas.	As required: ▪ Re-shape areas to ensure that they are free-draining; and ▪ Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
Surface Water and Groundwater Quality	▪ Sample and monitor surface and groundwater quality.	Quarterly for at least two years post-closure.	▪ Water quality results within ranges of the approved WUL and/or DWS standards.	As required: ▪ Increase monitoring frequency and detect point sources. ▪ Optimise monitoring plan if needed.
Groundwater Quantity	▪ Sample and monitor groundwater levels in the vicinity of the mine.	Quarterly for at least two years post-closure.	▪ No evidence of dewatering and lowering of water tables within the vicinity of the mine.	As required: ▪ Increase monitoring frequency and detect point sources. ▪ Optimise monitoring plan if needed.

14.1 Motivation for Amendments

No amendments are made at this stage of reporting.

15 Stakeholder Participation

No stakeholder issues or comments have informed this RCP as it has not been presented for comments at this stage of the project.

16 Recommendations

The following is recommended to assist Temo in successfully carrying out the rehabilitation and closure:

- All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel;
- Ensure that as far as possible all decommissioned infrastructures are placed outside of freshwater areas and their associated 32 m zone of regulation;
- Unnecessary crossing of the freshwater features and their associated buffers should not take place and the substrate conditions of the ephemeral drainage lines and downstream stream connectivity must be maintained;
- Wherever possible, restrict decommissioning activities to the drier winter months to avoid sedimentation of the freshwater resources further downstream;
- Limit the footprint area of the decommissioning activities to what is absolutely essential to minimise impacts as a result of disturbances to soils, compaction of soils and loss of natural vegetation;
- Ensure that sound environmental management is in place during the proposed decommissioning phase;
- No material may be dumped or stockpiled within any freshwater areas (or the buffers) in the vicinity of the proposed decommissioning footprint;
- No vehicles or heavy machinery may be allowed to drive indiscriminately within any freshwater areas and their associated zones of regulation. All vehicles must remain on demarcated roads and within the decommissioning area footprint;
- All vehicles must be regularly inspected for leaks;
- Re-fuelling must take place on a sealed surface area away from freshwater systems to prevent ingress of hydrocarbons into topsoil;
- All spills should be immediately cleaned up and treated accordingly;
- Appropriate sanitary facilities must be provided for the duration of the decommissioning activities and all waste must be removed to an appropriate waste facility;

- All erosion noted within the decommissioning area footprint should be remedied immediately and included as part of the ongoing rehabilitation plan;
- If it is absolutely unavoidable that any of the freshwater areas present will be affected, disturbance must be minimised and suitably rehabilitated;
- Permit only essential personnel within the zones of regulation for all freshwater features identified;
- Ensure that no incision and canalisation of the freshwater resources present takes place as a result of the proposed decommissioning activities;
- A suitable AIP control programme must be put in place for both the decommissioning and closure phases so as to prevent further encroachment as a result of disturbance to the surrounding terrestrial zones; and
- Monitor all systems for erosion and incision.

17 References

Beukes, J., Mohr-Swart, M., & Tanner, P. (2007). *Guidelines for the Rehabilitation of Mined Land.* Johannesburg: Chamber of Mines of South Africa/Coaltech.

Department of Water Affairs and Forestry. (2007). *Best Practice Guideline H4: Water .*

DMP & EPA. (2015). *Guidelines for Preparing Mine Closure Plans.* Australia: Department of Mines and Petroleum (DMP) and the Environmental Protection Authority (EPA). Retrieved August 22, 2018, from http://www.dmp.wa.gov.au/Documents/Environment/ENV-MEB-121.pdf

Ellery, W. N., Grenfell, M., Grenfell, S., Kotza, D. C., McCarthy, T. S., Tooth, S., . . . Ramsey, L. (2009). *WET-Origins: Controls on the distribution and dynamics of wetlands in South Africa. WRC Report No TT 334/08, Water Research Commission.* Pretoria: WET-Origins.

Goudie, A., & Thomas, C. (1985). *Pans in southern Africa with particular reference to South Africa and Zimbabwe. Zeitchrift fur Geomorphologie NF 29: 1-19.*

Government Gazette. (1998). *National Environmental Management Act.* Cape Town: Republic of South Africa Government Gazette.

Hardwick, S., & Ismail, A. (2019). *Environmental Authorisation for the Temo Mine Proposed Rail, Road and Pipeline Development, Limpopo Province.* Bryanston: Digby Wells Environmental.

LLM. (2018). *Integrated Development Plan 2018/19.* Lephalale: Lephalale Local Municipality.

Marshall, T., & Harmse, J. (1992). A review of the origin and propagation of pans. *SA Geographer , 19*, 9-21.

Moripe, L., & Postma, B. (2009). *Environmental Management Programme (Including Environmental Impact Assessment) for the Mini-Pits Project at Tshikondeni.* Clean Stream Environmental Services.

Nana, M., Roy, K., & Bremner, K. (2019). *Environmental Impact Assessment and Water Use Licence for the Proposed Development of a Road Diversion, Rail Loop and Pipeline for Temo Coal Mine (Pty) Ltd, Limpopo Province.* Bryanston: Digby Wells Environmental.

Nel, D., Colvin, C., Makuwerere , C., & Burns, A. (2012). *Financial Provisions for Rehabilitation and Closure in South African Mining: Discussion Document on Challenges and Recommended Improvements (Summary).* WWF-SA Report Series.

