

A number of specialist studies were commissioned to provide baseline information about the study area and to identify potential positive and negative impacts associated with the Project. These studies included investigations on air quality, noise, vibration, traffic, ecology, archaeology and cultural heritage; and the social environment.

Based on this work, a Draft Scoping Report, including a Plan of Study for EIA, was compiled and made available to stakeholders for comment for a 30-day period starting on 6 October 2008 and ending on 7 November 2008. The updated Final Scoping Report, including an issues trail of all stakeholder comments received, was then submitted to DEAT for approval on 17 November 2008.

The issues raised by stakeholders during the Scoping Study provided a basis for identifying specialist studies and their terms of reference (TORs), as well as clarifying other issues that needed to be addressed in the EIA. The specialist studies that have been undertaken are listed below in Table 3.1. Copies of the specialist reports are included in Volume 2 of the Final EIR.

Table 3.1

Specialist Studies Undertaken

#	Specialist Study	Specialist	EIR reference
1	Air quality impact assessment	uMoya-NILU Consulting (Pty) Ltd	See Volume 2
2	Noise assessment	Jongens Keet Associates	See Volume 2
3	Phase 1 archaeological and cultural heritage study	Archaic Heritage Project Management, University of Pretoria	See Volume 2
4	Social Impact Assessment	ERM Southern Africa	See Volume 2
5	Terrestrial ecology assessment	Natural Scientific Services	See Volume 2
6	Traffic impact study	ITS	See Volume 2
7	Vibration assessment	Department of Mechanical and Aeronautical Engineering, University of Pretoria	See Volume 2

3.2.3

Integration and Assessment Phase

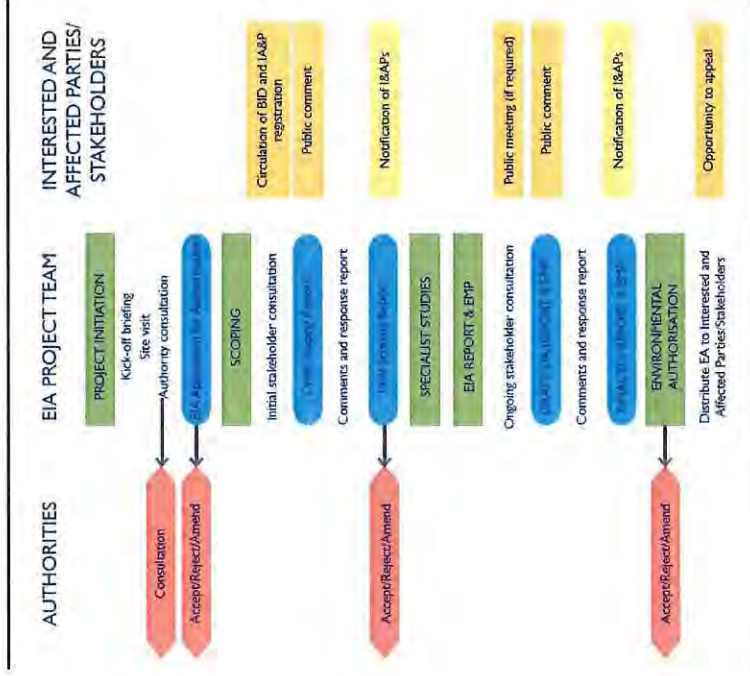
The aim of this phase is to bring together the findings of the specialist studies and the relevant available information into an EIA report and to once again elicit stakeholder comment on the proposed project and impact assessment process.

Relevant available information, including the findings of the specialist studies (see Volume 2 of the Final EIR) and information regarding the characteristics and requirements of proposed alternatives, have been integrated by ERM to produce this Final EIR. The report focuses on the description, assessment and

evaluation of potential positive and negative biophysical and social impacts, as well as the identification of appropriate mitigation / enhancement measures for the construction and operational phases of the Project.

Figure 3.1

EIA process flow diagram



Environmental Management Plan

A Draft Environmental Management Plan (EMP) has been compiled in accordance with Section 34 of the EIA Regulations. This EMP is essentially a delivery mechanism for environmental and social mitigation measures, recommendations and commitments from the EIA Report for the proposed development (1).

The Project EMP will consist of three documents, namely:

(1) Lötcher, P. 2005. Guideline for Environmental Management Plans. CSIR Report No. ENV-S-C 2005-063 H.F.S.A., Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

- A Construction EMP (CEMP);
- A Standard Environmental Specification (SES); and
- A Project Environmental Specification (PES).

Both the CEMP and SES are generic documents, approved by DEAT, and used for all Transnet projects. The PES, however, will include information specific to this project that is not documented in the CEMP or SES.

The EMP will stipulate mitigatory requirements (for construction impacts) that the contractors must adhere to, and will form the basis for their detailed method statements.

Operational impacts will be captured in the overarching Transnet operations Environmental Management System (EMS), which will be updated to include project specific considerations recommended in this EIA Report.

The Draft EMP provides the framework of requirements for environmental management and provision has been made for updating the Draft EMP once the detailed project design is complete. This framework specifies the management actions (e.g. mitigation) required and performance targets to be achieved. However, the specific requirements to implement these mitigation requirements will need to be developed during the detailed design and planning phase and as part of the bidding and sub-contracting process for the construction phase.

The Transnet generic EMP documents are included in *Annex A1*.

3.3

IMPACT ASSESSMENT METHODOLOGY

The purpose of impact assessment and mitigation is to identify and evaluate the significance of potential positive and negative impacts on identified receptors and resources according to defined assessment criteria; to develop and describe measures that will be taken to avoid, minimise, mitigate/ compensate for any potential adverse effects and enhance any potential positive impacts; and to report the significance of the residual impacts that remain following mitigation, compensation and/ or optimisation and enhancement.

There are a number of ways that impacts may be described and quantified. An impact is essentially any change (whether positive or negative) to a resource or receptor brought about by the presence of the project component or by the execution of a project related activity.

The types of impacts and terminology used in this assessment are outlined in the *Sections* that follow. *Table 3.2* describes the nature of the impact.

Table 3.2

Impact assessment terminology

Term	Definition
<i>Impact nature</i>	
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect impact	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on resources).
Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.

Assessing significance

There is no statutory definition of 'significance' and its determination is, therefore, somewhat subjective. However, it is generally accepted that significance is a function of the **magnitude** of the impact and the **likelihood** of the impact occurring. The criteria used to determine significance are summarised in *Table 3.3*.

Table 3.3

Significance criteria

Criteria	Description
<i>Impact magnitude</i>	
Extent	<p>On-site – impacts that are limited to the boundaries of the rail reserve, yard or substation site.</p> <p>Local – impacts that affect an area in a radius of 20 km around the development site.</p> <p>Regional – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem.</p> <p>National – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.</p>
Duration	<p>Temporary – impacts are predicted to be of short duration and intermittent/occasional.</p> <p>Short-term – impacts that are predicted to last only for the duration of the construction period.</p> <p>Long-term – impacts that will continue for the life of the Project, but cease when the Project stops operating.</p> <p>Permanent – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat or upliftment and economic development of local communities) and that endure substantially beyond the Project lifetime.</p>

Table 3.4

Example of significance rating matrix

		SIGNIFICANCE RATING			
		Negligible	Negligible	Medium	High
MAGNITUDE	Likelihood	Negligible	Negligible	Minor	Minor
	Negligible	Negligible	Negligible	Minor	Minor
	Low	Negligible	Negligible	Moderate	Moderate
	Medium	Minor	Moderate	Major	Major

In Table 3.5, the various definitions for significance of an impact are given.

Table 3.5

Significance definitions

Significance definitions
Negligible impact Negligible impact (or insignificant impact) is where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor impact An impact of minor significance is one where an effect will be experienced, but the impact magnitude is small (with and without mitigation) and, for negative impacts, well within accepted standards, and/or the receptor is of low sensitivity/ value.
Moderate impact An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the negative impact has been reduced to a level that is as low, or positive impact enhanced as far as reasonably practicable (ALARP). This does not necessarily mean that 'moderate' negative impacts have to be reduced to 'minor' impacts, but that moderate impacts are being managed effectively and efficiently. In the same way, moderate positive impacts may not be able to be enhanced to have major positive impact.
Major impact An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/ sensitive resource/ receptors. A goal of the EIA process is to get to a position where the Project does not have any major residual negative impacts (especially not those endure into the long term or extending over a large area) and major positive impacts are enhanced as far as possible. For some aspects, however, there may be major residual negative impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). (e.g. visual impact of a development). It is then the function of regulators and stakeholders to weigh such negative impacts against the positive impacts in coming to a decision on the Project.

The level of confidence in the findings and key uncertainties will be clearly identified, e.g. where information is insufficient to determine the impact significance, this will be clearly stated.

The impact rating will be summarised to reflect the significance of the impact with and without the incorporation of mitigation/enhancement measures.

BIOPHYSICAL ENVIRONMENT: Intensity can be considered in terms of the sensitivity of the biodiversity receptor (i.e. habitats, species or communities).

- Negligible** - the impact on the environment is not detectable.
- Low** - the impact affects the environment in such a way that natural functions and processes are not negatively affected, or these natural functions are enhanced to a small degree.
- Medium** - where the affected environment is altered but natural functions and processes continue, albeit in a modified way, or are considerably improved.
- High** - where natural functions or processes are altered to the extent that it will temporarily or permanently cease; or in the case of a positive impact, will be restored to close to its natural state in terms of functions and processes.

Where appropriate, national and/or international standards are to be used as a measure of the impact. Specialist studies should attempt to quantify the magnitude of impacts and outline the rationale used.
SOCIO-ECONOMIC ENVIRONMENT: Intensity can be considered in terms of the ability of project affected people/communities to cope with or adapt to negative changes brought about by the Project, the degree to which their quality of life/ well-being will be enhanced as a result of the socio-economic benefits.

- Negligible** - there is no perceptible change to people's quality of life.
- Low** - People/ communities are able to cope with/ adapt to negative impacts with relative ease and maintain pre-impact quality of life/ well-being. People would marginally benefit from the proposed activity and would experience a relatively small improvement in quality of life/ well-being.
- Medium** - Able to cope with/ adapt to negative impacts with some difficulty and maintain pre-impact livelihoods but only with a degree of mitigation support. People's quality of life/ well-being are considerably improved as a result of benefits.
- High** - Those affected will not be able to cope with/ adapt to negative changes and continue to maintain pre-impact quality of life/ well-being. People will have their quality of life/ well-being significantly improved.

Impact likelihood (Probability)
Negligible The impact does not occur.
Low Impact may possibly occur i.e. occurs infrequently.
Medium Impact is highly likely to occur i.e. occurs under most conditions.
Definite Impact will definitely occur.

Once a rating is determined for magnitude and likelihood, the following matrix can be used to determine the impact significance.

The colour scheme used within this EIR to indicate the minor, moderate and high negative and positive impact ratings, is included *Table 3.6* below.

Table 3.6

Colour scale for significance ratings

Negative ratings	Positive ratings
Negligible	Negligible
Minor	Minor
Moderate	Moderate
High	High

4

PROJECT DESCRIPTION

4.1

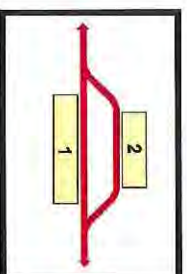
BACKGROUND AND RATIONALE

In response to an increase in the global demand for manganese ore (an essential component of iron and steel production as well as a fuel additive) and future container traffic handling capacity at the Port of Ngqura, twenty nine (29) loops have been identified for expansion and/ or construction along the existing railway line between Hlotzazel, the new Port of Ngqura and the Port of Port Elizabeth. The loops (also called passing loops or crossing loops) would facilitate increased general freight container and commodities (such as manganese ore) traffic on the line by allowing trains approaching each other on a single line to pass each other safely.

Box 4.4.1

Definition: passing/crossing loop

A passing loop or crossing loop is a place on a single line railway where trains travelling in opposite directions can pass each other. A passing loop is usually double ended and connected to the main track at both ends.



In February 2008, ERM was appointed by HMGJV, on behalf of Transnet, to undertake a high level environmental and social screening exercise to highlight any potential key risks (“fatal flaws”) associated with the upgrade of a number of loops between the Port of Ngqura in the Eastern Cape and De Aar in the Northern Cape.

The high level screening study formed part of a larger feasibility study conducted by HMGJV to better understand the possible opportunities and constraints associated with the proposed railway upgrade. Once it was decided to proceed with the project, ERM was appointed as independent environmental consultants, to undertake the EIA.

In addition to the loops investigated in the high level study, a number of additional loops were identified for upgrading and construction. Furthermore, the scope also included five (5) yards to be refurbished at Hlotzazel, Postmasburg, Marnathwane, Beaconsfield and Ronaldsvlei (the latter two are both near Kimberley), a new substation to be constructed at Emali (near Sishen) and a second existing line between Kimberley and De Aar to be refurbished and electrified. Although the latter does not fall within the legal requirements for an EIA and does not need approval from DEAT, it does form part of the

overall upgrade of the railway line to facilitate increased traffic and is, therefore, considered as part of the scope of this EIA.

4.2

PROJECT LOCATION

The existing railway line that runs from Hotazel in the Northern Cape to the Port of Port Elizabeth in the Eastern Cape covers a distance of approximately 1100 km and passes through the major railway hubs of Kimberley and De Aar.

Of the twenty nine (29) proposed loop sites, twenty three (23) fall within the Eastern Cape while the remaining six (6) are located in the Northern Cape, south of De Aar. All five (5) railway yards to be refurbished as well as the new proposed substation are located between Hotazel and Kimberley in the Northern Cape.

Finally the existing disused second line to be refurbished and electrified is located between Kimberley and De Aar in the Northern Cape. See the locality map i.e. *Figure 1.1 in Chapter 1*.

4.3

OVERVIEW OF PROPOSED PROJECT COMPONENTS

The proposed project can be divided into broad activities associated with upgrade, construction or refurbishment of railway infrastructure, the refurbishment of the yards and upgrade of the related infrastructure, the acquisition of construction material, the construction of additional infrastructure and construction camps and laydown areas.

Table 4.1 summarises the proposed project activities according to these broad activity categories.

Table 4.1

Proposed project components

Broad project components	Description
Upgrade, construction or refurbishment of railway infrastructure and associated infrastructure	<ul style="list-style-type: none"> Upgrade of 25 existing loops. In most cases the upgrading will entail extending the loops. Construct 4 new loops to at least 1200 m in length. Improve access roads and new or altered level crossings associated with existing loops. Refurbish and electrify the existing second line between De Aar and Kimberley. Relocation of signalling equipment and associated structures to allow a loop extension.
Refurbishment of station yards and upgrade of the related infrastructure	<ul style="list-style-type: none"> Upgrade station yards at Hotazel, Mamathwane, Beaconsfield and Ronaldsvlei (both near Kimberley) and Postmasburg. Upgrade of the wagon maintenance facilities at Postmasburg. Provide additional locomotive staging facilities at Beaconsfield.

Broad project components	Description
Acquisition of construction material	<ul style="list-style-type: none"> Install additional signalling between Emil and Hotazel. The construction process will also require the use of existing borrow pits close to the construction sites and the creation of new borrow pits (within the rail reserve) to obtain suitable fill material.
Construction of additional infrastructure	<ul style="list-style-type: none"> Construct a new electrical traction substation at Emil.
Construction of camps and laydown areas	<ul style="list-style-type: none"> Site offices, construction camps and laydown areas for the storage of raw materials will be established during the construction phase of the proposed project.

Transnet is confident that the proposed upgrade and refurbishment dealt with in this EIA would not preclude or compromise future development of a terminus at Coega and the required Intermodal Facility.

4.4

UPGRADE, CONSTRUCTION OR REFURBISHMENT OF RAILWAY INFRASTRUCTURE AND ASSOCIATED INFRASTRUCTURE

The following sections provide further details on the various components of the Project.

4.4.1

Proposed loop developments

The proposed loop developments consist of the extension and/or upgrade of 25 existing loops and the construction of four new loops to a minimum length of 1 200 m. It is expected that most of the extensions and the new loops will be inside the existing rail reserve with the exception of a few loops which may require small tracts of additional land as a result of the limited width of the railway reserve at specific locations. The exact locations and extent of land expropriation will only be confirmed following a topographic survey of the rail reserve boundaries at the loop sites. Transnet will commence negotiations with relevant landowners who may be affected by the need for additional land as soon as the locations are confirmed.

At some of the sites, temporary use of adjacent land will be necessary during the construction phase only (e.g. for equipment laydown areas or access roads). Fences will be maintained in their current and/or temporary positions and reinstated to their original or new positions at the completion of the construction phase. Transnet will secure permission from the affected landowners before any fencing is removed.

The alignment of the loop developments will follow the existing railway line, which means that cuttings and embankments, where required, will be widened at the same track level. Culverts and drainage structures will be extended in the same positions, whilst maintaining the existing surface water drainage patterns.

Electrical equipment will be similar to the existing equipment and will consist of mast poles supporting the overhead traction wires feeding power to the locomotives. Colour light signals and relay rooms will be placed at the loops to control the train movements.

New and Re commissioned Loops

“New Loops” refers to new and re commissioned loops, where the latter refers to loops that were previously decommissioned but will be restored as part of this Project. Only one brand new loop is proposed at Tootabli, near Alcedale in the Eastern Cape. *Table 4.2* summarises the length of the proposed new loops.

Table 4.2
Length of new and re commissioned loops

Loop name	Length of new loop (m)
Eastern Cape	1332
Tootabli (new)	1363
Klipfontein (re commissioned)	1432
Clonheath (re commissioned)	
Northern Cape	
Hanover Road (re commissioned)	1272

Extended loops

Twenty five existing loops will be upgraded as part of the proposed project, twenty in the Eastern Cape and five in the Northern Cape. *Figure 4.1* shows the existing loop to be extended at Barkly Bridge, Eastern Cape.

Figure 4.1
Existing loop to be extended at Barkly Bridge, Eastern Cape



Table 4.3
Existing loops to be lengthened

Table 4.3 summarises the existing loops to be upgraded.

Loop name	Length of loop extension (m)
Eastern Cape	450
Barkly Bridge	150
Addo	1100
Coerney	777
Verby	716
Eagle's Crag	593
Blinkhoff	439
Sallare	678
Komnadagga	372
Golden Valley	548
Mfortner	840
Halesowen	840
Marlow	698
Kaptein	480
Knutstard	658
Visriver	512
Conway	827
Talberg	712
Rosmead	730
Thonker	996
Carlton	1460
Northern Cape	
Barredael	582
Wildfontein	324
Linde	698
Burgervilleweg	760
Blaetsman	710

Construction methodology for new and upgraded loops

The typical loop construction methodology is outlined below. This is a generic methodology and some aspects may not be relevant to all of the proposed loop developments.

