ENVIRONMENTAL MANAGEMENT PROGRAMME

TRANSNET SOC LTD
PROPOSED BOSHOEK RAILWAY LOOP, NORTH WEST PROVINCE

Prepared for:

TRANSNET

Prepared by:

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1. INTRODUCTION

An Environmental Management Programme (EMPr) must consist of a set of mitigation, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The programme also includes the actions needed to implement these measures.

1.1. Environmental Management Programme

An EMPr can be defined as, "*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced*".

EMPr's are very important tools in the sound environmental management of projects, provided the specifications are implemented and the user understands the contents of the report and the reasons for the implementation of certain specifications.

The EMPr has the following objectives:

- To state standards and guidelines which are required to be achieved in terms of environmental legislation.
- To set out the mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts and where possible to improve the condition of the environment.
- To provide guidance regarding method statements which are required to be implemented to achieve the environmental specifications (refer to Annexure 1 for an example of the method statement).
- To define corrective actions, this must be taken in the event of non-compliance with the specifications.
- To prevent long-term or permanent environmental degradation.

The following principles have been used in the preparation of the EMPr:

- Compliance with relevant legislation, standards, codes, and practices in the application of safe technologies;
- Minimisation of impacts on the environment and human beings;
- Performance of all activities in a safe and effective manner and maintenance of all equipment in good operating condition for the protection of the health and safety of all persons and to conserve the environment and property;
- Focus on environment risk prevention;
- Focus on occupational and public health, safety; and
- The undertaking of all necessary precautions to control, remove, or otherwise correct any leaks and/or spills of hazardous materials, or other health and safety hazards.

There are essentially four broad categories of EMPr's: Design EMPr, Construction EMPr, Operational EMPr and Decommissioning EMPr. The objectives of these EMPr's are all the same and include; identifying the possible environmental impacts of the proposed activity, and developing measures to minimise, mitigate and manage the negative impacts while enhancing the positive ones. The difference between these EMPr's is related to the different mitigation measures required for the different stages of the project life cycle. Each category of EMPr is discussed in more detail below.

1.1.1. Design EMPr

The Design EMPr is an integral component of the project life cycle and requires interaction between the design engineers and environmental consultants to ensure that the engineers are aware of the environmental constraints that must be considered and incorporated into the final design of the project.

The format of this design EMPr is checklist in nature to ensure that all specifications are included in the design phase. The design EMPr phase requires ongoing and in-depth discussions between the final design team and the environmental control officer. The engineer will have to cost for, and be available for, ongoing discussions with the environmental officer at all stages of final design.

The majority of the work is undertaken at a desktop level and thus impacts are negligible and will not be discussed in further detail.

1.1.2. Construction EMPr

The Construction EMPr details the environmental management system/framework within which construction activities will be governed for the Construction Phase. The Construction EMPr consists of various actions, initiatives and systems that the contractor will have to ensure are in place and are undertaken. The Construction EMPr consists of both a management system and environmental specifications which contain detailed specifications that will need to be undertaken or adhered to by the contractor.

The Construction EMPr will need to be developed in parallel with the Final Design Stages, and constructive input must be invited from the selected contractor. Sound environmental management is orientated around a pragmatic, unambiguous but enforceable set of guidelines and specifications, and for this reason it is imperative that the contractor, while being bound by the EMPr, fully understands it and has had input into its final development. For this reason the final construction EMPr will need to be signed off after input from the selected contractor prior to the initiation of construction activities. It should, however, be noted that the contractor must tender on the existing document and that in areas of uncertainty, a precautionary approach to the environmental guidelines and specifications must be adopted

1.1.3. Operational and Maintenance EMPr

The operational phase EMPr provides specific guidance related to operational activities associated with a particular development. Operational EMPr's are sometimes referred to as Environmental Management Systems (EMS).

Impacts during the operational phase of a development of this nature will be few in number and low in intensity. By taking pro-active measures during the construction phase, potential environmental impacts emanating during the operational phase will be minimised. Monitoring of certain issues such as the success of vegetation re-establishment and erosion control will be required to continue during operation.

The final Operational EMPr must be developed in conjunction with any other relevant stakeholders prior to the adoption thereof.

1.2. Contents of the EMPr

The contents of the EMPr, as it is defined the Amended Environmental Impact Assessment (EIA) Regulations 2014 (as amended) published as Government Notice (GN) No R. 326 of 7 April 2017 in terms of Chapter 5 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended), must be consistent with requirements included in Appendix 4 of the Regulations (Table 1.1)

Table 1.1: Contents of an EMPr

EMPr REQUIREMENTS ACCORDING TO APPENDIX 4 OF GNR 982 OF 2014		SECTION OF REPORT
1	An EMPr must comply with section 24N of the Act and include- a. Details of: i. the EAP who prepared the EMPr; and	Section 3.5
	ii. the expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Annexure 3
	b. a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Chapter 3
	c. a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Figure 3.1 – Figure 3.3; Annexure 4
	d. a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Chapter 4
	i. Planning and design	
	ii. Pre-construction activities	
	iii. Construction activates	
	iv. rehabilitation of the environment after construction and where applicable post closure; and	
	v. where relevant, operation activities;	
	f. description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	Section 3.2 – Section 3.4 and Chapter 5
	a. avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	b. comply with any prescribed environmental management standards or practices;	
	c. comply with any applicable provisions of the Act regarding closure, where applicable; and	
	d. comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
	g. the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 5 and Chapter 6
	h. the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Table 6.1
	i. an indication of the persons who will be responsible for the implementation of the impact management actions;	
	j. the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	
	k. the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 5.4
	l. a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 5.4 and Chapter 6
	m. an environmental awareness plan describing the manner in which-	Chapter 8
	a. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	b. risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
	n. any specific information that may be required by the competent authority.	Nothing specified at this stage

Provided in the chapters that follow is the EMPr for the proposed development, based on the requirements of Appendix 4 of the Amended 2014 EIA Regulations as detailed above.

2. DEFINITIONS

For the purposes of this EMPr, the following definitions and abbreviations shall apply:

Alien Vegetation: Alien vegetation is defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable. This includes plant species identified as Alien and invasive species in the National environmental Management Biodiversity Act of 2004, Alien and Invasive Species Regulations, 2014.

Cement laden water: Means water containing cement or concrete arising from the Contractor's activities.

Contaminated water: Means water contaminated by the Contractor's activities such as with hazardous substances, hydrocarbons, paints, solvents and runoff from plant, workshop or personnel wash areas but excludes water containing cement/ concrete or silt.

Construction Camp: Construction camp (site camps) refers to all storage and stockpile sites, site offices, container sites, workshops and testing facilities and other areas required undertaking construction activities.

Environment: Environment means the surroundings within which humans exist and that could be made up of:-

- The land, water and atmosphere of the earth;
- Micro-organisms, plant and animal life;
- Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Aspect: An environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment.

Environmental Authorisation (EA) (formerly known as, Record of Decision): A written statement from the relevant environmental authority, with or without conditions, that records its approval of a planned undertaking to construct the proposed infrastructure and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Environmental Control Officer (ECO): A suitably qualified and experienced person or entity appointed for the construction works, to perform the obligations specified in the EA.

Environmental Site Officer (ESO): An ESO is the site-based designated person responsible for implementing the environmental provisions of the construction contract and is appointed by the service provider that carries-out construction activities.

Environmental Impact: An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Environmental Impact Assessment*:* The process of examining the environmental effects of a development. The assessment requires detailed/specialist studies of significant issues that have been identified during the environmental scoping.

Environmental Management Programme: An environmental management tool used to ensure

that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

Environmental Management System: The internationally accepted and recognized environmental management system (EMS) which enables companies, organizations and operations to systematically manage, prevent and reduce environmental problems and associated costs. In terms of ISO 14001 and EMS is defined as, "*that part of the overall management system includes organizational structure, planning activities, responsibilities, procedures, processes and resources for developing, implementing, reviewing and maintaining the environmental policy.*"

Environmental Policy: A statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

External Auditor: A suitably qualified and experienced independent expert as per the required auditor qualifications (ISO 14012).

His: Means his or her, as applicable.

Independent Environmental Consultant: A suitably qualified and experienced independent environmental consultant (IEC) appointed by the Engineer to perform the obligations specified in the Contract. The IEC shall provide reports to the regulatory authority, the Engineer and any other parties as specified by the regulatory authority.

Interested and Affected Party (I&AP): Refers to an I&AP party contemplated in section 24(4)(d) of the NEMA (1998, Act No. 107) and which, in terms of that section, includes –

a) *Any person, groups of persons, organisation interested in or affected by an activity, and;*
b) *Any organ of state that may have jurisdiction over any aspect of the activity.*

ISO 14001 Environmental Management System (ISO 14001): The internationally accepted and recognised Environmental Management System as reflected in the document SABS ISO 14001: 1996.