Open Up. (2017, May 12). *Wazimap updated with 2016 Municipal Election Results and new municipalities*. Retrieved January 11, 2019, from Open Up: https://openup.org.za/articles/wazimap-2016-update.html

Pulles Howard & de Lange Inc. (2006). *Storm Water Management: Best Practice Guidelines for Water Resource Protection in the South African Mining Industry.* Johannesburg: Department: Water Affairs and Forestry.

Regulation Gazette. (2015). *Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations.* Department of Environmental Affairs.

Roy, K., Coutts, B., & van Aardt, R. (2016). *Namane Generation Independent Power Producer and Transmission Line Project, Lephalale, Limpopo - Conceptual Rehabilitation Plan and Closure Cost Assessment.* Bryanston: Digby Wells Environmental.

Statistics South Africa. (2011). *Statistics by Place*. Retrieved January 11, 2019, from http://www.statssa.gov.za/?page_id=964

Wazimap. (2017). *Wazimap*. Retrieved January 11, 2019, from Profiles: Province North West: https://wazimap.co.za/

WDM. (2018). *2018/19 Integrated Development Plan.* Modimolle: Waterberg District Municipality.

WRC. (2015). *Water resources of South Africa 2012 study.* Pretoria: Water Research Commission.

Appendix A: Financial Provision and Associated Plans

DIGBY WELLS
ENVIRONMENTAL

Temo Coal Mine - Road Diversion, Rail Loop and Pipeline, Limpopo Province

Closure Cost Assessment Report

Project Number:

NAM5335

Prepared for:

Temo Coal Mining (Pty) Limited

15 February 2019

Digby Wells and Associates (South Africa) (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 11 069 6801, info@digbywells.com, www.digbywells.com

This document has been prepared by Digby Wells Environmental.

Report Type:	**Closure Cost Assessment Report**
Project Name:	**Temo Coal Mine - Road Diversion, Rail Loop and Pipeline, Limpopo Province**
Project Code:	**NAM5335**

Name	Responsibility	Signature	Date
Adrienne Rall	Report Writer		February 2019
Michelle van Niekerk	First Review		February 2019
Leon Ellis	Senior Review		February 2019
Sanusha Govender	Project Manager		February 2019

DECLARATION OF INDEPENDENCE

Digby Wells and Associates (South Africa) (Pty) Ltd

Contact person: Adrienne Rall

Digby Wells House
48 Grosvenor Road
Turnberry Office Park, Bryanston
2191

Tel: 011 789 9495
Fax: 011 069 6801
E-mail: adrienne.rall@digbywells.com

I, Adrienne Rall, as duly authorised representative of Digby Wells and Associates (South Africa) (Pty) Ltd., hereby confirm my independence (as well as that of Digby Wells and Associates (South Africa) (Pty) Ltd.) and declare that neither I nor Digby Wells and Associates (South Africa) (Pty) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of Temo Coal (Pty) Limited, other than fair remuneration for work performed, specifically in connection with the Temo Coal (Pty) Limited Project.

_____

Full name:	Adrienne Rall
Title/ Position:	Junior Mine Closure Consultant
Qualification(s):	BSc (Hons) Environmental Water Management
Experience (years):	2 years

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1 Introduction

Temo Coal Mine Limited (Pty) Limited (hereinafter Temo) has appointed Digby Wells Environmental (hereinafter Digby Wells) to assist with the application for Environmental Authorisation for listed activities which are ancillary to Temo Coal Mine's (hereinafter Temo Mine) existing Mining Right, authorised by the Department of Mineral Resources (DMR) in September 2013 (LP 30/5/1/2/2/199 MR). The Project was also authorised in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment (EIA) Regulations thereunder, dated 18 June 2010 (which have been since been repealed).

Contained herein is the closure cost assessment, compiled in accordance with the requirements of the NEMA, as amended, and associated Financial Provisioning Regulations, 2015 (Government Notice No. 1147 published in GG 39425 on 20 November 2015) (GN R1147).

1.1 Project Description

This report was compiled in support of the application for the construction of infrastructure ancillary to the Temo Mine, specifically, the proposed construction of a road diversion, rail loop and pipeline. This infrastructure is required for the continuous operations of Temo Mine, however, it does not serve to include or assess the infrastructure and disturbance forming part of the original environmental authorisations of Temo Mine.

As such, Temo proposes to divert a municipal road around the approved Mining Right area for mining to proceed efficiently which will remain post-closure, as well as construct a rail loop for transportation aiding in logistical performance. In addition to the rail loop and road diversion, a pipeline is proposed to be constructed to transport water from the municipally-owned Lephalale Waste Water Treatment Works (WWTW) to Temo Mine. For clarification, the maps of the planned activities are displayed in Appendix A of this report.

At present, the status of the pipeline post-closure has not been confirmed (i.e. will it be removed or remain in place). Digby Wells has therefore included two alternative costing scenarios in the assessment, where the pipeline is decommissioned, and alternatively, where it remains post-closure (the railway is removed in both instances):

- Scenario 1: Pipeline and Railway Removed Post-Closure; and
- Scenario 2: Pipeline Remains Post-Closure, Railway removed.

1.2 Project Location

Table 1-1 presents a summary of the pertinent location details for Temo Mine.