- Establish temporary offices, workshops, stores, shelters, mess toilets and ablution facilities;
- Relocate fences to new permanent or temporary positions as required for construction purposes;
- Clear land for site facilities within the rail reserve;
- Relocate existing electrical, communication and signal equipment where construction is necessary;
- Clear land, remove topsoil and stockpile within the rail reserve where loops are to be lengthened;
- Clear land, remove topsoil and stockpile outside the rail reserve where new roads and level crossings are to be constructed;
- Construct new roads and level crossings where required to the standards specified by the relevant road and rail authorities;

- Extend culverts;
- Excavate cuttings were required;
- Excavate material from borrow pits inside/outside the rail reserve and transport it by tipper lorry to the required site where it will be placed and compacted;
- Widen cuttings, where required, by blasting with commercial explosives;
- Erect temporary crushing plants on site;
- Build up banks and cuttings in layers and compact the final load-bearing gravel foundation to the required standard;
- Build a new maintenance road within the rail reserve;
- Dispose of excess material not used for fill or stockpiling;
- Lay skeleton track of sleepers and rails;
- Add ballast stone to hold and cushion the track and align it to the required level and horizontal placement;
- Erect the overhead traction equipment (OHE) on masts mounted on a concrete foundation next to the track;
- Erect signals and install equipment in secure relay rooms;
- Rehabilitate the site using topsoil and natural vegetation and re-establish drainage patterns where water courses have been dammed or diverted during construction; and
- Reinststate fences where required.

Construction requirements will include raw materials, water and electricity. Raw materials will be sourced both locally and abroad. For example, rails and signalling equipment will be imported from Europe, while sleepers, fasteners, cement, steel reinforcing, electrification equipment, prefabricated culverts, ballast stone and fencing materials will all be sourced locally.

Water will be sourced locally or trucked in by road. In certain instances boreholes may be drilled with permission from the Department of Water Affairs and Forestry (DWAFF). The location of the proposed boreholes has not yet been determined.

All electricity for work sites will be provided by mobile generators.

Associated infrastructure

New or upgraded construction, access and maintenance roads

All the proposed loop sites are accessible from the existing road network. However, temporary construction roads will be required at all the sites. Existing access roads will need to be widened at Verby, Eagles Crag, Tootabi, Blinkhoff, Salthair and Klipfontein.

Maintenance roads will be widened and or relocated at Coerney, Kommadagga and Golden Valley while an access road to a borrow pit near Conway will need to be constructed.

See Box 4.2 for a definition of these types of roads.

New or existing level crossings and associated roads

In order to accommodate the proposed new and extended loops a number of level crossings and associated roads will be affected. Eleven level crossings will be extended and five, namely, Barkly Bridge, Kommadagga, Kaptein, Knutsford and Hanover Road, will be relocated along with their associated roads (see Figure 4.2). Of the level crossings to be relocated, three are public level crossings (see Table 4.4).

Definitions for associated infrastructure

Access road:	an access road is a temporary or permanent road that provides access to the railway.
Maintenance road:	a maintenance road is a single track road that runs parallel to the railway to allow easy access for maintenance.
Construction road:	a construction road is a temporary road used during the construction phase only.
Level crossing:	a level crossing is an at-grade crossing, without recourse to a bridge or tunnel, of a railway line by a road, path, or another railroad.

Box 4.4.2

Figure 4.2

Aerial photograph of level crossing to be moved at Barkly Bridge



Table 4.4 summarises the proposed changes to the level crossings and associated roads at the loop sites.

Table 4.4

Changes to level crossings and associated roads

Loop name	Changes to level crossing (Y/N)	Changes to associated road (Y/N)	Additional notes
Eastern Cape	Y, relocate	Y, relocate	Relocate public road
Barkly Bridge	N	N	
Addo	Y, extend	N	
Coeney	Y, extend	N	
Verby	Y, extend	N	Private crossing
Eagle's Crag	Y, extend	N	Private crossing
Toolabi	Y, extend	N	Private crossing
Blinkhof	N	N	
Saltare	Y, extend	N	
Komnadagga	Y, extend	Y	
Golden Valley	Y, relocate	Y	Relocate service road
Klipfontein	Y, extend	Y	
Mortimer	N	N	
Halasowen	Y, extend	N	
Marlow	N	N	
Kaptein	Y, relocate	Y, relocate	Relocate service road
Knutsford	Y, relocate	Y, relocate	Relocate public road
Visrivier	Y, extend	N	
Comway	Y, extend	N	Private crossing
Glenheath	N	N	
Tafelberg	N	N	
Rosmead	Y	N	
Fionker	Y, extend	N	
Carlton	N	N	
Northern Cape			
Barrediel	N	N	
Wildfontein	N	N	
Linde	N	N	
Hanover Road	Y, relocate	Y, relocate	Relocate public road
Burgervilleweg	N	N	
Bloterman	Y, extend	N	

Relocation of signalling equipment

At some of the loop sites, signalling equipment and associated structures will have to be relocated to accommodate the expansion of the loop.

4.4.3 *Refurbishment of the Kimberley – De Aar section*

Although not a legal requirement in terms of the EIA Regulations, the scope of this EIA also includes the potential impacts associated with the refurbishment and electrification of an existing second line, approximately 230 km in length, between Kimberley and De Aar in the Northern Cape.

Approach to the refurbishment and electrification

The refurbishment will include, but is not restricted to, the following activities:

4.5

REFURBISHMENT OF STATION YARDS AND UPGRADE OF THE RELATED INFRASTRUCTURE

This Section describes the proposed changes planned for various existing yards.

General approach to the yard upgrades

The yard upgrades will include, but are not restricted to, the following activities:

- Grinding of worn rails and rail bound crossings;
- Replacement of worn rails where required;
- Weld crossings and fix of skid marks;
- Adding of ballast where required;
- Replacement of missing and damaged fastenings;
- Replacement of wooden sleepers on certain turnouts or the upgrade of the turnouts using concrete sleepers;
- Clearing of cuttings to ensure proper drainage;
- Screening of dirty ballast (separating the soil from the rock) on site by manual labour and only where necessary;
- Replacement of cracked concrete sleepers;
- Replacement of certain types of sleepers;
- Screening and repair of mud holes formed in the foundation of the railway line;
- Installation of level crossing blocks on level crossings that are currently ballasted;
- Removal of trees and bushes within the track profile;
- Replacement of all rails and sleepers that were previously removed; and
- Alignment and tamping of the line once all the above has been completed.

The methodology for the electrification of the line will be as follows:

Augers will be used for drilling. These augers may be mounted on the wagons of a construction train. The wagons will also be loaded with masts and concrete. Once the holes have been drilled, a crane will lift and place the masts into the holes. The masts will then be stabilized using concrete. Holes that can not be drilled on-track, will be drilled off-track by hand and/or auger.

Once all the masts have been secured into position, trolleys will be used to unroll the overhead contact wire. The construction train equipped with a working platform will then lift the wire which will then be secured to the masts using swing cantlevers. Finally, height restriction indicators and the required road signs at the level crossings will be repositioned for safety.

The implementation of this component of the Project may commence prior to the required authorisation from DEAT with respect to the rest of the project outlined above.

- **Earthworks:**
 - Preparation of the site: A grader is used to clean and grub the site. A front-end loader or bulldozer will then be used to remove excess/unsuitable material which will be taken off site by tipper Lorries.
 - Tipper Lorries will be used to bring any additional fill material to site which will then be spread by a grader and compacted by roller to the final level.
 - Lay new/additional track:
 - Tipper lorries will deliver ballast materials which will be spread into position by a grader.
 - Sleepers will then be delivered by lorry and placed in position by hand using hand tools.
 - Rails will be brought to site by road and fixed in position on the sleepers by hand using hand tools.
 - Additional ballast will be delivered by lorry, boxed in and compacted and the track lifted to its final level and alignment by hand.
 - Finally the track will be compacted using a tamping machine which also ensures the correct alignment and level.
 - Electrification of a new section of track:
 - Augers, used for drilling, will be mounted on the wagons of a construction train. The wagons will also be loaded with masts and concrete. Once the holes have been drilled, a crane will lift and place the masts into the holes. The masts will then be stabilized using concrete. Holes that can not be drilled on-track, will be drilled off-track by hand and/or auger.
 - Once all the masts have been secured into position, trolleys will be used to unroll the overhead contact wire. The construction train equipped with a working platform will then lift the wire which will then be secured to the masts using swing cantilevers.
 - Finally, height restriction indicators and the required road signs at the level crossings will be repositioned for safety.

4.5.2

Yard upgrades

As part of the proposed project, five yards will be refurbished/upgraded at Hotazel, Postmasburg, Mamathwane, Beaconsfield and Ronaldsvlei. Each yard is discussed briefly below.

Hotazel

The yard is located approximately 3 km south of Hotazel and is accessible from the R31 running adjacent to the railway line. The yard is currently in two sections and will require some alterations to connect these two sections and create a single yard. In particular, some of the existing tracks will have to be lifted to connect the two yards. The yard will be lengthened to a minimum of 1 300 m and an additional line on the western side of the yard will be

extended to accommodate 104 - 105 wagon trains. The extension will be electrified to 3 kV direct current (DC).

In addition, the third leg of the triangle junction, approximately 400 m north of the yard, will be tied into the existing line.

Mamathwane

The Mamathwane yard is located approximately 22 km south of Hotazel, adjacent to the Mamathwane mine which forms part of the Kalahari manganese fields.

The loop within the yard is to be extended south towards Kimberley and electrified to 3 kV DC.

Postmasburg

The yard is located approximately 3 km north west of the town of Postmasburg.

The yard requires additional maintenance facilities for wagons and refurbishment, including electrification of the line running to the locomotive/wagon repair workshop. The workshop itself may also need to be extended to accommodate an additional bay.

Ronaldsvlei and Beaconsfield

The Ronaldsvlei change-over yard and the Beaconsfield electric locomotive running shed are located approximately 5 km south of Kimberley. Change-over yards allow locomotives to change from direct current to alternating current (AC) and vice versa.

At the change-over yard, an additional loop may be added to the southern end of the yard and extra block joints (1) will be installed to facilitate signal interlocked switching of the overhead electrification and thus improve safety in the yard.

Three additional staging lines are planned for electrical locomotives at the electric locomotive running shed.

(1) Block joints are an insulated joint between two lengths of rail that divide train routes up into signalling areas or 'blocks', enabling the position of every train to be known and ensure smooth and safe running of the service.

4.6 ACQUISITION OF CONSTRUCTION MATERIAL
4.6.1 *New and existing borrow pits*

A number of existing and new borrow pits will be utilised for both ballast and sub-base material during the construction period. An explanation of the different material types is given in Box 4.3.

Box 4.3 *Materials that can be extracted from borrow pits*

Ballast – Coarse, crushed stone laid to form a bed for the sleepers and rails.

Bulk material – This material is used for earthworks within the rail prism before the construction of the structural sub-ballast layers (see sub-base below). The bulk material is comprised of material found in-situ and some fill material from elsewhere, if required.

Sub-base material – This material is used to construct the top layers of the rail prism onto which the ballast is then placed.

Figure 4.3 shows the existing borrow pit near the Barkly Bridge loop site.

Figure 4.3 *Proposed borrow pit south of Barkly Bridge, Eastern Cape*



The proposed borrow pit sites are listed in Table 4.5. Where new borrow pits have been identified, these are located on Transnet property (i.e. within the rail reserve).

Table 4.5

List of borrow pits associated with the loops

Loop name	Borrow pit required	(Y/N)	Sub-base material	Distance to off-site borrow pit
Eastern Cape				
Barkly Bridge	Y, On site		Y, Off site	7.5km
Addo	N		N	
Coerney	Y, On site		Y, Off site	38km (from Barkly Bridge)
Verby	Y, On site		N	
Eagle's Crag	Y, On site		Y, On site	
Tootabi	Y, On site		Y, Off site	5km
Blinkhoff	Y, On site		Y, On site	
Saltare	Y, On site		Y, On site	
Komnadagga	Y, On site		Y, On site	
Golden Valley	Y, On site		Y, Off site	15km
Klipfontein	Y, On site		Y, On site	
Mortimer	Y, On site		Y, On site	
Fatesowen	Y, On site		Y, Off site	11km from Cradock
Marlow	Y, On site		Y, Off site	10km from Cradock
Kaptein	Y, On site		N	
Knutsford	Y, On site		Y, Off site	2km
Verstier	Y, On site		Y, Off site	4km
Conway	Y, Off site		Y, Off site	4km, on Transnet property
Glenheath	Y, On site		Y, Off site	5km
Tafelberg	Y, On site		Y, Off site	5km
Rosmead	N		In situ	
Fionker	Y, On site		Y, On site	
Carlton	Y, On site		Y, On site	
Northern Cape				
Barredel	Y, On site		Y, Off site	12km
Wildfontein	Y, On site		Y, Off site	3km
Lunde	Y, On site		Y, Off site	10km
Hanover Road	Y, On site		Y, Off site	<50m
Burgervilleweg	Y, On site		Y, On site	
Blatteman	Y, On site		Y, Off site	5km

4.7

CONSTRUCTION OF ADDITIONAL INFRASTRUCTURE

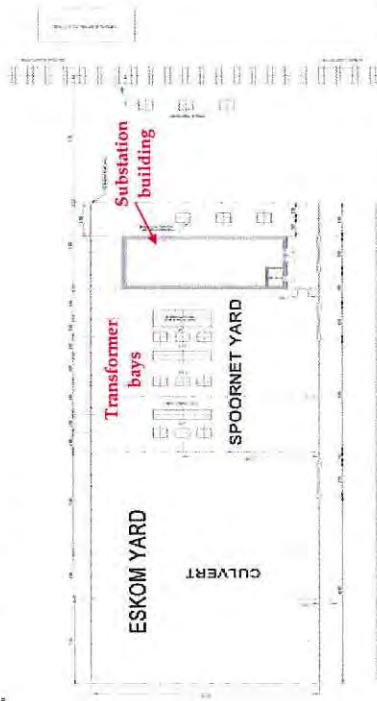
4.7.1

New substation at Emili

A new 3kV DC Transnet Freight Rail traction substation is proposed at Emili to provide the additional power required to handle more trains between Sishen and Wincanton Substations, on the line linking Hotazel to Kimberley. Emili is located approximately 6.5 km from Kathu and 35 km south of Mamathwane.

An area of approximately 20 m x 43 m (860 m²) is required of which 20 m x 15 m will be allocated to Eskom for the installation of their outdoor equipment and the rest will be used for both indoor and outdoor railway related equipment. Figure 4.4 below illustrates a typical substation layout.

Figure 4.4 Typical substation layout



The Eskom outdoor equipment (see Figure 4.5) will consist of isolating equipment and foundations and steelwork. Aerial cables will connect the substation equipment (positioned approximately 50 m from the track) to the overhead track equipment. The supply of Eskom power must still be negotiated but it is assumed that the supply will be a 132 kV 3-phase AC supply.

Figure 4.5 Eskom outdoor equipment (Sishen Substation)



The railway related indoor equipment will be housed in a building 7 m x 5 m in size (30 m²) (Figure 4.6). The indoor equipment will include high speed circuit breakers, a reactor coil, batteries and a battery charger, a rectifier, a positive isolator, an earth switch, control panels and protection equipment. The outdoor equipment for the railway will include the main traction transformer, auxiliary transformer, primary circuit breakers, surge arresters, disconnecting switches, foundations and steelwork.

Figure 4.6 The railway related indoor equipment building (Sishen Substation)



The Transnet Freight Rail substation will transform the power supplied by Eskom to 3 kV DC for traction purposes.

The 132 kV AC 3-phase supply will be provided via an Eskom distribution line. This line and the associated servitude registration process fall outside of the scope of this project and an approval from DEAT will have to be obtained through a separate EIA process undertaken by Eskom.

4.8 SITE OFFICES, CONSTRUCTION CAMPS AND LAYDOWN AREAS

Three site offices will be established between Hotazel and the Port of Ngqura, at Hotazel, Kimberley and Cradock.

Construction camps will be established at each work site. The camps will typically be 50 m X 50 m (2 500 m²) in size and contain a dormitory, a mess with ablution facilities, a tuck shop, fuel tank(s) and a workshop. Fuel will be stored in purpose-built, self-contained tanks. All electricity will be provided

by mobile generators. Electricity will be used for lighting, general household applications and industrial use such as welding and other electrical equipment. It is estimated that approximately 600 kg of non-hazardous domestic/household waste will be generated per week per site at each camp. The construction camps will house the permanent construction staff. The general labour force will not be housed at the camps but will be sourced from surrounding areas.

Laydown areas will be established at every construction site and will typically be 60 m X 50 m (3 000 m²) in size. The laydown area will contain an office, chemical toilets and lock-up facilities for valuables. No fuel or oil will be stored within the laydown area of the construction site.

Special provision will be made in the construction and operation phase EMP to ensure early engagement with local communities at an early stage in order to obtain their input (and buy-in if possible) to the planning and management of the proposed construction camps. Transnet may seek professional advice in this regard so as to maximise appropriate skills development and training, and labour stability.

4.9

PHASING OF LOOP CONSTRUCTION AND CAPACITY INCREASES

The following sections outline the planned timing for loop construction activities and the estimated increases in the tonnages to be transported along the line.

4.9.1

Phasing of loop construction

Construction will begin as soon as possible after approval for the Project has been granted by DEAT and the statutory appeal period has lapsed. Should approval for the Project be granted and no appeals lodged, it is expected that construction will begin at selected loop sites by around October 2009.

At the time of writing this report, the number of loops to be included in Phase 1 has not been finalised. However, all the loops to be constructed for Phase 1 of the project will be chosen from the loops submitted to DEAT as part of the application.

The phasing of loop construction is dependent on the respective demands of both manganese and container traffic. The phasing will be strategically reassessed at regular intervals during the construction and implementation phase of the Project.

4.9.2

Phasing of capacity increases and associated train frequency

The current capacity of the line between Hotazel, the Port of Ngqura and Port Elizabeth for manganese ore is 4.4 mtpa (2 trains/day) and for containers, three trains per day per direction. The proposed project will facilitate the

4.10

increase in manganese ore tonnage to approximately 6 mtpa (3 trains/day) in 2009 and thereafter to 8 mtpa (4 trains/day), 10 mtpa (5 trains/day) and 12 mtpa (6 trains/day) at various stages in the future as part of this project. The container trains will increase from the current three trains per day to six trains per day. The number of trains for both the manganese and the container traffic are given as per day per direction.

The number of trains per day depends on demand and no calculation of the maximum capacity of the line in terms of number of trains per day has been made.

JOB CREATION AND SKILLS DEVELOPMENT

A number of jobs will be created during both the construction and operational phases of the project, with construction activities requiring both skilled and unskilled workers. An estimate of the numbers of jobs that could be generated as well as the type or skill level required is described below. However, these are not confirmed numbers and will also depend on the Principal Contractor appointed by Transnet to construct the new infrastructure.

4.10.1

Job creation

A number of both temporary and permanent jobs will be created through both the construction and operation phase of this project. Skilled, semi-skilled and unskilled labour will be required. Skilled labour will be sourced nationally, including the Eastern and Northern Cape, and semi-skilled and unskilled labour will be sourced locally, where construction and manufacturing will take place.

Construction phase (temporary labour)

Each contract for the construction of between six and nine loops will require an estimated 75 skilled labourers and an estimated 100 unskilled labourers.

Skilled labourers will be required to operate machinery and equipment on site. Skilled artisans and supervisors will also be required. Unskilled workers will be used for manual labour tasks on site.

Operation phase (permanent labour)

The following types of personnel may be recruited for the operational phase of the Project, as the capacity of the line is increased over time: administrators, private secretaries, yard masters, yard officials, yard foreman, sundry workers, section managers, chief shedmen, shed assistants, shedmen, train assistants, train control officers, service drivers, train drivers and general workers.

In addition, both temporary and permanent jobs may be created in the manufacture of wagons and equipment for the railway line.

The private sector and the Coega IDZ, the Metro and the Eastern Cape, as well as the country in general will benefit from the increased capacity of the line. As a result, both the mining and shipping industry, for example, may also generate employment opportunities both locally and regionally.

