

Visual Impact Assessment:

Proposed Lephalale Railway Yard and two associated borrow areas, Steenbokpan, west of Lephalale, Waterberg District, Limpopo Province

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EXECUTIVE SUMMARY

Transnet SOC Limited (Pty Ltd) is applying for environmental authorisation to construct the Lephalale Railway Yard and its associated infrastructure. The Lephalale Railway Yard is an existing 100-wagon yard along the existing Lephalale –Thabazimbi railway track in the Waterberg District, which just requires extension for it to accommodate 200 train wagons in future for the increase in load and capacity.

The aim with the extension of the yard is to allow more trains to enter and exit Lephalale, to check rolling stock, allow switching of crew and to function as a service and maintenance facility for diesel locomotives.

The new railway yard is a Strategic Infrastructure Project (SIP) and is instrumental in “unlocking the northern mineral belt of the Waterberg as a catalyst” by creating rail capacity to Mpumalanga and Richards Bay. The requirement to transport coal and coal products from Lephalale to end users across South Africa and beyond have increased tremendously and demand scenarios generated from customers and public domain sources range from 80 Mtpa to 135 Mtpa. Therefore the increased rail capacity is required to support the forecast growth and demand for long term rail network capacity from the Waterberg area.

The yard will be 5km in length along the existing rail track and 60 metres that will extend beyond the existing Transnet servitude and requires the acquisition of an additional 22 hectares of land.

The brief for the project supplied by Naledzi Environmental Consultants Pty Ltd was to compile a Visual Impact Assessment Report for the project that consists of:

- The four (4) new service tracks for the Lephalale Railway Yard development
- Three buildings (office building, administration building (North Facility) and maintenance and repair building (South Facility)) to be constructed in two phases
- Phase 1 will include building a bypass line south of the existing track to enable an alternative route whilst building the new tracks
- Phase 2 will include the building of the additional railway tracks, the bulk of the earthworks and building the facilities.
- Investigate the site for the railway yard and the two proposed borrow pits (and its alternatives) and make recommendations with regard to the visual impacts.

During the field survey, the possible visual impacts were noted.

The primary visual concern of the proposed new railway line and associated infrastructure was investigated and can be summarised as follows:

Railway lines and associated infrastructure

- From the survey it was clear that the visual disturbance will be in an area close to the railway line – 100m and less. The dense vegetation and high trees will screen the activities.
- It is important to note that in a few places the railway line will be elevated to ensure a level working area – expected the height of the railway line and train will not be more than 10m.
- The height of the stores (single steel structure) will be in the order of 10 – 12 meters.
- During the site visit, it was mentioned by the engineers that a communications tower will be erected – height was not confirmed. This single structure will have a smaller visual disturbance when compared to the 1400kV power lines.

- The view from the small outcrops in the nature reserve (south of the railway line) will have a very low visual disturbance from the proposed new infrastructure.
 - The high vegetation will screen the activities
 - The distance in more than 1km away and the background vegetation will further lower any visual disturbances
 - The clearing of vegetation for the intensive breeding facility (western section of the reserve area) will not increase the visual impact from the outcrops significantly
- It is clear that the existing visual impacts (power lines, game fences, power station) is high. The additional impact from the railway line will be very small and won't increase the already high visual impact.
- The impact from lights at night must be noted.
- It is recommended that all pylons for lights must be as low as possible – preferably not higher than any other structures.
- It is recommended that the lights must face towards the activities in order to lower the potential light pollution towards the surrounding landscape.
- Lights must be managed – only use the lights in areas where physical activities are ongoing, the rest must be switched off.

Borrow pits

- Very low visual impacts.
- The sites can be screened by the vegetation.
- Site B2 (recommended by the landowner) is in an old cultivated field – will have a moderate visual impact in that area.

Contents

EXECUTIVE SUMMARY	i
INTRODUCTION.....	1
METHODOLOGY	5
DISCUSSION	7
Existing land use	7
Landscape character	7
Construction of the new railway lines and the associated infrastructure.....	8
Borrows Pits.....	32
Borrow Pit 1	32
Borrow Pit 2	33
CONCLUSIONS.....	35
Railway lines and associated infrastructure	35
Borrow pits	35
REFERENCES.....	36

The Environmental Impact Assessment Regulations (Regulation 17 of Government Notice No R354 of 2010), requires that certain information is included in specialist reports. The terms of reference, purpose of the report, methodologies, assumptions and limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below.

Expertise of author:

- Working in the field of ecology since 1996 and in specific vegetation related assessments since 2000.
- Worked in the field of freshwater ecology and wetlands since 2000.
- Involved with visual assessments since 2009.
- Is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Reg. No. 400109/95).

Declaration of independence:

BioAssets in an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by BioAssets is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure:

BioAssets undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to BioAssets by the client, and in addition to information obtained during the course of this study, BioAssets present the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practise.



Dr Wynand Vlok (Pr. Sci. Nat 400109/95)

10 March 2019

Date

INTRODUCTION

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- Investigate the site for the railway yard and the two proposed borrow pits (and its alternatives) and make recommendations with regard to the visual impacts.

During the field survey, the possible visual impact from the railway yard, the associated infrastructure and the borrow pits were investigated. The important aspect used during the study, was to determine areas where the proposed development will have visual impacts and each of the problem areas were photographed and assessed for this the report. The process followed included:

- The site visit aimed to record the receiving environment
- During the desk top study and site visit the physical characteristics of the project were described
- General landscape characterisation was recorded and this was done by focussing on the landscape and the nature of the environment
- The potential views or visual receptors were mapped according to specialist’s studies (refer to Social Report) and the I&AP comments on the visual impacts. Concerns were related to the visual changes of the environment with regard to the livestock and game farms and the nature reserve – related to visitors travelling in the area and visiting the facilities
- From these aspects the significance of the visual impact for each component of the project was determined and then some mitigation and management options are listed.