Method Statement: Is a written submission by the Contractor to the ECO in response to the EMPr or to a request by the ECO, setting out the plant (construction equipment), materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the ECO when requesting the Method Statement. The Method Statement shall be in such detail that the ECO is able to assess whether the Contractor's proposal is in accordance with the EMPr and/or will produce results in accordance with the EMPr.

Mitigate: The implementation of practical measures to reduce the adverse impacts, or to enhance beneficial impacts of a particular action.

No-Go Area: Areas where construction activities are prohibited.

Pollution: According to the NEMA (Act No. 107 of 1998), pollution can be defined as, "*Any change in the environment caused by (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future*".

Potentially hazardous substance: Is a substance, which, in the reasonable opinion of the ECO, can have a deleterious effect on the environment. Hazardous Chemical Substances are defined in the Regulations for Hazardous Chemical Substances published in terms of the Occupational Health and Safety Act.

Reasonable: Means, unless the context indicates otherwise, reasonable in the opinion of the ECO, after he has consulted with ESO.

Rehabilitation: To re-establish or restore to a healthy, sustainable capacity or state.

Silt laden water: Means water containing sand and silt arising from the Contractor's activities and/or as a result of natural run-off.

Site: The area in which construction is taking place.

Solid waste: Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Species of Special Concern: Those species listed in the rare, indeterminate, or monitoring categories of the South African Red Data Books, and/or species listed in globally near threatened, nationally threatened or nationally near threatened categories (Barnes, 1998).

Threatened species: Threatened species are defined as: a) species listed in the endangered or vulnerable categories in the revised South African Red Data Books or listed in the globally threatened category; b) species of special conservation concern (i.e. taxa described since the relevant South African Red Data Books, or whose conservation status has been highlighted subsequent to 1984); c) species which are included in other international lists; or d) species included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).

Topsoil: The top 100 mm of soil and may include top material e.g. vegetation and leaf litter.

3. BACKGROUND INFORMATION

3.1. Introduction

Transnet SOC Ltd (Transnet) has proposed the construction of a new loop along the railway line between Boshoek and Rustenburg, on a portion of the farm Boschhoek 103JQ in the Bojanala Platinum District Municipality, North West Province. EOH Coastal & Environmental Services (EOH CES) have been appointed to undertake the Basic Assessment process in terms of the NEMA, EIA Regulations (2014, as amended in 2017), for the proposed development.

3.2. Project Background

Transnet has commissioned the Waterberg rail corridor expansion programme following several requests from industry to increase the long-term rail network capacity from the Waterberg coal fields (Limpopo Province) to the Richards Bay Coal Terminal (Kwa-Zulu Natal Province) and the Port of Maputo (Mozambique). This entails the upgrade of the existing railway system including Lephalale to Thabazimbi, Rustenburg and Pyramid South which then joins the line extending to Ermelo and Richards Bay (Figure 3.1).

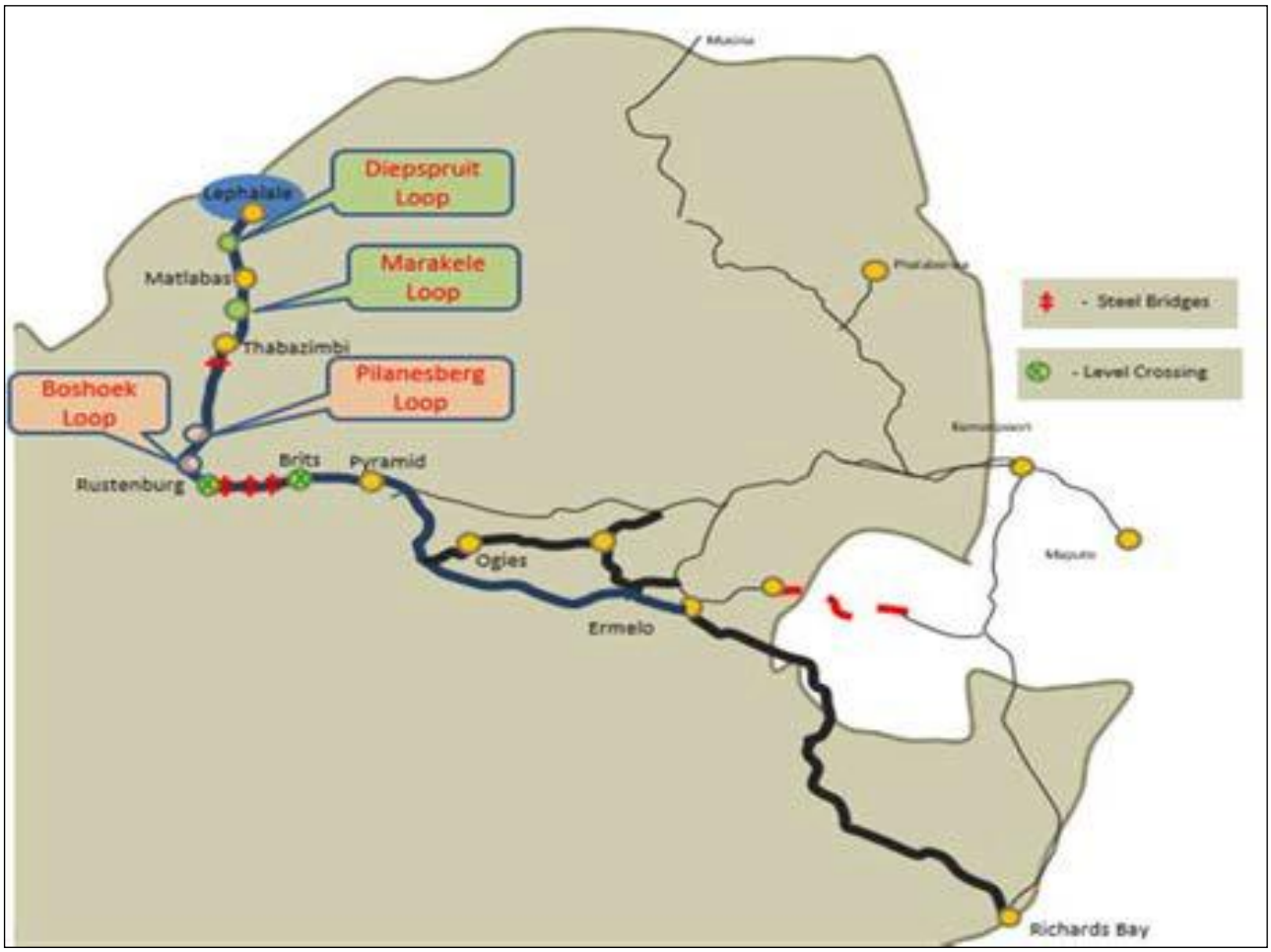

Figure 3.1: Transnet railway network between Waterberg coal fields and the Richards Bay Coal Terminal.

The Waterberg railway line is a key corridor for the transportation coal as well as various other export commodities, including chrome, ferrochrome, cement, lime, granite, iron ore, containers and general freight. It also serves several inland domestic markets and is thus currently fully utilized with an increase in demand expected over the next ten to twenty years. Transnet determined that 200-wagon trains need to be able to operate along the Waterberg line in order for the demand to

be met. This was concluded through several feasibility studies which included a series of train capacity simulations resulting in the requirement of a five-stage upgrade to the line.

The 240km section of the Waterberg line between Thabazimbi and Pyramid South has been identified as a major bottleneck as it currently does not allow for the passing of 100-wagon trains, let alone 200-wagon trains. Stage 3 of the proposed Waterberg line upgrade includes the implementation of two railway loops (passing lanes) to be constructed at the following locations along this section of the line:

- Boshoek (between Km 132.82 and 135.78)
- Pilanesberg (between Km 159.55 and 160.95)

3.3. Project Location

The activity falls within the jurisdiction of the Rustenburg Local Municipality, situated within the Bojanala District Municipality, North West Province. The project site can be accessed via the N4 from Pretoria to Rustenburg and then via the R565 from Rustenburg to Boshoek (Figure 3.2).

Figure 3.2: Location of the proposed Boshoek Railway Line project.

3.4. Project Description and Scope

The construction work includes 1.67km of track work parallel along the northern side of the existing rail (called a loop) as well as moving the existing gravel service road to accommodate the new track. This will allow two trains to safely pass each other along the railway line (Figure 3.3). Construction of the new loop will be undertaken within the Transnet servitude however, Transnet will acquire land (via a lease agreement) for the purpose of stockpiling and site camp areas. The loop will be constructed in line with Transnet's S410 Specification (March, 2006) which covers railway earthworks and service roads. The new loop traverses through fairly flat terrain from Km

132.82 to Km 134.80 and passes through an embankment approaching the Matlopyane river bridge at Km 134.97.