4.10.2

Skills development

In order to maintain a reliable train service between Hotazel and the Port of Ngqura, training programmes will be developed to ensure that both existing and new employees reach the required skill levels. Prior to recruitment and training, professional guidance will be sought to help identify suitable candidates and training programmes based on a thorough skills analysis. Induction training will be provided to all new employees whether they are contract or permanent staff.

A need for training and skills development in the following areas has been identified with respect to this Project:

- Training in maintenance practices on existing locomotives to improve reliability and allow for possible expansion of the locomotive fleet;
- Training programmes for new locomotives based on the manufacturer's specifications;
- Training in wagon maintenance crews to accommodate changes in wagon designs;
- Training in the use of modern electronic monitoring equipment and data processing to improve maintenance practices; and
- Training in train operating plans to ensure reliable and sustainable operations.

4.11

ALTERNATIVES

The consideration of alternatives is a legal requirement, as stipulated in the EIA Regulations, R385 of April 2006. Alternatives are defined as a 'different means of meeting the general purpose and requirements of the activity, which may include alternatives to: (a) the property on which or location where it is proposed to undertake the activity; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; and (e) the operational aspects of the activity ⁽¹⁾'.

(1) 'activity' means an activity identified in (a) Government Notice No. R. 386 and R.387 of 2000 as a listed activity, or (b) in any other notice published by the Minister or MEC in terms of section 240 of the Act as a listed activity or specified activity.

The different types of alternatives that may be relevant to the Project are discussed in the following sections, including the no-go or do-nothing alternative, i.e. maintenance of the status quo.

4.11.1

Location and site alternatives

The location of the loop sites is driven primarily by technical factors and is restricted to the existing route of the railway line. Various train scheduling diagrams were prepared by the railway engineers so that scenarios could be considered for where new or extended loops were needed to allow for the increased capacity in tonnage on the line over time. The overall strategy with planning the loop upgrades was to achieve overall stability in the regional rail network.

The selection of the yards that form part of this Project and the substation site is also directly linked to the overall expansion of the rail network.

Tables 4.6 to 4.9 indicate the rationale for the location and relative direction of the proposed loops, the changes to the yards and the location of the substation.

New Loops

Table 4.6
Rationale for selection of New Loops

Loop name	Direction (with respect to the Port of Ngqura and Hotazel)	Rationale for direction/location of new loop
Eastern Cape Tootabi	Not applicable	Loop location dictated by optimized train running times.
Klipfontein	Towards Hotazel	Loop to be extended in the direction of Hotazel to avoid costly alterations to a road-over-rail bridge in the direction of the Port of Ngqura.
Glenheath	Towards the Port of Ngqura	Loop to be extended in the direction of the Port of Ngqura to minimise the crossing time (scheduling issue) and to take advantage of better train handling on the Port of Ngqura side.
Northern Cape Hanover Road	Towards the Port of Ngqura	Loop to be extended in the direction of the Port of Ngqura to avoid costly alterations to a road-over-rail bridge in the direction of Hotazel.

Extended Loops

Loops shorter than 1 200 m were identified. Those that were too technically difficult (and thus too expensive to extend) or that posed environment risks were identified and excluded from further investigation.

The remaining loop site alternatives were then again subjected to the various traffic demand scenarios. Train turn around times, their sensitivity to various delays and train handling requirements were then analysed. Safety considerations are paramount as scheduling conflicts could result in train collisions. The minimum number of loops, that satisfied the relevant criteria, were then selected for the EIA.

According to the project railway engineers, R&H Railway Consultants, the following alternative sites were considered during the planning phase of the loops.

The direction of the extension, at existing crossing loops, was dictated by the conditions at each site. For at least two proposed sites – Wilmos and Drenan - plans for an upgrade or expansion were scrapped due to the costs of constructing a grade separation bridge at a major road level crossing at the one site and the need for a road deviation at the other. Both would have required land to be expropriated. Further details about the Wilmos and Drenan options are provided below:

- At Wilmos, plans were abandoned in favour of a loop upgrade at Klipfontein. The location of Wilmos was such that it would require major engineering intervention, including deviating the line, building bridges and diverting canals as well as expropriating land at the loop. These factors did not make this site feasible.
- At Drenan, the proposed loop extension was constrained by a bridge on the one side and a tunnel on the other. This option was scrapped due to engineering implications and cost.

Table 4.7 *Rationale for Selection of Existing Loops to be Lengthened*

Loop name	Direction (with respect to the Port of Ngqura and Hlotazel)	Rationale for direction of lengthening
Eastern Cape	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly alterations to a bridge over the Sunday's River in direction of the Port of Ngqura.
Barley Bridge	Towards Hlotazel	Loop to be lengthened in the direction of the Port of Ngqura to avoid altering the branch line to Kirkwood in direction of Hlotazel.
Addo	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly earthworks required to widen a deep cutting in direction of the Port of Ngqura.
Coeney	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly earthworks required to widen a deep cutting in direction of the Port of Ngqura.

Loop name	Direction (with respect to the Port of Ngqura and Hlotazel)	Rationale for direction of lengthening
Verby	Towards the Port of Ngqura	Loop to be lengthened in the direction of the Port of Ngqura due to steep gradient ⁽¹⁾ in the approach direction from Hlotazel.
Eagle's Crag	Towards the Port of Ngqura	Loop to be lengthened in the direction of the Port of Ngqura to avoid costly alterations to a bridge over the Boesmans River in the direction of the Port of Ngqura.
Blinkhlof	Towards the Port of Ngqura	Loop to be lengthened in the direction of the Port of Ngqura to avoid costly alterations to a bridge over a small River in the direction of Hlotazel.
Saltare	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly alterations to the approach to a tunnel in the direction of the Port of Ngqura. The current main line will become the loop and a new main line will be built alongside to avoid extensive earthworks involved in having to cut deep into a hill adjacent to the line.
Komnadagga	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly alterations to the approach to a tunnel in the direction of the Port of Ngqura.
Golden Valley	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly alterations to a level crossing in the direction of the Port of Ngqura.
Merrimer	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid costly alterations to a bridge over a small River in the direction of the Port of Ngqura. Furthermore, the section towards Hlotazel is on the straight which will improve train handling and safety.
Halesowen	Towards the Port of Ngqura	Loop to be lengthened in the direction of the Port of Ngqura at request of train operations in Kimberley to ease train handling on the up grade section of the line under loaded conditions.
Marlow	Towards the Port of Ngqura	Loop to be lengthened in the direction of the Port of Ngqura at request of Marlow Agricultural High School (following the public participation process) to avoid two level crossings linking the school with its adjoining agricultural operations on the other side of the railway line. Cost was also a significant issue.
Kaptein	Towards the Port of Ngqura	Loop to be lengthened in the direction of the Port of Ngqura to avoid costly alterations to a level crossing in the direction of Hlotazel.
Knutsford	Towards Hlotazel	Loop to be lengthened in the direction of Hlotazel to avoid the earthworks cost of a deep cutting in the

(1) Gradient is a problem from a train handling perspective. If the gradient is too steep the train could break apart when pulling away or the wheels could lose traction and damage the rails.

Loop name	Direction (with respect to the Port of Nggura and Hotazel)	Rationale for direction of lengthening
Visrivier	Towards Hotazel	Loop to be lengthened in the direction of Hotazel to avoid costly alterations to a level crossing and a bridge over the Fish River in the direction of the Port of Nggura.
Conway	Towards Hotazel	Loop to be lengthened in the direction of Hotazel to avoid costly alterations to a level crossing on the R401 and a bridge over the Fish River in the direction of the Port of Nggura.
Tafelberg	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura to avoid costly alterations to a road-over-rail bridge in the direction of Hotazel.
Rosmead	Towards Hotazel	Loop to be lengthened in the direction of Hotazel due to high cost of installing new signalling on the Port of Nggura side of Rosmead.
Flonker	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura to avoid costly earthworks required to construct the loop in the direction of Hotazel.
Carlton	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura to avoid costly alterations to a road-over-rail bridge in the direction of Hotazel.
Northern Cape Barredeel	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura due to increase efficiency with respect to crossing time and thus improved throughput (point-to-point running time).
Wildfontein	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura due to safety considerations with respect to the steep gradient on the Hotazel side of the station.
Linde	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura. There are no real limitations in lengthening the loop in the direction of Hotazel. However, current selection is better for throughput (point-to-point running time).
Burgervilleweg	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura to avoid costly alterations to a road-over-rail bridge in the direction of Hotazel.
Bletterman	Towards the Port of Nggura	Loop to be lengthened in the direction of the Port of Nggura to avoid costly alterations to a road-over-rail bridge in the direction of Hotazel.
Bletterman	Towards the Port of	Loop to be lengthened in the direction of the Port of

Loop name	Direction (with respect to the Port of Nggura and Hotazel)	Rationale for direction of lengthening
	Nggura	Nggura to avoid costly alterations to a road-over-rail bridge in the direction of Hotazel.

Yard Changes

The current yard infrastructure along the railway line from Hotazel to the Port of Nggura is sufficient to deal with the increased rail traffic. However, some yards require moderate upgrades to improve their functionality. Hence, no yard selection process was undertaken as was the case with the loops. *Table 4.8* simply indicates the rationale for the changes to each yard.

Table 4.8 Rationale for Proposed Changes at the Yards

Yard Name	Brief description	Rationale for changes
Northern Cape Hotazel Yard	Yard to be remodelled.	Yard to be remodelled to handle 104/105 wagon trains. Current layout of the yard dictates the location of the changes planned.
Mamathwane Yard	Mamathwane yard to be extended in the direction of the Port of Nggura (including train handling and throughput) and the signal station.	Yard to be extended in the direction of the Port of Nggura to improve train operations (including train handling and throughput) and upgrade signalling to facilitate a link to a private siding serving a mining client.
Posmasburg Yard	Access to wagon repairs section to be electrified and a lean-to ⁽⁶⁾ to be added to the workshop.	Electrification will allow locomotives to operate independently and limit the need for shunting.
Beaconsfield Yard	An additional staging yard to be constructed at the Electric Running Shed (ERS) ⁽⁷⁾ .	The additional staging is a requirement for current operations.
	Cross-overs to be added in the yard and electrified	The additional cross-overs will reduce the time of getting locomotives to and from the ERS/workshop.
Ronaldsvlei	Two block joints to be installed on the DC lines.	The block joints will improve the signalling and train safety.
	A crossing loop to be added	The crossing loop will facilitate more capacity for change over from DC to AC for locomotive exchanges.

⁽⁶⁾ Shed with a sloping roof and three walls that abut the wall of another structure (<http://en.wikipedia.org/wiki/Lean-to>).

⁽⁷⁾ Workshop to repair electric locomotives.

New Substation

An explanation for the siting of the proposed substation at Emul is provided in Table 4.9.

Table 4.9 Rationale for the Selection of the Substation Site

Substation Name	Rationale	Alternatives
Northern Cape Emul Substation	Due to the increase in the volume of manganese transported, the frequency of trains will increase. Simulation results indicate that the voltage at the locomotives with two trains in the section between Sishen and Wrcancon substations will fall below the acceptable levels to run the service.	1. Do not build a new substation. If the new substation is not built, this will result in trains not being able to run on schedule due power limitations. 2. Build a new substation at another location. The position of the site for the new substation was determined through a computer simulation. No other feasible options were generated. 3. Run diesel locomotives. This has implications for cost, train efficiency and the environment.

4.11.2

Design alternatives

Alternative designs were investigated with respect to the loops considered. The proposed loop extensions were designed such that no new bridges were required and only limited earthworks and relocation of existing roads and level crossings would be required.

The following design alternatives were considered:

- The port of Saldanha and the Port of Ngqura (near Port Elizabeth) were investigated as alternative ports of export to the existing port at Port Elizabeth. At the time of writing of this report the port of Ngqura was considered the best option based on economic considerations. However, this selection is subject to change in response to changes in the global economy.
- The alternative to relocate the entire railway line from Sishen to De Aar, bypassing Kimberley, was also investigated and found to be unfeasible due to cost and environmental implications and risks.
- A new second railway line was considered for the entire length of the line. However, this option was rejected due to cost, environmental risks as well as significant geographic constraints such as deep or narrow valleys and numerous river crossings.

4.11.3

Demand alternatives

Demand is driven by the international and local markets. As such the latest forecasted demand data was evaluated. This was done for an increase in demand for manganese ore from the current two trains per day to six trains per day and the containers originating at Ngqura from zero to three trains per

day per direction (6 slots) (plus the 3 container trains currently originating in Port Elizabeth) and various combinations thereof. Following this evaluation, various scenarios for capacity increases over time were developed. These are subject to change as markets change.

The current demand requires nine new / upgraded loops (as outlined in Section 4.9.1). The combination of loops was chosen such that minimal additional loops would be required as capacity demands increase.

4.11.4

Activity alternatives

Activity alternatives relate to providing alternatives ways of achieving the same objectives. In this Project, the objective is to increase the volume of containers and commodities transported. An activity alternative would, therefore, relate to transportation of these goods by road, rather than rail. Assessing the potential for road transport would need to involve other role players and government and would require considerable input and investigation, owing to the large geographic scale of the study area and the volumes of goods that need to be transported. There are a number of advantages and disadvantages to road transport which include the following:

- Advantages - include opportunities for small entrepreneurs / road transport contractors to benefit from the associated employment and economic opportunities
- Disadvantages - include the impact on the public in terms of road infrastructure maintenance, vehicle congestion, vehicle emissions and road safety, accessibility and extent of major road networks; and the cost of transport by road.

4.11.5

Process alternatives

Process alternatives are dictated by various aspects including but not limited to the operating conditions, throughput needs and design requirements and/ or restrictions. The most optimal solution is found by limiting the extent of infrastructure and rolling stock investments required. This is achieved by optimizing the processes i.e. streamlining activities and using an optimal train length of 104 wagons.

Shorter trains would result in increased train frequency and fleet size, with the latter carrying a significant capital cost. An increase in train frequency would require additional train slots in the overall schedule. The schedule would then slowly get more and more congested which would require additional loops to be extended or built to alleviate the problem. This construction would carry a cost burden and potential environmental and social risks.

4.11.6

Material alternatives

Due to the specialised nature of the material required for a project of this nature there are limited opportunities for considering material alternatives.

Material requirements are dictated by axle loads and design requirements so as to safely operate a railway service of this nature.

4.11.7

Phasing alternatives

Various phasing alternatives were investigated namely 6, 8, 10 and 12 mtpa of manganese ore and three additional container trains (along this rail corridor). The output from the analysis carried out by the railway engineers showed that different loop combinations are required between Port Elizabeth and De Aar depending on the throughput tonnage required. The major driver in infrastructure requirements is the throughput tonnage required which is dependent on international and local demand for manganese ore. Increasing the number of phases results in increased costs as more loops are constructed in total to achieve the same throughput. Thus the decision was taken to opt for the scenario that is based on the latest information available to Transnet and the Manganese Industry - this would be the most cost effective solution.

4.11.8

The no-go alternative

Should the proposed loops, yards, traction substation and associated infrastructure not be constructed or upgraded then an increase in container and commodity capacity on the railway line between the Port of Ngqura and Hotazel will not be possible. This would have serious implications for South Africa's mining and container handling sectors and would affect our export capabilities. This suggests direct negative consequences for the provincial and national economy. Local effects would be related to a lack of stimulation in terms of employment and opportunities for small and medium enterprises, which would benefit from the proposed development. The implementation of this component of the project may commence prior to the required authorisation from DEAT with respect to the rest of the project outlined above.

5

ENVIRONMENTAL AND SOCIAL BASELINE

INTRODUCTION

This section provides a description of the baseline biophysical and socio-economic characteristics of the Project area which traverses the Northern and Eastern Cape provinces. The study area largely follows the existing railway line from Hotazel to the Port of Ngqura and Port Elizabeth, 1 100 km to the south east.

5.1

BIOPHYSICAL ENVIRONMENT

Climate

The climate varies over the entire length of the existing railway line from the dry and arid Northern Cape to the wetter coastal regions of the Eastern Cape.

5.2

5.2.1

The climate of the eastern part of the Northern Cape Province, which includes the towns of Hotazel, Postmasburg, Kimberley and De Aar, is typically characterised by summer rainfall of approximately 400 mm per annum, high summer temperatures, with extreme temperatures exceeding 40 °C, and cold and clear winters with temperatures below 0 °C at night (Mucina, & Rutherford, 2006).

The climate of the central and western part of the Eastern Cape Province, through which the existing railway line runs, varies according to the distance from the Indian Ocean. Coastal regions are typically characterised by mild, temperate conditions with average temperatures of between 14 °C and 23 °C, while inland areas experience slightly more extreme conditions with average temperatures of between 5 °C and 35 °C. Rainfall is scarce throughout the western part of the province with rainfall typically occurring at the coast in winter and inland during summer (Mucina, & Rutherford, 2006).

Local climatic conditions at the development sites could determine the scale and affect of project activities on the environment, for example, the amounts of dust generated (especially in dry, water scarce areas) by additional train traffic and the extent of erosion and surface run-off (for e.g. in wetter coastal areas) due to construction activities.

5.2.2

Topography

The topography of the project area is largely dominated by the semi arid Karoo basin in the Northern Cape and much of the Eastern Cape, as well as the sub-escarpment and coastal areas of the Eastern Cape. The terrain through which the existing railway line runs is, therefore, predominantly quite flat, with exception of those sections of the line that traverse the Cape Fold mountains and the escarpment north of Patterson and south of Cradock.

5.2.3

The topography of the landscape could play a role in determining how many people/communities are able to see or hear the proposed activities.

Geology

Given the length of the line, the geology has been roughly divided into regions with similar morphology. These are listed below and based on the Geology Map of South Africa and the Kingdoms of Lesotho and Swaziland (Keyser, 1997):

- The section of line between Horazal and Sishen is located entirely on geology of the Kalahari Group which is comprised of Aeolian sands and limestone;
- From the Sishen to Harts River the railway line is primarily underlain by geology of the Transvaal Supergroup, although there is a small section of Quaternary geology of the Kalahari Group immediately east of Postmasburg. The Transvaal Supergroup rocks are comprised of dolomite, limestones, cherts, jaspilite and andesites, whilst the Kalahari Group geology is comprised of Aeolian sands and limestone;
- The portion of the line from Harts River to Barkly West is underlain by geology of the Ventersdorp Supergroup, which is comprised of basalts and andesites;
- From Barkly West to De Aar the geology is made up of the Ecca Group shales;
- From De Aar to Kommadagga the line is primarily underlain by geology of the Beaufort Group with doleritic intrusions. This geology is comprised of mudstones and sandstones;
- Between Kommadagga and Paterson, where the line crosses the Sunnberg mountain range, the project area is underlain by sedimentary rocks (quartzite and shales) from the Cape Supergroup; and
- Between Paterson and Port Elizabeth, the geology is comprised mainly of mudstones and limestones of the Algoa and Uitenhage groups.

Based on the fact that a structurally sound existing railway line is already in place, the upgrade of the current line is not expected to cause instability to, or impact negatively on local geology. The abovementioned strata should provide sufficient foundation for the proposed activity if construction is undertaken in accordance with a detailed geotechnical investigation.