When one assess the study area, it is clear that various impacts are currently present and it will have an influence on the visual impact assessment. The study area is in some cases highly developed and

many activities contribute to have a negative impact on the area. These include farming activities (e.g. game farms and its associated infrastructure, the power station and the numerous power lines, small businesses, mining, roads and residential areas.

For this study it is possible to look at the visual resource associated with the environment and study area and it can be rated as follows:

- High – the majority of the study area is devoid of infrastructure elements
- Moderate – area shows some development, erosion, alterations or degradation
- Low – the area is severely modified or altered with developments lowering the scope for positive enhancement of the area.

One can further rate the impact using the following exposure ratings (Table 1).

Table 1: Visual exposure ratings

	High exposure	Moderate exposure	Low exposure	Insignificant exposure
Surrounding farms	0-1.5km	1.5-3km	3-10km	More than 10km
Tourists	0-1.5km	1.5-3km	3-10km	More than 10km
Motorists	0-1.5km	1.5-3km	3-10km	More than 10km

The following are indicators that could suggest the need for visual input based on the nature of the receiving environment and the nature of the project and includes:

- Areas with protection status, such as national parks or nature reserves;
- Areas with proclaimed heritage sites or scenic routes;
- Areas with intact wilderness qualities, or pristine ecosystems;
- Areas with intact or outstanding rural or townscape qualities;
- Areas with a recognised special character or sense of place;
- Areas lying outside a defined urban edge line;
- Areas with sites of cultural or religious significance;
- Areas of important tourism or recreation value;
- Areas with important vistas or scenic corridors;
- Areas with visually prominent ridgelines or skylines.

Table 2: Categorisation of issues to be addressed by the visual assessment

Type of environment	Type of development - Low to high intensity				
	Category 1 development	Category 2 development	Category 3 development	Category 4 development	Category 5 development
Protected/wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural, historical significance / disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

The key to the categories of development are the following:

- Category 1 development: e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.
- Category 2 development: e.g. low-key recreation, resorts or residential type development, small-scale agriculture or nurseries, narrow roads and small-scale infrastructure.
- Category 3 development: e.g. low density resort and residential type development, golf or polo estates, low to medium-scale infrastructure.
- Category 4 development: e.g. medium density residential development, sports facilities, small-scale commercial facilities and office parks, one-stop petrol stations, light industry, medium-scale infrastructure.
- Category 5 development: e.g. high density township and residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations, quarrying and mining activities with related processing plants.

Explanation of terms used above is:

- Low-key development – generally small-scale, single-storey domestic structures, usually with more than 75% of the area retained as natural (undisturbed) open space.
- Low density development¹ - generally single or double-storey domestic structures, usually with more than 50% of the area retained as natural (undisturbed) open space.
- Medium density development - generally 1 to 3 storey structures, including cluster development, usually with more than 25% of the area retained as green open space.
- High density development - generally multi-storey structures, or low-rise high density residential development.

The following key to the categories of issues is used:

- Very high visual impact expected:
 - Potentially significant effect on wilderness quality or scenic resources;
 - Fundamental change in the visual character of the area;
 - Establishes a major precedent for development in the area.
- High visual impact expected:
 - Potential intrusion on protected landscapes or scenic resources;
 - Noticeable change in visual character of the area;
 - Establishes a new precedent for development in the area.
- Moderate visual impact expected:
 - Potentially some effect on protected landscapes or scenic resources;
 - Some change in the visual character of the area;
 - Introduces new development or adds to existing development in the area.
- Minimal visual impact expected:
 - Potentially low level of intrusion on landscapes or scenic resources;
 - Limited change in the visual character of the area;
 - Low-key development, similar in nature to existing development.
- Little or no visual impact expected:
 - Potentially little influence on scenic resources or visual character of the area;
 - Generally compatible with existing development in the area;
 - Possible scope for enhancement of the area.

In this section the following terms refer as follows:

- Fundamental change – dominates the view frame and experience of the receptor;
- Noticeable change – clearly visible within the view frame and experience of the receptor;
- Some change – recognisable feature within the view frame and experience of the receptor;
- Limited change – not particularly noticeable within the view frame and experience of the receptor;
- Generally compatible – Practically not visible, or blends in with the surroundings.

METHODOLOGY

The position of the new railway lines and associated facilities and the proposed borrow pits (and alternatives) were assessed and all possible areas of impact were photographed. Current visual impacts and other positive natural features were assessed as part of the survey.

The sites were mapped and aerial photographs and maps were studied during the desktop assessment to identify landscape features. The inputs from the meetings with stakeholders were used to identify additional areas of concern and the survey was then planned to include all these areas.

When carrying out an assessment of likely effects on a landscape resource and on visual amenity it is important to remember this is a complex issue simply because it is determined through a combination of quantitative and qualitative evaluations. When assessing the visual impact in an area, it is important to take the worst-case scenario into account, as this is how all participants (local inhabitants) experience the possible development. Landscape and visual assessments are separate, although linked, procedures.

The landscape, its analysis and the assessment of impacts on the landscape all contribute to the baseline for visual impact assessment studies. The assessment of the potential impact on the landscape is carried out as an impact on an environmental resource, i.e. the physical landscape. Visual impacts, on the other hand, are assessed as one of the interrelated effects on people (i.e. the viewers and the impact of an introduced object into a particular view or scene).