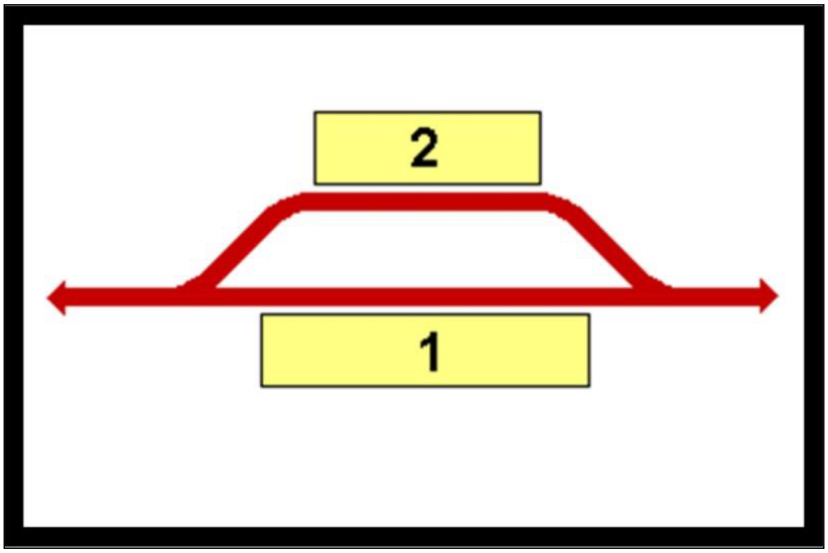

Figure 3.3: Diagram illustrating a railway loop (Aerial view; courtesy of Transnet).

The following items will form part of the construction works (Figure 3.4):

1. Perways (bridges and platforms):
    - 1,671 km of track comprising 60kg UIC60 rails on PY sleepers;
    - 1:20 RH tangential point set at Km 132.82;
    - 1:20 LH tangential point set at Km 135.78.

2. Signalling:
    Install a localised remote control system to enable the Train Driver to remotely operate the 1:20 tangential point sets on both sides of the loop. The system makes use of a radio control system for operation.

3. Structures
    There are five (5) box culverts (Table 3.1) which will be extended in order to accommodate the new loop. The culvert openings will be kept unchanged and the length of the culverts will be extended to the specification of the new loop line.

4. Bridge
    The river bridge will be constructed at approximately Km 135.130. The size and shape of the bridge will be similar to the existing one on the main line.

Figure 3.4: An example of a railway perway (left) and typical railway signalling (right).

Table 3.1. Box culvert description and location.

Description	Km	DMS Coordinates
Culvert 1: 1.80 m x 4.90 m box culvert	133.10	**Lat**: -25°, 30', 37.3942"; **Long**: 27°, 07', 06.0789"
Culvert 2: 1.90 m x 4.90m box culvert	133.96	**Lat**: -25°, 30', 16.0228"; **Long**: 27°, 06', 46.2882"
Culvert 3: 1.90 m x 4.90m box culvert	134.41	**Lat**: -25°, 30', 05.4372"; **Long**: 27°, 06', 35.4205"
Culvert 4: 0.50m pipe culvert	134.82	**Lat**: -25°, 29', 58.0180"; **Long**: 27°, 06', 23.0570"
Culvert 5: 2.4/5m x 6.70m arched culvert	135.13	**Lat**: -25°, 29', 52.3852"; **Long**: 27°, 06', 13.6585"

Support Facilities

The proposed railway loop alignment is situated within the existing Transnet railway servitude however a site camp will be required for the construction phase of the development. Transnet have agreed with Glencore, who currently operate a chrome smelter directly adjacent to the servitude, to make use of one of the existing transformed areas within their property (please refer to the Basic Assessment Report).

Access Road - The site will be accessed via 'Main Road', which is a tarred road intersecting the R565 at a point located south of Boshoek, and then via several existing un-tarred railway servitudes roads. As such, the development will not require any additional access roads to be constructed other than the new servitude which will be constructed north of the proposed new loop.

Site Camp - A construction site camp will be required during the construction phase of the proposed development. It will be located within an already-disturbed area near to the proposed development site, within the property currently utilized by the Glencore chrome smelter, immediately off Main Road towards the north of the Glencore Smelter (please refer to the Basic Assessment Report for the exact site camp details). The site contains no vegetation, having been used as a turning zone for mining trucks.

Water Supply - Water required for the construction phase of the proposed development will be acquired from the Rustenburg Local Municipality as well as from several existing Transnet water depots within the vicinity of the existing railway line. Based on the proximity of nearby surface water resources, the proposed development will trigger Section 21c and 21i water uses, as set out in the National Water Act (NWA) (Act No. 36 of 1998, as amended), thus requiring a Water Use Authorisation (WUA) application to the Department of Water and Sanitation (DWS).

Solid Waste, Wastewater and Sewage – The construction phase of the proposed development will include temporary onsite ablution facilities which will be emptied and serviced by an external service provider. Solid waste generated will be collected and stored in a designated area within the proposed site camp and will be removed to a licenced landfill facility by the contractor on a regular basis. There is no solid waste or sewerage associated with the operational phase of the proposed railway loop.

Electricity supply – Electricity supply will be obtained from the existing Eskom service lines located within the railway servitude and will be derived from the National Grid. The existing line is currently electrified at 25 kilovolts (kV) and the proposed loops will feed into this existing system.

3.5. The Environmental Policy

The contractor is required to compile an Environmental Management Policy, which must consider the following:

- The contractor's mission, vision and core values;
- Guiding principles;
- Requirements of, and communication with I&APs;

- The environmental specifications and intentions of the specifications must be upheld;
- The need to work towards continual improvement;
- The obligation to prevent pollution and ecological degradation;
- The importance of coordination with other organisational policies (e.g. quality, occupational health and safety, etc.);
- Site activities will be conducted in a manner that does not create a nuisance, risk or hazard to the natural environment;
- Reference to specific local and/or regional conditions;
- Employee and public health and safety must be considered a priority;
- A commitment to compliance with relevant environmental laws, regulations, by-laws and other criteria to which the contractor subscribes.

The contractor (contractor is defined as principal contractor, sub-contractors and any employees retained on this project) is required to be familiar with the environmental policy (to be developed by the applicant) and all that it implies, and to adopt and implement the policy throughout the course of construction. The policy must be communicated to all employees (and sub-contractors) of the contractor, and made available to the public, if requested.

3.6. Environmental Objectives and Targets

In order to meet the commitments detailed within the Environmental Management Policy, as well as those included within the environmental specifications of this EMPr, the contractor shall develop environmental objectives and targets. The objectives and targets must conform to, and comply with, the following criteria:

- The objectives and targets shall constitute the overall goals for environmental performance identified in the environmental policy and strategy;
- When establishing objectives and targets, the contractor shall take into account the identified environmental aspects and associated environmental impacts, as well as the relevant findings from environmental reviews and audits;
- The targets must be set to achieve objectives within a specified timeframe;
- Targets must be specific and measurable;
- When the objectives and targets are set, the contractor must establish measurable Key Performance Indicators (KPIs). The latter will be used by the contractor as the basis for an Environmental Performance Evaluation System, and can provide information on both the environmental management and the operational systems;
- Objectives and targets need to apply broadly across the contractor's operations, as well as to site-specific and individual activities;
- Objectives and targets must be reviewed from time to time in view of changed operational circumstances and/or changes in environmental legal requirements, and need to take into consideration the views of the I&APs.

3.7. Environmental Legislation and Guidelines

The Contractor must ensure that all South African legislation concerning the natural environment, pollution and the built environment is strictly enforced. Such legislation must include, but is not limited to the:

- The Constitution of the Republic of South Africa Act No. 108 of 1996.
- National Environmental Management Act No. 107 of 1998 as amended.
- National Heritage Resources Act, No 25 of 1999.
- National Environmental Management: Biodiversity Act 10 of 2004
- National Environmental Management: Air Quality Act 39 of 2004
- National Environmental Management: Waste Management Act 59 of 2008
- The Environment Conservation Act No 73 of 1989
- National Water Act, No 36 of 1998
- National Forest Act, No 84 of 1998
- Occupational Health and Safety Act 85 of 1993

- Provincial Nature Conservation Ordinance of 1974
- National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations
- All relevant provincial legislation, Municipal by-laws and ordinances

3.8. Details of the Environmental Assessment Practitioner (EAP)

EAP:	Mr Gideon Raath
Company:	EOH Coastal & Environmental Services (EOH CES)
Physical Address:	1 Osborne Lane, EOH Business Park, Bedfordview
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EOH CES was established in 1990, and is an independent specialist environmental consultancy with offices in Grahamstown and East London and satellite offices in Maputo, Mozambique and Port Elizabeth. Our principal area of expertise is in assessing the impacts of development on the natural, social and economic environments through, among other instruments, the environmental impact assessment process, and in so doing contribute towards sustainable development.

We adopt a scientific approach to our studies, underpinned by an informed and holistic view of the environment and a pragmatic approach to sustainable development. We believe that a balance between development and environmental protection can be achieved by skilful and careful planning. Our success rate in achieving this balance in a variety of approved developments is evidence of our capability. EOH CES has offices in Grahamstown, East London, Port Elizabeth, Cape Town, Johannesburg and Maputo, Mozambique. Our staff is usually comprised of between 25 to 30 consultants and 11 support staff. All our staff is well qualified in the biological, social and environmental sciences, and produce scientifically robust, defensible reports and EIAs.

