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ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE EXPANSION OF RAILWAY LINES AT PYRAMID SOUTH WITHIN CITY OF TSHWANE MUNICIPALITY IN PRETORIA, GAUTENG PROVINCE.

DEA REF.: 14/12/16/3/3/1/1839

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EMPr	Environmental Management Programme
HSE	Health, Safety and Environmental Officer
ECO	Environmental Control Officer
EO	Environmental Officer
CA	Competent Authority
NEMA	National Environmental Management Act
NWA	National Water Act
I &APs	Interested and Affected Parties
MSDS	Material Safety Data Sheets
SOP	Standard Operating Procedures
SAHRA	South African Heritage Resources Act
BAR	Basic Assessment Report
TFR	Transnet Freight Rail

DEFINITIONS

Audit: A systematic and objective evaluation in terms of the conditions set out in any Environmental Authorization and Environmental Management Plan on a regular (periodic) basis. The degree of compliance is recorded in bi-annual audit reports. An audit aims to ensure that all regulatory requirements are adhered to.

Bund: An artificial containment wall (embankment) designed to contain spillages of a hazardous nature such as chemicals and hydrocarbons.

Competent Authority: The Competent Authority is the authority responsible for the issuing of the Environmental Authorisation. In this instance, the "Competent Authority" means the Head of Department (HoD) of the National Department of Environmental Affairs,

Construction Site Camp: The construction site camp refers to the designated area where the Contractor's offices (temporary), and associated infrastructure will be located during the construction period of the proposed project.

Contamination: To release a substance into a natural environment where it is not normally found, which is harmful to the health of the indigenous organisms or ecosystems and humans.

Contaminated: Means the presence in or under any land, site, buildings or structures of a substance or micro-organism above the concentration that is normally present in or under that land, which substance or micro-organism directly or indirectly affects or may affect the quality of soil or the environment adversely.

Contractor: The individual and/or company that are responsible for the development and/or construction activities related to the proposed project. The Contractor is further responsible for the implementation of and compliance with the conditions and stipulations contained within the in-

Site Documentation.

Environment: Means the surrounding within which a human exists and that are made up of:

(i) The land, water and atmosphere of the earth;

(ii) Micro-organisms, plant and animal life;

(iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and

(iv) The physical, chemical aesthetical and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Audit: Means work done to identify and evaluate compliance of the statement and the residual environmental impact of an existing activity, the effectiveness of mitigation measures and the functioning of monitoring mechanisms.

Environmental Control Officer (ECO): The person appointed as an environmental specialist who must monitor the Proponent's compliance with the Environmental Management Plan conditions and requirements. The ECO monitors compliance with the approved Environmental Management Programme (EMP) and the conditions as stipulated in the Environmental Authorisation.

Environmental Impact: Change in an environment resulting from the effect of an activity on the environment, whether positive or negative. Impacts may be the direct consequence of an individual's or organisation's activities or may be indirectly caused by them.

General waste: Means waste that does not pose an immediate hazard or threat to health or to the environment, and includes –

(a) domestic waste;

(b) building and demolition waste;

(c) business waste: and

(d) inert waste,; or

(e) any waste classified as non-hazardous waste in terms of the regulations made under section 69,

	and includes non-hazardous substances, materials or objects within business, domestic, inert, building and demolition wastes
Hazard:	Means a source of or exposure to danger.
Hazardous Waste:	Means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
Interested and Affected Party:	Individuals and/or peer groups that are and/or maybe affected albeit positive or negative by the proposed activity. IAP's include authorities, local communities, environmental interest groups, and the public.
Mitigation:	Measures designed to avoid, reduce or remedy the proposed adverse impacts.
Monitoring:	The repetitive and continued observation, measurement and evaluation of environmental criteria to follow changes over a period and to assess the efficiency of control measures.
Pollution:	Means 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 organ of state, where that change has an adverse effect on human health or wellbeing 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.
Preventative	A predetermined action to address potential problems before they develop

Action: into situations which would be contrary to the requirements of the EMPr. Preventative action is most often determined from the results of monitoring and audits during management review.

Site Documentation: In this document, "Site Documentation" refers to all relevant documentation pertaining the TCP Environmental Standards and the authorisation, operation and management of the site;

- Environmental Authorisation;
- Method Statements;
- Registers;
- Environmental Management Programme; and
- Written instructions from the TCP PM.

Solid Waste: Means all waste, including construction debris, chemical waste, excess cement/concrete, wrapping material, timber, tins and cans, drums, wire, nails, domestic, dead organic waste, asphalt products.

TCP Construction Manager (CM): Works together with the Project Manager to ensure that construction proceeds in accordance with the relevant environmental specifications and agreed schedule.

TCP Environmental Officer (EO): Responsible for ensuring that the EMP and conditions of the Authorisation is implemented by the project/construction team and Contractors and their Sub-contractors.

TCP Project Manager (PM): Means the overall project manager responsible for implementation of the project. The TCP PM has the authority to issue instructions and oversee the operations of contractors.

Topsoil: Topsoil is the upper, outermost layer of soil, usually the top 300m. It has the highest concentration of organic matter and microorganisms and is where most of the Earth's biological soil activity occurs.

1 INTRODUCTION

The Environmental Management Programme (EMPr) specifies all the potential environmental impacts, control and mitigation measures, performance criteria, relevant reporting and monitoring procedures. The EMPr forms a crucial part of the conditions for approval and ensures that the project proponent remains accountable for compliance issues. It must form part of the construction contractual agreements by means of inclusion in the environmental specifications that form part of the contract between the client and the contractor.

To ensure a holistic framework for the management of the environmental impacts, during the planning, design and construction phases of the expansion of the railway lines project, the EMPr initially sets out general environmental requirements, which are applicable to these phases of the project. The EMPr also contains a series of project environmental specifications designed to avoid, minimize and ultimately manage the potential environmental impacts of the expansion of railway lines project during the planning, design and construction phases of the project.

Environmental impacts anticipated during the operational and maintenance phase of the project will be managed in terms of an Environmental Management System (EMS), which the Concessionaire is required to implement.

The EMPr aims to facilitate appropriate environmental input during all phases of the project, during the construction activities as well as the future operational activities associated with the proposed expansion of railway lines at Pyramid South. To achieve this, the EMPr must define the management measures required to promote positive environmental consequences, prevent and/or minimise adverse environmental impacts of the project. aThe EMPr defines the objectives of such measures and describes how they will be achieved.

This is achieved by making recommendations for the planning and design, specify the limitations the contractor must abide by during construction, detail the issues that should be taken cognisance of and indicate specific actions that must be undertaken to ensure that the environment is not unnecessarily damaged. In addition, the EMPr provides a clear indication of the environmental management requirements of each of the role players involved during the construction operation and decommissioning phases of the development.

1.1 Project Background

The project forms part of the Transnet Waterberg rail corridor expansion programme between Ermelo, located in Mpumalanga Province, and Lephalale, located in the Limpopo Province. The railway line is a key corridor to Transnet for the transportation of various commodities, including coal, chrome, ferrochrome, cement, lime, granite, iron ore, containers and general freight. The construction activities focus specifically on the upgrades required for the coal expansion of the line. Unlocking the Waterberg area is a key priority in Government's National Development Plan and has been identified as part of Strategic Infrastructure Projects (SIP 1) by the Presidential Infrastructure Coordinating Commission (PICC). Specifically, for coal, expansion in rail capacity was identified as a strategic initiative and received much attention from Government as a key driver for the South African economy.

The latest rail capacity demand from coal miners in the Waterberg is informed by mine expansion projects and proposed new mine developments. In line with these strategic priorities for the country, Transnet has developed a programme for expansion of railway infrastructure between Lephalale in the Limpopo province and Ermelo in the Mpumalanga province. The expansions will ultimately feed the heavy haul Coal Line for increased coal exports through the Port of Richards Bay and deliver coal to several power stations along the existing rail route.

The scope of the project at Pyramid South yard includes the expansion of the existing railway lines in the yard. The yard is a switching yard which switches from 25 kV AC to 3 kV DC. The yard is located on the railway network between Lephalale and Ermelo. The yard expansion will be undertaken within the Transnet servitude; therefore, no additional land will be acquired (Figure 1). The expansion requires the construction of new culverts, extension of culverts and new surface drains (Table 1).

Table 1: Pyramid South yard coordinates

	Latitude	Longitude
Phase 1		
Start	25°36'36.50"S	28°14'4.39"E
End	25°36'32.15"S	28°15'11.77"E
Phase 2		
Start	25°36'37.94"S	28°13'51.47"E
End	25°36'33.40"S	28°15'39.06"E
Phase 3		
Start	25°36'40.27"S	28°13'18.53"E
End	25°36'28.00"S	28°15'58.65"E

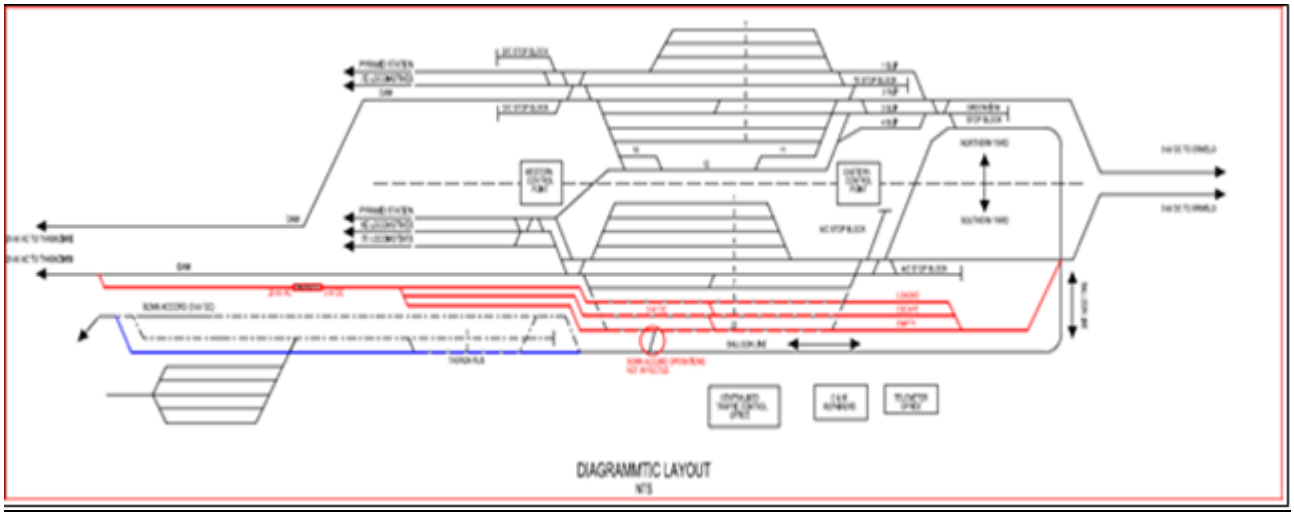

Figure 1: Diagrammatic layout Pyramid South yard (Blue line: Phase 1 (Bonn Accord Deviation), Red lines: Phase 2 (End-state)

1.2 Purpose of the Environmental Management Programme

The EMPr aims to identify and define mechanisms which will avoid, minimize and mitigate possible negative or adverse environmental impacts of the activities on the site whilst amplifying the benefits associated with the project. An EMPr defines the method by which the receiving environment is to be managed, the performance criteria to be used and the relevant reporting and monitoring procedures and structures. To ensure that compliance with the legislative requirements is met it is essential that:

- The roles and responsibilities of the various parties involved in the operation are clearly delineated;
- The training and awareness criteria is outlined;

- Monitoring, auditing, record keeping,3 and reporting protocol is set;
- Environmental legal compliance is reviewed;
- All activities and the associated impacts and proposed mitigation measures are defined; and
- The closure criterion is set.