- **The Visual Resource**
Landscape character, landscape quality (Warnock and Brown, 1998) and “sense of place” (Lynch, 1992) are used to evaluate the visual resource i.e. the receiving environment. A qualitative evaluation of the landscape is essentially a subjective matter. In this study the aesthetic evaluation of the study area is determined by the professional opinion of the author based on site observations and the results of contemporary research in perceptual psychology.
- **Landscape Impact**
The landscape impact of a new development is measured as the change to the fabric, character and quality of the landscape caused by the physical presence of the new development. Identifying and describing the nature and intensity of change in the landscape brought about by the proposed railway yard is based on the professional opinion of the author supported by photographic simulations. It is imperative to depict the change to the landscape in as realistic a manner as possible. To do this, photographs were taken from key viewpoints to illustrate the physical nature of the proposed railway yard in its final form within the context of the landscape setting. The resultant change to the landscape can then be observed and an assessment of visual intrusion made.
- **Visual Impact**
Visual impacts are a subset of landscape impacts. Visual impacts relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people’s responses to the changes, and to the overall effect with respect to visual amenity. Visual impact is therefore measured as the change to the existing visual environment (i.e. views) caused by the intervention and the extent to which that change compromises (negative impact) or enhances (positive impact) or maintains the visual quality of the scene as perceived by people visiting, working or living in the area. This approach reflects the layman’s concerns, which normally are:
 - Will I be able to see the new development?
 - What will it look like?

- Will the development affect views in the area and if so how?

Landscape and visual impacts do not necessarily coincide. Landscape impacts can occur in the absence of visual impacts, for instance where a development is wholly screened from available public views, but nonetheless results in a loss of landscape elements and landscape character within a localised area (the site and its immediate surrounds).

- Intensity of Visual Impact

The intensity of visual impact is determined using visual intrusion, visibility and visual exposure criteria (Hull and Bishop, 1988), qualified by the sensitivity of viewers (visual receptors) towards the proposed development. The intensity of visual impact is therefore concerned with:

- The overall impact on the visual amenity, which can range from degradation through to enhancement;
- The direct impacts of the landfill upon views of the landscape through intrusion or obstruction;
- The reactions of viewers who may be affected by the activity.

- Significance of Visual Impact

The significance of impact was determined using a ranking scale, based on terminology from the Department of Environmental Affairs and Tourism's (DEAT, 1998) guideline document on EIA Regulations.

The following criteria are used:

- Occurrence, based on:
 - Probability of occurrence (how likely is it that the impact may occur?)
 - Duration of occurrence (how long may it last).
- Severity, based on:
 - Intensity of impact (will the impact be of High, Moderate or Low intensity?) and
 - Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

DISCUSSION

The discussion will focus on the new railway line extension, the associated buildings and the two borrow pits and the proposed alternatives sites.

Existing land use

Land use currently includes the following: the Medupi Power Station Complex, new developments associated with this complex, mining in the larger area around the railway line, settlements, cultivation (both subsistence and commercial), cattle farming (both subsistence and commercial), game farming, ecotourism and other associated infrastructure. The residential impacts are associated with the power station, mining activities, agricultural activities, tourism, roads, power lines, telephone lines and cell phone towers, erosion and dumping of refuse.

Tourism is an important activity associated with the game farms and the nature reserve and include travelling of visitors to local residents and visitors to a number of tourism destinations in the area. Some of the roads are tarred and some are gravel roads. A number of power lines (ranging from 11kV to 1400kV) are present in the area with telephone lines and cell phone communications masts dotting the landscape.

Landscape character

The landscape at the study site is dominated by the undulating plains with some ephemeral drainage lines feeding into streams and rivers, a few low rocky outcrops, limited cultivated lands (mostly not in use anymore), game farms, cattle farms, mining operations and residential developments. The main activity in the area is associated with the Medupi Power Station Complex.

Construction of the new railway lines and the associated infrastructure

For this study the main focus was on the area near the railway lines and the proposed new buildings, as these are considered to have the highest visual impact for the landowners and guests. The key observation points (KOPs) are highlighted in Figure 1. KOPs are typically used as viewpoints for assessing potential visual impacts resulting from a proposed management activity.

Table 3 is a summary of the key observation points (KOPs).

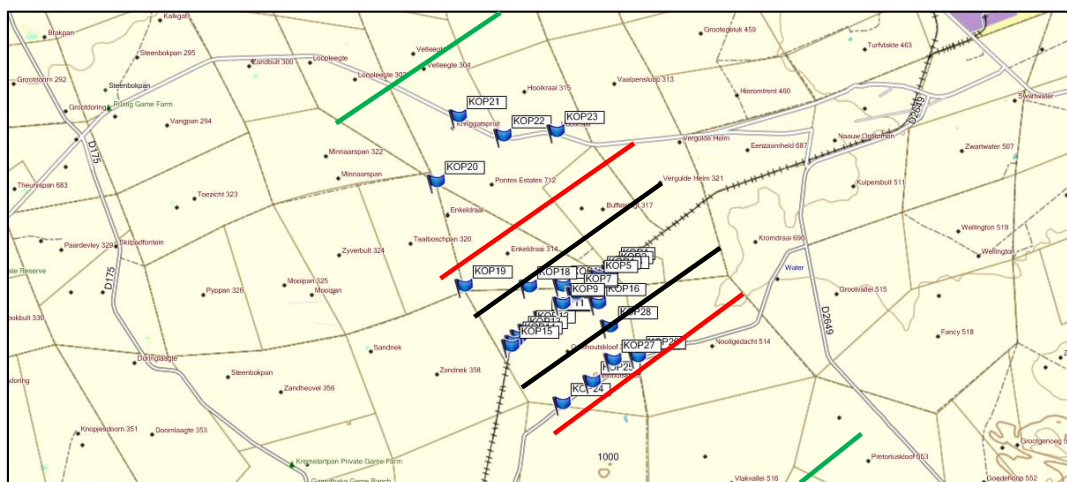


Figure 1: The broad corridor surrounding the proposed new railway infrastructure with the key observation points (KOPs) marked and the visual exposure rating distances (Table 1 – black line = 1.5km, red line = 3km and green line = 10km) indicated.