5.2.4

Surface and Groundwater

The existing railway line, along which the proposed upgrades, refurbishments and developments will occur, runs in a southerly direction from Horazal

towards Postmasburg, crossing a number of tributaries of the Ga-mogara River before heading in an easterly direction, crossing the Klein Riet, Steenbok, Harts and Vaal Rivers, before arriving in Kimberley. From Kimberley, the railway line runs south south west, crossing the Riet River, the Orange River and the Hondelbatspruit, en-route to De Aar, before crossing the provincial border between the Northern and Eastern Cape near Carlton. From here, the line runs in a south easterly direction towards Cradock before following the Noupootspruit, the Groot and Klein Brak, Great Fish, Boesmans and Sundays Rivers in a generally southerly direction to the Port of Ngqura and Port Elizabeth.

River systems encountered along the route (where the railway either crosses or is located within 500 m of a river system) are largely classified by the National Spatial Biodiversity Assessment (NSBA), compiled by the South African National Biodiversity Institute (SANBI), as endangered and critically endangered⁽⁹⁾ with the exception of the Ga-mogara, Hondelbatspruit, Groot Brak and Noupootspruit, all of which are classified as not threatened (see Figure 5.2 and Figure 5.3). According to the NSBA, “critically endangered ecosystems have lost so much of their original natural habitat that ecosystem functioning has broken down and species associated with the ecosystem have been lost or are likely to be lost.” Therefore, any remaining natural habitat must be protected and conserved to ensure that species associated with these systems are not threatened further.

Figure 5.1 shows the Critically Endangered Boesmans River at the proposed Toobabi loop.

⁽⁹⁾ Critically endangered river: heterogeneity signatures fall to an impact length below their conservation target (in this case 10% of their total length).

Figure 5.3

River ecological status: De Aar to Port Elizabeth

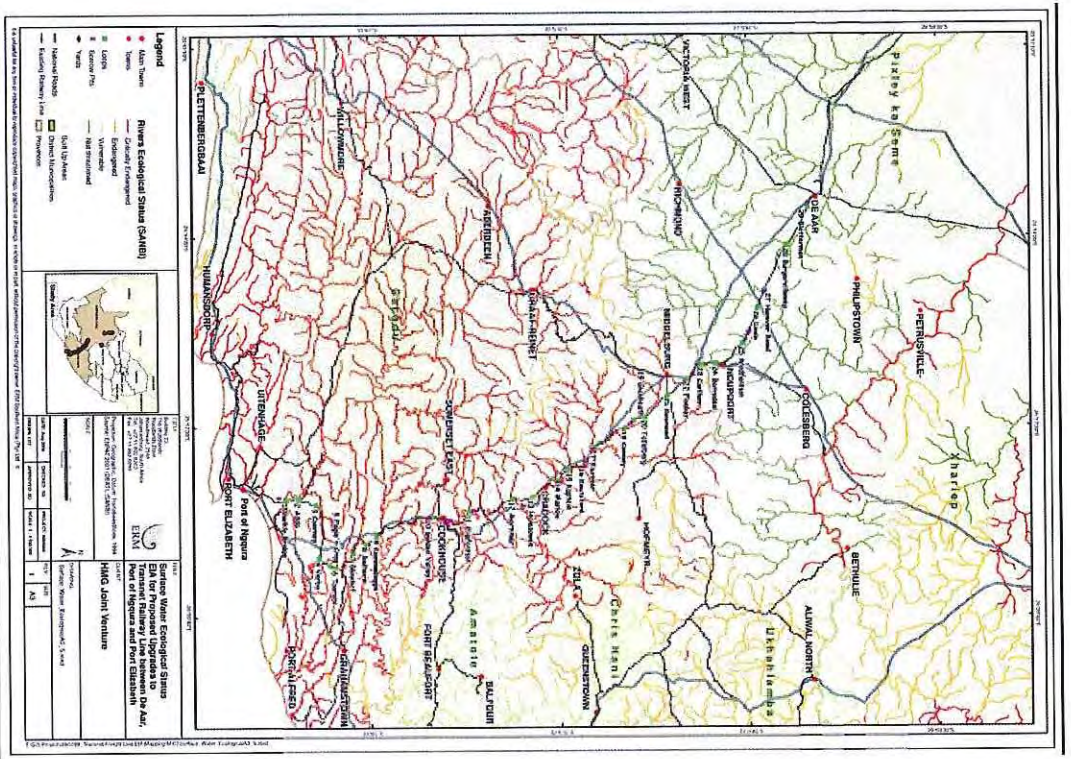


Figure 5.4

Groundwater sensitivity: Hotazel to De Aar

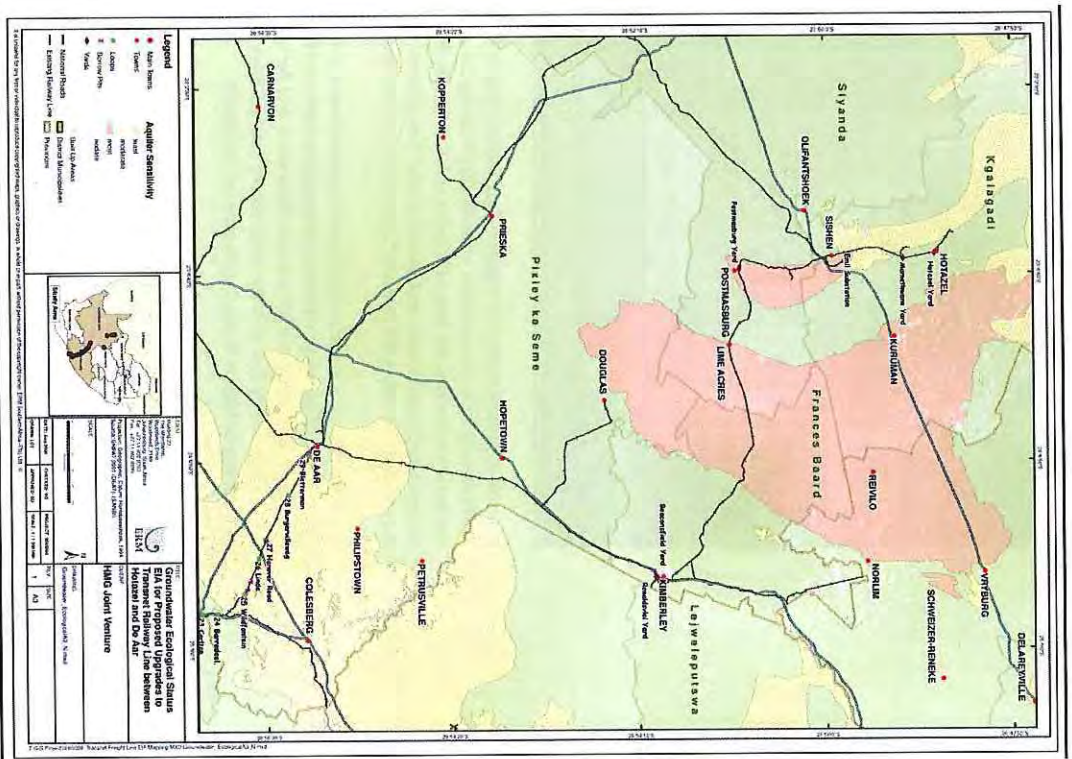
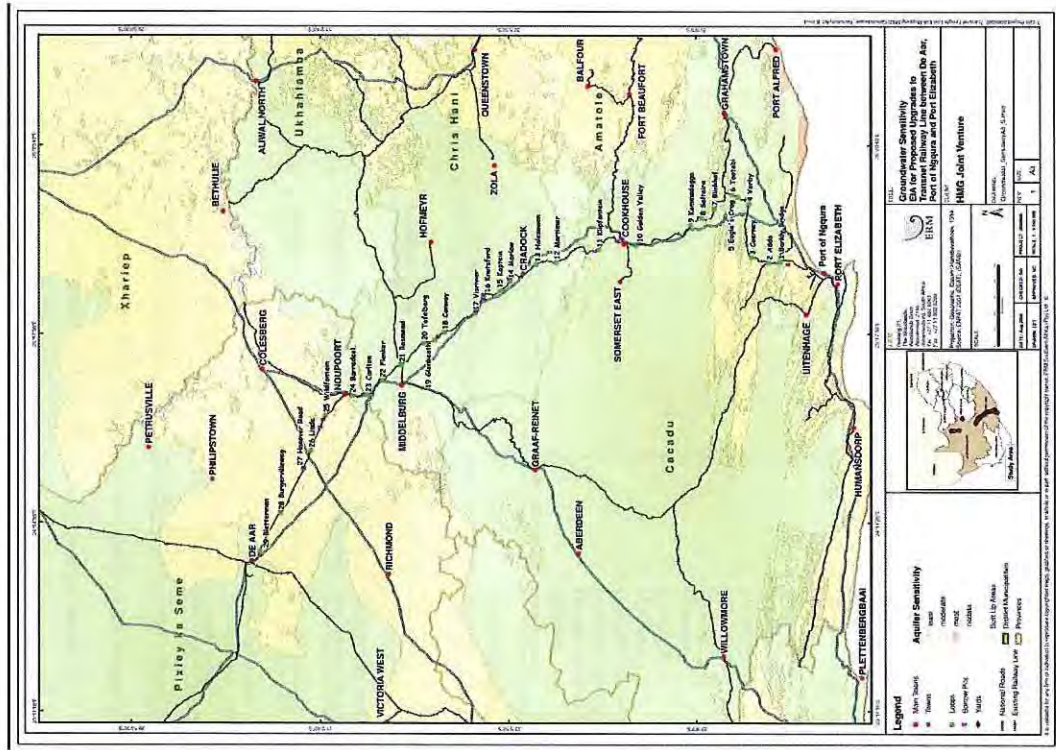


Figure 5.5

Groundwater sensitivity: De Aar to Port Elizabeth



5.2.5

Flora and Fauna

Flora

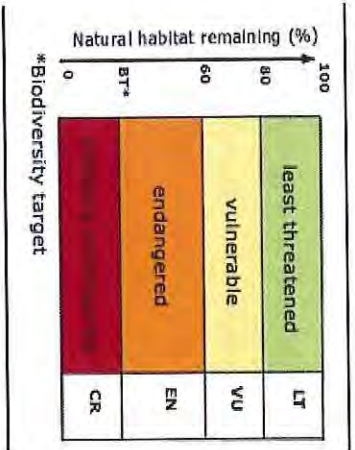
The topography along the current railway line is characterised by the escarpment and Karoo basin in the north and Cape Fold Mountains in the south. As such, the vegetation in the north is characterised by species that constitute the Savannah, Nama Karoo and Grassland Biome species. As the railway line approaches the edge escarpment, moving into the sub-escarpment region, the vegetation is dominated by Albany thickets Biome species and those associated with the Fynbos and Azonal Biome (Mucina and Rutherford, 2006).

The project area falls within 13 different vegetation types, based on Mucina and Rutherford (2006). From north to south of the project area, this includes, Kathu Bushveld, Kuruman Thornveld, Kimberley Thornveld, Northern Upper Karoo, Tarkastad Montane Shrubland, Eastern Upper Karoo, Southern Karoo River, Great Fish Thicket, Albany Alluvial Vegetation, Albany Broken Veld, Kowie Thicket, Sundays Thicket and Coega Bonteveld.

Of the 13 vegetation types identified within the study area, 12 are classified as least threatened and one is classified as endangered by the NSBA. The ecological status (Least Threatened (LT), Vulnerable (VU), Endangered (EN) and Critically Endangered (CR)) is based on how much of a given vegetation type's original area remains intact, relative to the four basic thresholds calculated on the basis of the best available science (see Figure 5.6) (Driver et al., 2005).

Note that the threshold beyond which an ecosystem becomes critically endangered varies from 16% to 36%, depending on the ecosystem. Basically, the more species-rich the ecosystem is, the higher the threshold value will be. This threshold is also known as the biodiversity target. It represents the proportion of each ecosystem one would ideally like to see included in a formal protected area.

Figure 5.6 National Spatial Biodiversity Assessment (NSBA) thresholds and criteria (Driver, A. et al, 2005)



The Albany Alluvial vegetation (Figure 5.7) is the only vegetation type on a national level that is considered threatened and has an ecological status of Endangered. The Addo Loop site falls within this vegetation type.

Figure 5.7

Albany alluvial vegetation



The target for conservation is 31%. Currently only about 8% is conserved (11), 6% statutorily conserved in the Greater Addo Elephant National Park, the

(11) Macina and Rutherford (2004)

Baviaansloof Wilderness Area, the Loerie Dam, the Swartkops Valley, the Yellowwoods Nature Reserves and the Double Drift Reserve Complex; and about 2% is protected in eight private conservation areas.

The ecological status at a national level for each of the vegetation types relevant to the study area are listed in Table 5.1 below.

Table 5.1

Vegetation types and their NSBA ecological status within the project area

Vegetation Type	Ecological Status	Sites where Vegetation is found within the Study Area
Kathu Bushveld	Least threatened	Horazal yard Mamathwane yard Emil substation
Kuruman Thornveld	Least threatened	Possnaburg yard
Kimberley Thornveld	Least threatened	Ronaldsvlei yard (Kimberley) Beaconsfield yard (Kimberley)
Northern Upper Karoo	Least threatened	Burgervilleweg Bleteman; Borrow pit near Bleteman
Tarkastad Montane Shrubland	Least threatened	Marlow Borrow pit near Knutsford
Eastern Upper Karoo	Least threatened	Halesowen Kaptein Knutsford; Borrow pits near Knutsford. Vishvler; Borrow pit near Vishvler Conway; Borrow pit near Conway Glenheath Tafelberg Rosmead Carlton Barredeel. Wildfontein Borrow pit near Wildfontein Linde Hanover Road; Borrow pit near Hanover Road
Southern Karoo River	Least threatened	Klipfontein; Borrow pit near Klipfontein Mortimer; Borrow pit near Marlow
Great Fish Thicket	Least threatened	Borrow pit near Cookhouse
Albany Alluvial Vegetation	Endangered	Addo
Albany Broken Veld	Least threatened	Blinkhof Saltare Kommadagga Golden Valley; Borrow pit near Golden Valley
Koowe Thicket	Least threatened	Verby

Vegetation Type	Ecological Status	Sites where Vegetation is found within the Study Area
Sundays Thicket	Least threatened	Eagles Crag Tooabi
Coega Bonteveld	Least threatened	Barkley Bridge Coerney Borrow pit near Barkley Bridge

At a provincial or municipal level, the Subtropical Thicket Ecosystem Planning (STEP) programme, based only in the Eastern Cape, has identified a number of vulnerable habitats. These vegetation types listed in Table 5.2 cover much of their original extent but further disturbance or destruction could harm their health or functioning. Consequently, these ecosystems can withstand only limited loss of natural area through disturbance or development.

Table 5.2 *Vegetation types and their STEP ecological status within the project area*

Vegetation Type	Ecological Status	Sites where vegetation is found within the Study Area
Fish Spekboom Thicket	Vulnerable	Borrow pit near Cookhouse
Sundays Doring Veld	Vulnerable	Addo
Sundays Spekboom Thicket	Vulnerable	Barkley Bridge Coerney

In addition to the national and provincial picture with respect to the ecological status of vegetation within the study area, the specialist baseline ecological study identified a number of protected, endemic, IUCN rated 'near threatened' (2) and conservation worthy species at a number sites

The ecological sensitivity of any piece of land is based on its inherent ecosystem service and overall preservation of biodiversity. Although national standards and priorities are taken into account, site specific ratings (based on fieldwork and observation) may differ from national ratings. For example:

- A vegetation type with a national listing of "Least Concerned" can still include habitats that support protected species or ecosystems with high connectivity (these species or ecosystems cannot simply be ignored because of the listing of the vegetation type they occur in). When considering biodiversity at the species level, protected species and species of conservation concern need to be taken into consideration; and
- Likewise, a vegetation type that is listed as "Threatened" can also have disturbed areas. Taking into consideration the limited impact of the

(2) Near-Threatened - is a conservation status assigned to species or lower taxa that may be considered threatened with extinction in the near future, although it does not currently qualify for the threatened status.

proposed project upgrades in an area that is already disturbed, the ecological sensitivity of the vegetation can only be rated as medium, rather than high.

Table 5.3 highlights the sites of medium and high ecological importance with respect to vegetation and plant species identified in the specialist ecology study (Volume 2 of the Final EIR). According to the study, high, medium and low ecological importance is defined as follows:

- **High ecological importance** – Sensitive ecosystems with either low inherent resistance or low resilience towards disturbance factors or highly dynamic systems considered being important for the maintenance of ecosystem integrity. Most of these systems represent ecosystems with high connectivity with other important ecological systems OR with high species diversity and usually provide suitable habitat for a number of threatened or rare species. These areas should be protected.
- **Medium ecological importance** – These are slightly modified systems which occur along gradients of disturbances of low-medium intensity with some degree of connectivity with other ecological systems OR ecosystems with intermediate levels of species diversity but may include potential ephemeral habitat for threatened species.
- **Low ecological importance** – Degraded and highly disturbed/transformed systems with little ecological function and are generally very poor in species diversity (most species are usually exotic or weeds).

Table 5.3 *Sites of medium and high ecological importance (vegetation)*

Site Name	Ecological importance (as determined by the specialist ecologist)	Plant species identified on site (by specialist ecologist)	Rationale for ecological importance rating
Barkley Bridge borrow pit	High (with conservation worthy plant species: Red Data species)	<i>Sideroxylon thermie</i> – DWAF protected2 <i>Ficinia truncata</i> - BIT <i>Rhombophyllum rhomboidum</i> – En, NT, PP <i>Euphorbia meloformis</i> subsp. <i>valida</i> – Rare, NT, PP Mesembryanthemaceae (<i>Carpobrotus edulis</i> , <i>Delosperma rogersii</i> , <i>Mesembryanthemum atonis</i> , <i>Ruschia lamata</i> , <i>Ruschia</i> sp., <i>Trichodesma bulbosum</i> , <i>Drosanthemum</i> sp.) – PP <i>Haemorrhia attenuata</i> – PP <i>Aloe humilis</i> – PP <i>Pachypodium bispinosum</i> – PP <i>Carpobrotus edulis</i> – Med	1. Due to numerous protected species under various legislations, the presence of a Near-Threatened species, a valued medicinal plant species and high diversity. 2. The nature of the activity, i.e. the destruction of vegetation resulting from the use of the borrow pit.

Site Name	Ecological importance (as determined by the specialist ecologist)	Plant species identified on site (by specialist ecologist)	Rationale for ecological importance rating
Marlow borrow pit	High	<i>Amaryllidaceae (Haemanthus familis, Cyranthus contractus) - PP</i> <i>Hemerocallis bolusii var. blackbeetiana - PP</i> <i>Tricholadema pumertianum & Ruschia spirosoi - PP</i>	1. Due to numerous protected species and high diversity. 2. The nature of the activity, i.e. the destruction of vegetation resulting from the use of the borrow pit.
Conway borrow pit	High (with conservation worthy plant species; high densities of protected plant species)	<i>Ruschia spirosoi - PP</i> <i>Aloe broomi - PP</i> <i>Stomatum (?) sp. - PP</i>	1. Due to numerous protected species and high diversity. 2. The nature of the activity, i.e. the destruction of vegetation resulting from the use of the borrow pit.
Adido	Medium	<i>Malophium sp. - PP</i>	Due to the presence of a protected species and that the site falls within a protected habitat. However, only a Medium rating was given because of the existing disturbance on site and the limited disturbance expected from construction activities (i.e. working within the railway reserve primarily, apart from the laydown area, and therefore only the vegetation within the reserve is expected to be disturbed/destroyed).
Eagles Crag	Medium (with conservation worthy plant species; high densities of protected plant species)	<i>Mesembryanthemaceae (Delosperma echinatum, Ruschia pulchella, R. urcinata, Lamprolathus prodructus) - PP</i> <i>Amaryllidaceae (Brunsvigia nivalis, Nerine cf. flavescens) - PP</i> <i>Pachypodium succulentum - PP</i> <i>Hypoxis cf. triflora - Med</i>	Due to the presence of numerous protected species and a valued medicinal species. Only a Medium rating was given because of the nature of the activity (i.e. construction activities can be limited to existing disturbed areas and the railway reserve).
Blinkhof	Medium		This site does not have any taxa of conservation interest. However, there is a high erosion potential, which is a concern. A Medium rating was given because of the potential for erosion to impact on the connectivity of adjacent ecosystems.

