DOT YEN TRADING

DRAFT BASIC ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF A BRIDGE AT KOELENHOF LEVEL CROSSING, STELLENBOSCH LOCAL MUNICIPALITY, WESTERN CAPE

MAY 2019

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PASSENGER RAIL AGENCY OF SOUTH AFRICA

DRAFT BASIC ASSESSMENT REPORT

FOR THE PROPOSED CONSTRUCTION OF A BRIDGE AT KOELENHOF LEVEL CROSSING, STELLENBOSCH LOCAL MUNICIPALITY, WESTERN CAPE PROVINCE

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PROJECT NAME	**:**	The Proposed Construction of a Bridge at Koelenhof Level Crossing, Stellenbosch Local Municipality, Western Cape Province **DEA REF NO**
TITLE OF DOCUMENT	**:**	Draft Basic Assessment Report

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EXECUTIVE SUMMARY

This Executive Summary incorporates the main findings of the Draft Basic Assessment Report (BAR) prepared as part of the Basic Assessment process being undertaken for the proposed construction of a two-span bridge over the existing Koelenhof Level Crossing across Kromme Rhee Road, Stellenbosch Local Municipality and within the jurisdiction of Cape Winelands District Municipality in the Western Cape Province.

i Brief Description of the Project

PRASA has identified the railway line level crossing with the Kromme Rhee Road as a high risk for public safety and hence should be eliminated through the construction of a road-over-rail bridge. The Koelenhof level crossing is located just north of the Koelenhof Station on the Stellenbosch-Paarl railway line and approximately 500m east of the R304/Bottelary Road intersection in Koelenhof. The crossing lies within close proximity of the Plankenbrug River which is a tributary of the Eerste River Catchment. The crossing therefore lies north of Stellenbosch in an area developed for agriculture **(Figure 1).**

ii Summary of Activity Alternatives

Four options are possible for the elimination of the level crossings at Kromme Rhee Road. This comprises:

Option 1: – Road-over-Rail Bridge at Kromme Rhee Road and closing of the Elsenburg Road level crossing (Recommended - most feasible activity);

Option 2 – Road-over-Rail Bridge at Kromme Rhee Road, as well as at Elsenburg Road level crossings (not recommended - the 2 crossings are 900m apart);

Option 3 – Road-over-Rail Bridge at Elsenburg Road and closing of the Kromme Rhee Road level crossing (not recommended - Elsenburg Road currently does not does play a major role as a mobility route, hence it is not feasible to close Kromme Rhee Road); and

Option 4 – Rail-over-Road Underpass at Kromme Rhee Road and closing of the Elsenburg Road level crossing (not recommended -. Major constraints, see **Table 3**)

iii Applicability of the EIA regulations 2014, as amended

A Basic Assessment is required in terms of the Environmental Impact Assessment (EIA) Regulations of 2014 (Government Notice (GN) R982), as amended, promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA) as the proposed project triggers GN R983 Activity 19 of Listing Notice 1; GN R985 Activity 12 and Activity 14 listed below:

Listing Notice 1: Activity 19: The infilling or depositing of any material of more than 10m³ into, or dredging, excavation, removal or moving of soil, sand, shells, grit, pebbles or rock of more than 10m³ from a watercourse

Listing Notice 3: Activity 12: The clearance of an area of 300m^3 or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

Listing Notice 3: Activity 14: The development of infrastructure or structures with a physical footprint of 10m^2 or more, where such development occurs within a watercourse; and if no development setback has been adopted, within 32m of a watercourse, measured from the edge of the watercourse.

Dot Yen Trading, has been appointed as the independent Environmental Assessment Practitioner to undertake the Basic Assessment Process to meet the relevant requirements of NEMA and the EIA Regulations 2014, as amended.

iv Public Participation Process (PPP)

The PPP has been designed to meet the requirements of the EIA Regulations 2014, as amended. The tasks undertaken to date include the following:

- A preliminary Interested and Affected Party (I&AP) database of relevant authorities, adjacent landowners, councillors, local community forums and other key stakeholders was compiled using the existing project database. Additional I&APs will be added to the database based on responses to advertisements and notification letters/Background Information Document (BID).
- Notification letters / BID (in English and Afrikaans) were sent to all potentially affected landowners on in March 2019 via email and / or registered mail informing them of the proposed project and inviting them to provide initial comment. The comment period extended from 5 March to 5 April 2019.
- An advertisement (in English and Afrikaans) was placed in a local newspaper, Stellenbosch gazette, on the 12th March 2019. The advert provided notification of the proposed project and I&AP registration and comment period.
- Site notices were erected at focal points at the site and Koelenhof train station.
- Public meetings will be held in the areas close to the proposed project. The anticipated month would be in April 2019. Venues, dates and times for the public meetings are yet to be confirmed.