Table 1-1: Summary of Project Location Details

Province		Limpopo		
Magisterial District		▪ Lephalale Magisterial District ▪ Ellisras Magisterial District		
District Municipality		Waterberg District Municipality		
Local Municipality		Lephalale Local Municipality		
Nearest Town		▪ 60 km west of Lephalale ▪ 4 km south of Steenbokpan Settlement		
Property Name and Number	**Rail Extension**	▪ Verloren Valey 246: RE ▪ Duikerpan 249:RE:RE ▪ Swelpan 24:RE ▪ Kleinpan 269:RE ▪ Wildebeesvlakte 268:RE ▪ Groote-Zwart-Buld 290:RE		
	Pipeline	▪ Draai Om 244: Re ▪ Swelpan 245: Re ▪ Verloren Valey 246:Re ▪ Nieuw Holland 247:Re ▪ Wildebeestvlakte 268:1 ▪ Kleinpan 269 :Re ▪ Houwhoek 270:Re ▪ Groot-Zwart-Bult 290:Re ▪ Grootdoorn 292:Re,1,2 ▪ Theunispan 293:Re/19,20,22, 25 ▪ Vangpan 294:Re & 1	▪ Steenbokpan 295:Re,1&3 ▪ Slangkop 296:2 ▪ Zandbult 300 Re ▪ Loopleegte 302:2 and 3 ▪ Vetleegte 304:Re ▪ Vaalpensloop 313:1 ▪ Hooikraal 315:Re ▪ Vergulde Helm 321:Re ▪ Hieromtrent 460:Re ▪ Turfvlakte 463:Re ▪ Waterkloof 502:4	▪ Waterkloof 502:Re/53,57,149,1 58,165, ▪ Onverwacht 503:Re,3,17,28,30, ▪ Groothoek 504:Re ▪ Eendracht 505:Re ▪ Altoostyd 506:Re ▪ Hanglip 508:1,3,5,9,10 ▪ Naauw Ontkomen 509 :Re &1 ▪ Paarl 522:Re &1 ▪ Schaapplaats 524:Re/23,25,26,27, 37, ▪ Eenzaamheid 687:Re & 1 ▪ Pontes Estates 712:Re ▪ Pontes Estate 744:Re
GPS Co-ordinates		23° 35' 14.631" South		

(relative centre point of study area)	27° 17' 37.788" East

2 Terms of Reference

Temo appointed Digby Wells to complete the necessary Scope of Work (SoW) to comply with the requirements encapsulated in the National South African regulatory framework, specifically the Financial Provision Regulations (2015), described in more detail in Section 3.

Additionally, Digby Wells compiled a cost assessment utilising the methodology as set out in the "Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine" (DMR, 2005).

3 Legislative Framework

Section 24P of the NEMA requires the holder of a mining right make financial provision for rehabilitation of negative environmental impacts. This is regulated by the Financial Provision Regulations (2015), of which Regulation 11 requires a Mining Right holder determine the closure liability through detailed itemisation of all activities and costs. These calculations must be based on the actual costs of implementation of the measures required for:

- Annual rehabilitation as reflected in the Annual Rehabilitation Plan (ARP) as per the minimum content prescribed by Appendix 3;
- Final rehabilitation, decommissioning and closure as reflected in the Rehabilitation, Decommissioning and Closure Plan (RCP) as per the minimum content prescribed by Appendix 4; and
- The remediation of latent or residual environmental impacts including but not limited to the pumping and treatment of polluted or extraneous water, as reflected in an Environmental Risk Report (ERR), as per the requirements of Appendix 5.

Because the proposed activities outlined in Sections 1.1 have not been granted the respective authorisations at the time of compiling this report, only the RCP and hence closure cost assessment are required presently.

4 Closure Cost Methodology

The GN R 1147 and the DMR methodologies are discussed separately below.

4.1 GN R1147

4.1.1 Financial Provision Model

Digby Wells calculated the closure cost associated with the proposed infrastructure additions in accordance with the legislative requirements presented in Section **Error! Reference source not found.** above. The closure cost assessment model was compiled using Microsoft Excel, and comprises of the following:

- An input sheet, containing measurements of the infrastructure;
- A standard rate sheet; and
- A summary sheet, which summarizes the costs for closure.

This model calculates the cost of demolishing, removing and rehabilitating each component of the mining area infrastructure. For ease of reference, the estimates are provided for the components listed below, detailing the infrastructure contained within them[1]:

- Rail Loop;
- Road Deviation; and
- Pipeline

4.1.2 Rates

The rates used were from the Digby Wells rates data base, these rates were updated by quotes from demolition and civil contractors and professionals wherever possible. The rate formulations of Digby Wells take into consideration the total labour costs, plant costs, fuel costs and construction costs thus providing a more accurate, defendable rate.

4.1.3 Infrastructure measurement

The infrastructure areas and other areas affected by mining activities were measured from plans provided by the client. All measured areas and infrastructure were mapped using GIS software and the overall Temo Mine ancillary infrastructure layout is attached in Appendix A.

4.2 DMR Methodology

In addition to the calculation based on GN R1147, Digby Wells included a calculation utilising the DMR methodology, as mentioned in Section 2. Although currently accepted, this methodology is not advised, as mandatory compliance to the Financial Provision Regulations (2015) as encapsulated in the NEMA, must occur by February 2020. This closure cost calculation is simply for comparative purposes.

For the objectives of the closure cost assessment for the mine to be met, a number of tasks had to be completed and are discussed below.

4.2.1 Cost Calculation

The DMR Guideline (DME, 2005) 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

[1] The infrastructure and other areas which will be affected by mining activities were measured from plans provided by Temo Mine. All measured areas and infrastructure were mapped using GIS software and a reference and layout plan is attached in Appendix A

classification of the mine according to mineral mined, the risk class of the mine and its proximity to built-up or urban areas. The details of the rates, multiplication and weighting factors for Temo Mine are described in the sections below.