In addition, EOH CES has a number of permanent associates that can be drawn on to provide additional expertise, including Rivers for Africa (who specialise in the determination of environmental water requirements), and Nomad Consulting (who specialise in social impact assessments and resettlement action plans). We also have well-developed working relationships with a number of other specialist consulting companies who provide expertise in areas such as air quality emission studies, visual impacts, noise impacts, heritage assessments, radiation hazard assessments, and soil and agricultural assessments.

Mr Gideon Raath *(Role: Project Management)*
Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit. Gideon's GIS background includes the management of the City of Cape Town invasive species GIS database, involving the storage, management, recall and quality control off all sightings, clearance visits and known infestations. Further experience include mapping for various consulting projects, boundary verification through ground-truthing and the spatial mapping and delineation component of this MSc research. Gideon has further attended public participation workshops, and has been involved with IAP identification, translation, public meetings and engagement for a variety of projects, mainly within the Afrikaans speaking Northern Cape.

Gideon's general consulting expertise includes project management, EIA and EMPr documentation development, integrated water use license applications, specialist botanical and ecological impact assessments, specialist wetland delineation and impact assessments, GIS applications and

mapping. Gideon works from the Johannesburg office, and is interested in invasion ecology, treatment of groundwater pollution through phytoremediation, botanical and wetland specialist studies, GIS application for ecology and environmental management, and the EIA processes in general.

Mr Roberto Almanza *(Role: Report Production)*
Roberto obtained his BSc (Environmental Sciences) from Nelson Mandela Metropolitan University majoring in Geology and Geography and obtained his BSc Honours in Geology in 2012. Roberto then went on to complete his MSc (Geology) while working as a geology consultant on a number of exploration projects across South Africa. Roberto joined EOH CES in 2015 and has been involved in several projects from Basic Assessments to Full Scoping and Environmental Impact Reports. He has also assisted with Environmental Auditing, Site Remediation, Water Use Applications and GIS mapping. Roberto now manages a number of small projects from the EOH CES Port Elizabeth office and is becoming involved in several waste-related studies conducted by EOH CES.

Mr Roy de Kock *(Role: Report Review)*
Roy is a Principal Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela Metropolitan University in Port Elizabeth. He is currently busy with his PhD in soil and vegetation contamination in the Karroo through the Nelson Mandela University in Port Elizabeth. His MSc thesis focused on Rehabilitation Ecology using an open-cast mine as a case study. He is based at the East London branch where he focuses on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa, and Africa.

4. IMPACT ASSESSMENT AND MITIGATION SUMMARY

This section provides an assessment of the pre-mitigation significance as well as the post-mitigation significance of the social and environmental impacts that may result from the major activities associated with the development.

4.1. Summary of Impacts Associated with the Development

The table below shows the significance of the impacts before and after mitigation is taken into account:

IMPACT	WITHOUT MITIGATION	WITH MITIGATION
Construction Phase		
1. Loss of Natural Vegetation	MOD –	LOW –
2. Loss of SCC	MOD –	LOW –
3. Rehabilitation of Disturbed Areas	MOD –	LOW –
4. Control of Alien Species	MOD –	LOW –
5. Material Stockpiling	MOD –	LOW –
6. Water Contamination (Cement / Concrete Material)	MOD –	LOW –
7. Water Contamination (Chemical Spills, sewage etc.)	HIGH –	LOW –
8. Stormwater management	MOD –	LOW –
9. Riparian vegetation (river)	MOD –	LOW –
10. Riparian vegetation (wetland)	MOD –	LOW –
11. Soil Compaction and Erosion	MOD –	LOW –
12. Solid Waste Generation	MOD –	LOW –
13. Impacts on Cultural Heritage, Archaeology and Palaeontology	MOD –	LOW –
14. Air Pollution	MOD –	LOW –
15. Noise	LOW –	Negligible
16. Visual Impacts	LOW –	Negligible
17. Traffic Impacts	MOD –	LOW –
18. Health and Safety Risks	MOD –	LOW –
19. Employment Creation	MOD +	MOD +
20. Purchasing of Materials from Local Businesses	MOD +	MOD +
Operational Phase		
21. Rehabilitation of disturbed areas	MOD –	LOW –
22. Invasion of Alien Species	MOD –	LOW –
23. Hazardous Waste Generation	HIGH –	LOW –
24. Increased Stormwater Runoff and Erosion Potential	MOD –	LOW –
25. Noise	MOD –	LOW –
26. Traffic Impacts	MOD –	LOW –
27. Health and Safety Risks	HIGH –	LOW –
28. Economic Benefits	HIGH +	HIGH +

4.2. Summary of Mitigation Measures

Construction Phase	
Impact 1: Loss of Natural Vegetation **Cause and Comment:** During the construction phase the clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation and habitat for	• The construction footprint must be surveyed and demarcated prior to construction commencing. • No construction activities will be allowed outside the demarcated footprint. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken.

other taxonomic groups.	• Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and used as ground cover during rehabilitation. Alternatively, the cleared vegetation can be given to local residents as a source of firewood.
Impact 2: Loss of SCC **Cause and Comment:** During the construction phase the clearing of natural vegetation will lead to the destruction of habitats and identified and unidentified plant and animal SCC.	• All areas that will be impacted must be surveyed and demarcated by a suitably qualified specialist prior to vegetation and topsoil removal in order to locate and rescue any SCC within the area and relocate them. • The contractor's staff must not poach or trap wild animals. • The contractor's staff must not harvest any natural vegetation.
Impact 3: Rehabilitation of Disturbed Areas **Cause and Comment:** During the construction phase poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	• All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Rehabilitation Management Plan. • Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation.
Impact 4: Control of Alien Species **Cause and Comment:** During the construction phase the removal of natural vegetation creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring natural ecosystems.	• The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.
Impact 5: Material Stockpiling **Cause and Comment:** During the construction phase stockpiling of construction material within 50 m of a watercourse / wetland could result in erosion and mobilisation of the materials into these systems, resulting in sedimentation and a decrease in water quality and aquatic habitat.	• No construction material must be stored within 50 m of a watercourse. • Stockpiles within 100 m of watercourses must be monitored for erosion and mobilisation of materials towards watercourses. If this is noted by an ECO, suitable cut-off drains or berms must be placed between the stockpile area and the nearest watercourse.
Impact 6: Water Contamination (Cement / Concrete Material) **Cause and Comment:** During the construction phase, accidental contamination of wet concrete (highly alkaline) in the rivers/wetland systems could result in mortality of macro-invertebrates and fish species that may be present.	• During the construction phase no concrete mixing must take place within 32 m of any river bank or wetland system. • A serviced fire extinguisher (to neutralise pH levels if a spill occurs) must be available on site in the event that wet concrete is accidentally spilled into the river. • The mitigation measures in Appendix B (concrete mixing) must be used in conjunction with this report.
Impact 7: Water Contamination (Chemical Spills, sewage etc.)	• During the construction phase no machinery must be

Cause and Comment: During the construction phase, accidental chemical spills or other spills (sewage, etc.) in the vicinity of the rivers/wetlands will result in water pollution, adversely affecting the aquatic ecosystem.	parked overnight within 50 m of the rivers/wetlands. • All stationary machinery must be equipped with a drip tray to retain any oil leaks. • Chemicals used for construction must be stored safely on bunded surfaces in the construction site camp. • Emergency plans must be in place in case of spillages onto road surfaces or within water courses. • No ablution facilities may be located within 50 m of any river or wetland system. • Chemical toilets must be regularly maintained/ serviced to prevent ground or surface water pollution.
Impact 8: Stormwater Management **Cause and Comment:** During the construction phase the inappropriate routing of stormwater will lead to stream sedimentation, adversely affecting the aquatic environment.	• Flood attenuation and storm water management plans must be drawn up and implemented. • An Erosion and Sediment Management Plan must be developed and implemented to minimize the ingress of sediment-laden stormwater into the rivers/ wetlands.
Impact 9: Riparian Vegetation (River) **Cause and Comment:** During the construction phase, the removal of sensitive riparian vegetation for road/bridge widening and upgrading of culverts will adversely affect the aquatic environment (particularly if detours are used when widening bridges).	• During the construction phase all riparian vegetation removal must take place under supervision of the Environmental Control Officer (ECO). • A Rehabilitation and Alien Vegetation Management Plan must be developed and implemented. • Banks must be artificially stabilized as soon as possible if significant riparian vegetation is removed.
Impact 10: Riparian Vegetation (Wetland) **Cause and Comment:** During the construction phase, indiscriminate removal of riparian vegetation at water crossing sites, within wetlands or encroachment into surrounding areas could lead to destabilisation of bank structures and an increase in erosion rates.	• During the construction phase removal of riparian vegetation must take place under the supervision of the ECO. • Removal of the alien invasive vegetation must be prioritised. • Banks must be artificially stabilized as soon as possible if significant riparian vegetation is removed. • Vehicles and machinery must not encroach into areas outside/surrounding the road upgrade footprint.
Impact 11: Soil Compaction and Erosion **Cause and Comment:** There is a possibility that soil may be compacted by the operation and parking of construction vehicles. Compacted soil results in the reduced ability for plant growth and water absorption. The clearing of vegetation will result in the exposure of soils. Exposed soils are easily susceptible to erosion by wind and water (i.e. run-off) during high wind or rainfall conditions.	• Newly cleared and exposed areas must be promptly rehabilitated to avoid soil erosion; • Where necessary, temporary stabilization measures must be used; • Plan for the worst case, that is, for heavy rainfall and runoff events, or high winds; • Appropriate erosion control measures must be implemented and a monitoring programme established to ensure that no erosion is taking place. At the first sign of erosion the necessary remedial action must be taken; • Care must be taken to ensure that runoff is well dispersed so as to limit erosion.
Impact 12: Solid Waste Generation **Cause and Comment:** It is anticipated that the proposed development will produce solid waste	• Rubble and other construction waste produced must be re-used if possible and, where it is not possible, must be disposed of at the nearest registered waste