The Draft BAR is being distributed for a 30-day comment period from 13th May to 14th June 2019 (excluding public holidays) to provide I&APs and commenting authorities the opportunity to comment on the proposed project. Copies of the full report have been made available at the following locations Koelenhof Library and the electronic copies are available upon request. The I&APs who wish to participate by contributing comments, registering or obtaining more information on the project can contact: ***Zama Ndlovu*** *on:* ***Tel:*** *078 244 9433,* ***e-mail:*** *zama@whlconsulting.co.za*

Comments received on the Draft BAR will be collated into a Comments and Responses Report and included in the Final BAR. Any comments received on the Final BAR will be forwarded together with the Final BAR for consideration and decision making to Authoring Departments. Once a decision has been made, all I&APs on the project database will be notified of the decision. A statutory appeal period will follow the issuing of the decision.

v Affected Study Area

The study area contains two broad 'habitat' types, which include (1) the wetlands and stream, and (2) cultivated farmland. The wetlands merge with the farmland southwest of the railway crossing but are only evident due to the presence of common reed in the cultivated fields while the riparian zone is dominated by alien invasive Kikuyu grass and Eucalyptus trees. The proposed railway crossing will cross over the Plankenbrug River and the associated valley bottom wetland area at a point where the river is located within a narrow and confined river channel. The associated valley bottom wetland area is largely none existent at the proposed crossing. The crossing is also immediately upstream of the Kromme Rhee Road and downstream of the off-channel dam on the western bank of the river in an area that has been significantly disturbed. The river is thus also in a modified condition at this point therefore the impact of the proposed crossing at this location would be of the least significance from a freshwater ecology point of view. The study area does not support any remnant vegetation, important species or spatially valuable habitat, such as ecological connectivity, since the area has been transformed.

Specialist findings were assessed and summarised in this report. Potential environmental impacts associated with the proposed project activities are expected to occur during the construction and operational phases. Identified potential impacts and recommended mitigation measures in the specialist studies include the following:

Loss of Vegetation and Ecological processes is due to the clearance of vegetation and plants of conservation concern, consequently causing habitat loss. However for this particular site, mitigation is not recommended nor would it be reasonable to implement any conditions for approval of the construction since the road reserve is generally maintained as a mowed landscape. The only scope for improving biodiversity would be to make use of locally indigenous shrub species along any sloped bridge surfaces. This is recommended if soil is to be graded along the bridge edges.

Loss of Aquatic habitat is also due to the clearance of vegetation. The riparian and wetland habitat in the area are already disturbed, however some loss of aquatic habitat and longer term disturbance of the remaining aquatic habitats adjacent to the crossing is expected. Ongoing monitoring of the bank adjacent to the new crossing should be undertaken to immediately mitigate any erosion that should take place or clear any invasive alien plant growth.

Flow modification is due to the construction of a structure within the river channel. The immediate surrounding area may impact on the runoff characteristics and river hydraulics at the site which in turn may alter the aquatic habitats adjacent and downstream of the proposed crossing. The structure at the river should not impede low flow in the river and should be designed such that it does not provide a barrier for the migration of biota in the river. The Department of Water and Sanitation (DWS) will need to be approached with regards to the need for a water use authorisation for the proposed bridge.

Water Quality Impairment and an increase in turbidity is also due to the proposed activities within the river channel. Some impairment of the surface water quality may occur, primarily sedimentation. The impacts during the proposed activities would be limited if the activities were to take place during the lower flowing months of the year (before the onset of the winter rainfall months in May/June). The longer term rehabilitation and management of the river channel at the river crossing should be managed by means of an approved Management Maintenance Plan (MMP) for the site.