4.2.2 Rates

The 2005 DMR Master Rates published by the DMR are no longer accurate. The 2005 rates have therefore been escalated using an average annual CPIX obtained from Statistics South Africa (refer to Table 4-1).

Table 4-1: Annual Escalation Rates

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
CPIX (%)	4.70%	7.10%	11.5%	7.10%	4.30%	5.00%	5.60%	5.70%	6.10%	4.60%	6.40%	5.28%	4.62%

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

Table 4-2: Primary Risk Class for Type of Mineral Mined (Temo Mine Risk Class Highlighted in Red)

Mineral	Ore	Size: large if > than (tpm)	Primary Risk Class			
			Large Mine		Small Mine	
			Mine & Mine Waste	Mine, Mine Waste, Plant & Plant Waste	Mine & Mine Waste	Mine, Mine Waste, Plant & 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
Zinc and Lead		10 000	C	A	C	A
Industrial Minerals (Andalusite, Barite,		10 000	C	C	C	C

Mineral	Ore	Size: large if > than (tpm)	Primary Risk Class			
			Large Mine		Small Mine	
			Mine & Mine Waste	Mine, Mine Waste, Plant & Plant Waste	Mine & Mine Waste	Mine, Mine Waste, Plant & Plant Waste
Bauxite, Cryolite, Fluorspar)						

Table 4-3: 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 4-4: 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 4-5: 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:

- 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.

The classification of Temo Mine has been summarised in Table 4-6.

It must be noted, however, that of the 18 closure components that exist, only three are influenced by the risk class and sensitivity; the remaining 15 have a standard multiplication factor, irrespective of the class or sensitivity.

Table 4-6: Mine Classification

Mine	Risk Class	Sensitivity	Terrain	Proximity to Urban Area
Temo Mine	A	High	Flat	Peri-Urban

5 Assumptions and Limitations

Digby Wells made the following assumptions and noted limitations as part of the closure cost assessments, as reflected in **Error! Reference source not found.** below:

Table 5-1: Assumptions and Limitations

Description	Consequence
Assumptions	
General	
The calculations do not account for any value recovered from sale of plant, steel or other material.	Value recovered from sale of the mine`s operational infrastructure can be used for any other purpose.
The Temo Mine's Life of Mine is scheduled until 2043.	A LoM assessment has been undertaken for the purpose of this assessment. The closure cost estimate, however, must be seen as a living document to be updated annually.
The closure cost assessment is based on the latest infrastructure layout plans and information received from Temo.	Any change (addition or removal) in the infrastructure layout plans or information will have implications on the closure cost estimate, and the assessment must be updated accordingly.
Methodologies for calculation include both the DMR rules-based approach, and the Financial Provision Regulations (2015) approach.	The DMR currently still accepts the DMR methodology for calculating financial provisioning; however by 2020 GN R1147 must be adhered to. The DMR calculation is included in this report for comparative purposes, although at the time of construction and / or operation, the mandatory time limit for compliance to the NEMA regulations will likely have passed, making this methodology compulsory.

Description	Consequence
General surface rehabilitation must involve the shaping of the surface topography to match the surrounding landscape where necessary. During the process of shaping the landscape and drainage lines must be properly reinstated into the topography. Any heaps of excess material also need to be removed so that effective revegetation can occur; Topsoil should be placed to a thickness of 0.15 m on the shaped and ripped footprints; and Topsoiled areas should be revegetated to achieve the final land use of Temo Mine.	Ability to effectively implement the final Land Use.
The Financial Provision Regulations (2015) estimate does not include VAT.	N/A
The DMR methodology includes 15 % VAT as required by the DMRs rules based method.	N/A
Digby Wells allowed for a contingency of 10% on the closure cost assessments as required by the DMR guideline document.	Price fluctuations with regard to plant hire, fuel prices and possible omissions from the assessment have been accounted for.
Digby Wells included a 12% allowance for project management fees at closure as required by the DMR guideline document.	The costs required to manage the closure and rehabilitation phase as well as provision for personnel to monitor and maintain the rehabilitated areas after closure has been account for.
Rail Loop	
At LoM it is assumed that the rail loop and extension will be decommissioned and demolished, and appropriately rehabilitated. The rail loop has been measured at 22,241.10 m in length, and assumed to have a 1.5 m wide footprint.	Ability to effectively implement the final Land Use.
For purposes of the DMR guideline assessment, it is assumed the railway is electrified.	N/A
Pipeline	

Description	Consequence
Digby Wells calculated costs assuming the pipeline is decommissioned and rehabilitated at closure, and where it is set to remain post-closure. The pipeline is assumed to be 0.35 m in width, covering a distance of 62,525 m, and is assumed to be supported by concrete plinths occurring at 5 m intervals over the distance of the pipeline.	Upon the decision of post-closure management of the pipeline (i.e. remove or remain) by Temo and relevant authorities, the closure cost assessment must be updated accordingly.
For purposes of the DMR guidelines assessment, it is assumed the pipeline is made from steel, and is considered as processing / plant infrastructure.	N/A
Monitoring and Maintenance	
Vegetation monitoring and maintenance on rehabilitated areas is assumed to take place for three years after closure.	Establish sustainable vegetation on rehabilitated area and early detection of, and early corrective measures on, areas that are failing to establish vegetation.
Digby Wells included the costs for travel in the monitoring and maintenance costs in the GN R1147 methodology.	N/A
Limitations	
No due diligence was undertaken to determine Temo's extent of responsibility.	Areas outside of those specified in this closure cost assessment report may influence the accuracy of the presented cost estimate.
No engineering drawings or designs were provided, hence Digby Wells based the calculation on plausible assumptions.	The assessment should be updated once these are made available to ensure a most accurate costing.

