Appendix F

Impact Assessment

F1 METHODOLOGY USED FOR ASSESSING IMPACTS

The assessment methodology employed for this project was developed by Environmental Resources Management (ERM) and is in line with Department of Environmental Affairs (DEA) requirements.

The impact assessment for the proposed project commenced with a site investigation. The site investigation was carried out by ERM in order to better understand the site setting and the affected biophysical and social context and identify any sensitive receptors. During the site investigation key personal that would be involved in the proposed installation were interviewed.

The adequate assessment and evaluation of the potential impacts and benefits that will be associated with the proposed project necessitates the development of a scientific methodology that will reduce the subjectivity involved in making such evaluations. A clearly defined methodology (described below) was used in order to accurately determine the significance of the predicted impacts on, or benefit to, the surrounding natural and/or social environment. The proposed project was considered in the context of the area.

Mitigation was incorporated into the project design in order to avoid or reduce negative impacts and enhance positive impacts. For the identified significant impacts in the construction and operational phases, the project team worked with the client in identifying suitable and practical mitigation measures. A description of these mitigation measures is included within the Environmental Management Programme (EMPr) (Appendix G).

F1.1 DETERMINATION OF IMPACT SIGNIFICANCE

Significance

Impacts are described in terms of '*significance*'. Significance is a function of the **magnitude** of the impact and the **likelihood** of the impact occurring. Impact magnitude (sometimes termed *severity*) is a function of the **extent, duration and intensity** of the impact. The criteria used to determine significance are summarised in *Table 1*. Once an assessment is made of the magnitude and likelihood, the impact significance is rated through a matrix process as shown in *Table 2*. outlines the various definitions for significance of an impact.

Significance of an impact is qualified through a statement of the **degree of confidence**. Confidence in the prediction is a function of uncertainties, for

example, where information is insufficient to assess the impact. Degree of confidence is expressed as low, medium or high.

Table 1 Significance Criteria

Magnitude – the degree of change brought about in the environment	
Extent	**On-site** – impacts that are limited to the Site Area only. **Local** – impacts that affect an area in a radius of 20 km around the development area. **Regional** – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type / ecosystems. **National** – impacts that affect nationally important environmental resources or affect an area that is nationally important / or have macro-economic consequences.
Duration	**Temporary** – impacts are predicted to be of short duration and intermittent / occasional. **Short-term** – impacts that are predicted to last only for the duration of the construction period. **Long-term** – impacts that will continue for the life of the project, but ceases when the project stops operating. **Long term** – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the project lifetime.
Intensity (1)	**BIOPHYSICAL ENVIRONMENT:** *Intensity can be considered in terms of the sensitivity of the biodiversity receptor (ie 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 affected. **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease.
	SOCIO-ECONOMIC ENVIRONMENT: *Intensity can be considered in terms of the ability of project affected people/communities to adapt to changes brought about by the project.* **Negligible** – there is no perceptible change to people's way of life. **Low** - People / communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium** - Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High** - Those affected will not be able to adapt to changes and continue to maintain-pre impact livelihoods.
Likelihood - the likelihood that an impact will occur	
Unlikely	The impact is unlikely to occur.
Likely	The impact is likely to occur under most conditions.
Definite	The impact will occur.

(1) The frequency of the activity causing the impact also has a bearing on the intensity of the impact, ie the more frequent the activity, the higher the intensity.

Table 2 ***Significance Rating Matrix***

SIGNIFICANCE				
		LIKELIHOOD		
		Unlikely	**Likely**	**Definite**
MAGNITUDE	**Negligible**	Negligible	Negligible	Minor
	Low	Negligible	Minor	Minor
	Medium	Minor	Moderate	Moderate
	High	Moderate	Major	Major

The following are descriptions of the overall post-mitigation significance ratings:

Negligible: Insignificant or no residual impacts.
Minor: An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and / or the receptor is of low sensitivity / value.
Moderate: An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that "moderate" impacts have to be reduced to "minor" impacts, but that medium impacts are being managed effectively and efficiently.
Major: 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.

F1.2 UNDERLYING ASSUMPTIONS

The conclusions presented in the BAR assumes the following:

- Site conditions as experienced and documented during the site visit are representative of general and average conditions.

F1.3 UNCERTAINTIES

- An impact assessment will always contain a degree of subjectivity, as it is based on the value judgment of specialists and the EIA practitioner. The evaluation of significance is thus contingent upon values, professional judgment, and dependent upon the environmental and community context.

- ERM relied on Engen to provide correct and up to date information. This assessment has been based on project description information provided to ERM by Engen e.g. volumes of water to be treated.

- The descriptions provided for the biophysical and socio-economic receiving environment relied heavily on existing secondary data.

F1.4 IMPACT IDENTIFICATION

The identified impacts are summarized in the Table below:

Table.3 Identification and description of issues

Impact	Description
	PLANNING AND DESIGN IMPACTS
Site selection of infrastructure	The incorrect placement of associated infrastructure should be carefully considered so as to avoid undesirable impact. Factors to be taken into account include but not limited to: • Location of nearby wetlands or bodies of water or environmentally sensitive areas; • Site contamination (obvious or hidden); • Commercial, industrial, and residential neighbours, including airports; • layout (including future expansions) and placement of noise sources; • Levels of electric and magnetic fields; • Availability and site clearing requirements for construction staging; • Access to water and sewer; • Drainage patterns and storm water management; • Potential interference with radio, television and other communication installations; • Disturbance of archaeological, historical, or culturally significant sites; • Underground services and geology; • Accessibility; • Aesthetic and screening considerations.
	CONSTRUCTION-RELATED IMPACTS
	Biophysical impacts (overall development)
Impacts on vegetation and protected plant species	Some loss of vegetation is an inevitable consequence of the development. In addition some protected species were present at the majority of sites and some impact on these species is likely to occur.

Alien Plant Invasion Risk	The disturbance created during construction will leave the disturbed areas vulnerable to alien plant invasion. The railway line forms a corridor for the dispersal of alien species and many alien species are common along the line and would represent a ready source for the invasion of the disturbed areas.
Increased erosion risk	Increased erosion risk would result from soil disturbance and the loss of plant cover within cleared and disturbed areas. The site is however largely very flat and the major erosion risk associated with the development would stem from wind erosion rather than water erosion. Cleared and disturbed areas with loose exposed sand would be most vulnerable.
Direct Faunal impacts	Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. There are also a number of mammals of conservation concern which occur in the area and impacts on these species would be undesirable. Some habitat loss for these species is likely to occur, but would not be of high significance given the scale of the development relative to the distribution extent of these species. Impacts such as electrocution would be of greater potential significance on account of the long-term cumulative impact that may result.
Impacts on Critical Biodiversity Areas	Negative impacts on Critical Biodiversity Areas would result from the transformation of natural habitat within areas classified as CBAs. This impact is only relevant to the sites in the Eastern Cape, as no fine-scale conservation planning has been conducted in the Northern Cape sections.
Noise disturbance	Noise disturbance could result from the use of heavy machinery, blasting, drilling and general construction activities.
Loss of or disturbance to sites of archaeological, paleontological or cultural significance	Excavation activities during the construction phase may disturb, damage or destroy scientifically valuable fossil heritage exposed at the surface or buried below ground.
Soil erosion	Soil erosion may occur as a result of vegetation clearing within the rail reserve, at access roads and along riverbanks.
Contamination of soil and groundwater resources	Contamination of soil and groundwater due to potential fuel, chemicals or effluent spillage.
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.

Dust nuisance	The generation of dust through site clearance, earthworks and general construction activities could pose a nuisance to social receptors in proximity to the loop sites.
Vibration nuisance	Vibration effects generated from construction related activities such as drilling and blasting could impact on social and biophysical receptors.
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.
Traffic disruption and hazards	Traffic disruptions could result owing to general construction activities including increased volume of heavy vehicles and blasting. These activities could also lead to potential traffic incidents.
Substation (construction phase impacts)	
Loss of vegetation communities	Vegetation clearing for a new substation and access road will lead to loss of vegetation communities.
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.
Dust nuisance	Generation of dust through site clearance, earthworks and general construction activities may impact on ecological and social receptors.
Noise disturbance	Noise disturbance to social receptors due to general construction activities.
Establishment of invasive alien species and weed taxa	Vegetation clearing and disturbances could lead to soil disturbance which will provide opportunities for alien plant and weed species to propagate.
Soil erosion	Soil erosion could result from cleared areas (e.g. for the access road).
Contamination of soil and groundwater resources	Contamination of soil and groundwater could occur due to potential fuel, chemicals or effluent spillage.
Social impacts (construction phase)	
Increased pressure on infrastructure and services	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.

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 transmission and prevalence of STIs given the rise in the number of single men within a targeted area. Prostitution may also result. This in turn exacerbates the transmission and, therefore, the prevalence of HIV / AIDS and STIs.
Increase in Social Ills	The introduction of project labourers / employees / contractors into local communities could lead to potential impacts including, inter alia, increase in prostitution, increase in the consumption and sale of alcohol and drugs, potential increase in domestic violence and an increase in violence in general.
Potential employment and procurement opportunities	Construction activities are associated with the generation of employment opportunities, across varying skill levels; and also requires the procurement of goods and services
OPERATIONS-RELATED IMPACTS	
General impacts	
Impact from increased noise generation	Impact on sensitive receptors such as human settlements, schools and wildlife areas owing to an increase in the frequency of trains.
Impact of manganese dust	Impact on sensitive receptors such as human settlements and wildlife areas due to long-term exposure.
Impacts from increased vibration effects	Impact of ground borne vibration on sensitive receptors such as settlements (people, houses & structures), from an increase in the frequency of trains.
Impact on public safety	Impact on public safety from higher train frequencies at level crossings.
Substation (operational phase impacts)	
Impact from increased noise generation	Impact on sensitive receptors such as settlements in close proximity to the railway yards and the substation site.
Contamination of soil and groundwater resources	Contamination of soil and groundwater due to potential fuel, transformer oil or chemical spillage at the substation.
Social impacts (operational phase impacts)	

Change in Sense of Place	Issues such as noise and vibration are likely increase due to the increased number of train movements per day thereby impacting the sense of place. The increase in rail traffic may impact on movement patterns across the line as well. The project may generate positive economic benefit and revitalisation of areas along the line.
Potential employment and procurement opportunities	The operations phase will impact direct employment and have indirect impacts through procurement.

F1.5 SPECIALIST INPUT

F1.5.1 Ecology

Impacts on vegetation and protected plant species

Some loss of vegetation is an inevitable consequence of the development. In addition some protected species were present at the majority of sites and some impact on these species is likely to occur.

The impact assessment rating table below is relevant to loops, Witloop, Wincanton, New Sishen, Glosam, Tsantsabane, Trewil, Ulco, Filedsview, Drennan, Thorngrove, Golden Valley-Cookhouse and Ripon-Kommadagga.

Nature of Impact:	**Negative**
Duration:	Long-Term
Scale:	On-site
Likelihood:	Definite
Magnitude:	Low-Medium
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

Alien Plant Invasion Risk

The disturbance created during construction will leave the disturbed areas vulnerable to alien plant invasion. The railway line forms a corridor for the dispersal of alien species and many alien species are common along the line and would represent a ready source for the invasion of the disturbed areas.

The impact assessment rating table below is relevant to loops, Witloop.

Nature of Impact:	**Negative**
Duration:	Short term
Scale:	On-site
Likelihood:	High
Magnitude:	Low-Moderate
Pre-mitigation significance:	Low-moderate
Post-mitigation significance:	Minor

The impact assessment rating table below is relevant to loops, Wincanton, New Sishen, and Golden Valley-Cookhouse.