The EMPr is a vital instrument with regards to the conditions set by the Environmental Authorisation as it ensures that the project proponent remains accountable for all compliance issues related to the development and management thereof.

1.3 Objectives of the Environmental Management Programme

The objectives of the Management Plan are to:

- Outline guidelines for construction and operational management for the sound management of environmental issues pertaining to the execution of all construction work associated with the project.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment.
- Provide a standard for management of environmental issues pertaining to the execution of civil and electrical construction work with specific reference to issues raised through the Environmental studies undertaken for the project as well as the requirements of the authorisation and Environmental Authorisation granted.
- Reduce the environmental impact of civil and electrical work through the proactive employment of sound and effective working practices.

This EMPr allocates and defines the responsibilities of each pertinent role player during the execution of the project with respect to the management of environmental aspects and impacts.

2 SITE DESCRIPTION

The proposed project is located on farm Doornpoort 295 JR within City of Tshwane Municipality with the following coordinates:

Southings: 25°36’37.23”

Eastings: 28°13’14.69”

Pyramid South is in the Onderstepoort, Bon Accord in Pretoria North, Gauteng Province and is situated along the old Warmbaths road (R101) in the Northern part of Rooiberg Asphalt Pyramid in Pretoria North. See locality map below.

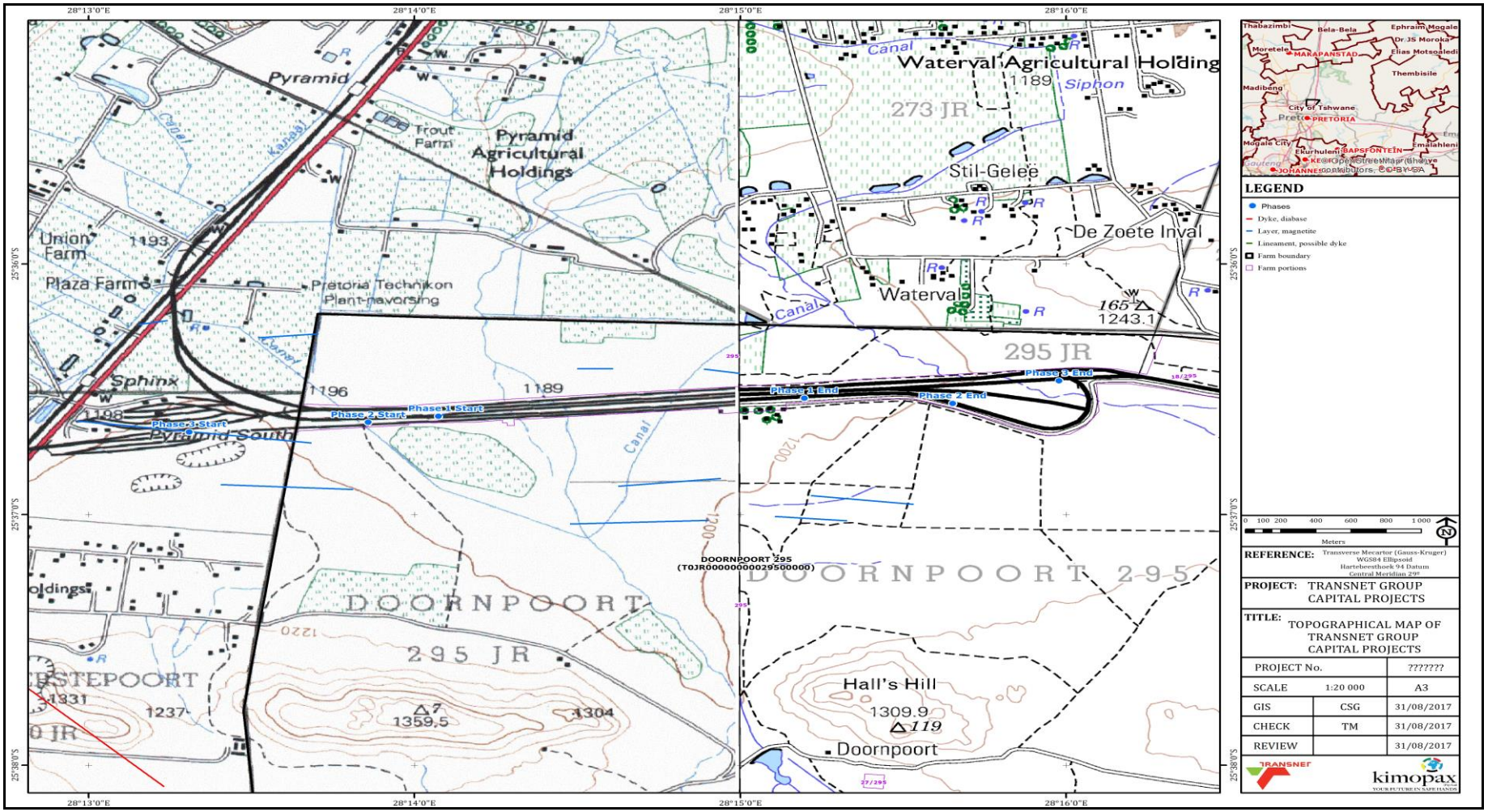

Figure 2: Locality Map for Pyramid South yard.

2.1 Climate

2.1.1 Rainfall and Evaporation

The project area has warm to hot, rainy summers and cold, dry winters and hotter and drier further north. **Error! Reference source not found.**presents the regional hydrology including the South African Weather Services (SAWS) and Department of Water and Sanitation (DWS) weather stations selected to characterise rainfall and evaporation at the site.

The rainfall station selected to represent the project site is SAWS station 513337_W, which is located approximately 3 km south west of the site with a rainfall record length of 70 years. The rainfall records show a mean annual precipitation (MAP) of 659 mm, which will be adopted for the site.

The evaporation station selected to represent the project site is DWS station A2E007, which is located 10 km east of the site and has a record length of 22 years (excluding years with estimates and missing records). S-Pan evaporation was converted to open water evaporation using evaporation coefficients from WR1990[1]. The evaporation records show a mean annual lake evaporation of 1108mm, which will be adopted for the site. Table 2 presents the average monthly rainfall and evaporation adopted for the site.

Table 2 : Average Monthly Rainfall and Evaporation

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall	112	93	80	47	16	7	5	5	17	61	106	110	659
Lake Evaporation	170	154	149	117	99	80	86	111	142	167	161	174	1108

2.1.2 Return Period Rainfall Depths

The data taken from the six nearest rain stations (to the central point on site) was used to estimate the 24-hour design rainfall depth using the Design Rainfall Estimation (DRE) in South

[1] Surface Water Resources of South Africa 1990 - Volume 1 Appendices - Appendix 3.3.1. WRC Report 298/1.1/94

Africa (Smithers and Schulze, 2003). A summary of the input stations is presented in **Error! Reference source not found.**.

Table 3: Summary of Weather Stations Used for Generating Rainfall DDF for the Site

Station Name	SAWS Number	Distance from site (km)	Record Length (years)	Mean Annual Precipitation (mm)	Altitude (m AMSL)
BON ACCORD DAM	0513337_W	4	72	678	1200
ONDERSTEPOORT-VET	0513309_W	6.5	90	731	1220
HAAKDOORNBOOM	0513245_W	7.4	53	645	1220
PRETORIA-MAYVILLE	0513312_W	11.4	60	708	1240
PRETORIA-P.W.D. KWEKERY	0513374_W	12.6	53	688	1310
PRETORIA-CAPITAL PARK	0513343_W	12.7	38	700	1260

The Smithers and Schulze method of DDF rainfall estimation is considered more robust than previous single site methods. WRC Report No. K5/1060 provides further detail on the verification and validation of the method. **Error! Reference source not found.**presents DDF rainfall estimates that were derived from the Smithers and Schulze method.

Table 4: Depth Duration Frequency Estimates for the Site

Duration (hours)/ days	Rainfall Depth (mm)						
	1:2yr	1:5yr	1:10yr	1:20yr	1:50yr	1:100yr	1:200yr
0.08	10.1	13.9	16.9	19.9	24.5	28.2	32.4
0.167	15	20.7	25.1	29.7	36.4	42	48.2
0.25	18.9	26.2	31.6	37.4	45.9	53	60.8
0.5	24	33.1	40	47.4	58.1	67.1	77
0.75	27.5	38	46	54.4	66.7	77.1	88.4
1	30.4	41.9	50.7	60	73.6	85	97.5

Duration (hours)/ days	Rainfall Depth (mm)						
	1:2yr	1:5yr	1:10yr	1:20yr	1:50yr	1:100yr	1:200yr
1.5	34.9	48.2	58.2	68.9	84.5	97.6	112
2	38.5	53.1	64.2	76	93.2	107.6	123.5
4	45.7	63.1	76.3	90.3	110.7	127.9	146.7
6	50.6	69.8	84.4	99.9	122.5	141.5	162.3
8	54.3	75	90.7	107.3	131.6	151.9	174.4
10	57.4	79.3	95.8	113.4	139.1	160.6	184.3
12	60.1	82.9	100.3	118.7	145.5	168.1	192.9
16	64.5	89.1	107.7	127.5	156.3	180.5	207.2
20	68.2	94.2	113.9	134.8	165.3	190.9	219
24	71.4	98.6	119.2	141	172.9	199.7	229.2
1 day	59.4	82	99.1	117.3	143.8	166.1	190.6
2 days	73.2	101.1	122.2	144.6	177.4	204.8	235
3 days	82.8	114.2	138.1	163.5	200.5	231.5	265.7
4 days	90.4	124.9	151	178.7	219.1	253	290.3
5 days	96.9	133.8	161.7	191.4	234.7	271	311
6 days	102.5	141.5	171.1	202.5	248.3	286.7	329
7 days	107.5	148.4	179.4	212.4	260.4	300.7	345.1