in the form of building rubble, excavated soil, excess concrete and general waste, such as litter, during the construction phase.	disposal facility; • Rubble, which will not be reused, must be removed from site on a regular basis; • If rubble is stored on site, it must be stored on designated portions of land away from any sensitive areas; • Litter must be controlled during construction – adequate bins must be made available on site at all times. These must be made scavenger and weather proof and must be emptied on a regular basis; • Construction materials stored at the site camp must be secured – i.e. plastics must be covered to prevent being blown off site; • The construction area must remain litter free and regular inspections for litter must be conducted. The activity must not contribute to any surrounding windblown litter; • Waste skips must be covered and emptied regularly; • Waste manifests must be provided by the Contractor to prove legal disposal; • Empty cement bags must be kept in sealed waste containers; • Waste must not to be buried or burned.
<u>Impact 13: Impacts on Cultural Heritage, Archaeology and Palaeontology</u> **Cause and Comment:** During the construction phase, features of cultural heritage, archaeological or paleontological importance may be damaged or destroyed. The railway bridge, five (5) box culverts and a burial site, which date back to the Late Historical Period, have been identified as significant elements in terms of the National Heritage Resources Act. Please refer to Archaeological Impact Assessment included in Appendix D.	• Please refer to the Archaeological Impact Assessment included in Appendix D for detailed management and mitigation measures; • Should any additional archaeological or cultural sites or objects be located during the construction of the proposed project, it must immediately be reported to the South African Heritage Resources Agency (SAHRA). Failure to report a site or object of archaeological and/or cultural significance is a contravention of the National Heritage Act (Act No. 25 of 1999); • All construction site staff must be briefed to immediately report any sites or objects, which are located during the construction of the facility. In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work must be terminated until a qualified archaeologist or historian can examine the item.
<u>Impact 14: Air Pollution</u> **Cause and Comment:** During construction, dust may be generated, especially where there is exposed ground. Specific activities that may contribute to the release of dust include offloading and stockpiling of building materials such as sand, storage of excavated materials and movement of heavy vehicles. The generation of dust may be exacerbated during windy, dry periods. In addition to dust, air	• Topsoil must be cleared in a phased manner to avoid large areas of bare ground; • Employ dust suppression measures such as wetting of the project area during dry, windy periods (Only water from a licensed source will be used); • Where practical, do not leave large cleared areas exposed for longer than necessary; • The area of disturbance must be kept to a minimum at all times; • Vehicle speed must be limited to the lowest possible, and must not exceed 30km/h on the construction site, service road or gravel roads used to access the site

pollution may result from the exhaust fumes emitted by construction vehicles, especially if the vehicles have not been serviced correctly.	camp. • Construction vehicles must be regularly maintained in order to ensure that no unnecessary exhaust fumes are being emitted.
Impact 15: Noise **Cause and Comment:** Construction activities are associated with an increase in noise levels as a result of construction vehicles, plant generators and various other equipment being used on site. While these activities will produce noise, it is unlikely to have a significant impact on the surrounding area which includes an existing railway station as well as the Boshoek Smelter.	• No construction activities may take place between sunset and sunrise; • Machinery that generates noise must be regularly maintained in order to ensure that no unnecessary additional noise is produced; • Equipment with lower sound levels must be selected where feasible.
Impact 16: Visual Impacts **Cause and Comment:** Construction vehicles and equipment will be evident in the existing landscape. Generation of dust will increase the visibility of the project and may become an eyesore if not managed correctly.	• Employ techniques to suppress dust and smoke generation during construction; • The contractor must maintain good housekeeping on site to avoid litter and minimise waste; • Night lighting of the construction sites must be minimised within requirements of safety and efficiency of the Environmental Regulations for Workplaces in terms of the Occupational Health and Safety Act (Act No. 85 of 1993); • Fires and fire hazards need to be managed appropriately.
Impact 17: Traffic Impacts **Cause and Comment:** During the construction phase of the proposed development, construction vehicles will be utilizing the existing road network. This may result in the impeding of traffic and damage to existing roads.	• Large construction vehicles must not be permitted to utilize public roads during peak hours (AM: 06:30 – 08:30 and PM: 16:00 – 18:30); • Any damage to public roads directly caused by large construction vehicles operating on this project must be repaired immediately.
Impact 18: Health and Safety Risks The use of construction machinery during the construction phase poses a potential risk to the health and safety of people working at the construction site as well as to commuters passing the site. The movement of construction vehicles also increases the risk of road accidents. The risk of accidents, fires and explosions must be mitigated effectively.	• All relevant Health and Safety legislation as required in South Africa must be strictly adhered to, including but not limited to the Occupational Health and Safety Act, 1993 (No. 85 of 1993); • Smoking must be prohibited in the vicinity of flammable substances; • Any welding or other sources of heating of materials must be done in a controlled environment and under appropriate supervision; • Ensure availability of fire extinguishers; • All employees must be aware of emergency/ contingency plans to ensure an understanding of the hazards and procedures required during an emergency situation; • An emergency preparedness and response plan must be implemented for the duration of construction; • Records of environmental and/or health and safety related incidents must be maintained and

	communicated to the relevant persons; • The Contractor shall ensure that signage, which must be pictorial and in the vernacular, is erected to warn against entering the construction area; • Traffic calming and speed control measures for access to construction sites shall be instigated in consultation with the local authorities.
Impact 19: Employment Creation **Cause and Comment:** The construction phase of the proposed development will create a number of temporary jobs for locals within the area.	None required
Operational Phase	
Impact 20: Purchasing of Materials from Local Businesses **Cause and Comment**: Where possible, materials will be sourced from local businesses and this will result in a boost of the local economy of the immediate vicinity and surrounding areas.	None required
Impact 21: Rehabilitation of disturbed areas Cause and Comment: During the Operational Phase, poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	• All cleared areas must be continuously rehabilitated with indigenous vegetation post-establishment. • The site will be considered as rehabilitated when 75% or more of the impacted areas are covered by primary growth (grasses and/or scrubs)
Impact 22: Invasion of Alien Species **Cause and Comment:** During the operational phase the loss of natural vegetation will increase the potential invasion by alien plant species. This, coupled with the lack of implementation of the Alien Vegetation Management Plan may result in large scale alien plant invasion.	• The approved Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.
Impact 23: Hazardous Waste Generation **Cause and Comment:** Hazardous waste is likely to occur as a result of an increased number of trains passing through the area on a weekly basis. Due to the nature of a freight railway line, leaking oil or fuel may enter or flow into the adjacent areas. In addition to this, operations of a siding include the temporary storage of moderate quantities of dangerous goods, which, if not properly stored and contained, may accumulate and result in hazardous waste entering the surrounding	• Hazardous substances must be disposed of at an appropriate classified waste site (unless it is to be recycled by approved methods), as per the National Environmental Management Waste Act 59 of 2008; • All contaminated spill fighting material such as fibres, soil, sandbags, etc. must be disposed of in an appropriate hazardous waste landfill site. Proof of this must be made available upon request; • The transportation, handling and storage of hazardous and flammable substances must comply with all the provisions of the Hazardous Substances Act 1973, (Act No. 15 of 1973) associated regulations as well as a SANS 10228 and SANS 10089 codes.