Nature of Impact:	**Negative**
Duration:	Short term
Scale:	On-site
Likelihood:	High
Magnitude:	Low
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

The impact assessment rating table below is relevant to loops Glosam Tsantsabane, Trewil, Ulco, Filedsview, Drennan, Thorngrove and Ripon-Kommadagga

Nature of Impact:	**Negative**
Duration:	Short term
Scale:	On-site
Likelihood:	Medium
Magnitude:	Low
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

Increased erosion risk

Increased erosion risk would result from soil disturbance and the loss of plant cover within cleared and disturbed areas. The site is however largely very flat and the major erosion risk associated with the development would stem from wind erosion rather than water erosion. Cleared and disturbed areas with loose exposed sand would be most vulnerable.

The impact assessment rating table below is relevant to loops, Witloop, Wincanton, New Sishen, Glosam, Tsantsabane, Trewil, Ulco, Filedsview, Drennan, Thorngrove and Ripon-Kommadagga.

Nature of Impact:	**Negative**
Duration:	Short term
Scale:	On-site
Likelihood:	Medium
Magnitude:	Low
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

The impact assessment rating table below is relevant to the Golden Valley-Cookhouse loop

Nature of Impact:	**Negative**
Duration:	Short term
Scale:	On-site
Likelihood:	Low
Magnitude:	Medium
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. There are also a number of mammals of conservation concern which occur in the area and impacts on these species would be undesirable. Some habitat loss for these species is likely to occur, but would not be of high significance given the scale of the development relative to the distribution extent of these species. Impacts such as electrocution would be of greater potential significance on account of the long-term cumulative impact that may result.

The impact assessment rating table below is relevant to loops, Witloop, Wincanton and Glosam.

Nature of Impact:	**Negative**
Duration:	Short-Term
Scale:	On-site
Likelihood:	High
Magnitude:	Low
Pre-mitigation significance:	Minor

Nature of Impact:	Negative
Post-mitigation significance:	Minor

The impact assessment rating table below is relevant to loops Tsantsabane, Trewil, Filedsview, Drennan, Thorngrove Golden Valley-Cookhouse Ripon-Kommadagga, New Sishen and Ulco

Nature of Impact:	Negative
Duration:	Short-Term
Scale:	On-site
Likelihood:	Medium
Magnitude:	Low
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

Impacts on Critical Biodiversity Areas

Negative impacts on Critical Biodiversity Areas would result from the transformation of natural habitat within areas classified as CBAs. This impact is only relevant to the sites in the Eastern Cape, as no fine-scale conservation planning has been conducted in the Northern Cape sections.

The following loops are assessed in terms of CBA ie Drennan, Thorngrove, Golden Valley-Cookhouse and Ripon-Kommdagga. Where loops are not discussed; it does not impact on CBA.

Nature of Impact:	Negative
Duration:	Long-Term
Scale:	On-site
Likelihood:	High
Magnitude:	Low
Pre-mitigation significance:	Minor
Post-mitigation significance:	Minor

Residual Impacts:

Provided that regular alien clearing of woody species takes place, then there will be no residual impacts.

Erosion risk at the site is low and there are not likely to be any residual impacts if standard regevetation and erosion mitigation actions are applied. Some habitat loss is an unavoidable consequence of the development. The extent of habitat loss is however minor and would not significantly any fauna in the area which are all widely distributed.

Some impact on the protected tree species *Acacia erioloba* and *Boscia foetida* is likely to occur and is not avoidable as the affected individuals cannot be

translocated. However, as these species are widespread in the area, this impact is not of broader significance and would not compromise the local populations of these species in any way.

Some habitat loss is an unavoidable consequence of the development. The extent of habitat loss is however minor and would not significantly any fauna in the area which are all widely distributed.

Some impact on the protected tree species *Acacia erioloba* may occur and is not avoidable as the affected individuals cannot be translocated. However, the development footprint has already been largely cleared due to the current construction activities in the area, and the additional impact created by the current development would be minimal.

Some impact on the protected tree species *Olea europea subsp. africana* may occur and is not avoidable as the affected individuals cannot be translocated. However, as this species is common and widely distributed in the area, the residual impact would not be significant.

Some impact on the protected tree species *Olea europea subsp. africana* may occur and is not avoidable as the affected individuals cannot be translocated. However, as this species is common and widely distributed in the area, the residual impact would not be significant.

Some impact on the protected tree species *Olea europea subsp. africana* and *Boscia foetida* may occur and is not avoidable as the affected individuals cannot be translocated. However, as these species are common and widely distributed in the area, the residual impact would not be significant.

Some impact on the protected tree species *Acacia erioloba* may occur and is not avoidable as the affected individuals cannot be translocated. However, as this species are common and widely distributed in the area, the residual impact would not be significant.

Some residual habitat loss and impact on the protected aloe species *Aloe striata* may occur and is not avoidable. The affected individuals of *Aloe striata* can be translocated which will reduce the residual impact to some extent.

As the development will result in some habitat loss, there will be some residual impact associated with the development, but as the extent of habitat loss is low, the residual impact on the ecological functioning of CBA would be minimal.

Cumulative impacts

Provided that significant alien invaders are cleared on occasion, then there will be no cumulative impacts in terms of alien plant invaders.

There are not likely to be significant cumulative impacts relating to erosion at the site.

There will be some cumulative impact in terms of habitat loss and faunal disturbance, but given the limited extent of the development, this would not be significant.

The development will contribute to cumulative impact in the area, the other major agent of transformation in the area being the mines in the area. The contribution of the current development to cumulative impact is however minor given the limited extent of the development, as well as the already disturbed nature of the majority of the development footprint.

Erosion risk at the site is low and there are not likely to be any residual impacts if standard regevetation and erosion mitigation actions are applied.

The development will contribute some extent to cumulative impact in the area, but given the limited extent of the current development and the disturbed nature of the receiving environment, the contribution to cumulative impacts would be minimal

The development will contribute some extent to cumulative transformation in the area, but given the limited extent of the current development and the disturbed nature of the receiving environment, the contribution to cumulative impacts would be minimal

The development will contribute a small extent to some cumulative impact on the CBA, but this would be an extremely small contribution that would not significantly affect the CBA.

F1.5.2 Noise

The introduction and extension of the passing loops may change the noise impacts around the railway line, since braking can change the tonal character of the generated noise. In addition, during stopping or accelerating, impulsive shunting noise can be generated by the wagons

jolting each other. At the passing loops, the idling locomotives may also increase the local noise levels for extended periods.

The significance of the above-mentioned impacts would be dependent on the time of day, the number and duration of events, the distance between the loops and the nearest receivers, as well as the individual sensitivities of the receptors.

Potential mitigation measures that would need further investigation are:

- Reduction of train speeds;
- Rolling noise reduction at source via rail dumpers;
- Low profile noise barriers located close to track;
- Noise barriers;
- Noise mitigation measures at the receiver, such as noise insulation and provision of ventilation, in order to be able to keep windows closed.

Vibration

Railway vibration is generated due to the moving loads and elastic deformation, as well as due to dynamic forces at the wheel-rail interface. Significantly higher vibration levels can occur due to wheel surface and rail irregularities. The vibration propagates via the sleepers and rail mounts into the ground via the track support structure. It then propagates through the ground and may sometimes affect the structural integrity of buildings or other structures, as well as be felt as tactile vibration by the occupants of buildings.

Mitigation of low frequency vibration is not easy to be achieved and is expected to involve the main dynamic system, which is the ground and as such very costly. However, trenches and 'wave-impeding blocks' (WIBs) have proven to provide a change in the modal propagation regime and offer vibration reduction at the low frequencies.

The identified noise sources and the receptors per loop, as well as the potential noise and vibration issues, which will be assessed in the detailed EIA phase, are outlined in the following table.

Table 4 Noise receptors and sources

NORTHERN CAPE			
Loop Extensions	Existing Sources	Identified Receptors	Possible Issues
Witloop	Vehicles on the R380, train traffic on the existing line.	Temporary office structures and farmhouse west of the line.	Noise impacts on the farmhouse and offices.
Wincanton	Vehicles on the R380, train traffic	Only unoccupied houses in close	No significant impacts are

NORTHERN CAPE			
Loop Extensions	Existing Sources on the existing line.	Identified Receptors proximity to the loop.	Possible Issues anticipated.
Sishen	Vehicles on the R325, train traffic on the existing line.	Two farmhouses and a community on the western side of the line. Sishen community is not anticipated to be impacted.	Noise impacts on the farmhouses and community west of the line.
Glosam	Sparse vehicles on local road to Glosam and train traffic on the existing line.	Glosam community and isolated farmhouses west of the line.	Noise impacts on the Glosam community and farmhouses.
Tsantsabane	Sparse vehicles on local gravel road to Postmasburg and train traffic on the existing line.	Small community south of the existing line.	Noise impacts on the existing community.
Postmasburg	Vehicles on the R385, train traffic on the existing line and loops, industrial area south east of the line.	Newtown and Boitshoko are the closest communities to the existing line and loops.	Noise impacts on the above-mentioned communities and vibration impacts on the Newtown houses closest to the line.
Trewil	Train traffic on the existing line and Trewil pump station.	One house south of the line.	Noise impacts on the house close to the line and vibration impacts on the house and pump station.
Ulco	Train traffic on the existing line and existing loop operations.	No receptors were identified, only abandoned houses.	No noise and vibration issues are anticipated.
Gong Gong	Vehicles on the R31, train traffic on the existing line.	The Gong Gong community is situated on the southern side of the line.	Noise impacts on the Gong Gong community due to the cumulative noise from vehicular traffic and train operations.
Fieldsview	Train traffic on the existing line.	No sensitive receptors in close proximity to the loop.	No noise and vibration issues are anticipated.
Mamatwane Yard	Manganese processing plant north of the loop, vehicles on the R380 and the access road to the plant,	Houses immediately east of the loop.	Noise and vibration impacts on the existing houses close to the line.

NORTHERN CAPE			
Loop Extensions	Existing Sources train traffic on the existing line.	Identified Receptors	Possible Issues
EASTERN CAPE			
Loop Extensions	Existing Sources	Identified Receptors	Possible Issues
Drennan	Train traffic on the existing line and sparse vehicle traffic on the R390.	Existing building structures close to the Drennan Station and farmhouses at Blauwkrantz, 700m north of the line.	Noise and vibration impacts on the existing structures close to the line and noise impacts on the farmhouses.
Thorngrove	Train traffic on the existing line and sparse vehicles on the road from the N10 to Thorngrove.	Existing building structures close to the Thorngrove Station. Several dwellings are situated north-east of the loop, as well as commercial buildings and warehouses east and south-east of the loop.	Vibration impact on the existing structures close to the Thorngrove Station and noise impacts on the dwellings and commercial installations east and south-east of the loop.
Cookhouse-Golden Valley	Vehicles on the N10, local traffic, human activities, train traffic on the existing line and operations on the existing Cookhouse loop.	The loop is within the Cookhouse community and several structures and dwellings are in very close proximity. The Bongweni community is situated approximately 700 m to the west of the loop. In addition, the Fish River Primary School and the Cookhouse Primary School are also situated close to the railway loop. Along the Golden Valley loop there are also isolated dwellings and structures in close proximity to the line.	Noise and vibration impacts on the various dwellings and structures within Cookhouse. Potential noise impacts on the Bongweni community. Along the Golden Valley loop, noise and vibration impacts are anticipated, since there are several dwellings and structures in close proximity to the railway line.
Ripon-Kommadagga	Vehicles on the N10, train traffic on the existing line.	Several building structures are situated close to the Ripon and Kommadagga loop. In addition,	Noise and vibration impacts on the dwellings and structures close to the loop and noise impacts on the local

NORTHERN CAPE			
Loop Extensions	Existing Sources	Identified Receptors farmhouses are located north of the line between 300m and 800m from the loop.	Possible Issues farmhouses north of the line.