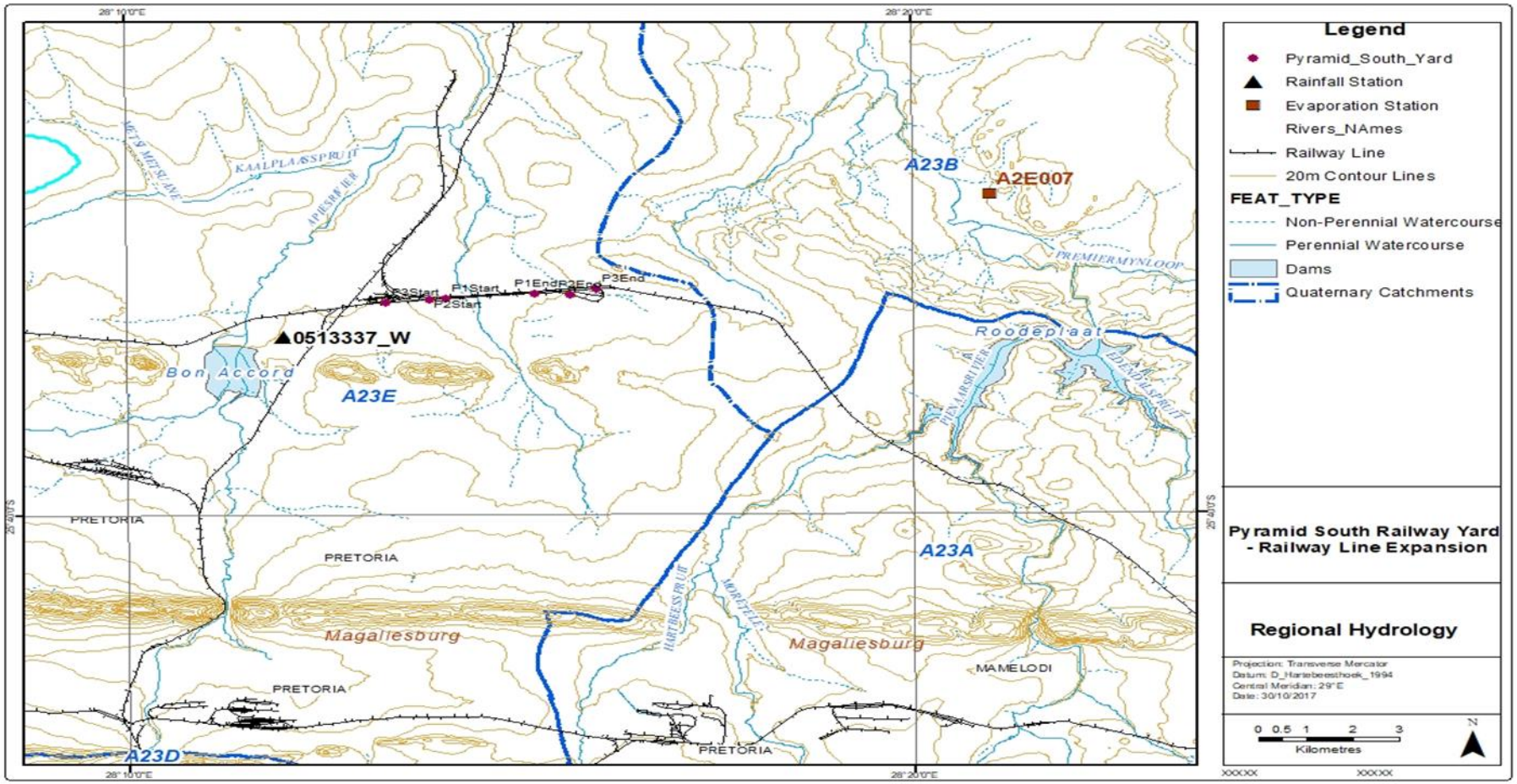

Figure 3: Regional Hydrology

2.2 Vegetation

Floral assessment results presented in this report, have been obtained from the terrestrial and aquatic units associated with the subject area of the site. A total six (6) NT, nine (9) EN and 19 VU red listed plants species were also searched in the site areas (see table 1).

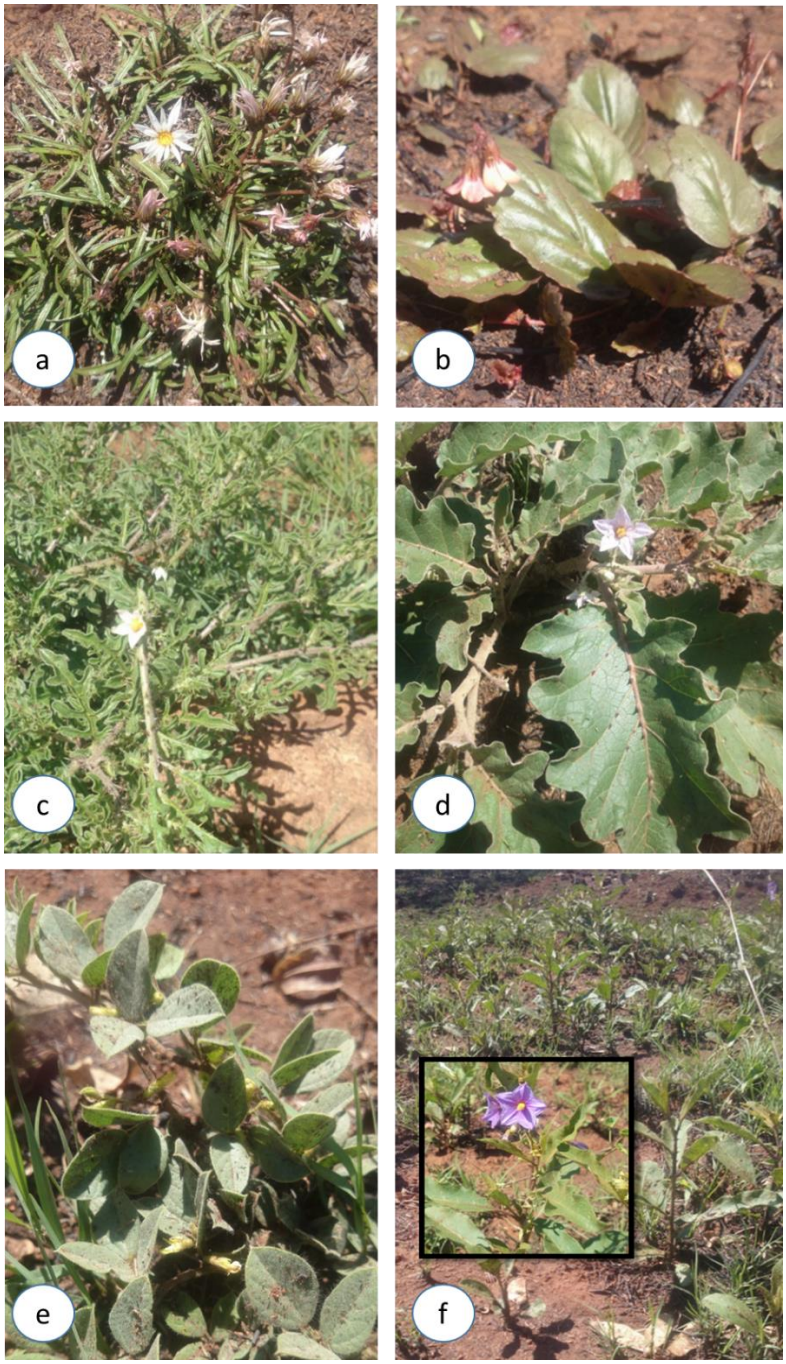

Figure 4: Example of herbaceous plants species recorded in the vicinity. a= Senecio sp., b= Vine species, c= Solanum sisymbiifolium, d= Solanum sp., e= Vine species, f= Solanum elaegnifolium

(a) Alien invasive plants species

A total of five (5) alien invasive plants was encountered scattered throughout the subject site area (listed in table 2). However, the density of alien invasive species was prominent on forbs than tree plants species. In addition, assessment was conducted on recovering site after being burnt down, therefore, other alien invasive plants species could have been missed out, particularly herbaceous and tubers plants species. Therefore, following Conservation of Agricultural Resource Act (CARA, 1983) and section 28 of the National Environmental Management of Biodiversity Act (NEM:BA, 1998), all these plants species should be controlled, either through chemical, mechanical or biological control measures.

(b) Medicinal and indigenous plants species

According to SANBI (2006), medicinal plants species are viewed as problematic from a conservation perspective, and can also be seen as a positive conservation opportunity, as these plants have increased value in terms of healthcare, income or cultural identity. These factors can be used as a motivator for conservation of these species and their habitats. Plant part substitution can be an important strategy for the conservation of medicinal plants, and traders should be encouraged to consider this strategy (Moeng & Potgieter, 2011). It is also well known that mining and agricultural activities encourage destruction of these plants species as well with their habitats.

As part of this assessment, a total of one (1) plants species, *Aloe* sp. (Asphodelaceae) was distinguished as a popular medicinal plant species (see figure 9c).

(c) Forb and grass plants species

A total of 14 forb plants species (including invasive, indigenous, medicinal) and one (1) grass species (table 2). These plants species were recorded in the both terrestrial and aquatic units. Since the herbaceous plants may be annuals, biennials or perennials, some could have been missed out during assessment, due to the fire disturbance triggered in the site.