Bridge construction cut offs to some areas
Access to the general dealer (Mikes General Dealer) will be cut off by the fill of the road-over-rail bridge. Access to farmhouses on Simonsig Wine Farm will be cut off by the bridge fill. Negotiations with PRASA and the property owners is required to resolve the impacts on these properties. On a positive note, the road-over-rail bridge will cut off the present informal vehicular and pedestrian access to Koelenhof station providing new improved and safe pedestrian access to Koelenhof station.

Cumulative impacts
The activity is very unlikely to have impacts upon the larger Plankenbrug River system, downstream of the site as the river has already been significantly modified by the Kromme Rhee Road crossing and surrounding land use activities. Currently the riparian vegetation along the river at the site is also dominated by alien vegetation however the disturbance caused by the proposed activities will further facilitate the spread of most of the alien species observed at the site. After completion of the construction phase, rehabilitate the disturbed areas and the clearing of alien vegetation.

vi RECOMMENDATIONS

Option 1 is considered to be a suitable construction of a road-over-rail bridge over the existing Koelenhof Level Crossing across Kromme Rhee Road. A road-over-rail bridge is technically more feasible than all the other three options **(Table 3).** Koelenhof level crossing site has been identified as a high risk level crossing. The objective of the project is to enhance the safety of both people and property by reducing the number of occurrences, fatalities and injuries which occur when road and rail vehicles intersect at level crossings. Therefore, Option 1 is recommended to be granted Environmental Authorisation to satisfy the purpose and need of the proposed project. In this regard it is fundamental that the EMPr **(Appendix I)** and all other mitigation measures in this Basic Assessment Report be instituted during all phases of the proposed project. Some of the key conditions are set out below:

- Improve the biodiversity in the study are by making use of locally indigenous shrub species along any sloped bridge surfaces. This is recommended if soil is to be graded along the bridge edges.
- If possible wetland related plants within the area to be disturbed could also be set aside for the revegetation of the area after construction is complete.
- The advice of a suitably qualified wetland/botanist specialist should be sought with regards to the rehabilitation of the disturbed areas and the clearing of alien vegetation.
- The bridge structure at the river should not impede low flow in the river and should be designed such that it does not provide a barrier for the migration of biota in the river.
- Ongoing monitoring of the bank adjacent to the new crossing should be undertaken to immediately mitigate any erosion that should take place or clear any invasive alien plant growth.
- The water quality impacts during the proposed activities would be limited if the activities were to take place during the lower flowing months of the year (before the onset of the winter rainfall months in May/June). Therefore construction works should preferably take place during the dry period.
- Stormwater runoff from the crossing and associated infrastructure should be adequately addressed in the design of the crossing to ensure that the runoff from the crossing is not concentrated and likely to cause erosion of the river bank.
- Silt and vegetation removed from the area to be disturbed should be removed away from the river channel, wetland area and riparian zone.
- The longer term rehabilitation and management of the river channel at the river crossing should be managed by means of an approved Management Maintenance Plan (MMP) for the site.
- To provide access to the general dealer (Mikes General Dealer) after the bridge construction, is considered virtually impossible and buying out this property appears to be the only solution. PRASA should proceed with this process immediately.
- It is proposed that PRASA enter into negotiations to sell their piece of land to Simonsig, as some portion of vineyards will be required as road reserve. Access to all dwellings can then be provided from the Simonsig property.
- An independent ECO must be appointed to audit compliance with the EMPr during the construction of the bridge and to audit compliance of rehabilitation in post construction phase.
- Prior to construction phase, it is relevant to obtain the other necessary Environmental Authorisations in terms of other legislations. For example: Water Use License.

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LIST OF ABBREVIATIONS / ACRONYMS

Basic Assessment Report	BAR
Background Information Document	BID
Critical Biodiversity Areas	CBA
Department of Environmental Affairs	DEA
Department of Environmental Affairs and Development Planning	DEADP
Department of Water and Sanitation	DWS
Ecological Support Areas	ESAs
Environmental Assessment Practitioner	EAP
Environmental Authorisation	EA
Environmental Control Officer	ECO
Environmental Impact Assessment	EIA
Environmental Management Programme	EMPr
Government Notice	GN
Integrated Environmental Management	IEM
Interested and Affected Party	I&AP
Level of service	LOS
Management Maintenance Plan	MMP
National Environmental Management Act (Act 107 of 1998)	NEMA
National Freshwater Ecosystem Priority Areas	NFEPAs
Passenger Rail Agency of South Africa	PRASA
Public Participation Process	PPP
South African Heritage Resources Agency	SAHRA
South African National Biodiversity Institute	SANBI
Traffic Impact Assessment	TIA
Western Cape Biodiversity Framework	WCBF
Water Use License	WUL