Significance

Nature of Impact:	Negative
Duration:	Long-term
Scale:	On-site
Likelihood:	High
Magnitude:	Low
Pre-mitigation significance:	Moderate
Post-mitigation significance:	Minor

F1.5.3 Palaeontology

Northern Cape

The extended loop development at Gong Gong is underlain by unfossiliferous lavas of the Early Precambrian Allanridge Formation (Ventersdorp Group) and no palaeontological impacts are therefore anticipated here.

Four of the proposed loop developments (Glosam, Postmasburg, Tsantsabane and Trewil) are underlain by Early Precambrian (2.6-2.5 billion year old) marine carbonate rocks of the Campbell Rand Subgroup (Ghaap Group, Transvaal Supergroup) that are known for their prolific fossil record of stromatolites, i.e. laminated microbial reefs constructed by cyanobacteria, in some cases associated with well-preserved microfossils.

The proposed loop developments at Wincanton, Sishen and Ulco are underlain by Late Caenozoic (probably Plio-Pleistocene) calcretes or pedogenic limestones, at least some of which may be attributed to the Mokalanen Formation of the Kalahari Group. The proposed new loop at Witloop and the Fieldsview loop extension overlie Pleistocene aeolian (wind-blown) sands of the Gordonia Formation, Kalahari Group. While a wide spectrum of vertebrate remains, invertebrates, trace fossils, plant fossils and microfossils have been recorded from these Kalahari Group sediments, in general they are of low palaeontological sensitivity and of

considerable lateral extent so impacts on fossil heritage here are likely to be of low significance.

Eastern Cape

The proposed railway loop extensions at Drennan and Thorngrove are underlain by Late Permian sediments of the Balfour Formation (Lower Beaufort Group) that are known for their fossil remains of therapsids (mammal-like reptiles) and other terrestrial vertebrates as well as plants and trace fossils. The Beaufort sediments at both localities may well have been baked by nearby intrusions of the Early Jurassic Karoo Dolerite Suite and are in part mantled with alluvial sediments of the Great Fish River that are of low palaeontological sensitivity.

The extended railway loop between Cookhouse and Golden Valley is largely underlain by alluvium but near-surface rocks of the Late Permian Middleton Formation (Lower Beaufort Group) might be impacted in the northern part of the study area near Cookhouse. Comparatively few, but scientifically important, vertebrate remains (e.g. various dicynodonts) have been recorded from the Lower Beaufort rocks in the Cookhouse area during recent palaeontological impact assessments. A wide range of vertebrate remains, invertebrates, trace fossils, plant fossils and microfossils have been recorded from Late Caenozoic alluvial sediments in the Great Karoo region, but in general they are of low palaeontological sensitivity and of considerable lateral extent so impacts on fossil heritage here are likely to be of low significance.

The proposed loop extension between Ripon and Kommadagga traverses a range of Carboniferous to Middle Permian sedimentary rock units including the Kommadagga Subgroup (Witteberg Group), Elandsvlei Formation (Dwyka Group), as well as the Prince Albert, Whitehill, Collingham and Ripon Formations of the Ecca Group. All of these units, especially the Whitehill Formation that is known for its well-preserved fossil fish, insects, crustaceans and aquatic mesosaurud reptiles, are potentially fossiliferous.

Loop	Project	Paleontological Heritage Sensitivity
1. Witloop	New loop	Low
2. Wincanton	Loop extension	Low
3. Sishen	New loop	Low
4. Glosam	Loop extension	Medium
5. Postmasburg	Loop extension	Medium
6. Tsantsabane	Loop extension	Medium
7. Trewil	Loop extension	Medium
8. Ulco	Loop extension	Low
9. Gong Gong	Loop extension	Zero
10. Fieldsview	Loop extension	Low

Loop	Project	Paleontological Heritage Sensitivity
11. Drennan	Loop extension	High
12. Thorngrove	Loop extension	High
13. Cookhouse – Golden Valley	Loop extension	Low
14. Ripon – Kommadagga	Loop extension	High

Significance

Nature of Impact:	Negative
Duration:	Long-term
Scale:	On-site
Likelihood:	Medium
Magnitude:	Low
Pre-mitigation significance:	Moderate
Post-mitigation significance:	Minor

F1.5.4 Heritage

Most of the heritage resources are positioned outside of the railway reserve areas. The Northern Cape specifically has evidence of the South African War events, the origins of the diamond digging time period, the movement of the San peoples, the conflict years (Mfecane or Difaqane) as well as the contact period between the San and the Iron Age people. A variety of grave sites are located at Groenwater, but no works are assumed to take place in this area.

The Eastern Cape is a well-defined Stone Age Archaeology area. Rock art sites have been identified within 50 metres from the railway line. Kommadagga to Ripon has displayed extensive traces related to various types of stone tool material. A phase 2 is recommended to remove the Stone Age material that is positioned within the railway reserve areas. Monitoring will also be required during construction.

Archaeological Background

The Northern Cape has traces of various types of archaeological sites inclusive of prehistorical and historical sites. A range of these sites are positioned next to the rivers, hilltops and pans. The Northern Cape is evident of rocky outcrops and river banks that were used by hunter gatherers to develop temporary camping areas to have access to water and hunting resources.

The Northern Cape is evident of the occurrence of a variety of rock art images, Stone Age sites and palaeontological significant areas. The historical sites are mostly related to the siege of Kimberley and the South African War. Stone age sites have been identified in the past by archaeologists in the well-

known Wonderwerk Cave located in the Kuruman Hills, Postmasburg, Doornfontein, Beeshoek and Kathu. Specularite workings, Later Stone Age and Early Middle Stone Age have been identified in Lylyfeld, Demaneng, Mashwening, King, Rust & Vrede, Paling, Glucester and Mount Huxley to the northern side. According to archaeological records rock art sites have been identified at Beeshoek and Bruce.

Evidence of Later Iron Age (LIA) early farmers occur in the close vicinity of Kuruman. The early farmers came in contact with the Khoisan groups known as the Late Stone Age (LSA) peoples. Most of the LSA peoples were incorporated in the LIA communities and this period is represented at the Blinkklipkop specularite mine close to Postmasburg.

In terms of archaeological records and reports completed by heritage specialists various old mine works occur on the ridges to the west of the Glosam railway line siding (A J Pelser, 2012). The Glosam railway siding is positioned at the Tsantsabane Local Municipality in the Siyanda district of the Northern Cape.

Rock Art Engravings Northern and Eastern Cape

Rock engravings are mostly found in the interior plateau for example in Kimberley and the Karoo (D Lewis Williams; T Dowson, 1989). The Wonderwerk Cave (Northern Cape) archaeological excavations and research have indicated that rock engravings were evident more than 10 000 years ago (D Lewis Williams; T Dowson, 1989). Evidence exists of rock art paintings occurring in caves and shelters at the Kuruman Hills, Ghaap Escarpment and scattered sites in the Karoo (D Morris, 1988).

Rock engravings have also been identified at Driekopseiland that is positioned in the close vicinity of Kimberley Town (K W Butzer, G J Fock, L Scott and R Stuckenrath, 1979).

Driekopseiland is evident of more than ninety percent of geometric engraving sites (D Morris, 1988). Geometrics have been identified at the Kuruman valley and the middle Orange area (D Morris, 1988). Engravings tend to be found at rock walls, low outcrops, or clusters of surface stone (K W Butzer, G J Fock, L Scott and R Stuckenrath, 1979).

Findings

Heritage resources of significance were identified during the reconnaissance survey during March 2012 to April 2012. The emphasis of the survey was placed on areas that may experience a direct impact or change. Additional information has been provided to highlight the occurrence of different types of heritage resources that occur in the close vicinity of the proposed

development areas and to ensure that those areas are protected if an change in scope occur.

The screening of the proposed development area indicated that significant cultural landscapes inclusive of the footprints of the San, the South African War, and historical diamond digging areas were within and surround the development footprint. The historical railway lines, historical structures and foundations which are part of the rail industrial archaeology have also been identified and added to the significant heritage resources that are positioned alongside the existing railway line.

Table 5 Heritage resources and ratings

Area	South	East	Description	Nature of Impact before mitigation	Nature of Impact after mitigation
Bad Hope Station	S28 30 15.8	E24 27 44.4	Historical Fortifications	Low	Low
Borrelskop Station	S28 23 19.2	E24 19 39.1	Old railway station foundations	Low	Low
Borrelskop Station	S28 23 28.8	E24 19 47.3	Old railway station foundations	Low	Low
Borrelskop Station	S28 23 28.8	E24 19 47.3	Old railway station foundations	Low	Low
Borrelskop Station	S28 23 19.2	E24 19 39.1	Old railway station foundations	Low	Low
Canteen Kopje Station	S28 32 39.0	E24 32 16.1	Archaeological site	Low	Low
Fieldsview Station and surroundings	S28 40 21.4	E24 38 55.2	!Xun and Khwe cultural landscape	Medium	Low
Fieldsview Station and surroundings	S28 35 44.0	E24 40 27.9	!Xun and Khwe cultural landscape	Medium	Low
Fieldsview Station	S28 32 09.3	E24 37 15.5	Old railway structure foundation	Medium - Low	Low
Fieldsview Station	S28 32 16.0	E24 37 25.4	Old railway structure foundation	Medium - Low	Low
Ghaap Station	S28 17 39.7	E24 12 24.8	Cultural landscape	Low	Low
Gong Gong Station	S28 28 43.9	E24 26 30.4	Historical Bridge	Medium	Low
Groenwater Station	S28 15 14.0	E23 18 46.0	Metsimetala Captain's Grave	High	Medium
Groenwater	S28 16 21.4	E23 20 09.0	Large	High	Medium

Area	South	East	Description	Nature of Impact before mitigation	Nature of Impact after mitigation
Station			historical grave yard (approximately 100 graves)		
Groenwater Station	S28 16 57.3	E23 19 45.2	New burial site (approximately 10 graves)	High	Medium
Groenwater Station	S28 16 57.3	E23 19 45.2	Historical grave (1947) Stone walling Three unmarked graves	High	Medium
Groenwater Station	S28 16 37.7	E23 20 06.4	Traditional council meeting place	High	Medium
Mid Station	S28 39 40.1	E24 43 39.6	Historical railway structures	Medium	Low
Ulco Station	S28 30 44.1	E24 28 51.5	Cultural landscape	Medium	Low
Winter's Rush Station	S28 26 04.9	E24 22 10.2	Old railway lines and railway station foundations	Low	Low
Winter's Rush Station	S28 26 14.9	E24 22 29.1	Old railway structure foundations	Low	Low
Winter's Rush Station	S28 26 18.6	E24 22 34.5	Old railway structure foundations	Low	Low
North of Barradeel Station	S31°13'12.07"	E24°56'49.06"	Medium density stone age material	Low	Low
Carlton Station	S31°18'18.18"	E24°57'2.02"	Sandstone blockhouse and railway	Medium	Low
Flonker Station	S31°22'58.69"	E25° 1'59.38"	Medium density stone age material and old railway line	Medium	Low
Rosmead Station	S31°29'24.36"	E25° 7'8.54"	Historical housing	High	Medium
Tafelberg Station	S31°36'55.37"	E25°14'25.87"	Historical church	High	Medium
South of Glenheath Station	S31°42'14.00"	E25°16'42.64"	Historical stone wall	Medium	Low
North of Peins Station	S31°50'36.50"	E25°22'16.60"	Historical bridge	Medium	Low
South of	S31°51'29.80"	E25°22'58.70"	Historical	Medium	Low