Site Name	Ecological importance (as determined by the specialist ecologist)	Plant species identified on site (by specialist ecologist)	Rationale for ecological importance rating
Golden Valley borrow pit	Medium	<i>Cyranthus smithiae - PP, NT</i>	1. Possible occurrence of a protected species / Near Threatened species. 2. The nature of the activity, i.e. the destruction of vegetation resulting from the use of the borrow pit. However, the diversity in the area was low, therefore, if it wasn't for the possible PP/NT species it would have been rated Low.
Cookhouse borrow pit	Medium (with conservation worthy plant species; Red Data species)	<i>Cyranthus smithiae - PP, NT</i> <i>Sagittaria grandiflora var. grandiflora - PP</i>	Only a few Protected species and low diversity (i.e. without the PP species the rating would have been Low).
Mortimer	Medium		The presence of the wetland-associated plant composition may indicate a wetland. Due to wetlands being protected a Medium rating was given.
Knutstord borrow pit	Medium (with conservation worthy plant species; high densities of protected plant species)	<i>Mesembryanthemaceae (Ruschia spirosoi, Delosperma multiflorum, Dryasibonium hispidum, Malophium sp., Ruschia craddockensis sibspp., craddockensis, Tricholadema sp.) - PP</i> <i>Pachypodium succulentum - PP</i>	Only a few Protected species and low diversity (i.e. without the PP species the rating would have been Low).
Flonker	Medium		'A climax community is a biological community of plants and animals which, through the process of ecological succession, has reached a steady state.' Due to the close proximity there could possibly be an impact on this vegetation type (i.e. impact on the connectivity of ecosystems).

Site Name	Ecological importance (as determined by the specialist ecologist)	Plant species identified on site (by specialist ecologist)	Rationale for ecological importance rating
Carlton	Medium	Site in close proximity to "climax" Beemkaree Koppies Shrubland	'A climax community is a biological community of plants and animals which, through the process of ecological succession, has reached a steady state'. Due to the close proximity there could possibly be an impact on this vegetation type (i.e. impact on the connectivity of ecosystems).
Fianover Road borrow pit	Medium (with conservation worthy plant species; high densities of protected plant species)	<i>Ruschia spinosa</i> , <i>Thimopsis</i> sp. - PP	Only a few Protected species and low diversity (i.e. without the PP species the rating would have been Low).

Key to column 3 (plant species identified on site):

- (d) - dominant taxa
- BIT - Biogeographically important taxon reaching the eastern limit of its distribution
- En - Endemic to Coega Botiveld
- NT - Near-threatened (according to IUCN listing criteria)
- PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974
- Med - Valued medicinal plant

Invasers and weed species are plants that invade natural or semi-natural habitats; especially areas disturbed by humans and are commonly known as environmental weeds. Weeds that invade severely disturbed areas are known as ruderal (13) and agrestal (14) weeds. Most of these weeds are annuals colonising waste sites and cultivated fields. These weeds only persist on recently disturbed areas and seldom invade established areas (Henderson, 2001). Declared weeds and invaders have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems.

The amended Regulations (Regulation 15) of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) identify three categories of problem plants, namely:

- Category 1 plants may not occur on any land other than a biological control reserve and must be controlled or eradicated. Therefore, no person shall establish, plant, maintain, propagate or sell/import any category 1 plant species.

(13) Ruderal species is a plant species that is first to colonise disturbed lands.
(14) Growing wild in cultivated areas.

- Category 2 plants are plants with commercial application and may only be cultivated in demarcated areas (such as biological control reserves) otherwise they must be controlled.
- Category 3 plants are ornamentally used plants and may no longer be planted, except those species already in existence at the time of the commencement of the regulations (30 March 2001), unless they occur within 30 m of a 1:50 year floodline and must be prevented from spreading.

Localised, albeit patchy invasions commonly occur along the railway servitude. Table 5.4 list the weed and invader species that were recorded in the project area during the ecology specialist study.

Table 5.4 List of weed and invader taxa recorded within the project area

Species	Common Name	Type	Control Measure
<i>Agave americana</i>	American agave	Invader	Eradicate
<i>Argemone ochroleuca</i>	Mexican poppy	Weed	Difficult to eradicate
<i>Atriplex lindleyi</i>	Australian saltbush	Invader	Control
<i>Cirsium vulgare</i>	Scotch thistle	Weed	Difficult to eradicate
<i>Eucalyptus camaldulensis</i>	Red river gum	Invader	Control
<i>Nicotiana glauca</i>	Wild tobacco	Weed	Eradicate
<i>Opuntia ficus-indica</i>	Sweet Prickly-pear	Weed	Eradicate
<i>Opuntia humifusa</i>	Creeeping prickly pear	Weed	Eradicate
<i>Opuntia imbricata</i>	Imbricate prickly pear	Weed	Eradicate
<i>Pennisetum setaceum</i>	Fountain grass	Weed	Eradicate
<i>Pinus</i> spp.	Pines	Invader	Control
<i>Prosopis glandulosa</i>	Mesquite	Invader	Eradicate

A more detailed description of vegetation in the study area can be found in the terrestrial ecology specialist report in Volume 2 of the Final EIR.

Fauna

Based on a Quarter Degree Square (QDS)⁽¹⁵⁾ survey of the project area, a number of avifauna and mammal species were identified. Amongst those identified, 34 Red Data listed bird species were recorded of which 19 are listed as Not Threatened (NT) and 15 as Vulnerable (VU).

Thirty nine Red Data listed mammal species were also recorded within the Study area. Of the 39 species recorded, 13 are listed as Data Deficient (DD), 7 are Not Threatened (NT), 11 are Protected Species (PS), 4 are Vulnerable (VU), 3 are Endangered (EN) and 1 is listed as Critical (CR). Some of these mammals only occur within protected areas (i.e. Nature Reserves, Private Game Reserves, etc.), for example, Black Rhinoceros (*Diceros bicornis*), listed as CR, and the Oribi (*Ourebia aurei*), listed as EN.

(15) Quarter Degree Squares (QDS) correspond to the area shown on a 1:50 000 map and are approximately 27 km long (north-south) and 23 km wide (east-west)

A number of heptofaunal species were also identified in the QDS analysis, many of which are endemic, restricted or rare in occurrence such as the Plain Mountain Adder, Albany Adder, Cape Mountain Lizard, Common Mountain Lizard, Namaqua Plated Lizard, FitzSimons' Longtailed Seps, Short-legged Seps, Common Longtailed Seps, Cape Grass Lizard Elandsberg Dwarf Chameleon, Perring's Coastal Leaf-toed Gecko, Essex's Dwarf Leaf-toed Gecko and the Giant Bullfrog.

A number of protected macro invertebrates may also occur within the project area. These include Creeping Scorpions *Opisthacanthus asper / rufidus*, Burrowing Scorpions *Opisthacanthus glaberrimus*, Horned Baboon Spiders *Ceritygus spp.*, Common Baboon Spiders *Harpactia spp.*, Golden Baboon Spiders *Prexistis Perithochilus spp.*, Coega Copper Butterfly *Aloides clarkii* and the Wineand Blue Butterfly *Leptochrysois haccus*.

A full list of species is located in the ecology specialist report in Volume 2 of the Final EIR.

5.2.6 Biodiversity Conservation Areas

A number of protected areas are situated in relatively close proximity to the existing railway line between Hotazel, the Port of Ngqura and Port Elizabeth. Two protected or conservation worthy areas, namely, the Addo Elephant National Park and the Shantwan Game Reserve, have a boundary which is approximately less than 1 km from a loop development site, i.e. Coeney and Eagles Crag Plus Tootabi respectively. The Frontiers Safari Game Farm is located approximately 1 km from the proposed loop development at Blinkhoff.

Table 5.5 summarises the protected areas in the vicinity of the proposed project sites.

Table 5.5 Protected areas in the vicinity of the proposed project sites

Station/yard name	Approximate distance to protected area (km)	Name of protected area	Direction (from loop/yard)
Barkly Bridge	2,8, 7	Addo Elephant NP, Tregathym Game Reserve	E
Coeney	0,02, 2,3	Addo Elephant NP	E, N
Eagle's Crag	0,4, 0,7	Shantwan Game Reserve	SE, E
	11	Addo Elephant NP	NW
Tootabi	0,4, 0,7	Shantwan Game Reserve	SE, E
	11	Addo Elephant NP	NW
Blinkhoff	1-1,5	Frontiers Safari Game Farm	E
Saltaire	10	Frontiers Safari Game Farm	SE
Komnadagga	12-13	E. Cape Game Farm	NE
Golden Valley	16,19,26,28	Glen Avon Falls Kloof, Boschberg Nature Reserve, Oudekraal Game Farm, East Cape Game Farm	NW, NW, NW, SE
Klipfontein	12	Oudekraal Game Farm	W

5.3

Station/yard name	Approximate distance to protected area (km)	Name of protected area	Direction (from loop/yard)
Mortimer	20, 23	Mountain Zebra NP, Oudekraal Game Farm	NW, SW
Halsowen	16	Mountain Zebra NP	W
Craddock	6,9	Mountain Zebra NP	W
Marlow	8,4	Mountain Zebra NP	W
Krausford	16,8	Mountain Zebra NP	SW
Variver	21	Mountain Zebra NP	S
Conway	-	-	-
Clenteah	-	-	-
Tafelberg	-	-	-
Reynaud	-	-	-
Flonker	-	-	-
Carlton	-	-	-
Barredel	-	-	-
Noupoort	-	-	-
Wildfontein	-	-	-
Linde	-	-	-
Hanover Road	-	-	-
Burgervilleweg	-	-	-
Blieteman	-	-	-
De Aar (yard)	-	-	-
Kimberley (yard)	30,35km	Vaalbos NP	NW
Postmasburg (yard)	-	-	-
Manathwane	-	-	-
Hotazel (yard)	-	-	-

5.3

SOCIO-ECONOMIC ENVIRONMENT

The type of socio-economic information reported on includes economic data, employment statistics, income and poverty levels as well as data on social infrastructure and services. This Section is structured such that it first reports on socio-economic data at the provincial level and then at the district level. A section on land use, ownership and land claims is also included.

The Transnet railway line which is to be upgraded traverses an extensive and diverse geographic area that varies considerably in terms of social and economic conditions. Much of the project area is rural, interspersed with urban pockets. It also contains one metropolitan municipality. The line traverses a total of six district municipalities, thirteen local municipalities and twenty towns. These are listed in Table 5.6.

The municipalities traversed by the railway line vary substantially in terms of their size, financial resources, administrative capabilities, access to social services and economic activities, as well as demographic composition.

Table 5.6

Provinces, Municipalities and Towns affected by the Transnet Freight Line

Province	Metropolitan and District Municipalities	Local Municipalities	Towns
Northern Cape	Kgalegadi District Municipality	Gamagara	Kathu (Sishen)
		Ga-segonyana	Mamathwane
	Siyanda District Municipality	Kgatelopele	Honazel
		Tsantsabane	Postmasburg
			Beeshoek
	Frances Baard District Municipality		Limeacres
			Lohathla
			Kimberley
	Pixley Ka-Seme District Municipality	Sol Plaatje	Uitso
		Dikgatlong	Noupoort
Umsobomvu		Hanover	
Eastern Cape	Chris Hani District Municipality	Ernhanjeni	De Aar
		Siyancuma	Belmont
	Cacadu District Municipality	Inxuba Yethemba	Craddock
			Rosmead
	Nelson Mandela Metropolitan Municipality	Sundays River Valley	Middelburg
		Makana	Alicedale
		Blue Crane Route	Cookhouse
		N/A	Port Elizabeth (and Coega)

The following Section sketches the socio-economic profile of the project area at a provincial and district municipality level. The section covers, *inter alia*, population levels, distribution and densities as well as ethnicity and language. It also reports on employment, poverty level as well as social infrastructure and services. The information is presented as per the geographic areas through which the railway line passes, namely:

- The Northern Cape and its district municipalities (see Table 5.6); and
- The Eastern Cape and its district municipalities (see Table 5.6).

Please note that racial categories used in this section, namely Black, White, Indian and Coloured, follow those used by Government.

5.3.1 Provincial Level

Northern Cape

The vast and arid Northern Cape is South Africa's largest province, with a total area of 372,889 km², nearly a third of the country's land area. The province is home to just four percent of the country's population resulting in an extremely low population density of three people/km² (Department of Economic Development, 2007).

Despite the rural nature of the area, 70 percent of households are in urban areas which include small towns and secondary cities (Pauw, 2005b). Kimberley is the largest urban area and Upington is the second largest. The Northern Cape has a young population with 58 percent of the population

younger than 30 years. The gender split in the Northern Cape is fairly even with 51 percent females and 49 percent males (Department of Human and Social Development, 2008). Over the past five years, there has been a trend of migration out of the province, whereby people in the 20 - 24 year age group are leaving the province in order to move to the Western Cape, North West, Gauteng and the Free State (Department of Economic Development, 2007).

In the Northern Cape, about 68 percent of the population speak Afrikaans, with other languages being Setswana, isiXhosa and English. The province has a rich San cultural heritage, with the San people living in the Kalahari area.

The Northern Cape lies to the south of the Orange River, which feeds the agriculture and alluvial diamond industries. The Northern Cape Province is the smallest contributor to the national economy, contributing only two percent to the Gross National Product. This contribution should, however, be seen in the context of it comprising a total of four percent of the country's population. In terms of income per capita, the province ranks third after Gauteng and the Western Cape (Pauw, 2005b). The 2007 estimate of the national growth rate is five percent (CIA, 2008). The Northern Cape has the lowest economic growth rate among South Africa's provinces at 3.1 percent (SAIRR, 2008).

The province is constrained by climatic extremes, limited water resources and the vast land mass that must be covered to effect efficient service delivery. These challenges influence the development of the socio-economic environment (Department of Economic Development, 2007).

The province is under-developed with an economy that relies heavily on primary production in the mining and agriculture sectors (Department of Economic Development, 2007). The provincial economy's dependence on the primary sector makes it vulnerable to factors like the strength of the rand and climatic conditions such as drought. Mining is the largest contributor to the regional gross domestic product; however, agriculture is the largest sector in terms of employment (Department of Economic Development, 2007).

The province is affected by high poverty rates (45 percent in 2001), inequalities in the distribution between race groups and high unemployment (Pauw, 2005b). The unemployment rate of 26 percent is higher than the national rate of 23 percent (Stats SA, 2007b). The dependency on social grants for the Northern Cape (14.8 percent) is marginally higher than the national average of 14 percent. Dependence on social grants has increased from 9.7 percent in 2002 to 14.8 percent in 2007 (Stats SA, 2007a). The labour dependence for the Northern Cape is 1.6 which is below the national of 1.9 (Health Systems Trust, www.hst.org.za). The labour dependence is defined as the number of people supported by every member of the labour force (age 15 - 55) excluding him or herself.

With respect to health, the biggest challenges are malnutrition, foetal alcohol syndrome, tuberculosis, chronic diseases such as hypertension, and HIV/

Aids. The HIV prevalence rate is 18.5 percent in the province (Department of Economic Development, 2007). The mortality profile of the Northern Cape shows that 51 percent of deaths are attributed to non-communicable diseases, particularly cardio vascular disease. Twenty-three percent of deaths are attributed to communicable diseases and malnutrition, 14 percent to HIV / Aids and 11 percent to injuries. The prevalence of HIV is higher in women than men, with the number of female deaths at 16 percent compared to 14 percent in males. The percentage of deaths as a result of injuries is more than double in the case of males as compared to females (Bradshaw *et. al.*, 2004).

More than 90 percent of the population have access to piped water albeit within a proximity of 200 m of their homes. Approximately 30 percent of the population depend on ground water resources of variable quality (Portfolio Committee on Water Affairs and Forestry, 2005). According to the census 2001 data, the sanitation backlogs in the Northern Cape are most significant in the Kgalagadi and Frances Baard District Municipalities. Nearly 41 percent of the province's population do not have access to flushing toilets (Department of Economic Development, 2007).

Eastern Cape

The Eastern Cape Province has a total land area of 168,966 km², which represents approximately 14 percent of South Africa's land area, making it South Africa's second-largest province after the Northern Cape. There are approximately 6.9 million people living in the province, constituting nearly 15 percent of the country's total population. Outside of the major cities, the Eastern Cape is largely rural and agricultural in nature with an approximate population density of 41 people / km².

The Eastern Cape has a female dominated population where 54 percent are female and 46 percent are male. An average of 39 percent of the population is younger than 15 years which is an indication of young dependency.

The province is dominated by the Black population group (87.5 percent) followed by Coloured (7 percent) (Department of Social Development, 2008). The majority of the people in the Eastern Cape Province speak isiXhosa (81 percent), followed by Afrikaans and English.

Even though the Eastern Cape is the hub of South Africa's motor industry and has extensive areas of fertile land, it remains one of the country's poorer provinces. The Eastern Cape comprises 14 percent of the national population, and contributes approximately eight percent to South Africa's national economy. In the most recent period, its economy has grown at a rate of 5 percent (South African Institute of Race Relations, 2008). The new port development at Coega (the Port of Ngqura) is expected to contribute significantly to the local and provincial economy

(<http://www.southafrica.info/geography/eastern-cape.html>).

The sector contribution to the Gross Geographic Product (GGP) is as follows:

- Agriculture (7 percent);
 - Mining (0.05 percent);
 - Manufacturing (21 percent);
 - Electricity (2 percent);
 - Construction (3 percent);
 - Finance (14 percent);
 - Trade (14 percent);
 - Community services (31 percent); and
 - Transport (9 percent).
- (http://www.socdev.gov.za/statistics/key_performance_indicators_pdfs/br_wmnet_indicators/gross_geographic_product.pdf).

The Eastern Cape is one of the poorest provinces in South Africa. The biggest employer is the public/ government (46) sector which employs 26 percent of the workforce. The unemployment rate is 55 percent and the percentage of the population living below the poverty line is 67 percent (Department of Social Development, 2008). The Eastern Cape Department of Social Development reports that only 18 percent of the workforce is employed in the formal sector. According to the General Household Survey, the Eastern Cape is the province with the highest dependence on social grants (19 percent). The rate of growth in social grant dependency is also the highest of all provinces, increasing from 5.5 percent in 2002 to 19.1 percent in 2007 (Stats SA, 2007a). The Eastern Cape also has the second highest labour dependency (71) (3.7 percent) after the Limpopo Province (4.8 percent) compared to the national average of 1.9 percent (Health Systems Trust,

<http://www.lists.org.za/real/thisists22/dahb>).