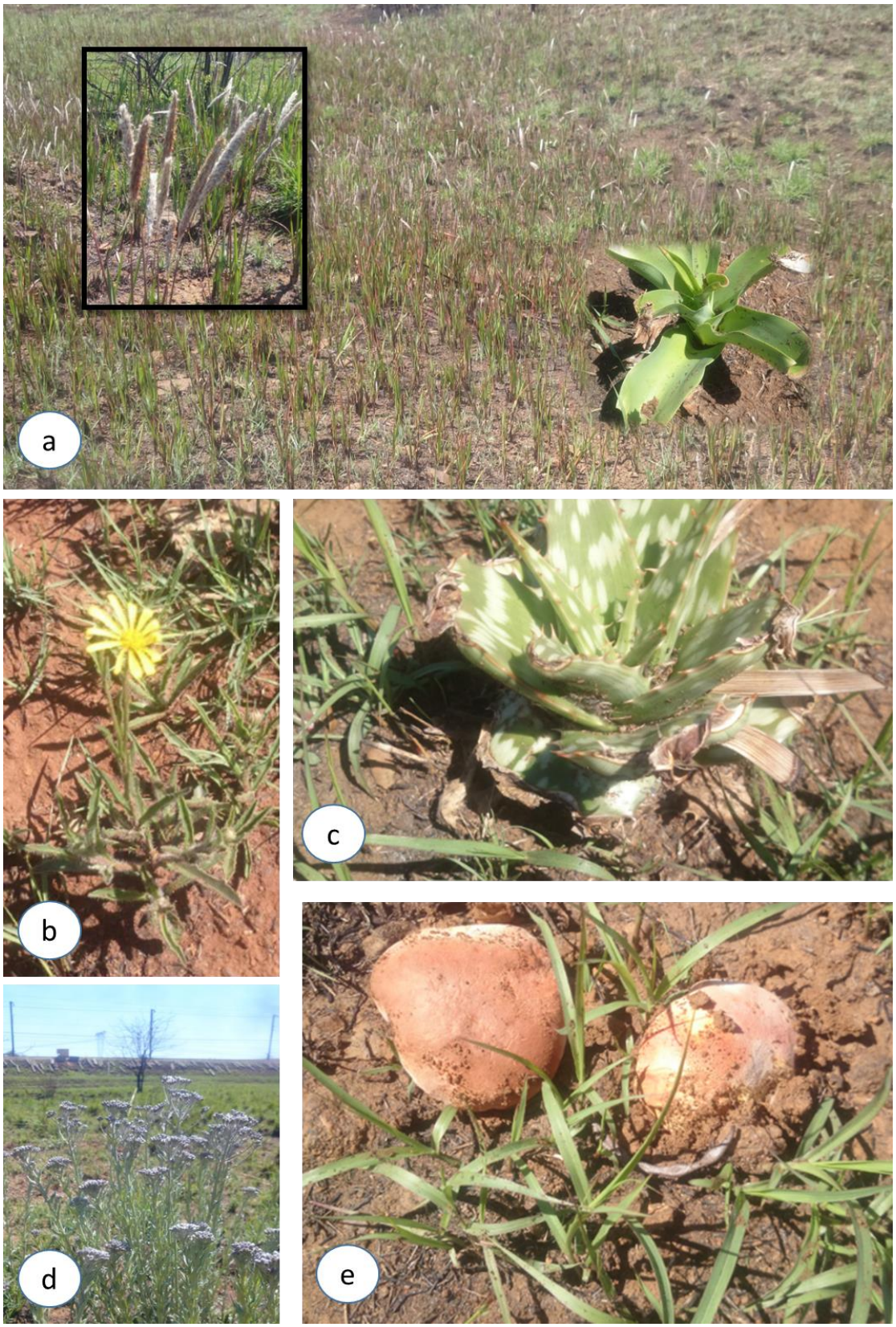

Figure 5: Examples of herbaceous plants species recorded in the vicinity. a= Poacea sp, b= Senecio sp., c= Aloe sp, d= Senecio sp., e= Mushroom species.

Figure 6: Examples of plants species associated with the wetland in the site. a= Argemone mexicana, b= Cyperus textilis, c= Combretum sp., d= Typha sp.

(d) Flora species of special conservation concern

Following the Gauteng, City of Tshwane C-Plan, the IUCN Red List of Threatened Species and NEM:BA assessments, some of these plants species described in the sections 3.2 b and c, are declared to be of Least Concern (LC), while some are CARA listed (see section 3.2 c). The results obtained in the both terrestrial and aquatic units, suggest that the is no plant Species of Conservation Concern (SCC) that requires translocation prior commencement of the project activities. Furthermore, the PRECIS SANBI database reflected no SCC plants associated with the subject site area.

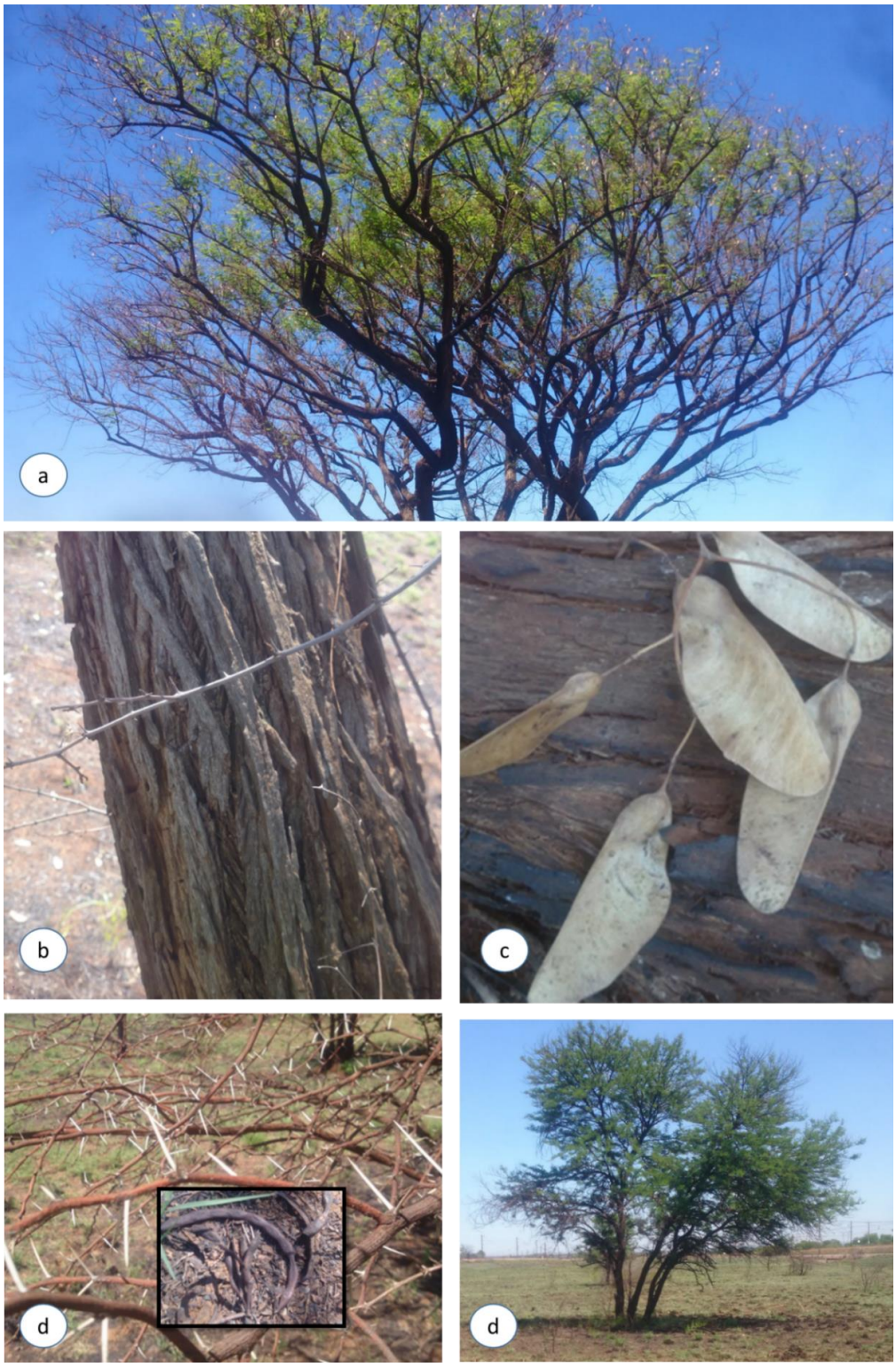

Figure 7: Tree species recorded in the vicinity. a= Tipuana tipu; b= stem bark of T. tiputa; c=fruit of T. tiputa; d= diagnostic features of A. karroo; e=Acacia karroo.

Table 2. List of different types of plants species recorded in wetland and terrestrial units

Family	Species	Conservation status [R, N]; IUCN	CARA Listed	National Protection Forestry Listed
Fabaceae	*Acacia karoo*	LC	No	No
Fabaceae	*Tipuana tipu*	Not assessed	Yes, 1b	No
Papaveraceae	*Argemone Mexicana***	Not assessed	Yes,1b	No
Solanaceae	*Solanum elaeagnifolium***	Not assessed	Yes, 1b	No
Solanaceae	*Solanum sisymbriifolium***	Not assessed	Yes, 1b	No
Solanaceae	*Solanum sp.* (x3)**	Not assessed	Yes, 1b	No
Asteraceae	*Senecio telekii*	LC	No	No
Asteraceae	*Senecio aureus*	LC	No	No
Russulaceae	Mushroom plant species	LC	No	No
Cyperaceae	*Cyperus textilis*	LC	No	No
Typhaceae	*Typha* sp.	LC	No	No
Combretaceae	*Combretum* sp.*	LC	No	No
Asphodelaceae	*Aloe* sp.#	LC	No	No
?	Vine plant species (x2)	LC	No	No

N= national protected; R= regionally protected; CARA=conservation of agricultural resource act; 0=no; 1=yes; *=endemic/indigenous;#=medicinal; alien invasive=; the IUCN Red List of Threatened Species [Least Concern (LC), Vulnerable (VU), Near Threatened (NT), Critically Endangered (CR), Critical (C), Endangered (E); Rare (R)].**

2.3 Geology

The geological map 5228 Pretoria indicates that the site is regionally underlain by shale, sandstone, grit and conglomerate of the Ecca Group of the Karoo sequence.In general, these rock types are covered by various fill and transported soils of variable origin/composition and residual soils of variable thicknesses

3 LEGISLATIVE OVERVIEW

3.1 The National Framework

For this EMPr a list of relevant legislation pertaining to the proposed expansion of Pyramid South railway lines is contained below:

- The Constitution of the Republic of South Africa (Act No.108 of 1996);
- National Environmental Management Act (Act No. 107 of 1998);
- National Water Act (Act No. 36 of 1998);
- National Heritage Resources Act (Act No 25 of 1999); and
- National Environmental Management: Biodiversity Act (Act 10 of 2004)
- National Environmental Management: Waste Act 59 of 2008

3.1.1 National Environmental Management: Waste Act 59 of 2008

The National Environmental Management: Waste Act (No 59 of 2008) asserts the roles of both national and provincial government in waste management. National governments competence to legislate is established in line with section 44 of the Constitution on the grounds of the need to maintain essential national standards, establish uniform norms and standards, and to promote and give effect to the right to an environment that is not harmful to health and well-being. The Act establishes a national framework for waste planning, regulation and management with roles for all spheres of government, specifically:

i) National government is tasked with establishing a national waste management strategy, including norms, standards and targets. National norms and standards may cover all aspects of the waste value chain, from planning to service delivery. Of particular importance from an intergovernmental perspective are the powers of national government with respect to norms and standards for:
   - The regionalization of waste management services;

- Tariffs for waste services provided by municipalities, including providing for tariffs to be imposed to provide for waste management infrastructure or facilities and ensuring that funds obtained from the provision of waste services are used for the delivery of these services.

3.1.2 Constitution of South Africa (Act No.108 of 1996)

Section 24 of Chapter 2, the Bill of Rights, of the Constitution of South Africa is the cornerstone of the protection and conservation of the environment through responsible and sustainable development for the benefit of the citizens of this country and future generations.