Area	South	East	Description	Nature of Impact before mitigation	Nature of Impact after mitigation
Peins Station			bridge		
South of Visrivier Station	S31°54'8.50"	E25°24'26.40"	Traditional grave	Medium	Low
South of Visrivier Station	S31°54'28.40"	E25°24'41.90"	Blockhouse	High	Medium
Visrivier Town	S31°54'51.30"	E25°25'5.30"	Visrivier historical landscape	High	Medium
South of Visrivier Town	S31°55'34.00"	E25°26'0.64"	Historical stone structure	Medium	Low
Knutsford Station	S31°57'10.30"	E25°30'21.90"	Medium density scattered stone tools	Medium	Low
Knutsford Station	S31°57'27.43"	E25°29'10.46"	Historical retaining wall	Low	Low
South of Knutsford Station	S31°58'32.70"	E25°31'4.70"	High density scattered stone tool material	Medium	Low
North of Kaptein Station	S32° 0'3.30"	E25°30'43.30"	Historical buildings	High	Low
North of Marlow Station	S32° 6'16.24"	E25°36'6.30"	Possible in situ stone age material may occur	Medium	Low
South of Klipfontein Station	S32°36'10.94"	E25°45'43.67"	Graves	High	Medium
Slagtersnek Station	S32°41'34.52"	E25°50'5.19"	Historical cultural landscape	Low	Low
Golden Valley Area	S32°42'45.00"	E25°48'41.18"	Rock art	Medium	Low
South of Golden Valley Station	32°49'42.02"S	25°47'46.79"E	Medium density middle and late stone tool material	Medium	Low
South of Golden Valley Station	32°50'5.60"S	25°47'41.39"E	Medium density middle and late stone tool material and historical monument	Medium	Low
Kommadagga Station and surroundings	33° 6'56.63"S	25°53'50.78"E	Medium density middle and late stone tool material	High	Medium
Kommadagga	S33° 6'57.10"	E25°53'50.68"	Medium	High	Medium

Area	South	East	Description	Nature of Impact before mitigation	Nature of Impact after mitigation
Station and surroundings			density middle and late stone tool material		
Kommadagga Station and surroundings	S33° 6'58.21"	E25°53'47.51"	Medium density middle and late stone tool material	High	Medium
Kommadagga Station and surroundings	S33° 7'1.24"	E25°53'46.28"	Medium density middle and late stone tool material located in the railway reserve and development area	High	Medium
Kommadagga Station and surroundings	S33° 7'6.71"	E25°53'58.56"	Medium density middle and late stone tool material located in the railway reserve and development area	High	Medium
Saltaire Station and surroundings	S33°10'46.09"	E25°56'22.74"	Medium density middle and late stone tool material located in the railway reserve and development area	High	Medium
Saltaire Station and surroundings	S33°10'46.09"	E25°56'22.74"	Rock art located in the development area	High	Medium
South of Alicedale Station	S33°21'0.04"	E26° 04'8.29"	Riverbank sensitive towards the occurrence of in situ archaeological material	High	Medium
Eagle's Crag Station	S33°23'2.40"	E26° 3'24.80"	Historical railway station	High	Medium
Flonker	S31°22'58.69"	E25° 1'59.38"	Historical railway line and medium density stone age material	Medium	Low

Significance

Nature of Impact:	Negative
Duration:	Long-term
Extent:	Regional
Likelihood:	Medium
Magnitude:	Low
Pre-mitigation significance:	Moderate
Post-mitigation significance:	Minor

Mitigation

- Construction activities must remain within designated rail reserve construction areas. If any types of works are to take place outside of the reserve areas, the significance level will change and a different assessment approach will be required. Should this be necessary, a professional registered Archaeologist must survey these areas prior to site disturbance to supervise and provide guidance
- The historical structures identified at cultural resource areas mentioned above may not be destroyed, demolished, altered, collected or impacted upon unless a permit has been issued by SAHRA
- During construction, if any heritage objects are discovered, a professional registered Archaeologist, SAHRA, Heritage Eastern Cape and Ngwao Boswa Kapa Bokoni (Northern Cape Heritage) must be informed. No work is allowed to proceed at the specific site of where the discoveries were made before a letter of approval has been issued by the relevant authorities. It is recommended that a professional registered Archaeologist be appointed on a contract basis to allow for continuous monitoring and sampling during the construction phase or where excavations are required
- It is proposed that the professional registered Archaeologist comprehensively document and survey before construction where an indication of scattered stone tools exist. It will also be to the advantage of the provincial and local heritage that scattered stone tool material is rescued and taken to McGregor Museum in Kimberley, Port Elizabeth Museum or Albany Museum in Grahamstown for safekeeping and protection. In this scenario it is required that the Archaeologist applies for a sampling and monitoring permit from SAHRA. Sensitive heritage features, as identified by the appointed professional, should be fenced in situations where construction activities will occur within 50 metres
- A built environment permit application must be submitted to Ngwao Boswa Kapa Bokoni (Northern Cape Heritage Department) and Heritage Eastern Cape who will determine if work may proceed at the

cultural landscape areas and indicate what the requirements are. They will also provide the terms and conditions related to work allowed at the cultural landscapes that is positioned within and outside of the proposed impacted area

- A heritage management plan must be completed to support the conservation of the historical structures, historical suburban area and historical diamond mining landscape as well as the associated heritage objects. This management plan must be approved and signed by the National and Provincial Heritage Authority before any construction activities may commence
- During construction it is recommended that identified historical features are buffered and fenced off
- A monitoring program is proposed that will allow for regular inspections to ensure that terms and conditions stipulated in the Heritage Management Plan are adhered to
- It is proposed that the professional registered Archaeologist apply for a sampling and monitoring permit that will allow for heritage resource rescue work if necessary. The permit will be used in the event that in situ archaeological material related to the South African War sites, stone tool material or any other type of heritage objects are uncovered during earthmoving activities
- The Provincial Heritage Resources Authority will provide the terms and conditions related to work allowed at cultural landscapes that are positioned in the Northern and Eastern Cape cultural landscape areas
- No rock engraving sites or cultural landscapes are allowed to be entered without a permit from the South African Heritage Authority
- Regular liaison with the local indigenous groups for example the Xun and Khwe at Kimberley, McGregor Museum, Wildebeestkuil Rock Art Centre, Albany Museum; Port Elizabeth Museum and academic institutions must take place. This will ensure the development of good community relations and will allow for a transparent approach dealing with Indigenous Groups
- At Sishen a new loop is proposed. This area is highly disturbed because of the occurrence of intensive mining activities. In terms of previous heritage impact assessment reports a cluster of Stone Age sites occurs close to Kathu and the Sishen areas. It is therefore advised that monitoring occurs before and after construction.
- The proposed Mamathwane Rail Compilation Yard covers an area of 120 ha that is proposed to be placed next to the existing railway line. Although the area is already disturbed because of railway activities, it must be emphasized that in terms of previous archaeological impact assessment reports, a high density of stone tools were identified in the close vicinity. It is recommended that monitoring occurs before and during construction
- The sections identified to include the doubling of an existing railway line fall within sensitive heritage resources landscapes. It is

recommended that a Phase 2 Heritage Impact Assessment is completed at these areas. A Phase 2 Heritage Impact Assessment is inclusive of sampling (removal of Stone Age material that is located in the development areas) and further detailed documentation within the impacted area. Monitoring (Phase 3) is proposed to occur during the construction phases of the development

- Rock art engravings occur within 50 metres from the railway line at the end of the Ripon to Kommadagga doubling section. It is recommended that the rock art engraving site is buffered and that no construction activity is allowed within 20 metres from the rock art site. Monitoring is required to ensure that the recommendation is adhered to
- Historical water towers that are positioned at Ripon to Kommadgga are under threat of removal and it is recommended that a permit application is forwarded to Heritage Eastern Cape to request permission for removal / replacement

Mitigation: borrow pits in sensitive cultural landscape sites

The following points should be noted:

- The aim should be to have minimal impact on heritage resources sites

- It is recommended that borrow pits are placed away from any significant heritage resources sites

- A Heritage Resources Assessment should be conducted prior to earthmoving activities
- A professional archaeologist must survey the area before and during construction. This will allow the archaeologist to determine if any heritage objects are positioned on the surface

- Heritage objects positioned on the surface before construction should be rescued

- If heritage objects need to be rescued a permit application must be completed and forwarded to the South African Heritage Resources Agency for approval. If a permit is issued by the relevant authority, sampling must be undertaken as soon as possible. The heritage objects will have to be documented properly and site recording forms must be completed

- The rescued material must be taken to the local museum responsible for safekeeping of provincial archaeological, historical and paleontological artefacts. It is advised that sampling is undertaken with the cooperation of the archaeology department at the McGregor Museum in Kimberley, Port Elizabeth Museum or the Albany Museum in Grahamstown. This

will allow for quality control in the archaeological fieldwork and will ensure that correct fieldwork methodologies are used

- Heritage objects uncovered after construction commenced should be rescued

- Should heritage objects be identified after construction activities have commenced, it is compulsory that development stops at the specific area. The professional archaeologist and McGregor Museum must be contacted as soon as possible to inform them about the situation such that the site can be assessed. The archaeologist must record the type of heritage objects uncovered and forward the information to the national as well as provincial heritage resources authorities. The heritage resources authorities will decide on the way forward. Works at the specific section may only proceed with an approval letter from the South African Heritage Authority, Ngwao Boswa ya Kapa Bokone (Heritage Northern Cape) and Heritage Eastern Cape

- Heritage resources should be monitored during construction

- Once earthmoving activities have commenced, the professional archaeologist must monitor the borrow pit areas on a monthly basis and provide an audit report to the heritage resources authorities. This will provide SAHRA, Ngwao Boswa ya Kapa Bokone (Heritage Northern Cape) and Heritage Eastern Cape with an opportunity to comment on the status of the cultural environment and provide additional comments / requirements when necessary

- Heritage resources should be monitored during the handover phase
- During the handover phase a final monitoring report must be forwarded to the relevant authorities

- Approval from heritage authorities before any type of development may commence

- No borrow pit developments are allowed without the approval from the South African and Provincial Heritage Agencies. The approval will be in the format of a letter or permit document dependent on a decision made by the heritage resources authorities. The permits normally contain a list of terms and conditions that must be followed. Monitoring and auditing will be completed against a list of heritage resources management requirements. On a monthly basis the sensitive areas identified in this report will be audited to ensure that no heritage resources of significance have been destructed, that no development activity occurs in the close vicinity of historical structures, grave sites or rock art engraving sites

- A professional archaeologist must monitor the area during rehabilitation of the borrow pit sites. The cultural landscape will be disturbed during the development of borrow pits and as a result a detailed cultural landscape rehabilitation plan is necessary to guide the process when construction activities come to an end

- Heritage Resources education and training
- Construction workers and the Environmental Control Officer must be educated in terms of the type of heritage objects that may be discovered during earthmoving operations, who to contact in such an event and what to do before a professional archaeologist attend to the site

F2 SOCIAL IMPACT ASSESSMENT

F2.1 INTRODUCTION

This section of the report analyses the social impacts that may result from the proposed expansion of the railway loops. These are based on research undertaken to date, including primary and secondary data.