environment.	
Impact 24: Increased Stormwater Runoff and Erosion Potential **Cause and Comment:** The proposed development will consist of more impervious surfaces than what currently exists on site and this will result in increased runoff and potentially increased erosion.	• A site-specific stormwater management plan must be implemented to manage the increased stormwater runoff; • Storm-water structures need to be implemented as part of the development and must link up with the current storm-water infrastructure in order to navigate stormwater and minimise soil erosion; • At the first signs of erosion, the correct procedures must be undertaken to manage, resolve and prevent it from occurring.
Impact 25: Noise **Cause and Comment:** The operation of a railway loop in the area may result in a slight noise increase due to a higher number of trains passing through the area. The overall noise level should not be any more than what is currently experienced on site.	• The siding infrastructure must be well maintained in order to avoid unnecessary noise produced near the site; • The Rustenburg Local Municipality by-laws relating to noise must be adherer to at all times.
Impact 26: Traffic Impacts **Cause and Comment:** The operation of the proposed railway loop will allow for additional use of the Waterberg railway line. This could result in an increase in potential accidents in along the line however, this is unlikely. With the correct management of railway traffic, the proposed railway loop will prevent delays along the railway route and will have an overall positive impact on railway traffic.	• The proposed railway loop must be operated in line with the relevant Transnet rail standards and train schedules.
Impact 27: Health and Safety Risks The operation of a railway siding poses a potential fire and explosion risk due to the storage of a number of potentially dangerous goods. In addition to this, health and safety risks occur with regards to onsite train arrivals and departures.	• All relevant Health and Safety legislation as required in South Africa must be strictly adhered to, including but not limited to the Occupational Health and Safety Act, 1993 (No. 85 of 1993); • Smoking must be prohibited in the vicinity of flammable substances; • Ensure availability of fire extinguishers; • An emergency preparedness and response plan must be implemented for the operational phase;
Impact 28: Economic Benefits **Cause and Comment:** The railway loop will contribute to increasing, amongst others, the coal-carrying capacity of the Waterberg railway line. This will contribute to the overall transport and delivery of economically valuable goods and facilitate a positive influence on the Gross Domestic Product.	None required

4.3. Basic Assessment Issues and Mitigation Measures

The identification and significance of identified project related impacts (before and after mitigation is presented in the Basic Assessment Report (BAR). The BAR identified potential impacts and risks associated with the proposed development and these, contained in this EMPr, presents the preliminary actions, specifications and management commitments that need to be adhered to in order to mitigate or enhance the impacts of significance. These are detailed in the sections that follow.

5. ENVIRONMENTAL MANAGEMENT SYSTEM

5.1. Reporting

5.1.1. Administration

Before the contractor begins each construction activity, the Contractor shall give to the ECO and engineer a written method statement setting out the following:

- The type of construction activity;
- Locality where the activity will take place;
- Identification of impacts that might result from the activity;
- Identification of activities or aspects that may cause an impact;
- Methodology and/or specifications for impact prevention for each activity or aspect;
- Methodology and/or specific actions for impact containment for each activity or aspect;
- Emergency/disaster incident and reaction procedures;
- Treatment and continued maintenance of impacted environment.

The contractor must provide such information in advance of any or all construction activities provided that new submissions shall be given to the ECO and/or engineer whenever there is a change or variation to the original.

The ECO and/or engineer must provide comment on the methodology and procedures proposed by the Contractor but he shall not be responsible for the contractor's chosen measures of impact mitigation and emergency/disaster management systems. However, the contractor shall demonstrate at inception and at least once during the contract that the approved measures and procedures function properly.

5.1.2. Good housekeeping

The contractor shall undertake "good housekeeping" practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods that leaves production in a safe state from the ravages of weather to include the care for and preservation of the environment within which the site is situated.

5.1.3. Record keeping

The engineer and the ECO will continuously monitor the contractor's adherence to the approved impact prevention procedures and the engineer shall issue to the contractor a notice of non-compliance whenever transgressions are observed. The ECO must document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance shall be documented and reported to the engineer in the monthly report. These reports shall be made available to the authorities when requested.

The Contractor shall ensure that an electronic filing system identifying all documentation related to the EMPr is established.

A list of reports likely to be generated during all phases of the Project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Environmental Management Programme;
- Final design documents and diagrams issued to and by the Contractor;
- All communications detailing changes of design/scope that may have environmental implications;

- Complaints register;
- Medical reports;
- Incident and accident reports;
- Emergency preparedness and response plans;
- Copies of all relevant environmental legislation;
- All relevant permits;
- All method statements from the Contractor for all phases of the project.

5.1.4. Document control

The Contractor and resident engineer shall be responsible for establishing a procedure for electronic document control. The document control procedure must comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person;
- Every document must identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution;
- All documents must be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor shall ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed. All documents shall be made available to the independent external auditor.

5.2. Construction phase

5.2.1. Clearing of the Site

In all areas where the contractor intends to, or is required to clear the natural vegetation and soil, either within the construction area, or at designated or instructed areas outside the construction area, a plan of action shall first be submitted to the engineer for his approval.

The EMPr shall contain a photographic record and change/land reference of the areas to be disturbed. This shall be submitted to the engineer for his records before any disturbance/stockpiling may occur. The record shall be comprehensive and clear, allowing for easy identification during subsequent inspections.

The contractor shall be responsible for the re-establishment of grass within the development boundaries for all areas disturbed during construction. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the construction area, or at designated or instructed areas outside the construction area. This responsibility shall extend until expiry of the defects notification period.

5.2.2. Excavation, hauling and placement

The contractor shall provide the engineer with detailed plans of his intended construction processes prior to starting any cut or fill or layer. The plans shall detail the number of personnel and plant to be used and the measures by which the impacts of pollution (noise, dust, litter, fuel, oil, sewerage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated. Particular attention shall also be given to the impact that such activities will have on the adjacent built environment. The contractor shall demonstrate his “good housekeeping”, particularly with respect to closure at the end of every day so that the site is left in a safe condition from rainfall overnight or over periods when there is no construction activity.

5.2.3. Construction Activities and Equipment

- Construction will be restricted to normal daytime working hours (07:00 – 18:00);
- No construction activities will take place during weekday evenings and night-time (after 17:00), on Saturdays after midday (12:00) and the entire day on Sundays;
- All noise-making equipment shall be turned off when not in use;
- All equipment shall be kept in good working order;
- All equipment shall be operated within specifications and capacity (i.e. do not overload machines);
- Compliance with the appropriate legislation with respect to noise is mandatory;
- The Contractor will familiarise himself with, and adhere to, any local bylaws and regulations regarding the generation of noise;
- Construction staff must be given “noise sensitivity” training;
- The Contractor will endeavour to keep noise generating activities associated with construction activities to a minimum;
- Modern low noise emission vehicles and equipment shall be favoured on site. The details of all construction machinery and vehicles must be determined prior to construction in order to identify potentially noisy machinery and to seek possible alternatives. These details will include the manufacturer, type and noise emission data of each machinery/vehicle and how many will be used at any time. Note that manufacturers of modern vehicles and machinery provided for the international market are obliged to provide noise emission data. Where this information is not available, noise measurements must be conducted prior to use of such machinery or vehicles;
- A well planned and co-ordinated “fast track” procedure is implemented to complete the total construction process in the area in the shortest possible time.

5.2.4. Pedestrian and Traffic Safety

- During construction the site shall be fenced off to prevent access;
- Fencing shall be inspected weekly and maintained properly, by the Contactor, until construction is complete;
- The Contractor shall ensure that signage, which must be pictorial and in the vernacular, is erected on all boundary fences warning against entering the construction area;
- Traffic calming and speed control measures for access to construction sites shall be instigated in consultation with the local authorities.

5.3. Operation Phase

5.3.1. Health and safety

- All relevant Health and Safety legislation as required in South Africa must be strictly adhered to, including but not limited to the Occupational Health and Safety Act, 1993 (No. 85 of 1993);
- All necessary occupational certificates and inspections must be complied with to the approval of an appointed Health and Safety Officer;
- The applicant or persons in control of the facility must train safety representatives, managers and workers in workplace safety.

5.3.2. Emergency plan

- An emergency response plan (for construction and operation) must be drawn up, to the approval of the Authorities, prior to construction and operation taking place;
- All pollution incidents must be reported immediately to the Authorities;
- Record(s) of environmental related incidents must be maintained and communicated to the ECO.

5.3.3. Safeguarding of the environment, local community and employees against fire risk

- Smoking must be prohibited in the vicinity of flammable substances;
- Ensure the availability of sufficient firewater tie-in points;
- Any welding or other sources of heating of materials must be done in a controlled environment and under appropriate supervision;
- Training must be provided in the use of the appropriate fire-fighting equipment;
- Ensure availability of fire extinguishers and fire-fighting equipment (SABS 089-1-1987);
- A close cooperation must be established with the local fire authority to ensure that they know the layout of the site, what equipment and facilities are available, where they are located, and how they are used; and
- All employees must be aware of emergency/ contingency plans to ensure an understanding of the hazards and procedures required during an emergency situation.

5.3.4. Spill contingency plan

- A site specific spill Contingency Plan (for construction, operation and the transportation of fuels) must be compiled, to the approval of the Authorities, prior to construction and operation taking place.