It reads as follow:

24) "Everyone has the right –

a) to an environment that is not harmful to their health or well-being; and

b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -

i. prevent pollution and ecological degradation;

ii. promote conservation; and

iii. secure ecologically sustainable development and use of natural resources while

iv. promoting justifiable economic and social development."

In terms of the proposed expansion of Pyramid South railway lines the Constitution upholds the rights of all the surrounding citizens to an environment that is not harmful to their health and well-being, and that the environment is protected through sustainable development practices whilst promoting economic and social development. The impact of the proposed development on the environment and citizens of the Republic must be determined "through reasonable legislative and other measures". To give effect to Section 24 numerous environmental laws, of which the National Environmental Management Act is but one, were instituted to protect and manage the environment and to promote sustainable development.

3.1.3 National Environmental Management Act (Act No. 107 of 1998)

The relevant legislation pertaining to the Environmental Authorization for this development is the National Environmental Management Act (NEMA) (No. 107 of 1998) as amended, and the EIA Regulations of April 2017 promulgated under NEMA. NEMA requires that activities be

investigated that may have a potential impact on the environment, socio-economic conditions and cultural heritage.

The results of the Basic Assessment Report must be reported to the competent authority. Section 24(C) of NEMA defines the competent decision-making authority which in this case is the National Department of Environmental Affairs. Procedures for the investigation and communication of the potential impact of activities are contained in Section 24 (7) of NEMA. This EMPr is compiled to be utilized during the construction and operation phase and to withstand the scrutiny of the authorities and the public during that process. In relation to Section 28 of NEMA "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment."

3.1.4 National Water Act (Act No. 36 of 1998)

The National Water Act (NWA) compels any water use in terms of Section 21 of the Act to be licensed. It is anticipated that the activities of the proposed expansion of railway lines will require a Water Use License due to a wetland located and other water uses on the proposed site during construction and operational phases.

3.1.5 National Environmental Management: Biodiversity Act (Act 10 of 2004)

In terms of the Act and in the context of this project the proponent must within the framework of NEMA provide for:

i. "the management and conservation of biological diversity within the Republic and of the components of such biological diversity;
ii. the use of indigenous biological resources in a sustainable manner."

For the purposes of this proposed expansion of railway lines and in terms of the National Environmental Management: Biodiversity Act all relevant ratified international agreements affecting biodiversity to which South Africa is a party, and which bind the Republic are applicable.

4 MANAGEMENT PROGRAMME AND INSTITUTIONAL MATTERS

4.1 Roles and Responsibilities

The most important role players in the management of the environment on site may include but are not limited to:

- Project Proponent - Transnet SOC Limited
- Transnet Project manager
- Transnet Construction Manager
- Transnet Environmental Officer (EO)
- Contractor
- Contractor's EO
- Environmental Control Officer (ECO)
- Competent Authority (CA)

4.1.1 Proponent

The Proponent (Transnet) remains ultimately accountable for the site and remains liable for any environmental damage caused by activities undertaken on the site. It is from this point of view that the Proponent set out a range of requirements in terms of the management of the environmental aspects for the site, to which the Contractor must adhere as a prerequisite to his/her appointment.

It is the responsibility of the Proponent to ensure that the principles of integrated environmental management, in terms of the requirements of Chapter 5 of NEMA, are implemented and maintained on the site and that environmentally sustainable practices are undertaken on the site. The Proponent must ensure that an approved EMPr and the conditions of the Environmental Authorisation (EA) be supplied to the Contractor for the activities undertaken on the site and monitor the Contractor's compliance to the requirements set out in the EMPr and EA and take disciplinary action for non-compliance.

Regular reports from the ECO regarding the compliance of the Contractor must be taken into consideration by the Proponent when evaluating the performance of the Contractor and taking corrective or punitive decisions towards eliminating the occurrence of the noncompliance incidents in future and to rectify current issues. Should the EMPr require to be reviewed due to its effectiveness the Proponent must submit the recommended changes to the Competent Authority (CA) for approval, prior to implementation.

4.1.2 Transnet Construction Manager

The Transnet Construction Manager has overall responsibility for environmental management on site which includes the implementation of the EMPr, TCP Environmental Standards and authorized conditions and reports to the Transnet Project manager. The TCP Construction Manager is supported by the TCP Environmental Officer. The specific environmental tasks during the construction phase will include:

- Reviewing the monthly reports compiled by the TCP EO;
- Communicating directly with the Contractor; and
- Issuing non-conformance notification to Contractors that do not comply with the requirements of the EMPr, TCP Environmental Standards and/or authorized conditions.

4.1.3 Transnet Environmental Officer (EO)

The Transnet Environmental Officer reports to the Transnet Construction Manager and is responsible for conducting the tasks required to ensure that the EMPr, TCP Environmental Standards and authorized conditions are implemented on the construction site.

The Transnet Environmental Officer will conduct the following tasks:

- Ensure that environmental issues receive adequate attention in the site induction training;
- Prepare and conduct awareness training (e.g. posters, tool box talks, signage)
- Conduct monthly observation & inspections and audit of all work places
- Monitor the Contractor's compliance with the EMPr, TCP Environmental Standards and authorized conditions on site
- Conduct monthly observations and environmental audits of all Contractor's and work areas
- Ensure that all environmental monitoring programmes (sampling, measuring, recording etc. when specified) are carried out according to protocols and schedules
- Measurement of completed work (e.g. areas top soiled, re-vegetated, stabilised etc.)
- Maintain site documentation related to environmental management (permits, EMP, method statements, EA, reports, audits, monitoring results, receipts for waste removal etc.). Documentation to be maintained on the relevant site Document Control System
- Attendance at scheduled SHE meetings and project coordination meetings
- Inspect and report on environmental incidents and check corrective action
- Keep a regular photographic record of all environmental incidents
- Implementation of environmental-related actions arising out of the minutes from scheduled meetings

- Management of complaints register
- Review and Sign off Method Statements prepared by Contractor's
- Audit Environmental Method Statements
- Collate information received, including monitoring results into a monthly report to the Construction Manager showing progress against targets
- The compilation of the Project Environmental Management File

The key deliverables will include the compilation of:

- Project Start Up Checklist
- Monthly inspection/environmental audit report
- Monitoring results
- Site close-out reports
- Incident reports
- Environmental Incident Register
- Environmental Non-Conformance Register
- Complaints Register
- Method Statements Register
- Hazardous Substances Register
- Site Close Out Inspection

4.1.4 Contractor

The Contractor is responsible for ensuring that all activities pertaining to the project/development complies with the requirements of the EMPr and the principles of Chapter 5 of the National Environmental Management Act (Act 107 of 1998) and any other relevant environmental legislation. The Contractor has the prerogative to appoint specific role players to perform functions on its behalf, delegating the responsibility to whoever is appointed.

It is furthermore the responsibility of the Contractor to allocate sufficient resources (time, financial, manpower, equipment, etc.) to ensure that compliance with the recommendations and specifications of the EMPr is achieved by all parties involved in the proposed project. The Contractor must ensure that the Contractors EO has access to all relevant documentations related to the project – this includes any environmental authorizations, permits, licenses, EMPr, and other relevant documentation.

The Contractor is responsible to inform and update any person or Sub-contractor in its employ of the requirements of the EMPr and environmental legislative requirements and put reporting and compliance monitoring measures in place to ensure conformance by the Subcontractors in relation to the EMPr or applicable environmental legislation.

4.1.5 Contractor's Environmental Officer

The Contractor will appoint an Environmental Officer whose role is to ensure implementation of the EMPr, TCP Environmental Standards and authorized conditions where applicable. The Contractor will submit the name and CV of the Environmental Officer as well as an Environmental Management Plan detailing roles and responsibilities with their tender submission. This will be for Transnet's approval and no work can commence on site if this has not been done.

The Contractor's Environmental Plan will include, but not be limited to:

- Description of environmental management responsibilities of the Contractor's Project Manager, Contractor's Site Manager and the Contractor's Environmental Officer
- Organisational Environmental Policy
- Environmental Method Statements
- Environmental Authorisation, where applicable.

The Contractor's Environmental Officer will liaise with the Transnet's Environmental Officer on site. It will be the responsibility of the Contractor's Environmental Officer to ensure that all work is conducted according to approved Environmental Method Statements and that the roles and responsibilities as set out in this document are fulfilled. The Contractor's Environmental Officer tasks will include:

- Daily or, weekly inspections of the work area(s) as per schedule or authorise through written instruction by Transnet Environmental Officer.
- Prepare activity/aspect based Environmental Method Statements
- Identify local, provincial and national environmental legislation that applies to the Contractor's activities
- Monitor compliance with the EMPr, EA conditions and Environmental Method Statements
- Ongoing Environmental Awareness Training of the Contractor's site personnel
- Reporting, investigating and recording of any environmental incidents caused by the Contractor or due to the Contractor's activities, including their sub-contractors
- Close out of environmental incidents

- Attendance at all SHE meetings and induction programmes, and toolbox talks where possible
- Waste Management
- Ensure that environmental signage and barriers are correctly placed
- Taking required corrective action within specified time frame

The Contractor's Environmental Officer will be expected to submit daily or weekly checklists to the Transnet Environmental Officer.

- Should the Contractor's Environmental Officer change from that person identified during either tender stage, or construction period, the Contractor will submit a CV of a replacement Environmental Officer for approval by the TCP Environmental Officer and Construction Manager. No work can proceed until the replacement Environmental Officer has been approved.

4.1.6 Environmental Control Officer (ECO)

The ECO operates independently to objectively monitor the implementation of the EMPr and its conditions and requirements. It is the responsibility of the ECO to monitor the degree of compliance to environmental legislation and the conditions stipulated in the EMPr by means of regular compliance audits.

All audit reports need to include a general description of the sites general state and if applicable identify and highlight specific areas of non-conformance. In the instance of major non-compliance (non-conformance) the ECO may in conjunction with the Transnet's EO and Transnet's Construction Manager suggest corrective action measures to the Proponent to eliminate the occurrence of the noncompliance incidents in future and to rectify the current issue.

The ECO has the authority to stop works if in his/her opinion the operation poses a serious threat to the environment or if an incident has occurred due to neglect or disregard of the imposed measures. Any non-compliance recorded in terms of the conditions of the EMPr, constitutes as a breach of Contract allowing the ECO to suspend part or all the works, as required and report the matter to the relevant authorities.

The ECO must conduct inspections once per week to assess compliance of the Contractor with the EMPr and report and provide feedback to the Proponent/Lessor on any environmental matters associated with the development.

5 GENERAL ENVIRONMENTAL MANAGEMENT SPECIFICATIONS

A copy of the EMPr should always be available on site in an Environmental File/Compliance Record. All employees, Contractors and sub-contractors are required to receive training regarding the contents of the EMPr relevant to their function, level of responsibility and accountability.