6 Calculation Summary

This section outlines the closure costs associated with both of the aforementioned methodologies in Section 4.

6.1 GN R1147

The closure cost estimate presented below was calculated to align with GN R1147. The estimated closure cost for the two scenarios are presented in

Table 6-1 below. The detailed cost calculations are presented in Appendix B and C.

Table 6-1: Summary of Cost Estimates based on GN R1147

DIGBY WELLS ENVIRONMENTAL	Digby Wells Environmental	
	Temo Coal Mining (Pty) Ltd, Temo Coal - LP30/5/1/2/2/199MR (Ancillary Infrastructure), NAM5339 Revision: 0	
Area and Description	**End of life 2043**	
Infrastructure and Rehabilitation	**Scenario 1: Pipeline and Railway Removed Post-Closure**	**Scenario 2: Pipeline Remains Post Closure, Railway Removed**
Area 1: Rail Loop Extension	R5,856,858	R5,856,858
Area 2: Pipeline	R6,155,463	R74,554
Sub-total	**R12,012,321**	**R5,931,413**
Monitoring and Maintenance		
Monitoring Costs (Vegetation)	R24,811	R23,676
Maintenance Costs (Vegetation)	R898,554	R821,562
Sub-total	**R923,365**	**R845,238**
Project Management (12%)	R1,441,479	R711,770
Contingency (10%)	R1,201,232	R593,141
GRAND TOTAL (Excl. VAT)	**R15,578,397**	**R8,081,561**

6.2 DMR Methodology

The closure cost below was calculated to align with the DMR methodology (2005). The estimated closure cost for the two scenarios are presented in Table 6-2 below. The detailed cost calculations are presented in Appendix D and E.

Table 6-2: Summary of Cost Estimates based on DMR Methodology

Component	Description	Total Cost	Total Cost
		Scenario 1: Pipeline and Railway Removed Post-Closure	Scenario 2: Pipeline Remains Post Closure, Railway Removed
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	R 108,030	-
2 (A)	Demolition of steel buildings & Structures	R 0	R 0
2 (B)	Demolition of reinforced concrete buildings & structures	R 1,863,587	-
3	Rehabilitation of access roads	-	-
4(A)	Demolition & rehabilitation of electrified railway lines	R 7,812,723	R 7,812,723
4(B)	Demolition & rehabilitation of non-electrified railway lines	R 0	R 0
5	Demolition of housing &/or administration facilities	R 0	R 0
6	Open pit rehabilitation including final voids & ramps	R 0	R 0
7	Sealing of shafts, adits & inclines	R 0	R 0
8(A)	Rehabilitation of overburden & spoils	R 0	R 0
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	R 0	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	R 0	R 0
9	Rehabilitation of subsided areas	R 0	R 0
10	General surface rehabilitation	R 688,659	R 373,590
11	River diversions	R 0	R 0
12	Fencing	R 0	R 0
13	Water management	R 0	R 0
14	2 to 3 years of maintenance & aftercare	R 91,647	R 49,717
15(A)	Specialist studies	R 0	R 0

Component	Description	Total Cost	Total Cost
		Scenario 1: Pipeline and Railway Removed Post-Closure	Scenario 2: Pipeline Remains Post Closure, Railway Removed
Total cost + Weighting Factor 2		**R 11,092,879**	**R 8,647,832**
Preliminary and General		R 1,331,145	R 1,037,740
Contingency		R 1,109,288	R 864,783
VAT (15%)		R 2,029,997	R 1,582,553
Grand Total (Incl. VAT)		**R 15,563,309**	**R 12,132,908**

7 Concluding Remarks

The closure liability assessment calculation must be updated annually as a requirement of the NEMA. This will ensure that all costs become more accurate over time and will reflect the relevant market conditions at the time, ensuring Temo Mine has sufficient budget to undertake closure, rehabilitation, and decommissioning activities at Temo Mine.