The identified impacts (positive and negative) have been assessed in terms of the effects of the proposed project on the receiving socio-economic environment and stakeholders. The project activities are described in *Section 1 of the Basic Assessment Report (BAR)*. The methodology used to assess the identified impacts is explained in *Appendix F*.

Mitigation measures have been provided that aim to avoid, minimise, reduce, remediate or provide appropriate alternatives for the negative impacts and enhance the benefits of the Project. The section furthermore provides a prediction of the residual impact that will remain, assuming that all mitigation measures are implemented.

F2.2 IMPACT ON THE LOCAL ECONOMY

The Project is expected to contribute to the local economy in the following ways:

- increased exportation of manganese ore;
- creation of direct and indirect employment which will lead to increased spending; and
- procurement of local goods and services.

The capital investment required to expand the railway loops is high at approximately R19.2 billion, which will be spent over the construction period. The increase in exportation of manganese ore is expected to generate an estimated annual income of R23.4 billion, should the proposed increase tonnage be met.

The Project is expected to create an estimated 12,171 employment opportunities, of which 9,128 will be indirect. Approximately 572 permanent positions will be created by the Project. The Project will require highly skilled, semi-skilled and unskilled workers to undertake the construction. Due to the technical nature of the construction phase, a big proportion of the workforce will be skilled and semi-skilled employees. Transnet is planning to employ people from the local areas for each contract;

which will result in a large number of people benefiting from the Project. However, the construction period of each loop will be relatively short, lasting between three and five months.

In addition to the direct employment opportunities available to local people, there will be a small number of in-direct and induced employment opportunities generated through the Project. In-direct employment will be created through the supply chain and other local procurement of goods and services. Induced employment will also be created through increased spending in the economy by people employed to work on the Project. However, the small scale of the project means that indirect and induced employment is likely to be limited.

In addition to the creation of employment opportunities, procurement opportunities will be available to local businesses. However, the procurement benefits will be limited, as most of the goods / services required are highly specialised and are unlikely to be available in the local areas. Local procurement will, therefore, primarily benefit the civils and construction industry, hospitality and service industries, such as accommodation, catering, transport, vehicle servicing and security services.

Given the scale and nature of the project the vast majority of goods and services will either be procured nationally (predominantly Gauteng) / and internationally (Europe). *Box 1.1* provides an overview of the major goods and services that will be procured as well as the anticipated origin thereof.

Box 1.1 Goods and Services to be Procured

International/ National:

- rails and turnout components will be sourced internationally;
- traction substation equipment will be sourced from South Africa and internationally;
- signalling and telecommunication equipment will be sourced from South Africa and internationally;
- sleepers and fastenings will be sourced within South Africa;
- overhead traction equipment will be sourced within South Africa; and
- overhead traction equipment, signalling and telecoms contractors will be sourced within South Africa.

Regionally/ Locally:

- ballast and layer works material will be sourced from the province, as close as possible to the site;
- civil and earthworks contractors will be sourced regionally and locally depending on availability of contractors; and
- plate laying contractors will be sourced regionally and locally depending on the availability of contractors.

During operation, only a limited number of jobs will be created ie 572 jobs. The type of jobs that will be created include administrators, sundry workers, section managers, train drivers and assistants, train control officers, service drivers and general workers. It is unclear if the afore mentioned jobs will be created or if they are in existence. The uncertainty is due to the fact that these jobs are associated with existing functionaries of the current operation of the railway line.

In-direct employment opportunities (temporary and permanent) will be created in the manufacturing of wagons and equipment for the railway line. These jobs require skilled and semi-skilled workers with experience in the relevant fields. Overall, the procurement requirements during the operational phase will be limited to routine maintenance of the loops and signal equipment.

The impact will be **positive** and **direct** as related to the generation of revenue to the economy and creation of employment opportunities, **in-direct** in terms of local procurement, and **induced** by increased employee spending. The duration of the positive impacts will be **short-term** as it relates to construction jobs, and some of the procurement, but it will be **long-term** for those permanently employed by Transnet.

The positive impacts related to employment and procurement will be experienced at the **local, regional and national levels**. The scale of the impact will be national due to the revenue generated by the increased exporting of manganese ore (operational phase).

The severity of the impact will be **medium** as the majority of the jobs and procurement will be temporary in nature and short –term (mostly during construction), and it will remain medium for the operational activities. The impacts will definitely occur during construction and operation; therefore, the impact likelihood is **medium** for construction and **low** for operations.

The magnitude of this impact is linked primarily with the duration / timeframe of the employment opportunities, quality / level of employment, and the degree to which local workers will secure the employment opportunities. The number of people who will be employed during the operations phase is likely to be low in comparison with the number of job seekers in the Project area. As such, the overall magnitude of this positive impact will be **moderate** during construction, **low** during the operation phase.

F2.2.1 Mitigation Measures

The following measures will be implemented to ensure that employment of local people is maximised and procurement of local, regional and national services is maximised:

- Transnet will establish a recruitment and procurement policy. The policy will sets reasonable targets for the employment of local residents / suppliers (originating from the local municipalities) and promote the employment of women as a means of ensuring that gender equality is attained. Criteria will be set for prioritising, where possible, local (local municipal) residents / suppliers over regional or national people / suppliers.

- All contractors will be required to recruit and procure in terms of Transnet's recruitment and procurement policy.

- Transnet will work closely with relevant local authorities, community representatives and organisations to ensure that the use of local labour and procurement is maximised. This may include:

    - sourcing and using available databases on skills / employment-seekers that local authorities may have.
    - advertising job opportunities and criteria for skills and experience needed through local and national media.
    - conducting an assessment of capacity within the Local Municipality and South Africa to supply goods and services over the operational lifetime of the project.

- No employment will take place at the entrance to the site. Only formal channels for employment will be used.

- Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the Project. This will help to ensure that they have future opportunities to provide goods and services to the sector.

- Transnet will implement a grievance procedure that is easily accessible to local communities, through which complaints related to contractor or employee behaviour can be lodged and responded to. Transnet will respond to all such complaints. Key steps of the grievance mechanism include:

    - Circulation of contact details of 'grievance officer' or other key Transnet contact.

- Awareness raising among local communities (including all directly affected and neighbouring farmers) regarding the grievance procedure and how it works.
- Establishment of a grievance register to be updated by Transnet, including all responses and response times.

F2.2.2 Residual Impact

The proposed project is not going to generate significant direct, indirect or induced employment or procurement opportunities; however, the operations will, for a long time, generate increased revenue to the local economy from exports. If Transnet commits to maximising opportunities for South Africans, specifically locals, by implementing the mitigation measures, the positive impact, *albeit* small, will be realised. The post-mitigation significance rating will remain one of moderate positive significance during construction and minor positive significance during operation. The pre- and post-mitigation impacts are compared in *Table 1.1* below.

Table 1.1 Pre- and Post- Mitigation Significance: Local Economy

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Construction	**MODERATE (+ve)**	**MODERATE (+ve)**
Operation	**LOW (+ve)**	**LOW (+ve)**

F2.3 DISRUPTED AGRICULTURAL ACTIVITIES

The majority of the Project affected farms are solely used for agricultural purposes; including both crop and livestock farming. Livestock kept on the farms consists of sheep, goats, and cattle; while crops include Lucerne, peppers, maize, and fodder. During the construction phase of the Project the agricultural activities will be disrupted on the Project affected farms. The construction activities that are likely to disrupt agricultural activities include site clearance, road widening/construction, assembly and installation of rail and associated infrastructure.

Livestock farming activities

During the construction phase, there will be a relatively large amount of disruption to agricultural activities. There will be site clearance, road construction, assembly and installation of railway line, as well as the construction of associated infrastructure.

The farmers' practice rotational farming as the vegetation requires time to regenerate. This is achieved through the division of the farm into camps which are individually fenced and gated; the farms are large enough to

enable such rotational methods. During construction, the farmers will need to keep their livestock in alternate camps to the construction area in order to ensure that the stock are not harmed or lost as a result of the intensive construction methods.

As mentioned above, the farms are divided into camps and in order to access the full Project site it will be necessary for the construction team to travel between camps; requiring them to open and close gates as they move. They will, at times, also be required to travel across / alongside neighbouring farms to reach the selected sites. It is critical that the gates are always closed once the team has passed in order to secure the stock.

The high numbers of light and heavy vehicles that will be passing through the farm camps are likely to cause damage to the gates and fencing. Any damage to this infrastructure could also lead to stock losses.

Some of the landowners mentioned that they often loose sheep and goats when there are people maintaining the railway line. They are concerned that extended construction activities will result in increased livestock losses.

Crop farming activities (irrigation farming)

Of the affected landowners, seven farmers undertake irrigated crop farming; Ripon, Kommadagga, Cookhouse, Golden Valley, Thorngrove, Drennan, Ulco, along with the neighbouring landowners. The landowners receive irrigation water from various sources, including formal irrigation schemes, boreholes on their farms, and through drawing water directly from the nearby Rivers. *Table 1.2*, shows the type of irrigation farming undertaken in each of the Project farms growing crops.

Table 1.2 Project Sites where Irrigation Farming is Undertaken

Project Site	**Crops Under Irrigation**
Ripon -Kommadagga	Peppers and maize
Cookhouse-Golden Valley	Fodder
Thorngrove	Fodder, maize, lucerne
Drennan	Maize, Lucerne
Ulco	Lucerne

The irrigation systems used include flooding, pivot, and underground irrigation. According to the landowners the irrigation pipes for the underground systems are buried between 1.5m and five metres below the surface and can easily be disturbed. According to the landowners, some of the underground irrigation infrastructure is close to the railway line.

Any destruction of the irrigation system is likely to negatively affect the farming activities as the crops are solely dependent on the water from the system. Furthermore, the disruption will lead to an economic loss for the directly affected landowners along with their neighbours who use the same system.

Operational activities are not expected to cause any disruption to agricultural activities. However, during the initial stakeholder consultation, the landowners and neighbours raised concerns related to the risk of veld fires. According to the stakeholders, trains cause sparks which sometimes cause veld fires that kill livestock and destroy crops. They suggested that Transnet need to better maintain the vegetation that grows on the side of the railway line in order to minimise damage to the livestock and crops.

The disruption to agricultural activities would be regarded as a **direct** and **negative** impact. The impacts of the Project will occur **locally and on-site**, as it will impact on the Project affected landowners along with their neighbours. The disruption as it relates to damage to irrigation pipes and veld fires will be **short**-to **long-term**. Irrigation farmers could experience financial losses brought on by damage to the irrigation pipes and temporary loss of access to irrigation. Livestock farmers will loose grazing land and possibly livestock; in case of loss of grazing land, the affected landowners may not all have the financial means to purchase livestock fodder / Lucerne and / replace the lost livestock.

The severity will be **high** as the farmers will have some difficulty adapting to the disruption without some degree of support and compromise, especially crop farmers who rely heavily on irrigation. The impact is likely to occur and it is rated as **medium**, with the overall impact magnitude rated as being of a **high negative** significance, as it relates to construction impacts and **low to moderate significance** as it relates to veld fires.

F2.3.2 Mitigation Measures

- Transnet will consult the affected landowners to discuss sensitive areas on their property and design the infrastructure layout in a manner that limits the impact on agricultural activities.

- Transnet to minimise the damage to farmland caused by construction activities by ensuring strict compliance with construction plans to minimise the development footprint and to implement a 'Code of Conduct' governing workers.

- The Code of Conduct must address the following aspects:

    - respect for local residents;

- respect for farm infrastructure and agricultural activities;
- no hunting or unauthorised taking of products or livestock;
- compliance with the Traffic Management Plan and all road regulations; and
- description of disciplinary measures for infringement of the Code and company rules.