Table 3: Summary of the Key Observation Points listed during the study.

KOP Number	KOP Coordinates
KOP1	S23.74991 E27.47070
KOP2	S23.75114 E27.46996
KOP3	S23.75262 E27.46845
KOP4	S23.75266 E27.46550
KOP5	S23.75383 E27.46430
KOP6	S23.75832 E27.45690
KOP7	S23.75786 E27.45683
KOP8	S23.76113 E27.45199
KOP9	S23.76092 E27.45189
KOP10	S23.76557 E27.44503
KOP11	S23.76526 E27.44480
KOP12	S23.76921 E27.43895
KOP13	S23.77094 E27.43602
KOP14	S23.77262 E27.43402
KOP15	S23.77391 E27.43279
KOP16	S23.76089 E27.46524

KOP17	S23.75557 E27.45201
KOP18	S23.75576 E27.43947
KOP19	S23.75550 E27.41543
KOP20	S23.72367 E27.40503
KOP21	S23.70380 E27.41320
KOP22	S23.70969 E27.42994
KOP23	S23.70836 E27.44972
KOP24	S23.79142 E27.45196
KOP25	S23.78478 E27.46314
KOP26	S23.77710 E27.48009
KOP27	S23.77812 E27.47094
KOP28	S23.77016 E27.46324



Figure 2: Aerial image giving a broad overview of the KOP's in relation to the larger study area.

When evaluating the visual resource impacts, it is clear that the visual resource rating will be low due to the fact that the area is “highly modified with extensive infrastructure development (power stations), power lines (1400kV), roads, settlements, game fences and grazing.

When looking at the visual exposure it is clear that the new railway lines will have a very limited impact, as in most cases the railway line is at ground level. In some areas, the railway line will be raised and this can have a visual impact for people travelling along farm boundaries. Currently, the trees act as an effective visual barrier. If a train is travelling along the railway line, it will have a visual impact, as the locomotive is approximately 3.5m high. In areas where the railway line is raised, this total height impact will be approximately 6 – 6.5m.

The office buildings will be (according to consultants) “only single story in height”, but a storing facility (<10m in height) will be higher than the single story brick facilities. In addition, there will be (to be confirmed) some communications antennas and light poles. The lights will have a visual impact at night and will further have a negative impact of the nocturnal biota.

In some areas, the railway line will be lowered (to ensure a level area for operations) and this will ensure that the trains will not be visible from the roads adjacent to the property fences.

During the site visit, the current railway line was not visible when more than 50m away. Some exceptions were noted where bush clearing was done or where access roads lead directly to gates on the boundary fence. Even when a train was passing, it was not visible from the farms when one was more than 50m away. An exception is when one is on the rocky outcrops on the Geelhoutskloof Reserve. On these elevated areas, the train will be visible in a small corridor of cleared vegetation, but the distance of more than 1.5km will lower the visual disturbance due to the vegetation in the background (train not in silhouette).

Although the Visual Exposure Rating (Table 1) states an exposure rating of moderate to high (0 – 3km sighting) for people living near the corridor, the screening effect of the trees and vegetation will lower this risk considerably. This will apply in areas where the roads on farms are next to the fence (e.g. KOP1 – service road for the railway line – Figure 3 and 4). KOP 2 (80m) and KOP 3 (135m) is two areas where the local management roads on the farms Enkeldraai and Pontes Estates (incorporated into the Geelhoutskloof farm) is screened from the railway line by the natural vegetation (Figure 3 and 5). Here the high power lines (1400 kV) north of the railway line is not always visible).

KOP 4 is where the railway line is at ground level (Figure 3, 6 and 7) and KOP5 is a section where the railway line is lowered to ensure a level track system (Figure 3, 8, 9 and 10). From the access road next to the railway line some parts are visible, but when looking into the farms, the dense vegetation screen the infrastructure.

According to Table 2 the impacts are rated as Category 4 with a high to very high visual disturbance expected, but when the current visual impacts are taken into consideration, it will be a low additional impact to the already high negative impacts from the Medupi Power Station and the power lines and one can describe the additional changes as “some change to the existing character – recognisable feature within the view frame and experience of the receptor”.

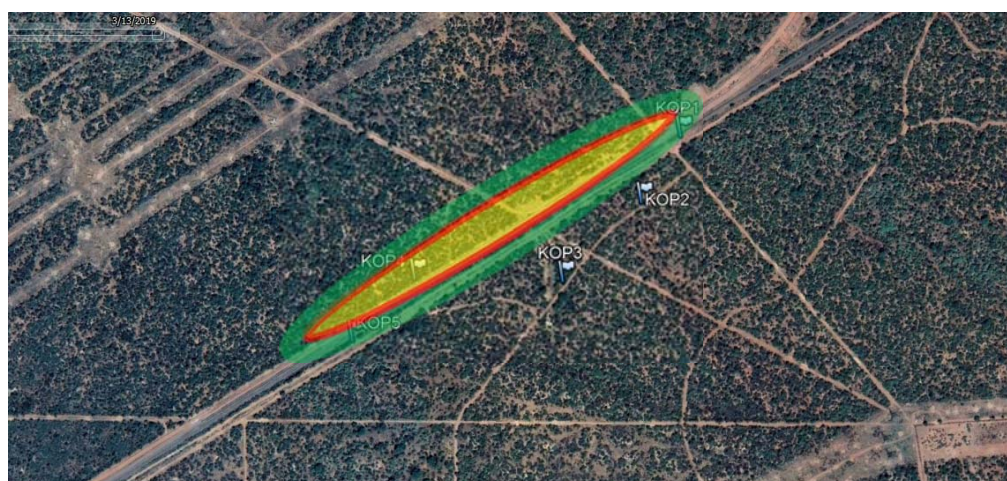


Figure 3: View of the eastern section where the study area starts – the area directly adjacent to the railway line will have a moderate to high impact (yellow and red) from the new development, but low (green) visual impact when 30m away into the vegetated areas.