8 References

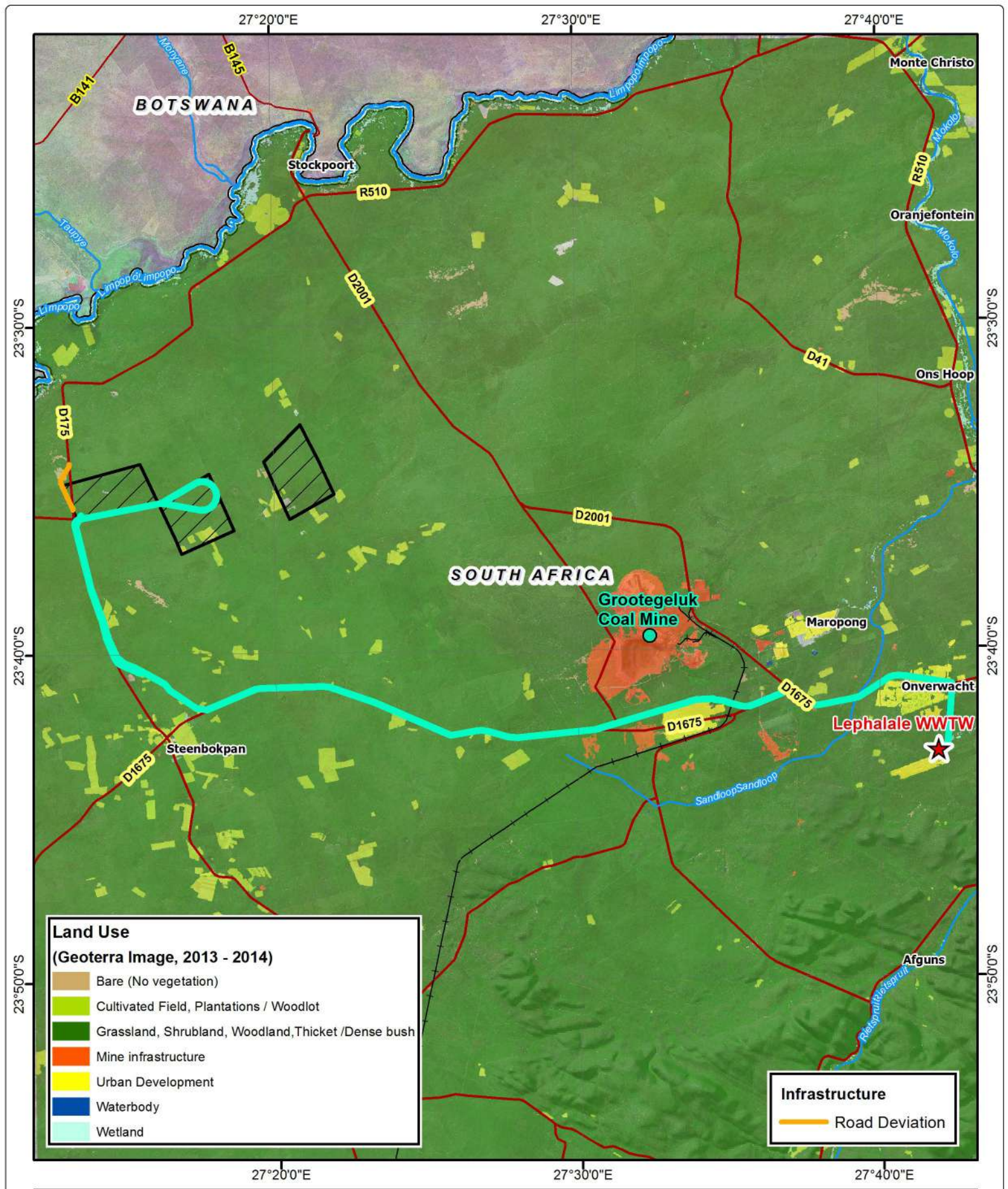
Digby Wells Environmental. (2018). *Final Scoping Report: Environmental Impact Assessment and Water Use Licence for Proposed Development of a Road Diversion, Rail Loop and Pipeline for Temo Coal (Pty) Ltd, near Lephalale, Limpopo Province.*

DMR. (2005). *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provsion Provided by a Mine.*

Government Gazette. (1998). *National Environmental Management Act.* Cape Town: Republic of South Africa Government Gazette.

Regulation Gazette. (2015). *Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations.* Department of Environmental Affairs.

Appendix A: Layout Plans



Temo Coal Mining: Proposed Final Land Use (Without Pipeline)

Legend

- Lephalale WWTW
- Grootegeluk Coal Mine
- Major Town
- Rehabilitated
- Main Road
- Arterial / National Route
- Temo Coal Mining Right
- International Boundary

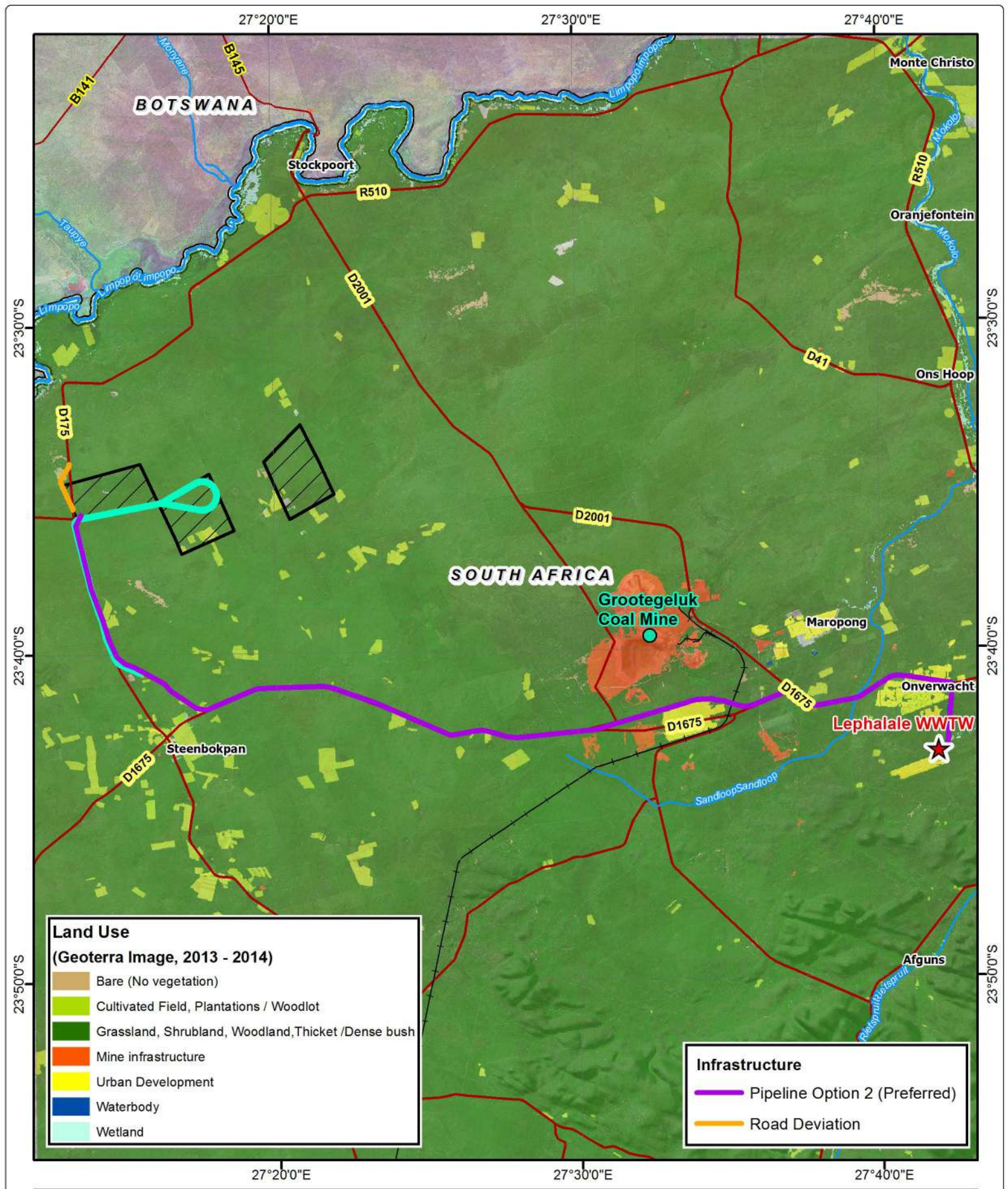
Projection: Transverse Mercator
Central Meridian: 29°E
Datum: WGS 1984
Date: 12/02/2019
Ref #: per.NAM5335.201902.493