- If workers are found to be in contravention of the Code of Conduct, which they signed at the commencement of their contract, they will face disciplinary procedures that could result in dismissal.

- Transnet will ensure that all weeds / vegetation growing along the railway line are constantly removed in order to avoid / minimise the possibility of veld fires.

- Any damage to natural vegetation (specifically grazing) will be rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation.

- Construction activities to be undertaken according to a schedule that is agreed upon with the landowners.

- Construction workers to ensure that the gates are closed at all times and that any damage to the infrastructure is repaired immediately.

- Transnet will continue to implement the grievance procedure that ensures that complaints related to Project activities can be lodged and responded to promptly, see *Section 1.2.1*.

- Transnet will create a compensation fund which will be used to compensate farmers for losses and any prolonged disruptions to agricultural activities that will have negative impacts on the financial situation of the Project affected farmers and their neighbours.

F2.3.3 Residual Impact

The implementation of the above mitigation measures would reduce the construction impacts from moderate to minor significance and the operation impacts will remain negligible. The pre- and post-mitigation impacts are compared in *Table 1.3*.

Table 1.3 Pre- and Post- Mitigation Significance: Disrupted Agricultural Activities

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Construction	**HIGH (-ve)**	**LOW (-ve)**
Operation	**LOW to MODERATE (-ve)**	**LOW to NEGLIGIBLE (-ve)**

F2.4 LOSS OF AGRICULTURAL LAND

The combined size of the project affected farms is approximately 20,000 ha. It is estimated that 35.71 ha of the total land will be required for the Project. The key issues that affect decision-making regarding any proposed changes to land use, from agricultural use to other use, are the following:

- Soil quality: The authorities are unlikely to allow any kind of development in an area that has good soil quality or high potential soil. Most of the soil in the Eastern Cape Province is considered to be of high quality with a few strips of low value soils, this makes it highly likely that a development may be stopped.

- Compatibility of farming and the proposed Project: The authorities would want to determine if the agricultural land will be maintained alongside the extended railway line. If the project is going to impact negatively on the sustainability of the farm the authorities are unlikely to give a permit for the change in land use.

The land needed for the extension is estimated to be 0.18 percent of the identified land parcels. The loss of land due to the Project will be minimal, but when considering other proposed developments on these farms (i.e. renewable energy projects), then the loss will be significant in the future. The majority of the land owners have not raised any concerns in this regard but some would like the design and the layout of the Project to be reviewed. Two landowners in Wincanton are in the process of finalising the sale of their farms to renewable energy developers for solar power facilities. In Ripon-Kommadagga, there are two renewable energy projects being proposed, a wind power facility and a hydro-power facility on the same farm. *Table 1.4* lists Project affected farms where renewable energy projects have been proposed.

Table 1.4 Project Sites where Renewable Energy Projects have been Proposed

Project Site	Proposed Renewable Energy Project
Ripon-Kommadagga	Wind and Hydro
Drennan	Solar
Fieldsview	Solar
Wincantion	Solar

The affected landowners have been compensated for the loss of land to other projects, and they will be compensated for the loss of land by Transnet due to the Project; however, it is unknown how the landowners will use the income generated from these developments to develop their farms or

supplement their incomes. It is anticipated that they will invest it in improving their current farming methods and activities.

The impact on agricultural land is going to be experienced as a **direct, negative** impact. The impact on agricultural land resulting from the construction activities will occur at the **on-site and local** level. The loss of land due the Project will be **permanent**. The severity will be low to medium as agricultural land will be lost. The likelihood of the impact occurring is rated as **medium**, and the overall impact magnitude is rated as **low** negative significance, as it relates to the expansion Project.

F2.4.1 Mitigation Measures

- Transnet will consult the affected landowners to discuss sensitive areas on their property and design the infrastructure layout in a manner that limits on agricultural activities.

- Any damage to natural vegetation (specifically grazing) will be rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation.

- Transnet will continue to implement the grievance procedure that ensures that complaints related to Project activities can be lodged and responded to promptly, see *Section 1.2.1*.

F2.4.2 Residual Impact

The implementation of the above mitigation measures would ensure that the construction and operation impacts remain of low significance. The pre- and post-mitigation impacts are compared in *Table 1.5*.

Table 1.5 Pre- and Post- Mitigation Significance: Loss of Agricultural Land

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Construction and Operation	**LOW (-ve)**	**NEGLIGIBLE(-ve)**

F2.5 INCREASED HEAVY AND LIGHT LOAD VEHICLE TRAFFIC ON THE ROADS

Construction materials and goods will be transported to the various sites by road. A total of four major roads will be affected, namely the National Road (N10) in the Eastern Cape, and the Regional Roads (R31, R325, and R385) in the Northern Cape. These roads play an important role in the transportation of goods and people between the Eastern and Northern Cape, and other Provinces. Currently these roads carry a significant number of heavy vehicles, and some of the roads undergo regular upgrades and maintenance. For instance, there are between three and four road work sites on each of

these roads at any given time, each of which operates using a "stop-and-go" system, causing a delay of between 15 and 30 minutes. In the Northern Cape, the majority of the heavy vehicles transport minerals and agricultural products from the mines and farms to other Provinces.

The introduction of additional heavy load vehicles on these roads will result in added strain and further deterioration to road quality. On sections of the roads where there are road works, the waiting time is likely to increase.

Secondary roads leading to the various Project Sites have gravel surfaces, and are narrow in sections; they are likely to be difficult to navigate when it is raining. These roads are currently being used by the farmers and local communities living close to the proposed Project Sites. All farms are fenced off, but at times livestock escape (due to some sections of the fences being unmanned (especially the ones belonging to Transnet) and people forgetting to close the farm gates) and they are found on the roads (specifically at Sishen). In some communities (e.g. Fieldsview) people ride horses on these roads, and the increase in vehicles on the roads will affect these people.

The introduction of both heavy and light vehicles (associated with construction) is likely to impact on the communities in the following ways:

- increased risk of accidents and injuries to people and livestock;
- increased pressure on the secondary roads; and
- increase nuisance factors such as dust and noise (see *Section 8* for impact assessments).

The impact of increased heavy vehicle traffic on the roads will only occur during the construction phase. During operations phase only light vehicles will continue to use the roads to the Project sites. This will occur mainly during maintenance and emergency activities; thus reducing the strain on all Project affected roads.

The impact will be **negative** and **direct** as increased road traffic may lead to the deterioration of major roads, injuries and potential death (human and livestock) on secondary roads. The impact will be **short-term** as it will mainly occur during construction, it will be experienced on the **local**, and **regional/ provincial** levels. The impact severity will be **medium** on both major and secondary roads, as people travelling on the major roads may get frustrated with all the road works; while on the local level, people living close to the Project Sites will be affected by more than increased traffic but also by nuisance factors (dust and noise) and potential fatalities.

The impact is definitely going to occur, thus the likelihood is **high**. The overall impact magnitude (for construction) is rated as **moderate to high**

negative due to the possibility of health problems brought on by increased dust, and fatalities to livestock and people.

Even though the Project will have an impact on the roads during construction, it is envisioned that it will have an positive impact during operations as ii is likely to decrease the heavy vehicle traffic on the major roads.

F2.5.1 Decrease in Heavy Vehicle Traffic

Due to the low capacity of the railway line currently, the majority of the minerals being mined (including manganese ore, iron ore, and others) in the Northern Cape are being transported by road (using heavy vehicles). This has put a severe strain on the road infrastructure, especially the Regional Roads (R31, R325, and R385). It is expected that once the expansion process is completed, the railway line will reach its full capacity, thus taking the strain of the major roads currently used to transport minerals.

Many of the landowners' interviewed were pleased to hear that the expansion of the railway line will reduce the number of heavy load vehicles on the roads. Some reported that they have had accidents, whereby some of the rock materials have fallen off the back of the trucks and hit their car wind-screens.

The decrease in heavy load vehicle traffic will be experienced as an **in-direct positive** impact by many of the road users in the Eastern and Northern Cape. The impact will be **permanent**, as the reduction in road traffic will last beyond the Project lifespan. The Project impact will be of a **local/provincial and national** scale. The impact severity will be **medium,** as there is likely to be limited damage to the roads. There will also be less road traffic accidents, as there will be less heavy vehicles on the roads to distract drivers. The impact will occur and its likelihood is rated as high. Overall the impact significance on decreased heavy vehicle load traffic on the roads is rated as **moderate** positive.

F2.5.2 Mitigation Measures:

- Transnet will inform National and Provincial road agencies about the Project and the scheduled transportation of goods and services to sites and determine the best way forward that will have limited impacts on the major roads (infrastructure and road traffic management).

- Transnet will upgrade the secondary roads should they further deteriorate as a result of Transnet's vehicles.

- Transnet will define and visibly display speed limits along all routes and enforce these amongst all project-related vehicles. Transnet drivers will be sensitised about potential accident risks to local users.

- Transnet to construct traffic calming measures on the road segments that pass through the villages or close to schools in order to reduce speeding.

- Transnet to ensure correct and safe loading of vehicles to avoid accidents.

- Transnet will develop a policy and procedure for assessing all damages and losses (e.g., damage to property, injury or death of people or livestock resulting from negligent project vehicle) and to determine appropriate measures to address these losses. This will be implemented in consultation with the affected parties and other relevant stakeholders, including the authorities.

- Transnet will develop a compensation fund which will be used to compensate farmers who loose livestock due to the Project activities, as well as to compensate people injured by the Project related vehicles.

- Transnet will continue to implement the grievance procedure that ensures that complaints related to Project activities can be lodged and responded to promptly, see *Section 1.2.1*.

- Transnet and its contractor/s will ensure that all drives adhere to the Code of Conduct, see *Section 1.2.1*.

F2.5.3 Residual Impacts

The increase in traffic during the construction phases brings with it a number of key risks to the local communities, road users and road infrastructure. With the implementation of the above mitigation measures, these negative impacts can be reduced to **low** significance. The residual impact for the decrease in heavy vehicle traffic will remain **moderate positive**.

Table 1.6 Pre- and Post- Mitigation Significance: Increased Traffic of Heavy Load and Light Vehicles on the Roads

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Construction	**MODERATE to HIGH (-ve)**	**LOW (-ve)**
Operation	**MODERATE (+ve)**	**MODERATE (+ve)**

F2.6 CHANGE IN SENSE OF PLACE

During the construction phase, there will be increased traffic, dust, and people on the site and affected farms. Due to the remote sparsely populated nature of the site, these impacts will temporarily affect the sense of place. The construction phase activities will result in the creation of nuisance factors e.g. dust, noise, vibration and an increase in traffic. It is predicted that the impact of each of the afore mentioned will be negligible as reported in the specialist studies on noise, dust, vibration and traffic (see Appendix D, respectively). The in-combination effect on the sense of place is likely to be exacerbated.

In addition, during operations there will be an increased in train traffic and the trains will be longer than before (between 105-200 wagons per loop), will resulting in an extended waiting times at level road crossings across both Project affected provinces.

Nuisance factors will be a direct **negative** impact for Project affected landowners and their neighbours; however, these will be short-term and experienced mostly during construction. The scale of the impact will be **on-site** and **local**, as it will only be felt by a limited number of people. The severity of the impact is **low** as community livelihoods will not be affected. There is a **high** likelihood that the impact will occur and as such, the overall magnitude of this impact is therefore **low** for construction and **negligible** for operations**.**

F2.6.1 Mitigation Measures:

- Mitigation related to noise and vibration, and air quality impacts are described in Sections 7.