5.3.5. Storm water management

- All surface spillages must be contained on-site through channels and trenches and diverted to an appropriate oil or water separator system of sufficient capacity;
- No fuels or oils must be allowed to be discharged directly into stormwater pipes or drains and sewage manholes or pipes;
- All waste oils, greases, fuels, chemicals etc. must be collected and disposed of in an appropriate manner off site. The contents of grease traps or other waste oil, grease and/or fuel disposal or storage containers must under no circumstances be emptied and dumped to the surrounding area. Outflow must be directed to the municipal sewer system;

5.3.6. Hazardous substance management (spent chemicals, oils, paint, grease, cement, lubricants, soaps, fuel etc.)

- Hazardous substances must be disposed of at an appropriate classified waste site (unless it is to be recycled by approved methods), as per the National Environmental Management Waste Act 59 of 2008;
- Waste from the oil interceptors must be disposed of to a suitable waste-handling contractor where Safe Disposal Certificates are to be issued;
- All product spills within the bunded area must be appropriately cleaned up;
- All contaminated spill fighting material such as fibres, soil, sandbags, etc. must be disposed of in an appropriate hazardous waste landfill site. Proof of this must be made available upon request;
- Ensure safe disposal of methanol/water mixture used for removal of any residual water from the tank before commissioning;
- In the event of a spill, hazardous material may be generated. Such material must be disposed of at a suitable licensed waste disposal facility, with chain of custody documentation supplied as proof of end recipient;
- The transportation, handling and storage of hazardous and flammable substances must comply with all the provisions of the Hazardous Substances Act 1973, (Act No. 15 of 1973) associated regulations as well as a SANS 10228 and SANS 10089 codes;
- An integrated waste management approach that is based on waste minimisation must be used and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste shall be disposed of at a landfill licensed in terms of section 20 (b) of the National Management Waste Act, 2008 (Act No. 59 of 2008);

5.4. Monitoring and Auditing

An independent ECO must be appointed to serve as an external auditor during the construction phase and, if necessary, for the first year of operation. This is to ensure that the EMPr and other relevant requirements are complied with.

5.4.1. EMPr monitoring

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. The overall monitoring and auditing of the site will be the responsibility of the ECO, however the operator must provide the necessary environmental control and audit measures and integrate these through their Environmental Management Systems. The ECO shall keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO. The ECO shall remain employed indefinitely until closure of the site (should this occur). The ECO shall remain employed until the close out audit and one year post construction. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority. Non-compliance with the EMPr must be rectified within one week of the relevant offending party receiving an audit report and notice.

6. ENVIRONMENTAL MANAGEMENT PROTOCOL

As part of the implementation and monitoring requirements, the employees involved in the proposed development must be trained in implementing and monitoring compliance with the EMPr and EA and to undertake the necessary monitoring and implementation of the prescribed mitigation measures detailed here (Table 6.1).

During the construction phase:

- The construction footprint must be surveyed and demarcated prior to construction commencing.
- No construction activities will be allowed outside the demarcated footprint.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken.
- Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation must be mulched and used as ground cover during rehabilitation.
- All areas that will be impacted must be surveyed and demarcated by a suitably qualified specialist prior to vegetation and topsoil removal in order to locate and rescue any SCC within the area and relocate them.
- The contractor's staff must not poach or trap wild animals.
- The contractor's staff must not harvest any natural vegetation.
- All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction.
- Restoration must be conducted as per the approved Rehabilitation Management Plan.
- Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation.
- The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations;
- Wherever possible, construction activities must be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc.
- When not possible, suitable stream diversion structures must be used to ensure the river is not negatively impacted by construction activity.
- No construction/ borrow pit material must be stored within 50 m of a watercourse.
- Stockpiles within 100 m of watercourses must be monitored for erosion and mobilisation of materials towards watercourses. If this is noted by an ECO, suitable cut-off drains or berms must be placed between the stockpile area and the nearest watercourse.
- During the construction phase no concrete mixing must take place within 32 m of any river bank or wetland system.
- A serviced fire extinguisher (to neutralise pH levels if a spill occurs) must be available on site in the event that wet concrete is accidentally spilled into the river.
- The mitigation measures in Appendix A must be used in conjunction with this report.
- During the construction phase no machinery must be parked overnight within 50 m of the rivers/wetlands.
- All stationary machinery must be equipped with a drip tray to retain any oil leaks.
- Chemicals used for construction must be stored safely on bunded surfaces in the construction site camp.

- Emergency plans must be in place in case of spillages onto road surfaces or within water courses.
- No ablution facilities may be located within 50 m of any river or wetland system.
- Chemical toilets must be regularly maintained/ serviced to prevent ground or surface water pollution.
- Flood attenuation and storm water management plans must be drawn up and implemented.
- An Erosion and Sediment Management Plan must be developed and implemented to minimize the ingress of sediment-laden stormwater into the rivers/ wetlands.
- During the construction phase all riparian vegetation removal must take place under supervision of the Environmental Control Officer (ECO).
- A Rehabilitation and Alien Vegetation Management Plan must be developed and implemented.
- Banks must be artificially stabilized as soon as possible if significant riparian vegetation is removed.
- During the construction phase removal of riparian vegetation must take place under the supervision of the ECO.
- Removal of the alien invasive vegetation must be prioritised.
- Banks must be artificially stabilized as soon as possible if significant riparian vegetation is removed.
- Vehicles and machinery must not encroach into areas outside/surrounding the road upgrade footprint.
- During the construction phase coffer dams (if required) must not be left in place for longer than 30 days.
- All work within the rivers must be completed during the dry season, when flows are at their lowest.
- Water in the rivers must be allowed to pass downstream of the construction activity. If necessary this must be achieved via a temporary diversion – this should not be in place for more than 30 days.
- A Rehabilitation and Alien Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc.
- No ablution facilities must be located within the 50 m no-go buffer.

<u>During operational phase:</u>

- All cleared areas must be continuously rehabilitated with indigenous vegetation post-establishment.
- The site will be considered as rehabilitated when 75% or more of the impacted areas are covered by primary growth (grasses and/or scrubs).
- The approved Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations;
- Flood attenuation and storm water management plans must be drawn up by a qualified engineer and approved by DWS.
- An Erosion and Sediment Management Plan must be developed and implemented to minimize the ingress of sediment-laden stormwater into the rivers.

8. ENVIRONMENTAL AWARENESS

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained with regard to the implementation of the EMPr, as well as regarding environmental legal requirements and obligations. Training shall be conducted by an independent person where necessary. Environment and health awareness training programmes must be targeted at two distinct levels of employment, i.e. management and labour. Environmental awareness training programmes shall contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course;
- A schedule for the presentation of the training courses.

The person conducting training shall ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records shall verify each of the targeted personnel's training experience.

The Developer shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training shall, as a minimum, include the following:

- The importance of conformance with all environmental policies.
- The environmental impacts, actual or potential, of their work activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Eskom's environmental management systems, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities.
- Environmental legal requirements and obligations.
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of the bridge, main access roads, approach roads or construction camps.
- The importance of not littering.
- The importance of using supplied toilet facilities.
- The need to use water sparingly.
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, a translator must be called to the site to further explain aspects of environmental or social behaviour that are unclear. An environmental training and awareness course has been provided in Annexure 2.

9. CONCLUSION

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr must be seen as a day-to-day management document. The EMPr thus sets out the environmental standards that are required to minimise the negative impacts and maximise the positive benefits of the proposed development as detailed in the BAR. The EMPr is a “live document”, and if continuously reviewed and managed correctly can result in successful construction and operation of the proposed development.

All attempts must be made to have this EMPr available, as part of any tender documentation, so that the contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these. Further guidance must also be taken on any conditions contained in the Environmental Authorisation, if the project is granted approval, and that these conditions must be incorporated into the final EMPr.

ANNEXURE 1: METHOD STATEMENTS

Method statements need to be compiled by the Contractor for approval by the ECO. For the purposes of the environmental specification, a method statement is defined as a written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the ECO is enabled to assess whether the Contractor's proposal is in accordance with the EMPr and / or will produce results in accordance with EMPr.

The method statement shall cover applicable details with regard to:

- Construction procedures,
- Materials and equipment to be used,
- Getting the equipment to and from site,
- How the equipment/ material will be moved while on site,
- How and where material will be stored,
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- Timing and location of activities,
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Engineer.

The Contractor shall abide by these approved method statements, and any activity covered by a method statement shall not commence until the ECO has approved the method statement. The method statement shall be submitted to the ECO not less than 20 days prior to the intended date of commencement of the activity, or as directed by the ECO.