The following measures aim to provide pre-empted solutions for common project issues during the execution of the project. These measures have been derived from prior experiences and are based on anticipated environmental issues:

- Where existing infrastructure is being utilized for project activities, and are in a state of disrepair, a photographic record must be kept – documenting the status before, during and after the project activities;
- No personnel are to be housed on site. Housing arrangements need to be made away from site;
- The Proponent and any person or Contractor in its employ must adhere to all conditions of the EMPr;
- Adequate storage and control of hazardous substances and hydrocarbons are required;
- All plant and equipment must be maintained at regular intervals to prevent spillages and or environmental incidents; and
- Control and monitoring of stormwater runoff is essential during operations.

5.1 Environmental Compliance Records

The Contractors EO will follow the Transnet's Environmental Governance framework on site whereby records will be kept on all matters environmental. All records kept must adhere to the following standards:

- Records must be legible;
- Records must be compiled as soon as practicable and should form part of the external audit report; and
- If amended, amendment must be done in such a way that the original and any subsequent amendments remain legible and are easily retrievable.

Records will include but not be limited to:

a) Induction and Environmental Awareness Training Register;

It is the responsibility of the Contractors EO to ensure that all persons working on site have received a suitable degree of environmental training. This allows the Contractor to keep its environmental obligations in check. Environmental induction/training may take the form of inductions, toolbox talks, demonstrations, media or a written test – whereby the employees' understanding of environmental issues pertaining to his/her job is explained and assessed.

The degree of specialized training/induction is dependent on the function performed by the employee and will be determined by the EO and ECO. All levels of management and employees need to undergo environmental training and training attendance records must be kept and available for review by the ECO. Copies/samples of the toolbox talks/induction/training material also need to be kept in the Environmental File available for review by the ECO.

b) Complaints Register

A Complaints Register must be kept on site always. This register must be easily accessible to all stakeholders and Interested and Affected Parties (I&APs) and made available for review to the ECO during audits. The Register must illustrate what measures have been implemented to address the complaints as well as indicate what the timeline was in resolving the complaints.

c) Stakeholder Liaison and Communications

Copies of all documents referring to stakeholder liaisons must be kept on record (preferably signed) and maintained. All communications need to be made available to the ECO during auditing.

d) Method Statements

The Contractor shall provide Method Statements for approval by the Transnet EO and the Transnet Construction Manager prior to work commencing on aspects of the project deemed or identified to be of greater risk to the environment and/or which may not be covered in sufficient detail in the construction phase of the EMPr, when called upon to do so by the TCP EO and the Transnet Construction Manager. A Method Statement is a "live document" in that modifications are negotiated between the Contractor and the TCP EO and the TCP Construction Manager, as circumstances unfold. All Method Statements will form part of the construction phase of the EMPr documentation and are subject to all terms and conditions contained within the construction phase of the EMPr.

Note that a Method Statement is a 'starting point' for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed to minimize risk of harm to the environment. Changes to, and adaptations of Method Statements can be implemented with the prior consent of all parties.

A Method Statement describes the scope of the intended work in a step-by-step description for the Transnet's EO and the Transnet's Construction Manager to understand the Contractors intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during these tasks.

All Method Statements are to be to the approved by the Transnet EO.

e) Emergency Procedure

The Contractors EO must ensure that there is an Emergency Procedure on site that provides a detailed explanation of actions to be taken in the event of emergency situations. This procedure must be known to all persons working on site and must also provide contact information of the emergency services. The plan is to be reviewed annually and after each emergency and or accident. The procedure needs to address, amongst other the following emergencies:

- Fire;
- Accidental leaks and spillages of hydrocarbons (oil, fuel; etc.);
- Destruction of habitat or animal fatalities; and
- Acts of nature such as floods, lightning storms, etc.

f) Site Documentation

A copy of the EMPr must be available on site and easily accessible to all persons working for and or on behalf of the Contractor. Issues and conditions of the Site Documentation need to be explained to all employees.

g) Declaration of Understanding (DoU)

The Declaration of Understanding will be signed and provided by the Contractor. The signed DoU is a written confirmation by the Contractor that the requirements of the EMPr, TCP Environmental Standards and authorised conditions are understood and will be complied with for the duration of their works on site.

h) Appointment of Contractor's Environmental Officer

The Contractor will appoint an Environmental Officer or assign to a competent person roles and responsibilities for environmental management during construction. The Contractor will forward details of the appointment to the Transnet's Construction Manager and Transnet's Environmental Officer for their review and approval. Should the Contractor's Environmental Officer or the person originally assigned with responsibilities for environmental management change from that person identified during either the tender stage, or the construction period, the Contractor will submit the details of such appointment or assignment for the TCP Project Manager's approval. No work will proceed until the new Environmental Officer is assigned or appointed.

5.2 Non-Compliance with Documentation

Any non-compliance with the EMPr, the recommendations and conditions contained in the EA, and any written instruction issued by the TCP Construction Manager/ Project Manager will be treated as serious. The Proponent will be responsible for the implementation of said documentation and will be held accountable for any non-compliance thereof. A penalties/disciplinary schedule will be developed and agreed to by the project Proponent and Contractor prior to and during the Construction Phase. These measures will be implemented where practical based on the scale and complexity of the construction activities associated with the proposed project.

5.3 Site Inspections- Internal Audits

To ensure all information pertaining to the management of the site is recorded the TCP EO will have to undertake monthly audit inspections to record all forms of non-compliance and incidents. These findings must be compiled into a monthly Internal Environmental Audit report, and needs to be provided to the ECO monthly. This internal report will inform the Proponent of all environmental matters that require addressing and will provide a detailed review of the degree of compliance with the EMPr. The TCP EO and Contractors EO needs to be available for the monthly compliance audits as well as can attend environmental meetings with the Proponent.

5.4 Monthly Inspections- External Audits

To ensure compliance with the EMPr is achieved it is the ECO's responsibility to undertake monthly site inspections or external audits. These inspections will aim to ensure that all persons working for and on behalf of the Proponent adheres to the EMPr and other relevant site documentation.

During these external audits the ECO will determine if:

- The Contractors EO's record of major incidents (e.g. spills, impacts, complaints, and legal transgressions) is updated and that corrective and preventive actions identified and recommended have been implemented;
- A review of the public complaints register is conducted and that adequate measures have been employed by the Contractors EO to address these complaints;
- Findings of the weekly Site Inspection Forms are adequately recorded and addressed;
- Notice of any major incidents and complaints was given to the relevant authorities or the Proponent, whichever is relevant depending on the severity of the incident, and that adequate follow up actions were taken;
- The Method Statements and Management Programme being used are reviewed and updated regularly and records of variations to the EMPr /Method Statements are kept;
- Environmental monitoring is conducted, findings recorded, and remedial action is taken where limits are exceeded;
- Appropriate environmental training of personnel is undertaken;
- Adequate emergency procedures are in place, visibly displayed and effectively communicated to personnel; and
- The system for implementing the EMPr is operating effectively.

Each monthly compliance audit will entail:

- A site visit, accompanied by the Transnet EO and the Contractors EO.
- The recording of findings of the site visit in the Environmental Checklist and reported on in the Environmental Audit Report.
- Action steps resulting from non-compliance with the EMPr:
  - ❖ Any non-compliance with the EMPr will be treated as very serious and will be handled in accordance with the agreed schedule of penalties/disciplinary actions and/or Section 32, 33 and 34 of the National Environmental Management Act, 107 of 1998.

6 CONSTRUCTION PHASE ENVIRONMENTAL MANAGEMENT PROGRAMME

6.1 Development of the Project Area

The project area/site will undergo necessary changes to the site design and infrastructure to accommodate the required environmental management measures. The redevelopment or changes to the site will take place in the following phases:

- Phase 1: Create detailed layout plan for approval by the TCP Construction Manager and TCP EO;
- Phase 2: Construction activities; and
- Phase 3: Decommissioning of construction site.
- Phase 4: Operational Phase

During the development of the project area the following activities and subsequent environmental management actions will be undertaken:

a) Site Camp Establishment

The construction site camp is a dedicated area which will house all buildings, offices, lay down yards, vehicle wash areas, fuel storage areas, batching areas and other infrastructure that is required for the execution of the construction activities.

b) Demarcation of the construction area

The appointed Contractor will ensure that the construction area is clearly demarcated according to a layout plan. The Contractor will ensure that construction activities will only be conducted inside the demarcated area and control access to the construction areas.

c) Site clearance

Clearance of vegetation shall be restricted to that which is required to facilitate the execution of the works. The appointed Contractor will ensure that all topsoil, spoil or excavated material be temporarily stockpiled for re-use or disposal in demarcated areas and protected against erosion or creating dust. Material which will not be further utilized for construction activities must be disposed of at a registered landfill. Waybills of the delivery to the registered landfill must be kept on record.

The Contractors EO must ensure that a photographic record is kept of the site before clearance commences. These records should also remain available to the TCP EO as part of the Environmental Compliance Records.

6.2 Dedicated Area Specifications

6.2.1 Batching and Cement Mixing Area

Concrete batching shall only be conducted in demarcated areas which have been approved by the Transnet's Construction Manager.

Such areas shall be fitted with a containment facility for the collection of cement-laden water. This facility shall be bunded and have an impermeable surface protection to prevent soil and groundwater contamination. Drainage of the collection facility will be separated from any infrastructure that contains clean surface runoff.

- The batching facility will not be placed in areas prone to floods or the generation of stagnant water. Access to the facility will be controlled to minimise potential environmental impacts.
- Hand mixing of cement and concrete shall be done on mortarboards and/or within the bunded area with impermeable surface or concrete slab.
- Bulk and bagged cement and concrete additives will be stored in an appropriate facility at least 10m away from any watercourses, gullies and drains.
- All concrete washing equipment, such as shovels, mixer drums, concrete chutes, etc. shall be done within the washout facility. Water used for washing shall be restricted as far as practically possible.
- Ready-mix concrete trucks are not allowed to wash out anywhere other than in an area designated for this purpose.
- The Contractor shall periodically clean out hardened concrete from the wash-out facility or concrete mixer, which can either be reused or disposed of as per accepted waste management procedures.
- Empty cement bags, if temporarily stored on site, must be collected and stored in weatherproof containers. Used cement bags may not be used for any other purpose and must be disposed of on a regular basis in accordance with the Contractor's solid waste management system.
- Concrete and cement or any solid waste materials containing concrete and cement will be disposed of at a registered disposal facility. Where disposal facilities for general waste are utilised, written consent from the relevant municipality must be obtained.

6.2.2 Eating Areas

The Contractor's employees shall only eat in designated areas indicated by the Contractor and approved by the Transnet's EO.

Food preparation shall be done in a specifically demarcated area on site and no open fires are permitted, without exception. Adequate heating and food preparation sources/areas must be provided for employees to ensure no fires will be made on site.