As in the case of the Northern Cape, cardio vascular disease is the primary non-communicable disease. The prevalence of HIV in the Eastern Cape is 29 percent, which is the same as the national average (Department of Health, 2007). HIV / Aids is the main cause of death in the province. The mortality profile of the Eastern Cape shows that 43 percent of deaths are attributed to non-communicable deaths. Twenty percent of deaths are HIV / Aids related, with more women (23 percent) dying of HIV / Aids than men (17 percent) (18). Deaths caused by communicable diseases are also higher than the Northern Cape at 27 percent (Bradshaw *et. al.*, 2004).

Only 62 percent of households have access to piped water in the Eastern Cape and 31 percent of households do not have access to toilets (Department of Social Development, 2008).

(16) The public/ government sector forms part of the community service sector above.

(17) Labour dependency is defined as the number of people supported by every member of the labour force excluding him/herself.

(18) The percentage of female and male deaths provided is a percentage of deaths of all female and male deaths.

*District Municipality (19) Level - Northern Cape**Kgalagadi District Municipality*

The Kgalagadi District Municipality is located in the Northern Cape Province and borders Botswana. Before March 2006 the area was a cross-border municipal area which straddled the Northern Cape and North West provinces. Following the re-demarcation of the provincial borders, the entire Kgalagadi municipal area is now located in the Northern Cape Province.

The District Municipality consists of three local municipalities, namely the Ga-Segonyana, Gamagara, and Moshaweng Municipalities. The Transnet Railway Line will traverse the Camagara and Ga-Segonyana local municipalities.

There are a total of 176,909 people living in the District Municipality, which is approximately 23,612km² in size, equating to a population density of approximately seven people/ km². The population is young with 66 percent being below the age of 30 years and only five percent being over the age of 65 years. Females represent 53 percent of the population.

In the Kgalagadi District Municipality, the majority of the population are Black (88 percent), with the next largest race group being Coloured (7 percent). Setswana is the first language of 84 percent of the population.

The affected area is sparsely populated and consists mainly of commercial farms and mining activities (Atkins & Marais, 2007). The District Municipality contributes 24 percent to the provincial gross domestic product (MEC for Finance and Economic Affairs, 2006). Key economic sectors in order of prominence are mining, social services, agriculture, trade/ tourism, manufacturing and construction. Despite mining being the most important economic sector it only employs two percent of the local population (Atkins & Marais, 2007).

The majority of people living in the Kgalagadi District Municipality (76 percent) have no income at all, with 16 percent earning between R400 and R800 per month (Stats SA, 2001). There is a high dependence on income earners in the District Municipality, as over 75 percent of the population are either unemployed or not economically active (Atkins & Marais, 2007).

Water and sanitation services in the Kgalagadi District Municipality are inadequate. Regarding access to water, 78 percent of households have a supply of water within 200m of their homes. A total of 14 percent of the households have water in their home or yard, while 36 percent of the

(19) A district municipality is a category of municipality envisaged in section 155(1) (g) of the Constitution of South Africa. In the constitution it is defined as a local authority that has municipal executive and legislative authority in an area that has more than one municipality (RSA Constitution, 1996).

households access water at a local school (Portfolio Committee on Water Affairs and Forestry, 2005).

Only 20 percent of households have flush toilets, 37 percent of the households make use of pit latrines without ventilation, while 22 percent of households do not have access to sanitation facilities (Portfolio Committee on Water Affairs and Forestry, 2005).

Refuse removal services of the Kgalagadi District Municipality are not available to the majority of households (67 percent), who make use of informal refuse dumps.

In the Kgalagadi District Municipality, HIV/ Aids is one of the major problems as is the high level of alcohol abuse.

Siyanda District Municipality

The Siyanda District Municipality covers an area of more than 100,000km² (almost 30 percent of the entire province) of which 65,000km² comprises the vast Kalahari Desert, Kgalagadi Trans-frontier Park and the former Bushman Land. The area is populated by roughly 200,000 people, giving it a population density of about 1.7 people/km² (Pauw, 2005a). There are more females (52 percent) in the District Municipality than males. As with the other District Municipalities, the population is young, with nearly 60 percent being below the age of 30 years and five percent over the age of 65 years (Stats SA, 2001).

The District Municipality comprises six local municipalities, namely Mier, Kai Garieb, Khara Hais, Tsantsabane, Kheis and Kgatelopele. Of these, the Transnet Railway Line traverses Kgatelopele and Tsantsabane. Upington is the district municipal capital and the seat of the municipal government.

The racial breakdown of the Siyanda District Municipality reflects that of the province. A total of 64 percent of the population are classified as Coloured, 24 percent are Black and the remaining 12 percent are White and Indian/ Asian. Afrikaans is the first language of 82 percent of the population followed by Setswana (14 percent).

The area is characterised by extensive livestock farming in the arid areas, as well as intensive irrigation farming along the Orange River. The area aims to become a major exporter of grapes and raisins. Diamonds, iron, lime and salt are mined in the eastern parts of the District Municipality and are major contributors to the District Municipality's economy. Tourism is also a growing sector due to the various national parks located within the District Municipality (Atkins & Marais, 2007).

The Siyanda District Municipality contributes approximately 13 percent to the provincial gross domestic product. Agriculture is the highest contributor to the primary sector (MEC for Finance and Economic Affairs, 2006).

In the Siyanda District Municipality, there is a high dependence on the economically active population, given that 55 percent of the population are either unemployed or not economically active. The majority of the population do not earn any income and 27 percent earn a monthly personal income of between R0 -R800 (Stats SA, 2001).

In the District Municipality the greatest social problems are illiteracy and poverty. The number of households living in poverty is 40.5 percent, this is below the provincial average of 42 percent (Atkins & Marais, 2007).

The largest employment sector in Siyanda District Municipality is agriculture (42 percent) (20) followed by the community and social services sector (13 percent). The construction and mining sector include relatively small work forces of 3.6 percent and 3.3 percent workers respectively (Atkins & Marais, 2007). There is a trend of inward migration of seasonal workers from the North West province, who work on irrigation farms along the Orange River. As a result the Black population has increased from 44,600 in 1996 to 51,300 in 2001 (Atkins & Marais, 2007).

Electricity is the most common energy source used by 61 percent of households, followed by wood which is used by 28 percent of households. A total of 90 percent of households in the towns and settlements of the Siyanda District Municipality have access to a supply of water (Atkins & Marais, 2007). Only 40 percent of the population have access to piped water in their homes or on their plots, while 31 percent of households access water at the local school. A total of 2,539 households that are located on farms, however, are without access to water.

A total of four percent of households in towns and settlements within the Siyanda District Municipality are without sanitation facilities and by 2010 it is expected that another 4,328 households will be established that require services. Another three percent of households on farms are without basic sanitation, with a further 1,302 households being expected to be established by 2010 that would require services which will exacerbate the sanitation provision backlog (Atkins & Marais, 2007).

Frances Baard District Municipality

The Frances Baard District Municipality has a total area of approximately 12,384 km² and accounts for three percent of the total geographic area of the Northern Cape Province, making it the smallest District Municipality in the province.

The District Municipality consists of four local municipalities, namely Sol Plaatje, Magareng, Dikgatong, Phokwane and a District Management Area

(20) The percentages relating to employment relative to the portion of the population that is employed and not the population of the district

(DMA). The Transnet Railway Line will traverse Sol Plaatje and Dikgatong local municipalities.

The District Municipality has a population of about 324,800 people (Stats SA, 2001) which is about 40 percent of the provincial population, giving it the highest population density in the province of 26 people/km² (Frances Baard District Municipality 2005/06 IDP). About 62 percent of the population of the Frances Baard District Municipality live in the Sol Plaatje local municipality, which is highly urbanised. More than half of the District Municipality's population are female (52 percent). Approximately 56 percent of the population are below the age of 30 years, making it a young population. Only five percent are over the age of 65 years.

Unlike other District Municipalities in the province, the population of the Frances Baard District Municipality is dominated by Black people (61 percent), 27 percent are Coloured and 12 percent are White. Setswana is the dominant home language closely followed by Afrikaans. IsiXhosa followed by English are the next two most common home languages (21) (Municipal Demarcation Board, 2006).

The Frances Baard District Municipality is isolated from the national spatial economy due to poor transport linkages. The key economic activities in the District Municipality are agriculture and mining. Mining is the highest contributor to the primary sector in Frances Baard District Municipality (MEC for Finance and Economic Affairs, 2006). The District Municipality contributes approximately 41 percent to the provincial gross domestic product. Sol Plaatje municipality is the economic engine of Frances Baard District Municipality as it contributes about 75 percent of the economic activities of the District Municipality.

The Frances Baard District Municipality suffers from high levels of unemployment (41 percent) and low wages for those who are employed. It is estimated that about 81 percent of those who are employed earn less than R3,200 per month (Stats SA, 2001).

About 78 percent of the Frances Baard District Municipality population use electricity as their main source of domestic energy, while 17 percent use candles and four percent use paraffin for lighting purposes.

Water and sanitation provision in the Frances Baard District Municipality is good with the majority of households having access to these facilities. According to the 2005 census 85 percent had access to water and 90 percent access to adequate sanitation (Portfolio Committee on Water Affairs and Forestry, 2005).

(21) The Municipal Demarcation Board reports figures based on 2001 Census data and reports figures in actual number as opposed to percentages. The figures are Setswana (142286), Afrikaans (186913), IsiXhosa (17107) and English (16102).

The population of the Frances Baard District Municipality suffers from low levels of education. It is estimated that about 42 percent of those aged 20 years and above have had no schooling or have only completed primary school, while only 25 percent have attained grade ten or above. This existing poor education standard has given rise to high levels of unskilled labour in the labour market.

Pixley Ka-Seme District Municipality

The Pixley Ka-Seme District Municipality is predominantly rural in character with a total population of 164,603 people, equating to 16 percent of the provincial population. The District Municipality is sparsely populated, with a population density of 1.6 people/km². There are approximately 41,135 households with an average of four people per house. The total population decreased from 176,283 in 1996 to 164,620 in 2001 largely as a result of migration out of the District Municipality in search of employment opportunities (Atkins & Marais, 2005). There are more women (53 percent) than men in the District Municipality. The population is young with approximately 58 percent of the population being below the age of 30 years and 6 percent over the age of 65 years.

The District Municipality consists of nine local municipalities of which the Transnet railway line will traverse, namely the Umsobomvu, Emthanjeni and Siyancuma Local Municipalities.

As with the majority of District Municipalities in the Northern Cape, the majority of the population in the Pixley Ka-Seme District Municipality are classified as Coloured (62 percent), 27 percent are Black and 10 percent are White. The majority (78 percent) of the population speak Afrikaans as a first language (Stats SA, 2001).

The Pixley Ka-Seme District Municipality contributes only 10 percent to the total gross geographic product of the Northern Cape Province and is currently the poorest of the five municipal districts in the province. The key economic sectors in order of prominence are agriculture, community services, trade/tourism, construction and private households. The towns primarily function as agricultural service centres. The District Municipality is the largest wool producing area in the country and has a long history of sheep farming. There is a growing trend towards game farming, resulting in further job losses in the agricultural sector (Atkins & Marais, 2007).

Unemployment in the Pixley Ka-Seme District Municipality is 37 percent, the highest in the Northern Cape Province. In 2001, 42 percent of households in the Pixley Ka-Seme District Municipality were living below the poverty line (Atkins & Marais, 2007). Poverty levels are said to have worsened after the scaling down of railway transportation and freight utilisation by government and the private sector (Mine Dipuo Peters, 2006). De Aar is an example of a town that has suffered as a result of the decline in rail transport with widespread unemployment. According to the Pixley Ka Seme District Growth

and Development Strategy the revitalisation of De Aar as a railway hub is being considered as a new economic initiative (Atkins & Marais, 2007).

More than 75 percent of households in the Pixley Ka-Seme District Municipality have access to electricity. This high average is not experienced evenly throughout the District Municipality. There has been an increase in the use of electricity as an energy source and a decrease in the use of paraffin, gas and candles.

The level of water service provision throughout the Pixley Ka-Seme District Municipality is high, with 97 percent of all households in the District Municipality having access to water services. Sanitation service provision is poor, with only 57 percent of the District Municipality's households having adequate sanitation services. The shortfall in sanitation services in this District Municipality alone accounts for nearly 31 percent of the provincial backlog.

In terms of housing, 83 percent of the Pixley Ka-Seme District Municipality live in formal housing, 11 percent in informal housing and only 2 percent in traditional housing (Pixley Ka-Seme reviewed IDP, 2005). More than 70 percent of households in the Pixley Ka-Seme District Municipality receive refuse removal services.

District Municipality Level - Eastern Cape

Chris Hani District Municipality

The Chris Hani District Municipality is in the heart of the Eastern Cape, a linking node to all the regions in the Province. It is largely rural and has pockets of urban zones. It comprises eight local municipalities and also includes the Mountain Zebra National Park. The Transnet Railway Line will traverse the Inxuba Local Municipality.

There are approximately 798,597 people living in the Chris Hani District Municipality in 203,041 households (Stats SA, 2008). The land area is 36,963 km², making for a population density of 22 people/km². Approximately 71 percent of the population reside in rural areas. The population is relatively young with 54 percent of the population under the age of 20 years. More than half of the population is female (54 percent). The population of the Chris Hani District Municipality is predominantly Black (94 percent) and 93 percent isiXhosa-speaking.

The Chris Hani District Municipality contributes 0.4 percent towards the national gross domestic product. Key economic sectors in the District Municipality are agriculture, community services, construction and trade. The transport sector achieved a growth rate of 4.3 percent between 1996 and 2005.

The population of economically active age (15-65 years) comprise approximately 54 percent of the population. Unemployment in the District

Municipality is 60 percent, which is higher than the provincial level. The Chris Hani District Municipality's average per capita income (R10,220 per annum/R852 per month) falls below the average for the province. The District Municipality has the second highest dependence on social welfare grants. The level and depth of poverty in the District Municipality is considerable, with 77 percent of the population being adjudged to be living in poverty (European Consultants Organisation, date unknown).

It is estimated that currently 73 percent of the total population of the Chris Hani District Municipality has access to water services, whilst only 55 percent receive sanitation services.

The number of clinics in the Chris Hani District Municipality provides for a ratio which is higher than the national norm of one clinic per 10,000 people (22). Access to health professionals is below the provincial average.

Education levels are low throughout the Chris Hani District Municipality with 30 percent of the population having had no schooling, despite the number of education professionals being higher than the provincial average (Akhins & Marais, 2007). The majority of Chris Hani residents are functionally illiterate. This results in a high number of uneducated people entering the workforce thereby increasing the size of the unskilled labour market.

Cacadu District Municipality

The Cacadu District Municipality is the largest of the six district municipalities in the Eastern Cape Province with a land area of 58,243 km². A relatively large part of the District Municipality consists of national parks, namely the Addo National Elephant Park and the Tsitsikamma National Park. The Cacadu District Municipality is predominantly rural in nature and is characterised by small, scattered towns and settlements. Despite its rural nature, it is the most urbanised District Municipality in the province with 67 percent of people living in urban areas. The District Municipality consists of nine local municipalities, of which the Transnet Railway Line traverses the Makana, Sundays River Valley and Blue Crane Route municipalities.

The Cacadu District Municipality includes less than five percent of the population of the Eastern Cape Province (Stats SA, 2001). The total population is 388,206 and the population density equates to nearly seven people/ km². The average number of people per household is four.

In the Cacadu District Municipality, the Black population is the dominant race group (52 percent) followed by the Coloured population (35 percent). The language spoken as a first language in the District Municipality follows the pattern for race groups in the District Municipality with isiXhosa being the first language of the majority of the population, followed by Afrikaans and a

(22) The quality of these clinics is not presented in the secondary data sources.

minority of the population speaking English as a first language (23) (Municipal Demarcation Board, 2006).

Agriculture is one of the key drivers of the economy in the Cacadu District Municipality as it contributes nearly 40 percent of the Eastern Cape's agricultural output (Akhins & Marais, 2007). It has an export based economy largely tied to agriculture. Farm output is transported to Port Elizabeth for processing and/or export. There has been some diversification of farming into tourism activities through, for example, game farming and hunting. The rate of economic growth between 1996 and 2002 was 2.4 percent, second only in the province to the Nelson Mandela Metropolitan Municipality (3.7 percent) (Akhins & Marais, 2007).

The largest proportion of the population in the Cacadu District Municipality is employed in the agriculture sector. The District Municipality has the lowest rate of unemployment (35 percent), poverty (46 percent) and of dependency in the province (European Consultants Organisation, date unknown). Less than one quarter (22 percent) of households in the Cacadu District Municipality live on less than R1,000 per month. Notwithstanding this, the average per capita income (R18,810 per annum/R1,568 per month) is the highest in the province, second only to the Metro.

A large proportion of the population (25 percent) has only some primary education. Another 15 percent of the population has no schooling. This translates into 60,570 people who do not have basic literacy. Functional literacy (60 percent) within the Cacadu District Municipality is below the Eastern Cape provincial average. Despite this, the percentage of the population that have completed matric (22 percent) is higher than that of the Eastern Cape (20 percent) (Akhins & Marais, 2007).

The Cacadu District Municipality depends predominantly on ground water for both human consumption and agricultural activity. The Cacadu District Municipality falls within what is known as the 'drought corridor' (24) (Usman and Reeson, 2004). This region is infamous for its sporadic droughts and water is generally scarce. The low level of local rainfall results in sporadic droughts consequently drying up supply boreholes to towns and villages. The number of households with water on site (85 percent) is almost double the Eastern Cape provincial average. A high number of households are connected to a water-borne sewerage system (68 percent), although a significant number (15 percent) are still dependent on the bucket system.

Electricity is the most common form of energy used in the Cacadu District Municipality, although wood and paraffin are still used relatively widely.

(23) The Municipal Demarcation Board reports figures based on 2001 Census data. It reports this figure as actual numbers as opposed to percentages. The figures are isiXhosa (189,941), Afrikaans (174,909) and English (20,856).

(24) The drought corridor extends across the Southern African region. This region extends from 20 degrees to 25 degrees south and is typically a summer rainfall region, but the region often experiences half or more of the summer season as a dry spell.

In the Cacadu District Municipality, 68 percent of the population have their waste collected once a week.

Access to health professionals and health services in the Cacadu DM is below the Eastern Cape provincial average.

Nelson Mandela Metropolitan Municipality

The Nelson Mandela Metropolitan Municipality (NMMMM) is the only metropolitan municipality in the Eastern Cape Province and is home to Port Elizabeth. The NMMMM was established in 2000 and covers an area of 1,845 km². The total population of the municipality is approximately 1.5 million people with a population density of 813 people/ km². The average household size is just less than four people, although approximately 16 percent of all households are occupied by single persons.

The majority of the population of the NMMMM are classified as Black (59 percent), while 24 percent are classified as Coloured. The remaining population are White and Indian/ Asian. Fifty eight percent of the population speak isiXhosa as their first language followed by Afrikaans (30 percent) and English (12 percent).

NMMMM is the economic powerhouse of the Eastern Cape Province, contributing 44 percent to the provincial gross geographic product. The economy of the municipality is based on strong manufacturing (notably automotive), agricultural and tourism sectors. As the hub of automotive manufacturing in South Africa it accounts for 50 percent of the local manufacturing sector.

The unemployment rate in the NMMMM is high with approximately 45 percent of the population being unemployed. It is understood that the prospect of finding work in the metropolitan area attracts in-migration of unskilled workers into the surrounding area, driving up unemployment rates in the NMMMM (Pauw, 2005a).