Figure 4: View of KOP1 where the access road indicate the eastern extent of the study area.



Figure 5: The high natural vegetation screen the railway line from the roads.



Figure 6: The visual impact will be high next to the access road (Transnet road) and management roads (on farms) next to the game fence, but impact also affected by the 1400kV power lines.



Figure 7: View towards the farms from the game fence showing screening achieved by the dense vegetation.



Figure 8: View of the section where the railway line is lowered – dense vegetation to the right screen the area.



Figure 9: Example of the screening of the vegetation towards the railway line



Figure 10: View from the railway line towards the access road – lowered railway line and vegetation effective screening of the impact from the farm roads.

In the second sector (KOP6 – KOP11) a similar trend was observed. When travelling against the boundary fences the new infrastructure will be visible, especially the Northern Facility (offices and stores) and this will add to the visual impact at that point.

At KOP6 and KOP7 the raised railway line will increase the visual impact for people next to the boundary fences of the farms (Figure 11 – 15). But as was noted earlier, once someone moved 50m away from the fence, the high natural vegetation will screen the elevated railway line and the trains travelling on it. Another factor in this area is the Northern Facility where the office block and steel stores will be constructed. The height of the store is said to be lower than 10m and this structure will be visible for people travelling along the boundary fences. The communications towers and light pylons will be visible as well. From a visual impact perspective, the lights at night will be the most comprehensive disturbance. It is recommended that lights must only be used in areas where work is carried out, that the lights must face towards the building (i.e. from the boundary fence towards the facilities) and that the pylons must be lower than the highest points of the buildings. This will lower the visual impact of light in the area and further lower the risk of light pollution for the nocturnal biota.

At KOP 8 and KOP9 (Figure 11 and 16 – 19) the railway line is a ground level and the infrastructure will be screened by the vegetation, the trains will be visible for people near the boundary fence, but screened when 50m away. The existing cement power lines are screened by the vegetation and this indicate that the vegetation act as an effective screen for the trains (3.5m high).

The last site (KOP10 and KOP11) in this sector (Figure 11, 20 – 24) is in an area where the railway line is lowered (cutting). Again the infrastructure and trains will not be visible from the boundary fences and the visual disturbance will be low. The existing power lines (1400kV) is sometimes visible (e.g. along access roads), but the vegetation screen it effectively in most areas.



Figure 11: Erosion associated with drainage lines and streams a severe problem in the sector - visual impacts that lower the visual exposure rating and category.



Figure 12: Example of the raised railway line that will increase visibility of the infrastructure and trains for people near the boundary fences (KOP6).



Figure 13: Along access roads to the boundary, the visibility of infrastructure will be high – along the open corridor the railway line, existing fences and power lines will be visible.



Figure 14: The view of the raised railway line from the boundary fence north of the infrastructure (KOP7).



Figure 15: On the raised section, the passing trains will be about 6-7m above ground level. Screening will be effective when someone is 30-50m from the boundary fence.



Figure 16: Example of existing infrastructure in the corridor near the boundary fence (KOP8) – screening by the natural vegetation effective when one move 30m away into the veld.



Figure 17: Image showing the effective screening of the vegetation from the farm towards the railway infrastructure (including the cement power line pylons).



Figure 18: At KOP9 the railway line visible in areas where the vegetation breaks – train will be visible for people at the boundary.



Figure 19: Effective screening by the natural vegetation once one move 30 – 50m into the veld.



Figure 20: At KOP10 the existing infrastructure supplying electricity to the farms are visible near the fence, but it is effectively screened by the vegetation when one move into the veld.



Figure 21: The railway line in the cutting will lower the visible disturbance at this point (KOP10).



Figure 22: View from the railway line in the cutting towards the existing infrastructure.



Figure 23: View from KOP11 along the access road towards the farm – existing Medupi power lines and farm electrical supply visible.



Figure 24: View towards the railway line in the cutting – low visual disturbance expected.

The last sector (western extent of the railway development) has similar visual impacts (both current and expected) as the rest of the project (Figure 25).

Here the natural vegetation is more modified and the visual exposure at KOP13, KOP14 and KOP15 (Figure 25 – 33) will be higher compared to the rest of the area to the east. In addition, the close proximity of the existing power lines, both north and south of the railway line, has a larger visual impact near the boundary fences. To the east, these power lines are further from the boundary fences (and the power lines) and here the impacts are therefore further from the railway facilities.