- Transnet will give adequate notice to the landowners and their neighbours before construction phase activities commences.

- Notice will be given to surrounding landowners before construction begins such that they are aware of the impacts and may make the necessary changes.

- Work together with local farmer unions and landowners to clearly explain the increased waiting time that is expected at the different crossings.

F2.6.2 Residual Impact

With the implementation of the above mitigation measure, the impact can be reduced from **low** negative to **negligible**. The pre- and post-mitigation impacts are compared in *Table 1.7***.**

Table 1.7 Pre- and Post- Mitigation Significance: Change in Sense of Place

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Construction	**LOW (-ve)**	**LOW (-ve)**
Operation	**NEGLIGIBLE**	**NEGLIGIBLE**

F2.7 MANAGING STAKEHOLDER EXPECTATIONS

During the previous EIA (2009) railway upgrade, stakeholder concerns centred on employment and procurement opportunities for the local communities. The same issues were raised as part of the initial site visits for the current expansion Project. It is, therefore, anticipated that the same issues will be raised again for the current Project. As stated in *Section F2.2*, there will be limited employment opportunities for unskilled labour; and the majority of the jobs that will be created will be temporary (mainly construction). As a result only a limited number of people will receive jobs. Local construction and other business owners raised concerns regarding with the awarding of tenders for such projects. They stated that businesses owned by previously disadvantaged people are often not awarded tenders as they lack experience in the construction / supply chain.

Issues related to the community benefits that extend beyond creation of employment issues have also been raised. It is important for Transnet to pro-actively managed these expectations, as they can lead to escalated levels of conflict and tension if they are not managed in a proactive manner. As such all grievances raised need to be addressed as per the process outlined in the grievance mechanism.

F2.7.1 Precautionary Mitigation:

- All concerns regarding jobs and other expectation will be addressed in accordance to the grievance procedures, see *Section 1.2.1*.
- Maximize local employment and procurement as outlined in *Section 1.2.1*.
- Advertise job criteria, required skills and experience for available jobs through local and national media and local communication channels.

- Advertise experience, quality and volume requirements for the supply chain needs.

- Local residents' expectations of Transnet will continue to grow over time. It will not be possible for Transnet to deliver on all community and stakeholder expectations; hence a **CSI Programme** should be developed that clearly outlines the anticipated initiatives. These initiatives will need to be identified in consultation with the local communities. The plan should outline what the nature of the assistance will be and how the investment projects will be distributed through the project area. This strategy will be communicated to stakeholders / local residents to ensure that their expectations remain realistic and are well-managed. Examples of potentially relevant programmes could include community policing, financial management, and drilling of boreholes.

Table 6 Impact Assessment

Impact	Alternative 1 (Preferred)
Impacts on vegetation and protected plant species	Duration: L: Invasive alien vegetation is highly likely to remain beyond the life of the project once established. Likelihood: l-M: It is highly likely that alien invasive vegetation will establish itself as a result of suitable conditions generated by construction activities. Pre-mitigation: Minor Post mitigation: Minor
Alien Plant Invasion Risk	Duration: M: With respect to the loops where habitat can re-establish itself. Likelihood: L: Some faunal loss / disturbance will definitely occur. Pre-mitigation: Minor Post mitigation: Minor
Increased erosion risk	Duration: M: Any loss of endangered invertebrate species will be permanent. Likelihood: L: Some protected invertebrates will definitely be impacted upon. Pre-mitigation: Minor Post mitigation :Minor
Direct Faunal impacts	Duration: S: Invasive alien vegetation is highly likely to remain beyond the life of the project once established. Likelihood: M: It is highly likely that alien invasive vegetation will establish itself as a result of suitable conditions generated by construction activities. Pre-mitigation: Minor Post mitigation: Minor
Impacts on Critical Biodiversity Areas	Duration: L: Invasive alien vegetation is highly likely to remain beyond the life of the project once established. Likelihood: L: It is highly likely that alien invasive vegetation will establish itself as a result of suitable conditions generated by construction activities. Pre-mitigation: Minor Post mitigation: Minor
Noise disturbance	Duration: S-t: - Impact expected during the construction phase only.

Impact	Alternative 1 (Preferred)
	Likelihood: H: Owing to the remoteness of project area and topography, noise impacts will definitely be experienced, even though this will be over a short duration (3-5mth period) and affect few receptors. Pre-mitigation: Moderate (Medium magnitude, high likelihood) Post mitigation: Minor
Removal of declared invader and weed species	Duration: T: Clearing of weed / alien invasives will only last for a short period. Alien vegetation is likely to re-establish. Surface disturbance may even accelerate propagation and spread. Likelihood: M: It is highly likely that some alien vegetation will be cleared. Pre-mitigation: Minor (Positive) (Low magnitude, medium likelihood) Post mitigation: Minor
Loss of or disturbance to sites of archaeological, paleontological or cultural significance	Duration :L: Loss of paleontological of vandalism of cultural heritage resources is expected to be permanent Likelihood: L: It is possible that archaeological, paleontological or cultural resources may be impacted during construction. Pre-mitigation: Minor (Medium magnitude, medium likelihood) Post mitigation: Negligible
Soil erosion	Duration: S-t: Erosion may occur during the construction phase only. Likelihood: L: Soil erosion at loop sites is possible. Pre-mitigation: Minor (Medium magnitude, low likelihood) Post mitigation: Negligible
Contamination of soil and groundwater resources	Duration: 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. Likelihood: L: Contamination impacts are possible, especially at fuel / chemical handling and storage areas. Pre-mitigation: Minor (Medium magnitude, low likelihood) Post mitigation: Negligible
Potential contamination of surface water features	Duration: S-t to L-t: Effects on surface water features polluted during construction may persist beyond the construction period. Likelihood: L: Contamination impacts are possible, especially at fuel / chemical handling and storage areas. Pre-mitigation: Minor (Medium magnitude, low likelihood) Post mitigation: Negligible
Dust nuisance	Duration: S-t: - Impact expected during the construction phase only. Likelihood: M: Dust impacts are very likely to occur at all development sites, although in very small measures. Pre-mitigation: Minor (Low magnitude, medium likelihood) Negligible
Vibration nuisance	Duration: S-t: - Impact expected during the construction phase only. Likelihood: L: Vibration levels of typical construction machinery are within acceptable levels. Pre-mitigation: Negligible (Low magnitude, low likelihood)

Impact	Alternative 1 (Preferred)
	Post mitigation: Negligible
Disruption to run-off / surface water flow affecting river systems	Duration: S-t: Earthworks and stockpiling will only occur during the construction phase. Likelihood: 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. Pre-mitigation: Negligible (Medium magnitude, negligible likelihood) Post mitigation: Negligible
Traffic disruption and hazards	Duration: S-t: Impact expected during the construction phase only. Likelihood: L: Impact possible where site is close to communities or high use public roads. For example Golden Valley, is located alongside national roads. Pre-mitigation: Negligible (Low magnitude, low likelihood) Post mitigation: Negligible

Social impacts (construction phase)

Impact	Alternative 1 (Preferred)
Increased pressure on infrastructure and services	Duration: S-t: Impact expected during the construction phase only. Likelihood: M: It is highly likely that there will be an increase in pressure on existing infrastructure Pre-mitigation: Moderate (Medium magnitude, medium likelihood) Post mitigation: Minor
Spread of HIV / AIDS and STIs	Duration: L: The impact could be permanent in some cases as it could potentially lead to the death of individuals. Likelihood: M: The influx of migrant workers is likely to lead to an increase in the prevalence of these diseases. Pre-mitigation: Moderate (Medium magnitude, medium likelihood) Post mitigation: Moderate
Increase in Social Ills	Duration: S-t: Impact expected during the construction phase only. Likelihood: M: The introduction of a construction workforce will likely lead to an increase in social ills. Pre-mitigation: Moderate (Medium magnitude, Medium likelihood) Post mitigation: Moderate
Potential employment and procurement opportunities	Duration: S-t: Impact expected during the construction phase only. Likelihood: H: Procurement of goods, services and employment (direct and indirect) will definitely be created for the duration of the construction phase. Pre-mitigation: Minor (low magnitude, high likelihood) Post mitigation: Negligible

Operation phase

The identified impacts and ratings are summarized in the Table below:

Impact	Alternative 1 (Preferred)
Impact from increased noise generation	Duration: L-t: Increased noise generation is associated with additional volumes of trains on the line, which will increase over time. Likelihood: M: Noise disturbance, above acceptable levels, will very likely be experienced at locations with settlements in close proximity to the line (30m – 100m). Pre-mitigation: Major (High magnitude, medium likelihood) Post mitigation: Major
Impact of manganese dust	Duration: L-t: It is expected that manganese ore will be transported on the line for the duration of its lifespan Likelihood: L: Although the manganese is transported as chunks of ore, some dust may possibly be dispersed off the open wagons, even though the quantities will be negligible. Pre-mitigation: Negligible (Low magnitude, low likelihood) Post mitigation: Negligible
Impacts from increased vibration effects	Duration: L-t: Increased vibration effects are associated with additional volumes of trains on the line, which will increase over time. Likelihood: L: The effect of the vibration caused by one train is expected to be similar to the current situation, even though the frequency of the vibration disturbance will increase. Pre-mitigation: Negligible (Low magnitude, low likelihood) Post mitigation: Negligible
Impact on public safety	Duration: L-t: Risk will exist for the duration of the lines operation. Likelihood: L: The likelihood of level crossing incidents is considered to be negligible; it is possible that incidents may occur due to human error. Pre-mitigation: Negligible (Low magnitude, low likelihood) Post mitigation: Negligible

Social impacts (operational phase)

Impact	Alternative 1 (Preferred)
Change in Sense of Place	Duration: L-t: The impact may be experienced at various stages during the project lifetime Likelihood: M: It is very likely that the sense of place will be impacted on for some people/communities. Pre-mitigation: Moderate (Medium magnitude, medium likelihood) Post mitigation: Negligible
Potential employment and procurement opportunities	Duration: L-t: Jobs will be created over the lifetime of the project as the volumes of product being handled increases. Likelihood: L: The likelihood of permanent job creation and procurement is possible, although the expected levels will be significantly lower during operations as opposed to the construction phase Pre-mitigation: Negligible (Low magnitude, low likelihood) Post mitigation: Negligible

It can be seen from the Table above that although a number of impacts have been identified, the post-mitigation significance of these are not considered to be major. It is therefore recommended that the proposed

expansions ad new loops be authorized provided that the recommended mitigation measures are implemented.

No-Go Alternative

The no-go or do nothing alternative (i.e. the maintenance of the status quo) involves not extending / constructing the proposed loops.

The impact of not implementing the Project can be viewed as both positive and negative. The positive consequences include not causing impacts to the biophysical and social environment, particularly to sensitive ecological or social receptors, whereas the negative implications are associated with the direct loss of opportunities for local employment and procurement of goods and services at a provincial and national scale. The key negative consequence would, however, be lost opportunities and revenue associated with reduced manganese export and container handing. If the railway line and associated structures is not upgraded to handle the additional capacity, this would result in a negative, direct impact on generation of foreign income, which would affect the provincial and national economy. Negative, indirect impacts would also be experienced on the supply chain that services this sector of the economy.