The level of service and infrastructure provision in the NMMMM is high as the majority of households have access to basic services, such as the provision of water and sanitation, electricity and refuse removal. Statistics illustrating this are outlined below (NMMMM IDP, 2008/09):

- 93 percent of households have access to a basic level of water, the remaining households have access to potable water through standpipes;
- 91 percent of households have access to a basic level of sanitation, with the bucket system having been eliminated in all formal areas;
- 99.8 percent of households have access to a basic level of solid waste removal; and

- 98 percent of households in formally demarcated municipal residential areas have access to a basic level of electricity.

5.4 LAND ISSUES RELATED TO THE PROJECT

5.4.1 Land use

The predominant land use activities in the Northern Cape are mining, livestock and game farming and agriculture (Department of Environmental Affairs and Tourism, 2004a). The Eastern Cape land use activities are predominantly forestry, agriculture as well as sheep and cattle farming (Department of Environmental Affairs and Tourism, 2004b).

The Eastern Cape has been selected as the site for the national pilot project for the implementation of bio-fuels through mass planting of canola.

5.4.2 Land ownership

Land ownership is an indicator of land tenure reform. Almost all the land in the Northern Cape is privately owned. In the past, state agricultural land has been made available to emerging commercial farmers, in the form of leasing, outright sale and access to grazing land. More recently the Northern Cape launched the Land Redistribution for Agricultural Development (LRAD) programme which is designed to reduce rural poverty by helping previously disadvantaged people to manage their own farms effectively (Department of Environmental Affairs and Tourism, 2004a). The Eastern Cape has 66.5 percent of the land under private ownership and 29.5 percent under communal (25) ownership. The state owns four percent of the land (Department of Environmental Affairs, 2004b).

5.4.3 Land Claims

This section provides an overview of land claims in the two provinces which the line traverses. It starts off with a national overview of progress made with settling land claims and some of the difficulties relating to settling outstanding claims. This is followed by progress made which is specific to the Northern Cape and Eastern Cape provinces respectively, highlighting some of the claims that have been finalised in the 2007/2008 financial year.

According to the Commission on Land Rights, 95 percent (74,747 claims) of all land claims lodged with the Commission have been settled. A total of 432,226 hectares of land were delivered to restitution beneficiaries during the 2007/2008 financial year, which has brought the total land restored to 2,078,385 hectares since 1995. There are still 4,900 claims outstanding nationally, and these claims are complex with numerous challenges including:

(25) Under communal ownership, individuals have no right to sell or own the land, so the land is ultimately owned by the state (Department of Environmental Affairs, 2004b).

- Claims that are still with the land claims court;
- Disputes involving communities as well as traditional leaders on jurisdiction issues; and
- High cost of land.

It is costing more to settle fewer claims and in some instances the Commission has resorted to land expropriation to fast track claims (Mphela, 2008). To date 53 notices of possible expropriation have been served, where there have been disputes on the issue of price.

The national target is to settle between 97 percent and 98 percent of claims by March 2009. It is envisaged that the remaining two percent will be not be settled due to the challenges mentioned above. A total of R15 billion is required to settle the remaining 4,949 claims (Mphela, 2008).

In excess of 90 percent of land claims have been settled in the Northern Cape, with only 218 claims outstanding. In the 2007/2008 financial year eleven claims were settled amounting to 107,552ha, benefiting 1,599 households.

There are 555 claims outstanding in the Eastern Cape. This could potentially have an impact on the project as the loop sites are located in this province. Given the number of claims that still have to be settled, the probability of the additional land needed being subject to a claim is higher than in the Northern Cape. The 2007/2008 financial year saw the settlement of 45 claims in rural areas, benefiting 8391 households.

5.4.4

Land acquisition process

The issue of land acquisition may impact the project if additional land is required for the construction and extension of the loops. It is currently unclear if additional land outside of the rail reserve will be required for the Project. This will become clearer once the boundary of the rail reserve at the loop sites has been surveyed.

With respect to the land acquisition process, Transnet has committed to the following Servitude and Land Acquisition Principles when undertaking an acquisition bid:

- Servitude acquisition will, as far as possible, be based on negotiations with landowners and an amicable agreement being reached. Expropriation shall not be used unless all other reasonable avenues have been exhausted.
- The calculation of compensation shall follow recognised international practice. A professional valuer shall be appointed to compile an evaluation of the land lost, based on the prevailing market conditions (i.e. recent sales).

5.4.5

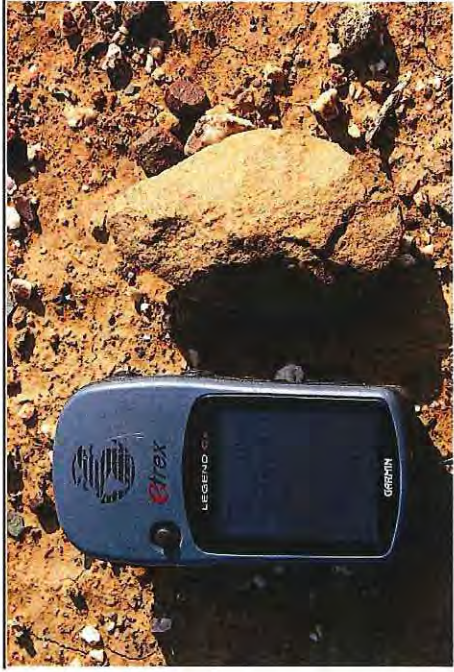
Historical, Cultural and Archaeological Aspects

A review of topographic, aerial and GIS maps as well as field observations revealed that the majority of sites for proposed upgrade, refurbishment or development are not associated with any significant historical, cultural and archaeological phenomena.

Most sites are heavily impacted and disturbed by current railway activities as well as agricultural and residential activities at certain sites. As such, cultural artefacts are rare. However, middle and late Stone Age artefacts (*Figure 5.8*) have been noted at a number of sites (Konnadagga, KDC011 near Klipfontein and KDC 003 near Wilpups on the Kimberley-De Aar Section) and there is a possibility that similar artefacts may be found during the construction process. For more detailed discussion see the specialist report in *Volume 2* of the Final EIR.

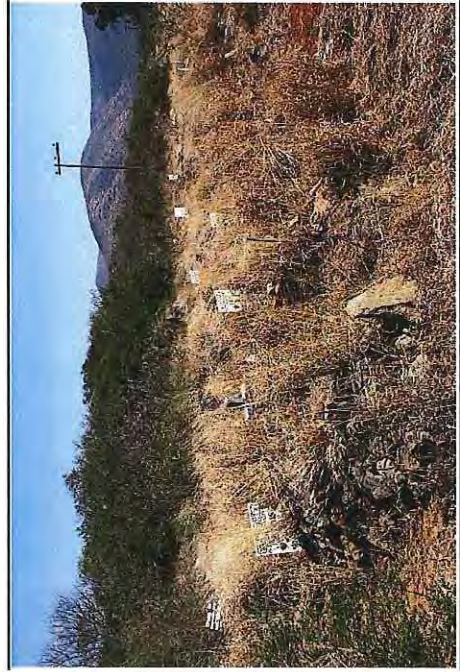
- The evaluation is based on the following principles:
 - 100% compensation for the servitude area based on the strip valuation on registration of the servitude.
 - Interest per annum on the consideration from the date of occupation (construction) to the date of registration.
 - 100% compensation for crop and other Infrastructure damage.
- The Expropriation Act 63 of 1975 provides for a solatium on both the value of the property and actual financial loss. The solatium to a maximum value of R55 000 shall be added to the compensation as follows:
 - 10% of total consideration amount, if the consideration amount does not exceed R100 000; plus
 - 5% of the consideration amount by which it exceeds R100 000, if the consideration amount does not exceed R500 000; plus
 - 3% of the consideration amount by which it exceeds R500 000, if the consideration amount does not exceed R1 million; plus
 - 1% (but not amounting to more than R10 000) of the consideration amount which it exceeds R1 000 000).
- Disagreements about valuations shall be settled, where possible, with the landowner through discussions between the owner and the independent valuer.

Figure 5.8 Middle to late stone age artefact found near the Kommadagga loop site



A number of important battlefields and associated gravesites occur adjacent to the line, particularly between Kimberly and De Aar in the Northern Cape. These areas occur outside of the railway reserve and none have been identified close to the proposed upgrade, refurbishment or development sites. However, the communal cemetery near the Klipfontein loop site is situated within the reserve (Figure 5.9).

Figure 5.9 Cemetery near Klipfontein loop site



It is understood that some of the Transnet station buildings (Figure 5.11) may be older than 60 years old and would, therefore, have some potential historical significance. None of these historic buildings, if present, will be damaged or altered in any way during the project. However, should any of these buildings be affected, the relevant heritage authorities will be consulted.

Figure 5.10 Abandoned station building at Golden Valley, Eastern Cape



6.1

INTRODUCTION

The undertaking of a public participation or stakeholder engagement process, as part of an EIA, is a legal requirement in terms of R385 of the EIA Regulations of 21 April 2006.

The purpose of the stakeholder engagement process for this EIA was to:

- Share information about the Project and the EIA process with potentially interested or affected stakeholders;
- Obtain stakeholder feedback on issues, concerns and opportunities;
- Respond to stakeholder queries about the potential impacts and benefits of the Project;
- Provide stakeholders with updates on the progress of the EIA; and
- Inform stakeholders of their rights in terms of the EIA process.

Stakeholders include neighbouring landowners (e.g. landowners adjacent to the entire railway line between Houtazel and the Port of Ngqura and other Project sites along the railway line); authorities (local, provincial and national); Non-Governmental and Community Based Organisations; and other interested groups or individuals.

6.2

STAKEHOLDER ENGAGEMENT DURING SCOPING

The following activities were undertaken during the Scoping phase:

- A stakeholder database was compiled from information in existing databases, from information provided by municipalities, from internet searches, from property title deeds, from responses to various Project notifications and from stakeholder attendance at public meetings. The database was updated throughout the EIA process. There is currently close to 600 stakeholders on the database.
- A Background Information Document (BID) was distributed to stakeholders in English, Afrikaans, isiXhosa and Seswana throughout the EIA process. The BID was also placed on the Project website (www.etrn.com/Transneteia). The purpose of the BID was to convey accessible information on this Project to potential stakeholders and allow them the opportunity to comment on the proposed Project and the EIA

process. The BID also invited potential stakeholders to register their interest in the Project.

- The Project was advertised in seven local newspapers and two regional newspapers between the end of July and September 2008. Advertisements were placed in English, Afrikaans and isiXhosa. These adverts informed the public of the Project and requested them to register as Interested and Affected Parties (I&APs) if they would like to participate in the EIA process. Respondents to the advert were included on the project database. The adverts also invited stakeholders to attend various public meetings.
- Site notices were placed at strategic locations (such as municipal offices, libraries and post offices) in 16 towns within or in proximity to the project area. The notices provided information about the Project, the contact details of the consultant and details of the public meetings.
- Eight public meetings were held at various locations within the project area. Each public meeting started with an open house exhibit for the attendees to view various posters and to interact with the project team on a one-on-one basis, followed by a formal public meeting including a more detailed presentation on the Project and then a question and answer session (see *Figure 6.1* and *Figure 6.2*). The meetings provided stakeholders with an opportunity to raise any issues or concerns regarding the Project proposal.

The location of the public meetings and number of attendees is summarised in *Table 6.1*.

Figure 6.1 Public meeting in Greenpoint, Kimberley



Figure 6.2 Public meeting in Cookhouse



Table 6.1

Summary of public meetings held

Town	Date	Address	No. of attendees
Eastern Cape Paterson	25 August 2008	Eastern Cape Agricultural Co-op Hall, Buchinar Street	15 registered
Cookhouse	26 August 2008	Town Hall, 6 Main Street	120 registered. Estimate 200+ present
Cradock	27 August 2008	Cradock High School, Elize Coetzee Hall, Naested Street	4 registered
Middleburg	28 August 2008	Town Hall, Market Street	75 registered
Northern Cape			
De Aar	29 August 2008	Multipurpose Centre, Malai Camp	7 registered
Greenpoint, Kimberley	10 September 2008	Greenpoint High School, Redwood Street	84 registered
Beaconsfield, Kimberley	11 September 2008	Dutloepsan Primary School, Corner Central & Hercules Street	4 registered
Hotazel	22 September 2008	Hotazel Recreation Complex, Kupferburger Circle, Hotazel	4 registered

- Throughout the EIA process to date, issues, concerns and opportunities raised by public and authority stakeholders, that were communicated to ERM, have been recorded and compiled into an Issues and Response Report.
- A Draft Scoping Report (DSR) was released for a 30-day public review period from 6 October to 7 November 2008. A notification letter, together with a copy of the DSR non-technical summary was sent to stakeholders on the database, to inform them of the availability of the DSR for comment and where the report could be viewed. The report was placed on the Project website and hardcopies were lodged at the following public libraries:
 - Port Elizabeth Main Library
 - Paterson Public Library
 - Kirkwood Public Library
 - Cookhouse Public Library
 - Cradock Public Library
 - Middelburg Public Library
 - Hanover Public Library
 - De Aar Public Library
 - Beaconsfield Public Library
 - Kimberley Public Library
 - Hotazel Public Library
- Six written comments were received within the commenting period on the DSR. These comments were compiled into a comments and responses table, which was included in the Final Scoping Report and also distributed

to those stakeholders who had provided comment. The Final Scoping Report was also placed on the Project website.

- A Draft Environmental Impact Report (EIR) was released for a 30-day public review period from 26 May to 25 June 2009. A notification letter, was sent to stakeholders on the database, to inform them of the availability of the EIR for comment and where the report could be viewed. The report was placed on the Project website and hardcopies were lodged at the following public libraries:

• Port Elizabeth Main Library	• Hanover Public Library
• Paterson Public Library	• De Aar Public Library
• Kirkwood Public Library	• Beaconsfield Public Library
• Cookhouse Public Library	• Kimberley Public Library
• Cradock Public Library	• Holazel Public Library
• Middelburg Public Library	• Addo Library

- Two written comments were received within the commenting period on the Draft EIR. These comments were compiled into a comments and responses table, which has included in the Final EIR and also distributed to those stakeholders who had provided comment.

- All registered stakeholders were notified of the submission of the Final EIR, which was placed on the Project website. The Executive Summary was made available both in English and Afrikaans.

Table 6.2 below contains a high level summary of the issues raised by stakeholders to date.

Table 6.2 Summary of issues raised by ISAPs

Broad categories	Issues raised
Socio-economic considerations	How and when the recruitment process will be rolled out. Fairness of the tender process and the real opportunities for local labourers and smaller, local operators. Whether Transnet's primary contractor will use local subcontractors. Nature of employment, skill levels and numbers to be employed. Position of former Transnet employees with respect to getting guaranteed employment on the project. Training and capacity building with respect to unskilled labour. Concern over health and safety of workers who may be exposed to manganese dust. Sanitation and management of waste at labour camps. Social ills associated with labour camps including the spread of HIV. Effect of the project on the already strained electricity supply network. Safety at railway crossings and an increase in rail accidents. Long term community benefits of the project. Benefits to local businesses. Impact of manganese dust on people living adjacent to the line. Impact of potential increases in vibration on houses adjacent to the railway line.

Broad categories Issues raised

Increased rail capacity for the transport of products from Eastern Cape, Metro and Industrial Development Zone to Gqeberha and growths of these areas.

Biophysical considerations

Assistance with beneficiation of country's mineral wealth at Coega.
Loss of biodiversity and impact on endangered animals and birds as a result of increased rail traffic and construction activities.
Impact on scarce water resources as a result of construction activities.
Local specialists and experts should be used in the process.
Possible benefits to the grain industry from increased trains along the line in terms of transporting their goods to market.
Heritage sites should be protected and local knowledge be used to identify important sites.

EIA process General

A need to look at the big picture with respect to other projects, future demands and plans along the line, such as a likely future rail terminus at Coega, the future need for an intermodal facility, rail support and maintenance facilities.
Impact of the project on the demand for road transportation alternatives
The process for land acquisition.
The linkage between the railway line and passenger transportation during the 2010 Soccer World Cup.
Possibilities for Public Private Partnerships.

Authority consultation and involvement

Authority consultation and involvement during the EIA process to date is summarised in Table 6.3 in chronological order.

Table 6.3

Summary of authority involvement

Description	Timeframe
Pre-application meeting with DEAT to confirm ERMA's approach to the EIA	1 July 2008
Submission of EIA applications to DEAT	21 July 2008
Informal meetings and discussions with various local authorities (municipalities) to discuss the public participation process	14-19 July 2008
The distribution of the BID to various local provincial and national authorities for comment	July – September 2008
Submission of copies of the EIA applications and reports to the provincial commenting authorities responsible for environmental management, namely, the Eastern Cape Department of Economic Affairs, Environment and Tourism (DEAET) and the Northern Cape Department of Tourism, Environment and Conservation (DTEC)	September 2008
Distribution of the DSR non-technical summary and copies of the DSR to various authorities for comment. This included the heads/managers of all the District and Local Municipalities within the Project area, the provincial environmental and heritage authorities, as well as the South African National Roads Agency (SANRAL)	Comment period from 6 October to 7 November 2008

7.1 INTRODUCTION

This *Chapter* should be read in conjunction with *Section 3.3* of on the EIA methodology being applied to this environmental assessment.

The sections that follow aim to firstly summarise all the biophysical and socio-economic impacts assessed for the construction and operational phases of the Project and secondly, to elaborate on the assessment of impacts judged to be of moderate or major significance (as defined in *Table 3.5 of Section 3.3*).

Although impact summary tables generally follow the detailed assessment, the scale and nature of this Project i.e. the many different components and number of sites to be assessed, warranted that the information was first condensed into a tabular format to identify which impacts were of greatest concern, before a detailed discussion was had as to why the Project Team judged these impacts as the ones of key concern (i.e. requiring the most mitigation).

It should be borne in mind that the rating of impact significance can often be somewhat subjective and to a large extent depends on the Project Teams experience of similar projects and/ or impacts and the input or opinion of specialists. As far as possible, a clear justifications for the impact ratings are, therefore, provided, both in the tables and in the descriptive sections that follows (*Sections 7.3 to 7.10*).

Mitigation measures are also provided in the descriptive section, to show how negative impacts could be reduced and positive impacts enhanced. No detailed impact description is provided for minor and negligible impacts – please refer to the Impact Summary tables for this information. As minor and negligible pre-mitigation impacts are already within acceptable levels and do, therefore, not require special mitigation measures, a number of general or best practice construction measures can be applied to further reduce/enhance these impacts. These measures are included in HMG’s Specific Environmental Specifications document provided in *Annex A1*.

7.2 IMPACT SUMMARY TABLES

The impact summary tables at the back of the report (*Tables 7.1 to 7.8*) have been grouped firstly according to Project phase (i.e. construction or operation) and then by Project component (i.e. loops, yards, substations, etc.). As the socio-economic impacts associated with the Project are broader, in that they apply to all the Project components, they have been summarised in separate tables.