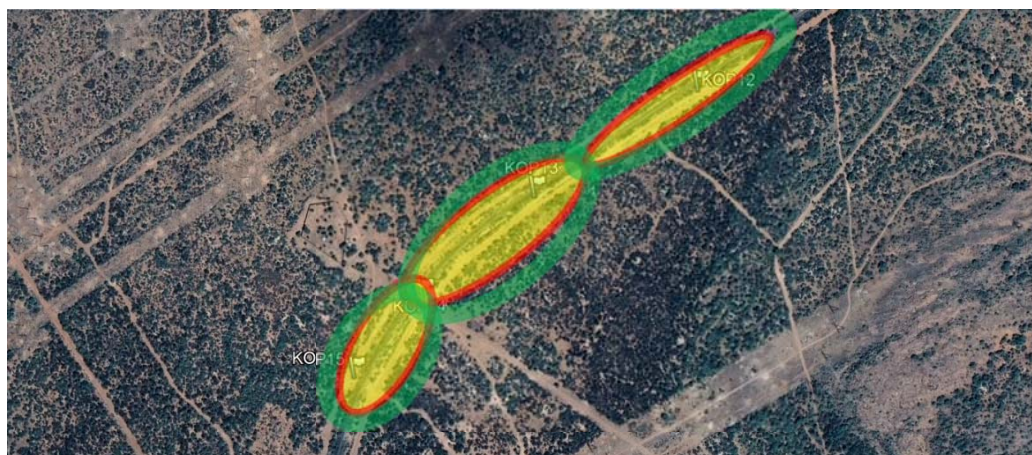


Figure 25: View of the western section of the new railway facilities – slightly larger distance high impact at KOP13, KOP14 and KOP15 compared to KOP12.



Figure 26: The view of the area at KOP12 – screening of the railway line by the natural vegetation.



Figure 27: The high trees, dense vegetation and undulating landscape mask railway lines.



Figure 28: Clearing of vegetation near KOP13 increase the possible visual disturbance from trains from a distance to 100m.



Figure 29: Current natural vegetation along the railway line lower the visual exposure rating.



Figure 30: At KOP14 the cleared vegetation and access roads (management roads on farm) increase visual disturbances, but the railway and trains will have a small added impact to the current visual cues on this site.



Figure 31: Example of cleared vegetation lowering the screening effect of the power lines and other infrastructure.



Figure 32: The elevated railway line at KOP15 increase the visual impacts at this point – will have a small increased negative impact added to the existing power lines, existing railway infrastructure, fences and cleared vegetation.



Figure 33: View from the railway access road towards the power lines near the boundary fence.

When looking at the areas to the north of the railway infrastructure, all KOP's (KOP17 – KOP21) further than 500m (Figure 34) had no visual disturbance of the railway of the proposed new buildings, as the vegetation gave a total screen of the existing and proposed facilities (offices, stores, communications tower) (Figure 35 – 40). The only possible change can be with lights used at night (no direct impact, but a background glow).



Figure 34: The KOP's north of the proposed new development – most of them 500+m away.



Figure 35: The screening effect of the vegetation – proposed railway infrastructure more than 3km away.



Figure 36: Along existing roads as direct view towards the proposed development, no visual impact expected – 2.5 – 3km away from the proposed development.



Figure 37: In areas cleared (old cultivated fields) no visual impact to the development.



Figure 38: In the area near the 1400kV lines (arrow) – no visual impact along the road to the railway line.



Figure 39: The view from 800m from the railway line (just south of KOP18).



Figure 40: Example of dense vegetation near the railway line (about 500m away) limiting the visual disturbance of the new development.

A similar situation result for some of the KOP's south of the railway development (Kop24 – KOP28 – Figure 41) where those are all more than 500m away from the development and the high trees and dense natural vegetation will effectively screen the buildings (Figure 42 - 44). As was noted above, the lights at night can be a limited impact, but it is recommended that only the lights needed for ongoing activities must be switched on and must face towards the railway infrastructure, not away towards the surrounding properties.

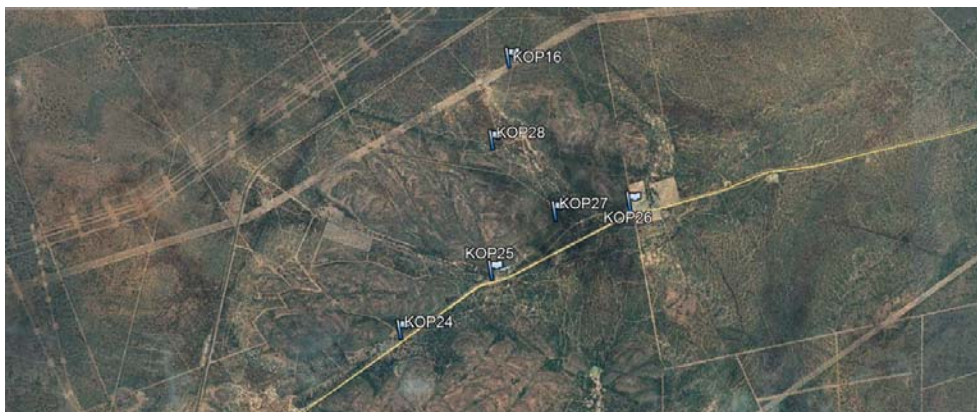


Figure 41: The KOP's south of the proposed new development – most of them 500+m away.



Figure 42: The view from KOP 16 – 700m from the railway line – open along the power lines, but dense vegetation towards the new development (Figure 43 and 44).



Figure 43: The view towards the railway line from KOP 16.



Figure 44: The view from 350m from the railway line – no visual disturbance from the new development – apart from lights.

Borrows Pits

Borrow Pit 1

The borrow pit nearest the railway development (Figure 45) will have a very low visual impact, as the natural vegetation can screen the area (Figure 46 and 47). This will mean that a 50m buffer between the site and access roads must be implemented.



Figure 45: The approximate positions of the two southern borrow pits near the railway line.



Figure 46: Dense vegetation can screen the borrow pit (A1) from the access roads near the railway line.



Figure 47: The same apply for the second option (A2) – dense vegetation can screen the borrow pit – depending on its final selected position.

Borrow Pit 2

A second option for the borrow pit was suggested further north (Figure 48). The first option (2a) is in an area with dense vegetation (dense stand of *Sclerocarya birrea*) that can screen the pit from traffic on the road, while the second option (2b_suggested by the landowner) is in an old cultivated field. This site will have no screening option.