The Contractor shall provide adequate scavenger or vermin proof and weatherproof refuse bins in this area.

6.2.3 Ablution Facilities

If permanent ablution facilities are not available, the location of temporary portable chemical latrines must be indicated on the site plan. Prefabricated ablution facilities must be approved by the TCP EO prior to site establishment. There must be at least one latrine per 10 employees on site. The Contractor must provide the toilets in terms of the Health and Safety by-laws of the municipality which will dictate on the number of toilets to be provided and is responsible for their maintenance and servicing regularly and proof of service shall be kept.

The Contractor must take all reasonable precautions to ensure that no spillages occur when the toilets are cleaned or emptied. Any disposal of waste from toilets on site is strictly prohibited. The toilets must be maintained and kept clean always. It is strictly prohibited to perform bodily functions anywhere other than in the provided ablution facilities. Toilets must be inspected for leaks daily and leaking toilets must be repaired immediately or removed from site.

6.2.4 Equipment Maintenance & Storage

All vehicles, plant and equipment shall be kept in good working order and serviced regularly in line with manufacturers' specifications. Leaking equipment must be repaired immediately or removed from the site. All maintenance of equipment and vehicles shall be performed in the designated workshop, bunded area or off site on the premises of a service provider.

The Contractor shall demarcate an area in which equipment and vehicles may be stored/ parked. The location of this area shall be approved by the Transnet's EO. The Contractor must take measures to ensure that the surface of the designated area is not contaminated because of

hydrocarbon leaks from any machinery or vehicles. These areas should be on an impermeable surface and not on bare soil.

6.3 Material Storage and Handling

6.3.1 Material Storage and Handling

The Contractor needs to ensure that an area is cordoned off as the designated materials delivery, handling and storage area, within the site camp. Materials need to be protected from the elements by means of cover. Products such as cement need to be stored in a covered area on an impermeable surface to prevent spillage and wastage.

All materials need to be stored within the construction site camp, with the lay-down area adhering to the specifications stipulated by the Transnet's EO. The material lay-down/storage area needs to be clearly marked and indicated on the site map. The Contractor is responsible for ensuring that any materials delivery service providers and/or construction vehicle operators are informed of all procedures and restrictions (e.g. which access roads to use, "no go" areas, speed limits, dust control, etc.) required to comply with the EMPr before they arrive at site and off load any materials.

The Contractors EO shall ensure that the service providers and/or construction vehicle operators are supervised during offloading by someone with an adequate understanding of the requirements of the EMPr. The person must be authorised to take the necessary actions if the service providers do not adhere to the requirements of the EMPr.

6.3.2 Hazardous Materials Handling & Storage

In the event of the handling and storage of hazardous material the Contractor shall comply with all relevant national, regional and local legislation about the transport, storage, use and disposal of hazardous materials. The Contractor shall update the hazardous substance register in the Environmental File with all the hazardous materials that may be used on site, together with the Material Safety Data Sheet (MSDS), storage, handling and disposal procedures of the materials. This information shall be made available to everyone on site.

The location of the hazardous material store shall be within the demarcated construction camp area or other suitable designated area. Prior to establishment the TCP Construction Manager in conjunction with the Transnet's EO shall approve the location and design of the store. All materials classified as hazardous need to be stored in a locked down storage area/container and

access needs to be controlled and a register kept of all material in the store. Record must be kept by a designated person of the stock being removed from the store and these records must be kept in the Environmental File on site for audit purposes.

The temporary storage area for spent hazardous materials needs to be enclosed by walls (bunded), under cover (roof) and located on an impermeable surface. The relevant Material Safety Data Sheets (MSDS) needs to be on site and accessible to all parties working with or near the hazardous materials. The Contractor needs to keep record of all hazardous material on site. The Contractor's EO will provide the TCP EO with a method stamen regarding the handling and storing of Hazardous substances.

6.3.3 Fuel (Petrol & Diesel) and Oil Storage

If fuel and oil is stored on site, the Contractor shall ensure the establishment of designated fuel storage and refueling bay within the construction camp site. The refueling bay needs to be on an impermeable surface, enclosed with bund walls that can capture 110% of the fuel storage tank's capacity. The bay also needs to be fitted with a hydrocarbon drainage system in the event of a leak or spill.

This area needs to be equipped with an emergency spill kit and all personnel needs to be trained in handling and clean-up an incident or spill. No underground fuel or diesel storage is allowed – fuel should be transported to the site as and when required and stored in the temporary fuel storage tank. The refueling of vehicles is allowed within the designated refueling bay area within construction camp confines. Where this is not possible, the Contractor shall notify the TCP EO by means of a method statement and get approval of the refueling method to be used. The use of hand held funnels are strictly prohibited.

6.4 Water Management

6.4.1 Water for Human Consumption

Water for human consumption shall be available at the site offices and at other convenient locations on site. The generally acceptable standard is that a supply of drinking water shall be available within 200m of any point on the construction site.

6.4.2 Storm Water Management

For the control of surface water runoff, all areas potentially generating contaminated storm water must be constructed with bunded walls and sloped to a catchment drain. All storm water needs to be directed into the storm water system. Clean and dirty surface runoff needs to be separated and clean water diverted away from the site. Measures must be implemented to minimize standing water in the construction area. No contaminated storm water will be allowed to enter the storm water system and natural surface water features on and adjacent to the site. All spoil/stockpile areas must be constructed to the satisfaction of the Transnet's Construction Manager and Transnet's EO in such a manner as to prevent erosion and contamination resulting from surface runoff.

6.5 Waste Management

6.5.1 Solid & General Waste Management

The site will be kept neat and tidy always. No littering by construction workers will be allowed, during the construction period. It is the responsibility of the Contractor to provide litter collection facilities for safe disposal at a licensed general waste disposal site.

It is the responsibility of the Contractor to implement a refuse control system which applies to all waste generated on site:

- Building rubble
- Solid general waste
- Cement bags and wrapping materials
- Surplus food, packaging and organic waste
- Hazardous waste/materials.

Solid waste shall only be stored in the designated general waste storage area in covered, tip proof waste skips for disposal. The burying and/or burning of refuse/waste are at no time permitted within the construction site. It is the responsibility of the Contractor to ensure that there are enough refuse bins placed around site. These bins need to be closed, to protect the contents from the elements i.e. restrict leaching and emptied on regular basis.

6.5.2 Hazardous Waste Management

Temporary waste storage facilities need to be equipped with waste skips, to be emptied on a regular basis. The waste skips need to be placed on an impermeable surface and enclosed. The

mixing of general waste and hazardous materials is not permitted – waste separation needs to occur before waste is placed in the waste skips.

The Contractor is responsible for keeping the site neat and tidy – no refuse is to be found on site outside bins/skips allocated for these purposes. The Contractor is responsible for the removal and disposal of all hazardous waste generated during the construction phase of the project to the active workface of the licensed municipal waste disposal site. Record of this must be kept for the ECO Audit.

6.5.3 Effluent Management

All sewage/effluent water originating from the site camp office shall be disposed of in such a manner as not to adversely affect the surrounding water sources (streams, rivers, wetlands, etc.). No wastewater shall be allowed to enter the drainage system. Sanitary arrangements should be to the satisfaction of the Transnet's EO, the local authorities and all applicable legal requirements.

6.6 Nuisance Control

6.6.1 Dust Control

It is anticipated that the proposed project will not generate excessive dust during the construction phase. In the instance though that dust is generated, dust control measures need to be implemented during the construction period. The Contractor must ensure that all vehicles/machinery abide by the traffic regulations and that the speed limit is enforced. In addition to this measure, the Contractor must implement a dust suppression programme i.e. watering or chemical stabilization in order to manage the dust generated from aggregate/soil stockpiles and roads which are potential generators of dust.

6.6.2 Noise Management

- Keep all equipment in good working order
- Operate equipment within its specification and capacity and don't overload machines
- Apply regular maintenance, particularly with regards to lubrication
- Operate equipment with appropriate noise abatement accessories, such as sound hoods
- Sensitive social receptors shall be notified of any excessive noise-generating activities that could affect them.

- Ensure that the potential noise source will conform to the South African Bureau of Standards recommended code of practice, *SANS 10103:2004*, so that it will not produce excessive or undesirable noise when released
- All the Contractor's equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice, *SANS 10103:2004*, for construction plant noise generation
- All the Contractor's vehicles shall be fitted with effective exhaust silencers and shall comply with the Road Traffic Act, (Act 29 of 1989) when any such vehicle is operated on a public road
- If on-site noise control is not effective, protect the victims of noise (e.g. ear-plugs) by ensuring that all noise-related occupational health provisions are met. (Occupational Health and Safety Act, (Act 85 of 1993).

6.6.3 Hydrocarbon Contamination

To prevent hydrocarbon contamination of the site and surrounding property and natural environments the measures outlined above and 6.2.1, 6.2.5 and 6.3.3 need to be implemented by the Contractor.

6.6.4 Surface Water Contamination

For the prevention of surface water contamination, the Contractor must construct structures that separate the clean and contaminated surface water around all areas potentially generating contaminated storm water. These contaminated areas must also slope to a catchment drain to contain the contaminated surface water runoff. The structures must be approved by the TCP Construction Manager and TCP EO.

All clean storm water needs to be directed into the storm water system. No contaminated storm water will be allowed to enter the storm water drainage lines or the ocean.

6.7 Ecological Risk Control Measures

To reduce the ecological impacts due to a reduction in water column dissolved oxygen concentration because of the destruction of a wetland due to construction, the mitigation measures must be implemented fully. For ecological impacts during construction, refer to Appendix G of the BAR for Impact Assessment.

6.8 Protection of Heritage Resources

a) Archaeological Sites

If an artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the TCP Construction Manager and TCP EO of such a discovery. The South African Heritage Resources Agency (SAHRA) is to be contacted and will appoint an archaeological consultant. Work may only resume once clearance is given in writing by the archaeologist.

b) Graves and middens

If a grave or midden is uncovered on site, or discovered before the commencement of work, all work in the immediate vicinity of the graves/middens shall be stopped and the TCP Construction Manager informed of the discovery. The Competent Authority should be contacted.

6.9 Rehabilitation after Construction

Contractors shall rehabilitate the entire site upon completion of work. A rehabilitation plan will be submitted to the Transnet EO for approval at least six weeks before completion. The following are critical issues to be included in the rehabilitation plan:

- Details of soil preparation procedures including proposed fertilisers or other chemicals being considered for use
- A list of the plant species that will be used in the rehabilitation process. Note that these should all be indigenous species, and preferably species that are endemic to the area. The assistance of an appropriately qualified botanist should be sought in developing this list
- Procedures for watering the planted areas (frequency of watering, methodology proposed etc).
- An indication of the monitoring procedures that will be put in place to ensure the successful establishment of the plants (duration and frequency of monitoring, proposed criteria for declaring rehabilitation as being successful). Procedures for the prevention of the establishment and spread of alien invasive species.