METHOD STATEMENT

CONTRACT:…….... **DATE**:……

PROPOSED ACTIVITY (give title of method statement and reference number from the EMPr):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

Start Date:	End Date:

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):

* Note: please attach extra pages if more space is required

DECLARATIONS

1) ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____

(Signed) (Print name)

Dated:._____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement

_____ _____

(Signed) (Print name)

Dated: _____

ANNEXURE 2: BASIC ENVIRONMENTAL EDUCATION COURSE

http://www.webweaver.nu/clipart/environmental.shtml

Reasons why should we look after the environment

- We have a right to a clean environment
- A clean environment is essential to healthy living
- All our basic needs come from the environment
- A contract has been signed – development vs the environment
- Penalties / fines could be issued

How to look after the environment

- Report issues
- Teamwork
- Follow the set rules and guidelines (EA, EMPr, Method statements etc.)
- Conserve, reuse and recycle

Tips and Guidelines

- Workers and equipment should not be allowed outside demarcated areas
- No swimming or polluting of water bodies allowed
- No damage / disturbance to vegetation or water bodies without consent / permits
- No disturbance allowed in no-go areas
- No hunting of animals
- Report all fires
- No burning or burying of waste
- No smoking near hazardous materials
- Training on fire fighting equipment
- Hazardous materials to be stored in designated and bunded areas
- Spill kits and drip trays a must
- Report all spills
- Control dust and Noise
- Maintain construction vehicles
- Availability and maintenance of sanitation facilities

Tips and Guidelines

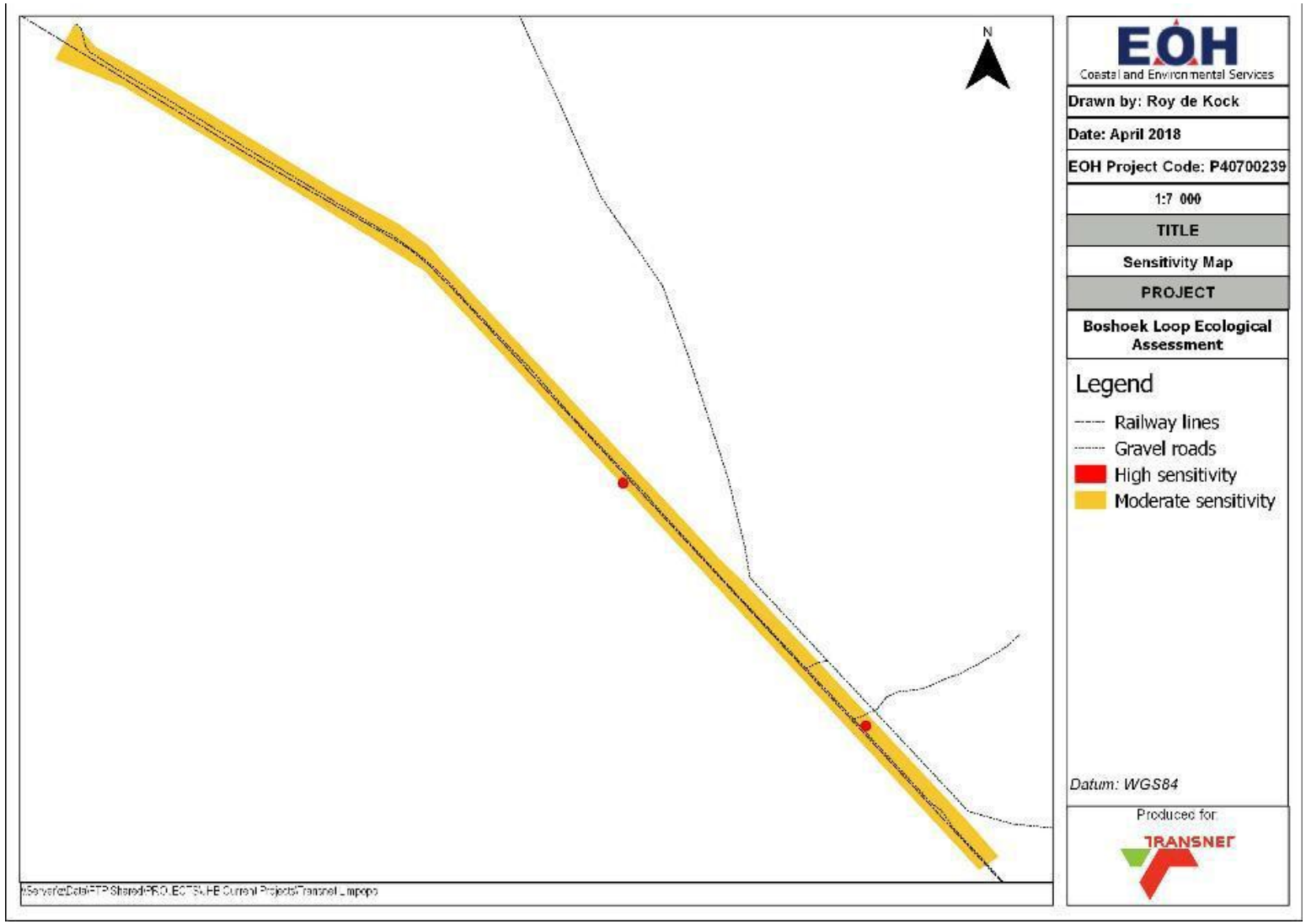
- Only eat is designated areas
- Do not litter
- Vehicles to remain on approved tracks and adhere to speed limit
- Ensure emergency phone numbers are available
- Ensure PPE is worn
- Report fires, leaks and injuries
- Ask if unsure

ANNEXURE 3: CVS OF PROJECT TEAM

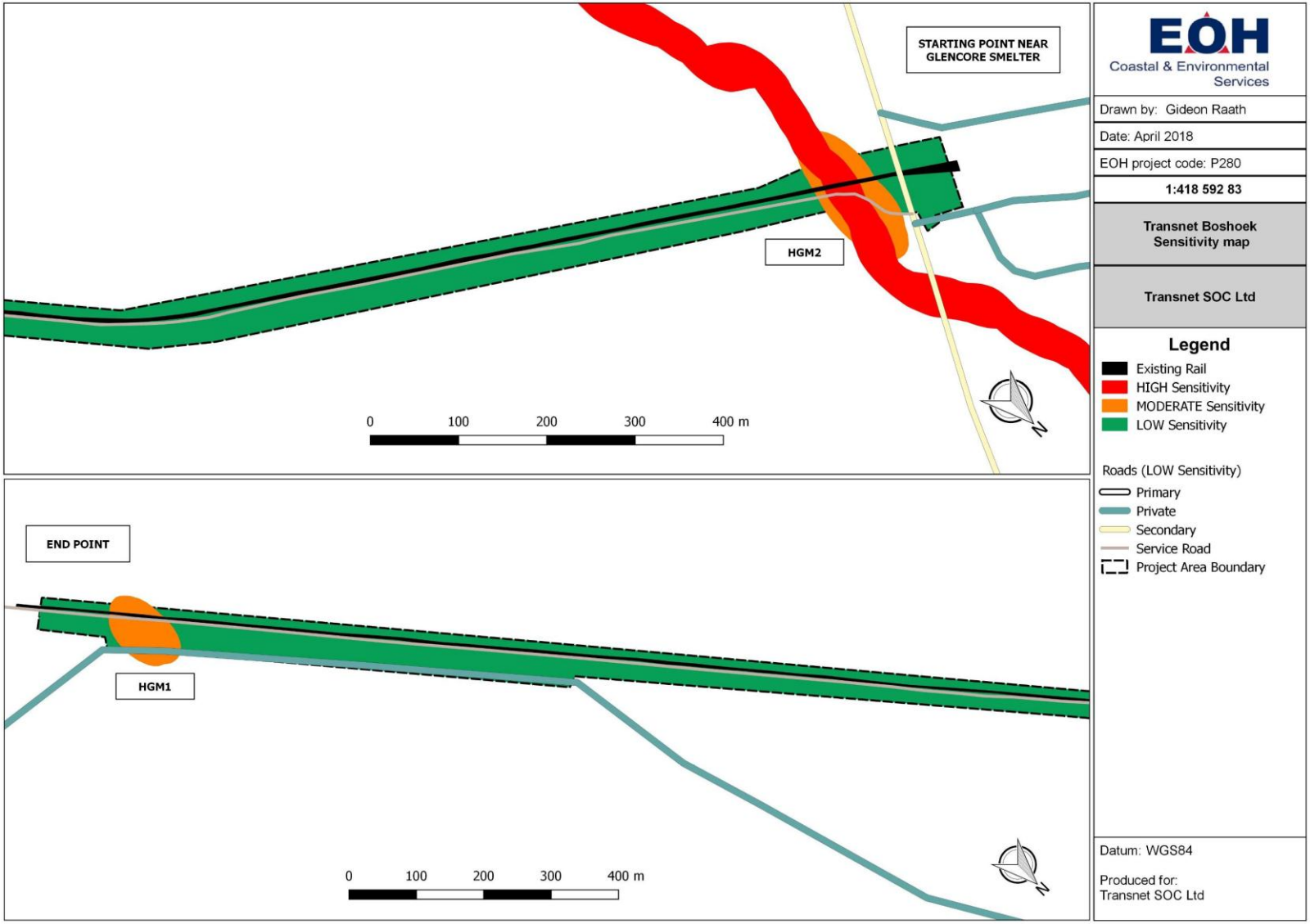
Please refer to the CVs in the Basic Assessment Report.

ANNEXURE 4: SENSITIVITY MAP

ECOLOGICAL SENSITIVITY MAP



AQUATIC SENSITIVITY MAP



HERITAGE SENSITIVITY MAP