A follow up meeting with DEAT to discuss the DSR, to highlight the key issues raised during the Scoping phase, to discuss the proposed approach to the EIA phase of study and to confirm the timing of the remaining EIA tasks	14 October 2008
The receipt of written comments on the DSR from SAHRA, Sol Plaatje Municipality and the Nelson Mandela Bay Municipality	October 2008
Submission of the Final Scoping Report (including Plan of Study for EIA) to DEAT	17 November 2008
DEAT approval of the Final Scoping Report (including Plan of Study for EIA) (<i>Annex A2</i>)	3 February 2009
Distribution of the EIR non-technical summary and copies of the full EIR to various authorities for comment. This included the heads/managers of all the District and Local Municipalities within the Project area, the provincial environmental and heritage authorities, as well as the South African National Roads Agency (SANRAL)	26 May 2009
Submission of Final EIR to DEAT and copies also sent to SAHRA, the Sol Plaatje Municipality and the Nelson Mandela Bay Municipality	20 July 2009

6.3

WAY FORWARD

After due consideration of the final report, DEAT will issue an Environmental Authorisation setting out their decision and the key factors that led to the decision. The authorisation may be positive (the Project has been approved) or negative (the Project has been rejected). ERM will distribute notice of the Environmental Authorisation to all registered I&APs on the project database.

The notification will include an explanation of the statutory appeal period as well as how and when stakeholders may lodge an appeal.

The tables provide the following information:

- The potential impact and a description thereof;
- The loops or other development sites to which the impact applies;
- The nature of the impact;
- Ratings for the magnitude (extent, duration and intensity) and likelihood of the impact, including justifications for the ratings;
- A rating for the significance of the impact before mitigation measures are applied (pre-mitigation); and
- The expected significance rating following the effective implementation of mitigation measures (post-mitigation or residual impacts).

Mitigation measures have been excluded from the impact summary tables in order to improve the readability of the tables and to keep them as concise as possible. The measures are, however, outlined in Sections 7.3 to 7.10 and will be linked to the EMP for the Project.

7.2.1 How to use the impact summary tables

It is suggested that the reader fold out the A3 tables at the back of the report in order to allow reading of the text in the report alongside the tables with cross reference to the table. Proceed by reading the general description of the nature of the impact and then the relevant assessment information related to that impact in the relevant row in the table. A summary is provided in the text and this is followed by the detailed description of the mitigatory measures.

7.3 CONSTRUCTION-RELATED IMPACTS

Table 7.1 Loops (construction phase impacts)

Impact	Description	Applicable Loops	Nature	Magnitude of Impact			Likelihood of impact occurring <i>N - Negligible</i> <i>L - Low</i> <i>M - Medium</i> <i>H - High</i>	Significance (Pre - Mitigation)	Significance (Post - Mitigation)
				Extent <i>O - On-site</i> <i>L - Local</i> <i>R - Regional</i> <i>N - National</i>	Duration <i>T - Temporary</i> <i>S-t - Short-term</i> <i>L-t - Long term</i> <i>P - Permanent</i>	Intensity <i>N - Negligible</i> <i>L - Low</i> <i>M - Medium</i> <i>H - High</i>			
Spread/colonisation of invasive alien species and weed taxa (Section 7.3.1)	Vegetation clearing and construction activities at the laydown areas and along drainage lines, could lead to soil disturbance, which may provide opportunities for alien plant and weed species to propagate.	All Loop sites	Negative - Indirect	O: Alien vegetation is likely to establish itself on-site.	P: Invasive alien vegetation is highly likely to remain beyond the life of the project once established.	H: Alien vegetation will affect/alter the species diversity, ecological function and landscape character permanently.	M: It is highly likely that alien invasive vegetation will establish itself as a result of suitable conditions generated by construction activities.	Minor (High magnitude, medium likelihood)	Moderate
Loss of vegetation communities Section 7.3.2)	Vegetation clearing along the rail corridor and access roads, and relocation of fences will lead to the loss of vegetation communities.	Sites of medium ecological importance include Addo, Eagles Crag, Blinkhof, Flonker and Carlton .	Negative -Direct	O: Impact will be on-site within the rail reserve	P: Even with effective rehabilitation the vegetation community will not return to its original state, the duration is permanent.	M: The affected environment will be altered but, natural functions and processes are likely to continue. However, since the vegetation communities are sensitive to disturbance, the intensity is expected to be medium.	H: Some vegetation communities will definitely be lost.	Moderate (Medium magnitude, high likelihood)	Minor
Loss of faunal diversity and richness (Section 7.3.3)	Clearing of vegetation, establishment of access roads and removal of fences, etc will directly	Blinkhoff, Sallaire and Eagles Crag	Negative - Direct & Indirect	O: Impact will be on-site within the rail reserve	L-t: With respect to the loops where habitat can re-	M: Disruption to or loss of faunal habitat may result in temporary relocation	H: Some faunal loss/ disturbance will definitely occur.	Moderate (Medium magnitude, high	Minor

Impact	Description	Applicable Loops	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre - Mitigation)	Significance (Post - Mitigation)
				Extent O - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
				surrounding natural environment (i.e. Boesmans River).	of possible siltation could have longer lasting impacts at Tootabi.		bank.		
Contamination of soil and groundwater resources	Contamination of soil and groundwater due to potential fuel, chemicals or effluent spillage.	Loop sites with medium or high groundwater sensitivity include: Barkly Bridge, Saltaire, Barredeel, Wildfontein, Linde, Hanover Road, Burgervilleweg, Bletterman	Negative - Direct	L: Although soil contamination would be on-site, contaminants leaching through the soil could reach the groundwater and have a local effect, as groundwater is likely to extend off-site.	S-t to L-t: Soil can be remediated in the short-term, however, groundwater may take longer to naturally remediate or may require treatment.	M: Variable intensity due to variable site conditions (nature of soil, topography, groundwater characteristics, etc.). Sites with high groundwater sensitivity are related to the quality and use or potential use of the groundwater.	L: Contamination impacts are possible, especially at fuel/chemical handling and storage areas.	Minor (Medium magnitude, low likelihood)	Negligible
Potential contamination of surface water features	Contamination of surface water features (perennial rivers, streams and dams) in proximity to the development sites as a result of potential fuel, chemicals or effluent spillage.	Perennial rivers within 500m exist at: Barkly Bridge, Eagles Crag, Tootabi, Mortimer, Marlow, Knutsford and Conway	Negative - Direct	L: Contamination of surface water features may have a local effect as the contaminated water may extend off-site.	S-t to L-t: Effects on surface water features polluted during construction may persist beyond the construction period.	M: Variable intensity due to variable site conditions (topography, pathways to the receptor, distance to surface water features, quality of the surface water body, etc.).	L: Contamination impacts are possible, especially at fuel/chemical handling and storage areas.	Minor (Medium magnitude, low likelihood)	Negligible
Dust nuisance	The generation of dust through site clearance, earthworks and general	Tootabi, Eagles Crag, Barkly Bridge, Coerney.	Negative - Direct	O: Impact will be on-site within the rail reserve	S-t - Impact expected during the construction	L: Social receptors are not likely to be affected by the	M: Dust impacts are very likely to occur at all development sites.	Minor (Low magnitude, medium	Negligible

Impact	Description	Applicable Loops	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre - Mitigation)	Significance (Post - Mitigation)
				Extent O - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
	construction activities could pose a nuisance to social receptors in proximity to the loop sites.	Golden Valley, Mortimer, Marlow, Visrivier, Conway, Rosmead, and Bletterman			phase only.	amount of dust generated.	although in very small measures.	likelihood)	
Vibration nuisance	Vibration effects generated from construction related activities such as drilling and blasting could impact on social and biophysical receptors.	Tootabi, Eagles Crag, Barkly Bridge, Coerney, Golden Valley, Mortimer, Marlow, Visrivier, Conway, Rosmead and Bletterman	Negative - Direct	O: Impact will be on-site within the rail reserve	S-t - Impact expected during the construction phase only.	L: Ground borne vibration could possibly affect environmental function and processes (especially for receptors within 8m from the source) but presents more of a nuisance issue. Expected vibration levels are too low to cause structural damage to houses (whether formal or informal). See Vibration Study Report in Annex A7.	L: There are no sensitive social receptors within 8m from the loop sites. Vibration levels of typical construction machinery are within acceptable levels.	Negligible (Low magnitude, low likelihood)	Negligible
Disruption to run-off/surface water flow affecting river systems	Disruption to run-off/surface water flow due to earthworks, excavated material storage and general construction activity could affect river system dynamics.	Tootabi	Negative - Direct	L: The Boesmans River borders the rail reserve at Tootabi.	S-t: Earthworks and stockpiling will only occur during the construction phase.	M: The Boesmans River is a critically endangered river system, therefore, run-off may affect river dynamics.	N: As the loop site is separated from the river by the existing railway line, it is unlikely that run-off /deviated surface water flow from cleared areas/stockpiles would enter the river.	Negligible (Medium magnitude, negligible likelihood)	Negligible
Traffic	Traffic disruptions could	Tootabi, Eagles	Negative	R: Although the	S-t - Impact	L: Few construction	L: Impact possible where	Negligible	Negligible

Impact	Description	Applicable Loops	Nature	Extent	Duration	Intensity	Likelihood of Impact	Significance (Post-Mitigation)
disruption and hazards	result owing to general construction activities including increased volume of heavy vehicles Marlow, Visiter, Mortimer, Golden Valley, Bridge, Coerny, Craig, Barkly		- Direct	O - On-site L - Local R - Regional N - National	fall more locally on secondary and minor roads in proximity to the construction sites, some materials may be transported by road from PE, hence the extent of the impact could be regional.	expected during the construction phase only.	vehicles (less than 10) are expected during the construction of each loop. Social receptors are likely to be able to adapt to this increase in traffic with ease. This increase in traffic volume presents only a low risk of incidents.	Significance (Pre-Mitigation)
				Duration T - Temporary S - Short-term L - Long term P - Permanent	N - Negligible L - Low M - Medium H - High	site is close to communities alongside national roads. For example Coerny, or high use public roads. Golden Valley, Visiter and Conway are located able to adapt to this increase in traffic with ease. This increase in traffic volume presents only a low risk of incidents.	Significance (Post-Mitigation)	

Table 7.2 Yards (construction phase impacts)

Impact	Description	Applicable Yards	Nature	Extent	Duration	Intensity	Likelihood of Impact	Significance (Post-Mitigation)
Contamination of soil and groundwater resources	Contamination of soil and groundwater due to potential spillage at the yards.	All yards	Negative - Direct	O - On-site L - Local R - Regional N - National	likely to extend off-site.	L: Although soil remediation can be remediated in the short term, however, groundwater may take longer to naturally remediate or groundwater and have a local effect as groundwater is likely to extend off-site.	L: As some contaminants of soil and/or yard sites, contamination are handled/stored at the yards, remediation is low at all the yard sites (see aquifer classification map in Chapter 5).	Significance (Pre-Mitigation)
Contamination	The generation of dust through site clearance, earthworks and general construction activities at the yards could pose a nuisance to social receptors in the vicinity.	All yards - more significant at Beaconsfield owing to proximity to residential area (within 1km)	Negative - Direct	O - On-site L - Local R - Regional N - National	likely to extend off-site.	L: Although dust impacts will not be severe, it is expected that they may be experienced by social receptors exposed to the construction activities (e.g. people driving past the yards).	L: As all the yards are existing, it is expected that social receptors to the yard upgrades will be able to adapt with ease. Beaconsfield is closest to a residential area but is far enough away not to be severely impacted by the intermittent and small quantities of dust generated during construction.	Significance (Post-Mitigation)
Dust nuisance	The generation of dust through site clearance, earthworks and general construction activities at the yards could pose a nuisance to social receptors in the vicinity.	All yards - more significant at Beaconsfield owing to proximity to residential area (within 1km)	Negative - Direct	O - On-site L - Local R - Regional N - National	likely to extend off-site.	L: Although dust impacts will not be severe, it is expected that they may be experienced by social receptors exposed to the construction activities (e.g. people driving past the yards).	L: As all the yards are existing, it is expected that social receptors to the yard upgrades will be able to adapt with ease. Beaconsfield is closest to a residential area but is far enough away not to be severely impacted by the intermittent and small quantities of dust generated during construction.	Significance (Post-Mitigation)
Noise	Noise disturbance to social receptors	All yards - more significant at Beaconsfield owing to proximity to residential area (within 1km)	Negative - Direct	O - On-site L - Local R - Regional N - National	likely to extend off-site.	L: Although dust impacts will not be severe, it is expected that they may be experienced by social receptors exposed to the construction activities (e.g. people driving past the yards).	L: As all the yards are existing, it is expected that social receptors to the yard upgrades will be able to adapt with ease. Beaconsfield is closest to a residential area but is far enough away not to be severely impacted by the intermittent and small quantities of dust generated during construction.	Significance (Post-Mitigation)

Impact	Description	Applicable Yards	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre - Mitigation)	Significance (Post - Mitigation)
				Extent O - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
disturbance	receptors due to general construction activities at the yards.	significant at Beaconsfield owing to proximity to residential area (within 1km)	- Direct	construction activities is mainly limited to the yard sites, however, some vehicular noise may be experienced beyond the site boundaries.	expected during the construction phase only.	the sites are Greenfield sites and the project involves upgrades to these sites, noise generated is not expected to be severe, even at Beaconsfield.	temporarily experienced by people passing by the yard sites.	(Low magnitude, low likelihood)	
Traffic disruption and hazards	Traffic disruption in the vicinity of the yards due to general construction vehicle activity. These activities could also lead to potential traffic incidents.	All yards - more significant at Beaconsfield owing to proximity to residential area (within 1km)	Negative - Direct	L: Owing to the possible transport of materials to the yard site, traffic impacts are expected to extend off-site. Traffic routes and sources of materials for the yard upgrades are not confirmed at this stage.	S-t: Impact expected during the construction phase only.	L: Minimal volumes of construction traffic are expected, therefore, this should not result in any disruptions to existing traffic flow / patterns and the risk of traffic incidents is, therefore, very low.	L: Although the likelihood of traffic impacts occurring is very low, it cannot be discounted completely owing to possible human error.	Negligible (Low magnitude, low likelihood)	Negligible

Table 7.3 Substation near Emil (construction phase impacts)

Impact	Description	Applicable Substation	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre - Mitigation)	Significance (Post - Mitigation)
				Extent O-s - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
Loss of vegetation communities	Vegetation clearing for a new substation and access road will lead to loss of vegetation communities.	Emil	Negative - Direct	L: Impact predominantly at the substation site but includes access road that will need to be cleared.	P: Vegetation communities will be permanently lost to the substation development and access road.	L: The area to be cleared for the substation is fairly small (600 sq m) and the ecological importance of the vegetation at the site is low (see Ecology Specialist Report in Annex A5), therefore, the intensity is considered to be low.	H: Some vegetation communities will definitely be lost through clearing.	Minor (Low magnitude, high likelihood)	Minor
Loss of and disturbance to fauna	Earthworks and vegetation clearing at the substation site and access road will directly affect faunal habitat and disturb current faunal activity.	Emil	Negative - Direct	L: Impact is predominantly at the substation site but extends to include the new access road that is required.	P: Loss of habitat (incl. that of a protected scorpion species) will be permanent	L: Even though the development of the substation site and access road may affect a protected scorpion species that could occur in the area, this species is mobile and occurs in the wider area, therefore the intensity is low.	H: Some disturbance to fauna and loss of habitat will definitely occur.	Minor (Low magnitude, high likelihood)	Minor
Dust nuisance	Generation of dust through site clearance, earthworks and general construction activities may impact on ecological and social receptors.	Emil	Negative - Direct	L: Largely an on-site impact but rated as local due to the requirement for an access road.	S-t: Impact expected during the construction phase only.	L: Even though the area is dry, the amount of dust expected to be generated is limited owing to the size of	H: Although limited to a short time and a small area, some dust will definitely be generated.	Minor (Low magnitude, High likelihood)	Minor

Table 7.4 Kimberley-De Aar railway refurbishment (construction phase impacts)

Impact	Description	Applicable Section	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre-Mitigation)	Significance (Post-Mitigation)
				Extent O - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
Loss of or disturbance to sites of archaeological, paleontological or cultural significance (Section 7.6.1)	General construction activities could cause disturbance, damage or destruction to sites of medium or high cultural significance (as defined in the NHRA); or affect sites of paleontological importance.	Site ID KDC 003 near Witputs	Negative - Indirect (e.g. through vandalism)	L: Site KDC 003 lies on private property approx. 50m southeast of the existing railway reserve boundary fence.	P: Damage to site will be irreversible.	H: This site is of high local significance in terms of the NHRA and would be permanently altered if impacted by construction activities.	L: It is possible that site KDC 003 could be impacted	Moderate (High magnitude, low likelihood)	Minor
Dust nuisance (Section 7.6.2)	Generation of dust from general refurbishment activities which includes the topping up of base material, replacement of the rail sleepers and adding of electrification equipment could impact on social receptors.	Settlements located at: Houtkraal - 60m, Potfontein - 100m, Oranjerivier - 75m, Klofontein - 450m and Modderivier - 75m. although Houtkraal and Potfontein appear to be abandoned station buildings i.e. uninhabited	Negative - Direct	O: All work to be done within the railway reserve.	S-t: Impact expected during the construction phase only.	M: Although dust generated will be minimal, as there are no major earthworks or blasting planned - this could impact on social receptors within 100m of the line at Oranjerivier and Modderivier.	H: Although of limited quantities, some dust will definitely be generated during refurbishment of the line.	Moderate (Medium magnitude, High likelihood)	Minor
Noise disturbance (Section 7.6.3)	Noise disturbance from general construction activities may impact on social receptors. No blasting is expected.	Settlements located at: Houtkraal - 60m, Potfontein - 100m, Oranjerivier - 75m, Klofontein - 450m and Modderivier - 75m. although	Negative - Direct	O: All work to be done within the railway reserve.	S-t: Impact expected during the construction phase only.	M: Although no major earthworks or blasting is expected to take place, there are social receptors within 100m of the line at Oranjerivier and Modderivier that	H: Although of limited intensity, noise will definitely be generated during construction.	Moderate (Medium magnitude, High likelihood)	Minor

Impact	Description	Applicable Section	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre-Mitigation)	Significance (Post-Mitigation)
				Extent O - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
		Houtkraal and Potfontein appear to be abandoned station buildings i.e. uninhabited				could be affected.			

Table 7.5 Social impacts for all project components during the construction phase

Impact	Description	Applicable Sites	Nature	Magnitude of Impact			Likelihood of impact occurring N - Negligible L - Low M - Medium H - High	Significance (Pre - Mitigation)	Significance (Post - Mitigation)
				Extent O - On-site L - Local R - Regional N - National	Duration T - Temporary S-t - Short-term L-t - Long term P - Permanent	Intensity N - Negligible L - Low M - Medium H - High			
Increased pressure on infrastructure and services (Section 7.7.1)	General construction activities and associated labour could lead to increased pressure on infrastructure such as water, sanitation and roads as well as general services such as clinics.	All loops, yards and the substation but more relevant to sites where isolated, local communities are located in proximity to the site	Negative - Direct	L: Impacts are likely to be on people living in close proximity to the sites (within 20km).	S-t: Impact expected during the construction phase only.	M: The intensity is difficult to rate as the impact is likely to be experienced differently by different groups of people in the community - the intensity is, therefore, conservatively rated as medium.	M: It is highly likely that there will be an increase in pressure on existing infrastructure	Moderate (Medium magnitude, medium likelihood)	Minor
Spread of HIV/AIDS and STIs	The project may attract migrant workers into the project area during construction. An increase in migrant workers is often linked to an increase in the	All loops, yards and the substation but most relevant to the loops	Negative - Indirect	L: The impact is not expected to be transmitted beyond the local level.	P: The impact could be permanent in some cases as it could potentially lead	M: Those affected would require support in dealing with this impact on them.	M: The influx of migrant workers is likely to lead to an increase in the prevalence of these diseases.	Moderate (Medium magnitude, medium likelihood)	Moderate