Significance of not implementing the project:

Nature of Impact:	**Negative**
Duration:	Long-term
Extent:	National
Likelihood:	High
Magnitude:	Minor
Pre-mitigation significance:	Major

Table** Error! No text of specified style in document.* ***Loops (construction phase impacts)

Impact	**Description**	**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	Intensity N – Negligible L – Low M – Medium H - High			
Impacts on vegetation and protected plant species		O: Alien vegetation is likely to establish itself on-site.	L: 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	Moderate
Alien Plant Invasion Risk		O: Impact will be on-site within the rail reserve	L: 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.	Minor	Minor

Impact	Description	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	Intensity N – Negligible L – Low M – Medium H - High			
Increased erosion risk	Clearing of vegetation, establishment of access roads and removal of fences, etc will directly affect faunal habitat. Indirect loss of diversity and species richness is associated with habitat loss.	O: Impact will be on-site within the rail reserve	L-t: With respect to the loops where habitat can re-establish itself.	M: Disruption to or loss of faunal habitat may result in temporary relocation of fauna and/or change in behavioural patterns.	H: Some faunal loss/ disturbance will definitely occur.	Minor	Minor
Direct Faunal impacts	General construction activity could lead to a loss of endangered burrowing scorpions and baboon spiders.	O: Impact will be on-site within the rail reserve	L: Any loss of endangered invertebrate species will be permanent.	M: Although invertebrate species can escape/ move away from construction sites, some endangered species may be killed during construction.	H: Some protected invertebrates will definitely be impacted upon.	Minor	Minor
Impacts on Critical Biodiversity Areas	Negative impacts on Critical Biodiversity Areas would result from the transformation of natural habitat within areas classified as CBAs. This					Minor	Minor

Impact	Description	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	Intensity N – Negligible L – Low M – Medium H - High			
	impact is only relevant to the sites in the Eastern Cape, as no fine-scale conservation planning has been conducted in the Northern Cape sections.						
Noise disturbance	Noise disturbance could result from the use of heavy machinery, blasting, drilling and general construction activities.	O: Impact will be on-site within the rail reserve	S-t: - Impact expected during the construction phase only.	M: Noise impacts will be more severe where social receptors are in close proximity to the loop site (within 50m) such as at Golden Valley.	H: Owing to the remoteness of project area and topography, noise impacts will definitely be experienced, even though this will be over a short duration (3-5mth period) and affect few receptors.	Moderate (Medium magnitude, high likelihood)	Minor
Loss of or disturbance to sites of archaeological, paleontological or cultural significance	Construction activities may result in the disturbance, damage or destruction of sites of medium to high cultural significance (as defined in the NHRA) or sites of	O: Impact will be on-site within the rail reserve	S-t: Vandalism likely to have a short-term impact on the cemetery site	M	L: It is possible that the cemetery may be impacted during construction.	Minor (Medium magnitude, medium likelihood)	Negligible

Impact	Description	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	Intensity N – Negligible L – Low M – Medium H - High			
	paleontological importance.						
Dust nuisance	The generation of dust through site clearance, earthworks and general construction activities could pose a nuisance to social receptors in proximity to the loop sites.	O: Impact will be on-site within the rail reserve	S-t: - Impact expected during the construction phase only.	L: Social receptors are not likely to be affected by the amount of dust generated.	M: Dust impacts are very likely to occur at all development sites, although in very small measures.	Minor (Low magnitude, medium likelihood)	Negligible
Vibration nuisance	Vibration effects generated from construction related activities such as drilling and blasting could impact on social and biophysical receptors.	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	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

Impact	Description	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	Intensity N – Negligible L – Low M – Medium H - High informal). See Vibration Study Report in Annex A7.			
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.	L: The Boesmans River borders the rail reserve at Tootabi.	S-t: Earthworks and stockpiling will only occur during the construction phase.	M:	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

Table 8 Social impacts for all project components during the construction phase

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
Impact on the Local Economy	The Project is expected to contribute to the local economy in the following ways: • increased exportation of manganese ore; • creation of direct and indirect employment which will lead to increased spending; and • procurement of local goods and services. The capital	All loops, yards and the substation but more relevant to sites where isolated, local communities are located in proximity to the site	National , Regional and Local	Construction- short term Operation – long term	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 positive	Mode4rate postive

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	investment required to expand the railway loops is high at approximately R19.2 billion, which will be spent over the construction period (xxx). The increase in exportation of manganese ore is expected to generate an estimated annual income of R23.4 billion, should the proposed increase tonnage be met. The Project is expected to create an estimated 12,171 employment opportunities, of which 9,128 will be indirect. Approximately 572 permanent positions will be created by the Project. The							

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	Project will require highly skilled, semi-skilled and unskilled workers to undertake the construction. Due to the technical nature of the construction phase, a big proportion of the workforce will be skilled and semi-skilled employees. Transnet is planning to employ people from the local areas for each contract; which will result in a large number of people benefiting from the Project.							
Disrupted Agricultural Activities	The majority of the Project affected farms are solely used for agricultural purposes; including both crop and livestock farming. Livestock kept on the farms consists of sheep,	All loops, yards and the substation but most relevant to the loops	L: The impact is not expected to be transmitted beyond the local level.	S: The impact could be permanent in some cases as it could potentially lead to the death of individuals.	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	Major	Minor

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	goats, and cattle; while crops include Lucerne, peppers, maize, and fodder. During the construction phase of the Project the agricultural activities will be disrupted on the Project affected farms. The construction activities that are likely to disrupt agricultural activities include site clearance, road widening/construction, assembly and installation of rail and associated infrastructure.					diseases.		
Loss of Agricultural Land	The combined size of the project affected farms is approximately 20,000 ha. It is estimated that 35.71 ha of the total land will be required for the	All loops, yards and the substation	Local only .	L-t: Impact expected during the construction phase only.	M:	M:	Minor to Negligible	Minor to Negligible

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	Project. The key issues that affect decision-making regarding any proposed changes to land use, from agricultural use to other use, are the following: • Soil quality: The authorities are unlikely to allow any kind of development in an area that has good soil quality or high potential soil. Most of the soil in the Eastern Cape Province is considered to be of high quality with a few strips of low value soils, this makes it highly likely that a development may be							

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	stopped. • Compatibility of farming and the proposed Project: The authorities would want to determine if the agricultural land will be maintained alongside the extended railway line. If the project is going to impact negatively on the							

Impact	Description	Applicable Sites	Magnitude of Impact Extent O – On-site L - Local R – Regional N - National	Duration T – Temporary S-t – Short-term L-t – Long term L - Long term	Intensity N – Negligible L – Low M – Medium H - High	**Likelihood of impact occurring** **N – Negligible** **L – Low** **M – Medium** **H - High**	**Significance (Pre - Mitigation)**	**Significance (Post - Mitigation**
	sustain ability of the farm the authorities are unlikely to give a permit for the change in land use.							
Increased Heavy and Light Load Vehicle Traffic on the Roads	Construction materials and goods will be transported to the various sites by road. A total of four major roads will be affected, namely the National Road (N10) in the Eastern Cape, and the Regional Roads (R31, R325, and R385) in the Northern Cape. These roads play an important role in	All loops, yards and the substation.	Regional and Local	Construction: short term Operation: long term	Medium	High	Construction: Moderate to Major Operation: Moderate positive	Construction Low Operation: Moderate positive

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	the transportation of goods and people between the Eastern and Northern Cape, and other Provinces. Currently these roads carry a significant number of heavy vehicles, and some of the roads undergo regular upgrades and maintenance. For instance, there are between three and four road work sites on each of these roads at any given time, each of which operates using a “stop-and-go” system, causing a delay of between 15 and 30 minutes. In the Northern Cape, the majority of the heavy vehicles transport minerals and agricultural products from the mines and farms							

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	to other Provinces.							
Decrease in Heavy Vehicle Traffic	Due to the low capacity of the railway line currently, the majority of the minerals being mined (including manganese ore, iron ore, and others) in the Northern Cape are being transported by road (using heavy vehicles). This has put a severe strain on the road infrastructure, especially the Regional Roads (R31, R325, and R385). It is expected that once the expansion process is completed, the railway line will reach its full capacity, thus taking the strain of the major roads currently used to transport minerals.		Regional and Local	Construction: short term Operation: long term	Medium	High	Construction: Moderate to Major Operation: Moderate positive	Construction Low Operation: Moderate positive

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
Change in Sense of Place	During the construction phase, there will be increased traffic, dust, and people on the site and affected farms. Due to the remote sparsely populated nature of the site, these impacts will temporarily affect the sense of place. The construction phase activities will result in the creation of nuisance factors e.g. dust, noise, vibration and an increase in traffic. It is predicted that the impact of each of the afore mentioned will be negligible as reported in the specialist studies on noise, dust, vibration and traffic. The in-combination effect on the sense of		Local	Long term	Medium	medium	Construction Minor negative Operation Negligible	Construction Minor negative Operation Minor negative

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
Managing Stakeholder Expectations	place is likely to be exacerbated. During the previous EIA (2009) railway upgrade, stakeholder concerns centred on employment and procurement opportunities for the local communities. The same issues were raised as part of the initial site visits for the current expansion Project. It is, therefore, anticipated that the same issues will be raised again for the current Project. As stated in Section 1.2, there will be limited employment opportunities for unskilled labour; and the majority of the jobs that will be created will be							

Impact	Description	Applicable Sites	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
	temporary (mainly construction). As a result only a limited number of people will receive jobs. Local construction and other business owners raised concerns regarding with the awarding of tenders for such projects. They stated that businesses owned by previously disadvantaged people are often not awarded tenders as they lack experience in the construction/ supply chain.							

Table 9 Railway line including the loops (operational phase impacts)

Impact	**Description**	**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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
Impact from increased noise generation	Impact on sensitive receptors such as human settlements, schools and wildlife areas owing to an increase in the frequency of trains.	L: Impact will extend beyond the rail reserve	L-t: Increased noise generation is associated with additional volumes of trains on the line, which will increase over time.	H: For those social receptors close to the railway line, where no buffer (e.g. steep or undulating topography) is present, noise impacts are expected to occur. On this basis, the noise study indicates that for trains travelling at an average speed of 45km / hr passed rural residential settlements approximately 30m from the line, the acceptable noise limit of 45dBA (according to SANS10103) will be exceeded by 14dBA . When the increase in train volumes is at its highest (estimated to be in	M: Noise disturbance, above acceptable levels, will very likely be experienced at locations with settlements in close proximity to the line (30m – 100m).	Moderate	Minor

Impact	Description	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
				2020), the acceptable noise limits will be exceeded by 18dBA at 45km / hr. The intensity of the impact will be even greater at higher train speeds.			
Impact of manganese dust	Impact on sensitive receptors such as human settlements and wildlife areas due to long-term exposure.	L: Impact will extend beyond the rail reserve	L-t: It is expected that manganese ore will be transported on the line for the duration of its lifespan	L: A previous study modelled quantities which showed the amount of additional manganese dust generated by increased train volumes to be negligible and within acceptable limits. Manganese dust generation is associated more with handling areas such as at the mines and at the export terminals. There is, therefore, not expected to be any alteration of ecological function and processes or any effect or people that may be living in proximity to the line.	L: Although the manganese is transported as chunks of ore, some dust may possibly be dispersed off the open wagons, even though the quantities will be negligible.	Negligible (Low magnitude, low likelihood)	Negligible

Impact	Description	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 L - Long term	Intensity N – Negligible L – Low M – Medium H - High			
Impacts from increased vibration effects	Impact of ground borne vibration on sensitive receptors such as settlements (people, houses & structures), from an increase in the frequency of trains.	L: Impact will extend beyond the rail reserve	L-t: Increased vibration effects are associated with additional volumes of trains on the line, which will increase over time.	L:	L: The effect of the vibration caused by one train is expected to be similar to the current situation, even though the frequency of the vibration disturbance will increase.	Negligible (Low magnitude, low likelihood)	Negligible