N

0 2.5 5 10
Kilometres

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com



Temo Coal Mining: Proposed Final Land Use (With Pipeline)

Legend

- Lephalale WWTW
- Grootegeluk Coal Mine
- Major Town
- Rehabilitated
- Main Road
- Arterial / National Route
- Temo Coal Mining Right
- International Boundary

Projection: Transverse Mercator
Central Meridian: 29°E
Datum: WGS 1984
Date: 12/02/2019
Ref #: per.NAM5335.201902.492

N

0 2.5 5 10
Kilometres

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com

Appendix B: Detailed GN R1147 Sheet – Scenario 1: Pipeline Decommissioned

Digby Wells Environmental

Temo Coal Mining (Pty) Ltd, Temo Coal - LP30/5/1/2/2/199MR (Ancillary Infrastucture), NAM5339

End of life Assessment, Detail breakdown, February 2019

Pipeline Decommissioned Map Ref.	Aspect Name	Description	End of life 2043					
			Class	Quantity	Unit	Rate	Amount	Comments
Area 1		**Rail Loop**						
		Demolish infrastructure						
	Rail Loop Extension	Demolish railway	121	22.24	Km	R26,227.42	R583,297.79	Assume 22 kg per rail
		Demolition Total					**R 583,297.79**	
		Rehabilitation						
	Rail Loop Extension	General ripping to alleviate compaction	132	33.4	ha	R8,766.75	R292,458.69	Assume 1.5 m across length to be ripped
		Replace and spread topsoil (0.3 m)	126	333600.0	m²	R11.65	R3,885,685.63	
		Establish vegetation	128	33.4	Ha	R32,836.21	R1,095,415.99	
		Rehabilitation Total					**R 5,273,560.31**	
		Area 1 Total					**R 5,856,858.10**	
Area 2		**Pipeline**						
		Demolish infrastructure						
	Pipeline	Demolish Pipeline	115	62525.84	m	R92.18	R5,763,913.34	Surface pipeline (0.35 m width) with concrete plinths at 5 m interval
		Demolition Total					**R 5,763,913.34**	
		Rehabilitation						
	Pipeline	General ripping to alleviate compaction	132	3	ha	R8,766.75	R27,407.41	Assume 0.5 m footprint width
		Replace and spread topsoil (0.15 m)	126	31263	m²	R11.65	R364,142.32	Assume 0.5 m footprint width
		Revegetate area	128	3	Ha	R32,836.21	R102,655.58	
		Rehabilitation Total					**R 391,549.74**	
		Area 2 Total					**R 6,155,463.08**	
		GRAND TOTAL (Excl. VAT)					**R 12,012,321.18**	

Appendix C: Detailed GN R1147 Cost Sheet – Scenario 2: Pipeline Remaining

Digby Wells Environmental

Temo Coal Mining (Pty) Ltd, Temo Coal - LP30/5/1/2/2/199MR (Ancillary Infrastucture), NAM5339

End of life Assessment, Detail breakdown, February 2019

Pipeline Remains Map Ref.	Aspect Name	Description	End of life 2043					
			Class	Quantity	Unit	Rate	Amount	Comments
Area 1		**Rail Loop**						
		Demolish infrastructure						
	Rail Loop Extension	Demolish railway	121	22.24	Km	R26,227.42	R583,297.79	Assume 22 kg per rail
		Demolition Total					**R 583,297.79**	
		Rehabilitation						
	Rail Loop Extension	General ripping to alleviate compaction	132	33.36	ha	R8,766.75	R292,458.69	Assume 1.5 m across length to be ripped
		Replace and spread topsoil (0.15 m)	126	333600.00	m²	R11.65	R3,885,685.63	
		Establish vegetation	128	33.36	Ha	R32,836.21	R1,095,415.99	
		Rehabilitation Total					**R 5,273,560.31**	
		Area 1 Total					**R 5,856,858.10**	
Area 2		**Pipeline**						
		Demolish infrastructure						
		N/a						Scenario - Pipeline to remain post closure
		Demolition Total					**R -**	
		Rehabilitation						
		N/a						
		Rehabilitation Total					**R -**	
		Area 2 Total					**R -**	
		GRAND TOTAL (Excl. VAT)					**R 5,856,858.10**	