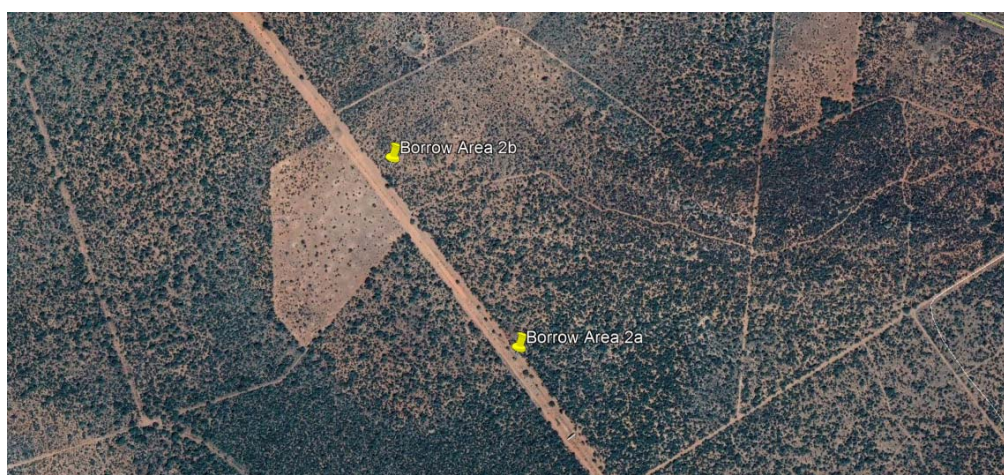


Figure 48: Approximate position of the northern borrow pit – 2a in the dense *Sclerocarya birrea* section and 2b in the old cultivated field (suggested by the land owner).



Figure 49: General view of the areas around option 2a.



Figure 50: View of the cultivated area suggested for option 2b

CONCLUSIONS

The primary visual concern of the proposed new railway line and associated infrastructure was investigated.

Railway lines and associated infrastructure

- From the survey it was clear that the visual disturbance will be in an area close to the railway line – 100m and less. The dense vegetation and high trees will screen the activities.
- It is important to note that in a few places the railway line will be elevated to ensure a level working area – expected the height of the railway line and train will not be more than 10m.
- The height of the stores (single steel structure) will be in the order of 10 – 12 meters.
- During the site visit, it was mentioned by the engineers that a communications tower will be erected – height was not confirmed. This single structure will have a smaller visual disturbance when compared to the 1400kV power lines.
- The view from the small outcrops in the nature reserve (south of the railway line) will have a very low visual disturbance from the proposed new infrastructure.
 - The high vegetation will screen the activities
 - The distance in more than 1km away and the background vegetation will further lower any visual disturbances
 - The clearing of vegetation for the intensive breeding facility (western section of the reserve area) will not increase the visual impact from the outcrops significantly
- It is clear that the existing visual impacts (power lines, game fences, power station) is high. The additional impact from the railway line will be very small and won't increase the already high visual impact.
- The impact from lights at night must be noted.
- It is recommended that all pylons for lights must be as low as possible – preferably not higher than any other structures.
- It is recommended that the lights must face towards the activities in order to lower the potential light pollution towards the surrounding landscape.
- Lights must be managed – only use the lights in areas where physical activities are ongoing, the rest must be switched off.

Borrow pits

- Very low visual impacts.
- The sites can be screened by the vegetation.
- Site 2b (recommended by the landowner) is in an old cultivated field – will have a moderate visual impact in that area.

Please refer to the attached Risk Assessment Matrix under Annexure A.

REFERENCES

- Hull, R.B. and Bishop, I.E. (1988), Scenic Impacts of Electricity Transmission Line: The Influence of Landscape Type and Observer Distance. *Journal of Environmental Management*. 1988 (27) 99-108.
- Lynch, K. (1992). *Good City Form*, The MIT Press, London. p131.
- Mucina, L. and Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African Biodiversity Institute, Pretoria.
- Warnock, S. & Brown, N., Putting Landscape First. *Landscape Design*. No. 268 March 1998. p 44-46.

RISK ASSESSMENT

	SIGNIFICANCE PRE-MITIGATION							SIGNIFICANCE POST MITIGATION							MITIGATION TYPE
CONSTRUCTION PHASE															
Aspect, Activity & Potential Impact	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	(Modify, Remedy, Control, Stop)
Aspect															
Visual Impacts - construction traffic and cranes for construction	Negative	3	1	2	2	13	Moderate	Neutral	2	1	2	1	9	Low	Control & Remedy
Lights	Negative	3	2	2	3	26	High	negative	3	2	2	2	20	Moderate	Control & Remedy

Mitigation for Construction Traffic and Cranes and lights:

- Control traffic, dust suppression, inform land owners of extent and duration of the construction phase, limit time and height of cranes for construction
- Ensure lights not used in areas where no work

	SIGNIFICANCE PRE-MITIGATION							SIGNIFICANCE POST MITIGATION							MITIGATION TYPE
OPERATIONAL PHASE															
Aspect, Activity & Potential Impact	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	(Modify, Remedy, Control, Stop)
Aspect															
Visual impact - trains, buildings and communications towers	Negative	3	1	5	1	8	Low	Negative	3	1	5	1	8	Low	Control
Lights	Negative	3	2	5	2	15	Moderate	Negative	3	2	5	1	10	Low	Control

Mitigation measures for Operational Impacts:

- Maintain visual shield with vegetation near the zone of impacts
- Use of lights at night to be control – lowest possible pylons, shine lights towards activity only, only use lights in areas where activities occur