6.9.1 Construction Camp Structures, Facilities & Fencing

Upon decommissioning all structures, facilities and fencing are to be removed from site by the Contractor. Cement/ concrete slabs allowed for bunding or foundation structures are to be demolished and removed to a registered general waste disposal site and the waybills/ delivery notes kept in the Environmental File.

6.9.2 Water Management

Storm water infrastructure utilized for the site camp are to be demolished and removed by the Contractor to a registered general waste disposal site and the waybills/delivery notes kept in the Environmental File. The areas where the infrastructure was constructed must be returned to its pre-construction state.

6.9.3 Effluent/Sewage

All prefabricated ablution facilities and temporary chemical latrines are to be removed from the site by the Contractor and any identified contamination cleaned up to the satisfaction of the TCP EO.

6.9.4 Soil

All topsoil which has been removed or disturbed during the construction phase must be replaced, levelled and grassed by the Contractor to stabilise the construction area and prevent erosion and dust to the satisfaction of the TCP EO. All areas which was paved/surfaced prior to the commencement of construction and where soil was exposed during construction must be inspected for soil contamination, remediated (if contamination detected) and resurfaced by the Contractor to the satisfaction of the TCP Construction Manager.

7 OPERATIONAL PHASE

Pyramid South railway line in its current state is operational for less than 60 years and is being operated by Transnet Freight Rail (TFR). The proposed project entails the expansion of the railway lines at Pyramid South.

In terms of the operation of the railway lines that are going to be expanded, the Environmental Management will be conducted as per the status quo in line with TFR's environmental systems and procedures and there will be no deviation from the current operation and Environmental Management Procedures. It can be concluded that the current operation as well as the environmental management for the extended infrastructure and fleet will sufficiently address any anticipated impacts.

The anticipated operational impacts (that includes ecological impacts) that were determined on the Draft Basic Assessment Report, the mitigation measures are going to be implemented as stated on the Draft BAR.

7.1 General Operational Management Activities

All current environmental management systems, programme and procedures being applied by the Proponent for the expansion of loops should be continued after the construction of the expanded loops and during operation thereof. Over and above the current environmental management practices attention should be paid to the following aspect and it must be ensured that these matters are sufficiently implemented and controlled.

7.1.1 Noise Management

Noise pollution emanating from the facility during operation will not generate excessive noise a typical of a light industrial area but where possible, noisy activities exceeding the limits should not take place at night (between the hours of 20:00 to 06:00).

8 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr specifies the minimum requirements to be implemented by Transnet as per the scope of works, to minimize and manage the potential environmental impacts and ensure sound environmental management practices. It also provides the framework for environmental monitoring throughout the construction and operational phases. The provisions of this EMPr are binding on Transnet during the life of the project. It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time. To simplify the EMPr requirements, each aspect related to the EMPr has been addressed in table 5. Each action within the EMPr is supported by the priority of when the specific action will need to be implemented. Each of these aspects is briefly described below for ease of reference.

- **Environmental Measures, Actions and Controls**

This section indicates the actions required to either prevent and/ or minimise the potential impacts on the environment that is associated with the project.

- **Responsibility**

The section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.

- **Monitoring Frequency**

This section indicates when the actions for that specific aspect must be implemented and/ or monitored. Impacts and mitigation measures identified, including a time schedule of actions to be undertaken to implement mitigatory measures for the prevention, management and remediation of each environmental impacts, socio-economic condition for each phase of the proposed expansion of railway lines at Pyramid South.

Time Frames

- Phase 1- Pre-construction (i.e. removal of vegetation within the developable area)
- Phase 2- Site Camp Establishment (i.e. site camp establishment, erection of temporary waste disposal facilities and ablutions and training programme for construction workers)
- Phase 3- Construction
- Phase 4- Post Construction (i.e. removal of waste disposal facilities, removal of site camps)
- Phase 5- Rehabilitation
- Phase 6- Operational phase

Table 5: Environmental Management Programme

Expansion of Pyramid South railway lines				
Nature of impact	**Mitigation measure**	**Time frame for mitigation measure to be undertaken**	**Person responsible for monitoring**	**Monitoring frequency**
Collapse and / erosion of stockpiled material (stone, sand and gravel).	Material must be stock piled in such a way that it cannot fall or cause injury or damage to properties or the natural environment. Stockpiles must not exceed 2m in height and must be covered if exposed to heavy wind or rain. Alternatively, low walls or berms must be constructed around the stockpiles.)	• Construction	Contractor	Regularly
Risk of contamination to soil during concrete mixing.	Cement mixing must take place on a hard surface or cement mixing trays must be used. Cement mixing is not permitted to occur where run-off can enter stormwater drains. Construction must be monitored by an ECO who must monitor compliance with the construction EMPr.	• Construction	Contractor	Regularly
The onsite erosion of exposed soil	As a general principle, contractors must limit	• Pre-	Contractor and	regularly

before rehabilitation is completed.	vegetation clearing to the platform site only. The contractor must stabilise cleared areas to prevent and control erosion and/ or sedimentation.	construction.	ECO	
Risk of spills from construction equipment (oils, fuels etc.) contaminating soil.	Any construction equipment that could leak oil must be placed on a drip tray. Construction vehicles must have a drip tray and any oil leaks must be attended to over a drip tray. All equipment must be in good working order to reduce the likelihood of oil leaks occurring. Any re-fuelling of equipment must occur on a hardened surface, within a designated re-fuelling area where any spills can be contained. Construction must be monitored by an ECO who must monitor compliance with the construction EMPr.	• Pre-construction • Site camp establishment • Construction	Contractor and ECO	Daily
Washing of construction vehicles on site resulting in contamination of stormwater.	No vehicle washing must occur on site unless in a designated wash bay which must then be constructed. Wash bays must be installed with sand and grease traps.	• Pre-Construction • Site Camp Establishment • Construction	Contractor	Daily/ Weekly

		• Post Construction		
Littering around the site.	Littering is not permitted on the site and general housekeeping will be enforced. Waste containers with lids must be provided on site during construction. These must be cleaned on a regular basis to prevent overflow. Refuse will be separated at source and disposed in the appropriate bins, which will be emptied regularly. Separation of waste and recycling of paper, glass etc., must be encouraged throughout the construction period. Composting of organic waste is encouraged. All solid waste generated during the construction process (including packets, plastic, rubble, cut plant material, waste metals etc.) must be placed in the waste collection area in the Construction Camp and must not be allowed to blow around the site, be accessible by animals, or be placed in piles adjacent the skips / bins.	• Site camp Establishment • Construction • Post Construction	Contractor	Daily/ Weekly
Potential for improper storage and	Construction will be managed through the	• Site camp	Contractor	Daily/ Weekly

disposal of waste materials generated during construction.	implementation of the EMPr and the impact can be fully mitigated provided the EMPr is monitored, followed and enforced. Separate waste bins for each of the waste streams generated must be provided. The waste containers must be appropriate to the waste type contained therein and where necessary should be lined and covered. Waste must not be allowed to accumulate on site but should be disposed of regularly by a reputable contractor. Hazardous waste such as oils, contaminated rags etc. must be disposed of at a hazardous class landfill. Rubble must not be buried on site.	Establishment • Construction • Post Construction		
Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.	Rubble can be temporarily stored on site in a designated skip until it is ready for disposal. All excess material and rubble must be removed from the site so not to restrict the rehabilitation process. The contractor and construction staff must be made aware of the buffers on site. The buffer must be clearly demarcated during the construction phase and	• Construction	Contractor	Daily/ Weekly

	no dumping is to occur in this sensitive environmental area. Any construction rubble produced must be disposed of at a designated landfill site. This will be monitored through an EMPr.			
Use of bush as toilets by contractors.	Staff must be provided with chemical toilets. The toilet waste must be disposed of at an appropriate disposal site and safe disposal certificates must be obtained. The staff may not use the bush as toilets. Workers must be briefed by the person in charge of managing construction / management activities on the do's and don'ts on the property, when workers arrive at the property. This must be repeated in bi-weekly training. This must be monitored through an EMPr	• Pre-Construction • Site Camp Establishment • Construction	Contractor	Daily/ weekly
Generation of noise because of construction activities and vehicles.	Excessive noise must be controlled on site. Workers will be trained regarding noise on site and construction hours will be kept to working hours (08h00 to 18h00). The construction must be monitored by an ECO who will ensure	• Pre-Construction • Site Camp Establishment • Construction	Contractor	Daily

	compliance with the construction EMPr. All precautions must be taken to ensure that noise generation is kept to a minimum. If excessive noise is expected during certain stages of the construction, mining industries adjacent to the site must be notified prior to the event.	• Post Construction		
Emissions generated from construction vehicles.	Emissions generated from construction vehicles will be minimal and is not expected to significantly affect the mines surrounds the Pyramid South railway lines. This impact is only relevant during the construction phase.	• Construction	Contractor	Daily/ weekly
Generation of dust caused by construction vehicles moving over exposed soil.	Measures to control dust generated during construction must be put in place and these will be controlled through the EMPr i.e. cleared surfaces to be re-vegetated as soon as possible behind the working front, dampening of access roads/stockpiles and platforms.	• Pre-Construction • Site Camp Establishment • Construction • Post Construction	Contractor	Daily
Sourcing of raw materials i.e.: (gravel, stone, sand, cement and water) from unsustainable sources	All materials must be obtained from a registered and sustainable source and all delivery notes and slips must be made	• Construction	Contactor	weekly

resulting in illegal sand winning causing significant environmental damage.	available to the Environmental Control Officer e.g. mined material such as stone must only be obtained from permitted quarries. Municipal water will most likely be used for dust suppression.			
Removal of existing vegetation.	No threatened species were found, only indigenous species and invasive species are going to be removed during Pre-construction phase.	• Pre-Construction	Contractor and ECO	Once-off

9 REHABILITATION AND CLOSURE PHASE ENVIRONMENTAL MANAGEMENT PROGRAMME

The proposed expansion of railway lines is of a long-term nature and the environment, habitats, social and economic activities and land uses in and around the Pyramid South railway lines will constantly undergo transformation and it is considered effective to establish the environmental management measures to be undertaken for the decommissioning/closure and rehabilitation of the facility now.

In terms of the closure and rehabilitation of the facility it is recommended that the Proponent, at the time of the facility reaching the end of its operational life, determine its proposed end use, the environmental status quo of the receiving environments as well as an environmental risk associated with the closure and rehabilitation activities to formulate the most appropriate and practical management recommendations.

10. CONCLUSION

If the above-mentioned management recommendations are adopted, it is anticipated that most of the negative environmental impacts of construction can be mitigated. An appointed environmental officer will need to monitor the site throughout construction to ensure that the required environmental controls are in place and working efficiently.