Appendix D: Detailed DMR Cost Sheet – Scenario 1: Pipeline Decommissioned

Digby Wells Environmental

Temo Coal Mining (Pty) Ltd, Temo Coal - Ancillary Infrastructure, NAM5335

DMR Closure Cost Assessment, 2019, Rev 0

Calculation of the Quantam, 2019

Class A (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
Component	Pipeline to be Decommissioned		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
	Description:		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	7,440.46	R 14.52	1.00	1.00	R 108,030
2 (A)	Demolition of steel buildings & Structures	m^2	-	R 202.25	1.00	1.00	R 0
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	6,252.58	R 298.05	1.00	1.00	R 1,863,587
3	Rehabilitation of access roads	m^2		R 36.19	1.00	1.00	-
4(A)	Demolition & rehabilitation of electrified railway lines	m	22,241.10	R 351.27	1.00	1.00	R 7,812,723
4(B)	Demolition & rehabilitation of non-electrified railway lines	m		R 191.60	1.00	1.00	R 0
5	Demolition of housing &/or administration facilities	m^2		R 404.50	1.00	1.00	R 0
6	Opencast rehabilitation including final voids & ramps	ha		R 205,867.92	**0.04**	1.00	R 0
7	Sealing of shafts, adits & inclines	m^3		R 108.58	1.00	1.00	R 0
8(A)	Rehabilitation of overburden & spoils	ha		R 141,361.22	1.00	1.00	R 0
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha		R 176,062.84	1.00	1.00	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha		R 511,369.96	**0.59**	1.00	R 0
9	Rehabilitation of subsided areas	ha		R 118,368.73	1.00	1.00	0
10	General surface rehabilitation	ha	6.15	R 111,981.93	1.00	1.00	R 688,659
11	River diversions	ha		R 111,981.93	1.00	1.00	R 0
12	Fencing	m		R 127.74	1.00	1.00	R 0
13	Water management	ha		R 42,578.68	**0.60**	1.00	R 0
14	2 to 3 years of maintenance & aftercare	ha	6.15	R 14,902.54	1.00	1.00	R 91,647
15(A)	Specialist studies						
							R 10,564,646
	Weighting Factor 2 (step 4.4)		**1.05**		**Sub Total 1**		**R 11,092,879**
				Preliminary and General	12% of Sub Total 1		R1,331,145.45
				Contingency	10% of Sub Total 1		R1,109,287.87
					Sub Total 2		**R 13,533,312**
					VAT (15%)		**R2,029,997**
					GRAND TOTAL		**R 15,563,309**

Appendix E: Detailed DMR Cost Sheet – Scenario 2: Pipeline Remaining

Digby Wells Environmental

Temo Coal Mining (Pty) Ltd, Temo Coal - Ancillary Infrastructure, NAM5335

DMR Closure Cost Assessment, 2019, Rev 0

Calculation of the Quantam, 2019

Class A (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
Component	Pipeline to Remain		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
	Description:		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		R 14.52	1.00	1.00	-
2 (A)	Demolition of steel buildings & Structures	m^2		R 202.25	1.00	1.00	R 0
2 (B)	Demolition of reinforced concrete buildings & structures	m^2		R 298.05	1.00	1.00	-
3	Rehabilitation of access roads	m^2		R 36.19	1.00	1.00	-
4(A)	Demolition & rehabilitation of electrified railway lines	m	22,241.10	R 351.27	1.00	1.00	R 7,812,723
4(B)	Demolition & rehabilitation of non-electrified railway lines	m		R 191.60	1.00	1.00	R 0
5	Demolition of housing &/or administration facilities	m^2		R 404.50	1.00	1.00	R 0
6	Opencast rehabilitation including final voids & ramps	ha		R 205,867.92	**0.04**	1.00	R 0
7	Sealing of shafts, adits & inclines	m^3		R 108.58	1.00	1.00	R 0
8(A)	Rehabilitation of overburden & spoils	ha		R 141,361.22	1.00	1.00	R 0
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha		R 176,062.84	1.00	1.00	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha		R 511,369.96	**0.59**	1.00	R 0
9	Rehabilitation of subsided areas	ha		R 118,368.73	1.00	1.00	0
10	General surface rehabilitation	ha	3.34	R 111,981.93	1.00	1.00	R 373,590
11	River diversions	ha		R 111,981.93	1.00	1.00	R 0
12	Fencing	m		R 127.74	1.00	1.00	R 0
13	Water management	ha		R 42,578.68	**0.60**	1.00	R 0
14	2 to 3 years of maintenance & aftercare	ha	3.34	R 14,902.54	1.00	1.00	R 49,717
15(A)	Specialist studies						
							R 8,236,030
Weighting Factor 2 (step 4.4)			**1.05**			**Sub Total 1**	**R 8,647,832**
				Preliminary and General		12% of Sub Total 1	R1,037,740
				Contingency		10% of Sub Total 1	R864,783
						Sub Total 2	**R 10,550,355**
						VAT (15%)	**R 1,582,553**
						GRAND TOTAL	**R 12,132,908**