	SIGNIFICANCE PRE-MITIGATION								SIGNIFICANCE POST MITIGATION							MITIGATION TYPE
CLOSURE PHASE																
Aspect, Activity & Potential Impact	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	(Modify, Remedy, Control, Stop)	
Aspect																
Dismantling of rail tracks, demolish of buildings and associated infrastructure.	Neutral	3	1	5	0	5	Low	Neutral	3	1	5	0	5	Low	Control	

Mitigation measures for Closure Impacts:

- Removal of structures will lower the possible limited visual impact
- Rehabilitate disturbed areas and ensure vegetation regrowth in disturbed areas

	SIGNIFICANCE PRE-MITIGATION							SIGNIFICANCE POST MITIGATION							MITIGATION TYPE
CUMULATIVE IMPACTS															
Aspect, Activity & Potential Impact	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	Status	Probability	Extent	Duration	Intensity	Significance Score	Rating	(Modify, Remedy, Control, Stop)
Aspect															
Visual impact near development (100m or less)	Neutral	3	1	4	0	5	Low	Neutral	3	1	4	1	0	Very Low	Control
Visual impact near development (100m or more)	Neutral	3	2	4	0	2	Very Low	Neutral	3	2	4	0	2	Very Low	Control

Mitigation measures for Cumulative Impacts:

- The existing impacts – 1400kV lines, Medupi Power Station, fences and other high infrastructure – the added impacts will be negligible.
- From a distance – e.g. the nature reserve, the existing impacts are the main concerns, added impact from trains and buildings will be negligible.

RISK ASSESSMENT METHODOLOGY

Mitigation Type

Control & Remedy

Modify

to reduce or lessen in degree or extent; moderate; soften:

Remedy

Something that corrects the impact of any kind.

Control

to control the impact/regulate

Stop

to restrain, hinder, or prevent

Criteria: EXTENT		
"Extent" defines the physical extent or spatial scale of the potential impact		
RATING		DESCRIPTION
1	Site specific	Impacts extending only as far as the activity, limited to the site and its immediate surroundings
2	Local	Impacts extending within 5km from site boundary
3	Regional	Impacts extending to the district (20km from boundary of the site)
4	Provincial	Impacts extending to provincial scale eg. Limpopo Province
5	National	Impacts extending to within the country i.e. South Africa.
6	International	Impacts extending beyond international border / the borders of South Africa
Criteria: DURATION		
"Duration" defines the temporal scale		
RATING		DESCRIPTION
1	Immediate	Less than 1 year
2	Short term	1-5 years
3	Medium term	6-15 years
4	Long term	Between 16 – 30 years
5	Permanent	Over 30 years. Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.

Criteria: INTENSITY			
"Intensity" establishes whether the impact would be destructive or benign.			
Status	RATING	DESCRIPTION	
Negative	0	Negligible	Where impacts do not really affect the environment and no mitigation is required
	1	Low	Where impacts will result in short term effects on the social and/or natural environment. These impacts are not deemed largely substantial and are likely to have little real effect. (marginally affected)

	2	Medium	Where impacts will result in medium term effects on the social and/or natural environment. These impacts will need to be considered as constituting a fairly important and usually medium term change to the environment, these impacts are real but not substantial. Impacts are fairly easy to mitigate
	3	High	Whereby effects will be long term on social, economic and/or bio-physical environment. These will need to be considered as constituting usually long term change to the environment. Mitigation is considered challenging and expensive
	4	Very High	Where impacts should be considered as constituting major and usually permanent change to the environment, and usually result in severe to very severe effects. Mitigation would have little to now effect on irreversibility

Criteria: INTENSITY

Status	RATING	DESCRIPTION
Positive	0	Negligible Where impacts affect the environment in such a way that natural, cultural and social functions and processes are not greatly and in instances no mitigation measures will be required. (environment not really affected)
	1	Low Minor improvement are anticipated over a short term on the social and/or natural environment.
	2	Medium Where moderate improvements are anticipated over a medium- to long-term on the social and/or natural environment.
	3	High Where large improvements are anticipated over a long term on social, economic and/or bio-physical environment.
	4	Very High This results in permanent improvements of the social/or natural environment.

Criteria: STATUS

“Status of impact” - describes whether the impact would have a negative, neutral or positive effect on the affected environment

RATING	DESCRIPTION
+	Positive Benefit to the environment
=	Neutral Standard / impartial
-	Negative cause damage to the environment

Criteria: PROBABILITY		
"Probability" describes the likelihood of the impact occurring.		
RATING		DESCRIPTION
0	Improbable	Where the possibility of the impact occurring is low.
1	Probable	Where there is a distinct possibility that the impact will occur.
2	Highly probable	Where it is most likely that the impact will occur.
3	Definite	Where the impact will occur regardless of any prevention measures.

Criteria: SIGNIFICANCE		
<p>"Significance" - attempts to evaluate the importance of a particular impact with mitigation measures included and also excluded. The significance was calculated using the following formula:</p> <p>Significance = (Extent + Duration + Intensity) X Probability</p>		
RATING		DESCRIPTION
0-4	Very Low	Where the impacts will not influence the development, social , cultural or natural environment
5 -12	Low	Where impacts will result in short term effects on the social and / or natural environment. The impacts merits attention however are not deemed largely substantial are likely to have little real effect
13-25	Medium	Where impacts will have a medium-term effect on the social and/or natural environment. These impacts need to be considered as constituting a fairly important and usually medium term change to the environment, these impacts can be mitigated by implementing effective mitigation measures.
26-44	High	Whereby effects will be long term on social economic and or bio-physical environment. The impacts could have a major effect on the environment. This may bring forth the consideration of no-go areas/open areas on the development land regardless of mitigations implemented. Mitigation is however possible.
45	Very High	Whereby effects will be permanent on the social economic and or bio-physical environment. Such impacts cannot be mitigated.