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Passenger Rail Agency of South Africa (PRASA) is proposing to construct a two-span bridge over the existing Koelenhof Level Crossing across Kromme Rhee Road, which is located within the Stellenbosch Local Municipality and within the jurisdiction of Cape Winelands District Municipality in the Western Cape Province. PRASA has identified the railway line level crossing with the Kromme Rhee Road as a high risk for public safety and hence should be eliminated through the construction of a road-over-rail bridge. The construction of the new bridge will fall in the vicinity of the Plankenbrug River, and this has triggered the need for a Basic Assessment process. PRASA has appointed Dot Yen Trading as independent Environmental Consultants, to undertake the Basic Assessment processes for the proposed project.

1.2 PROJECT DESCRIPTION

The proposed bridge structure over the railway line at the Koelenhof level crossing will have a width of approximately 16m which will accommodate: 2 traffic lanes; 2 shoulders on both sides; sidewalks; a kerb; and channels on both sides **(Figure 1).** The railway line and Plankenbrug River will be crossed by means of a two-span 30m long bridge and a culvert respectively (AECOM, 2014).

Figure 1: Proposed bridge construction and layout plan for the Koelenhof railway crossing
(Source: AECOM, 2014 detail figure no. Koel 2A)

See the general bridge layout drawings in **Appendix A.**

A summary of the proposed technical design details are set out in **Table 1.**

Table 1: Summary of the Technical Details of the bridge structure *(Source: AECOM, 2014)*

	Design Assumptions	Description
1	**Bridge Superstructure**	• Precast M-beams with cast in-situ top slab made continuous over supports; • 2 x 15m spans (total length from centre of bearing to centre of bearing = 30m); • Bridge width = 16.25m (total width); and • Road width = 16m (2x 3.7m lanes, 2x 2m shoulders, 2x 300mm channel, 2x 2m raised sidewalks).
2	**Bridge Substructure**	• Spill through abutments with reinforced earth walls; • Wall type piers; and • Foundation type unknown (either spread footings or piles). Will depend on the outcome of the Geotechnical investigation.
3	**Cast in-situ Culvert**	• Existing culvert just west of the railway line to be demolished; and • New cast in-situ culvert – first estimation indicates 3 x 3.6m x 2.4m are required.
4	**Miscellaneous:**	• 2 x staircases (only on station building side); • 1 x ramp; and • Stairs and ramp founded on fill.

1.3 ACCESS ROADS

The section of Kromme Rhee Road to form part of the elimination of the rail crossing will stretch from the R304/Bottelary Intersection in the west to approximately 200m past the Nooitgedacht access road intersection in the east. The length of road to be reconstructed will be approximately 900m (AECOM, 2014). New access roads to the north and south of Kromme Rhee Road are proposed, together with a pedestrian path immediately west of the railway line.

The road design of the side/access roads are planned as follows:

- Class 4 roads (3.4 m wide lane widths per direction);
- 2.4 m wide paved sidewalks (due to the school and station which needs to be served);
- 16 m road reserve;
- No parking areas permitted alongside these roads; and
- Design speed 50 km/h.

As a result of the parameters set above, the design criteria for the side/access roads are as follows:

- Horizontal curves will be a minimum of 80 m;
- Vertical curves will be designed for a minimum K value of 11 for sag curves and 10 for crest curves;
- Gradients will be a maximum of 7% and a minimum of 0.4%; and

- Stopping sight distances will be a minimum of 65 m
- Intersection radii at bell mouths minimum 8m.

1.4 NEED AND DESIRABILITY

This project is part of the National Department of Transport and Roads to eradicate all level crossing country wide. PRASA has identified Koelenhof level crossing as one of the high risk level crossings in the Western Cape due to the high number of accidents that have occurred in the recent years (AECOM, 2014).

The main objective of the project is to enhance the safety of both people and property by reducing the number of occurrences, fatalities and injuries which occur when road and rail vehicles intersect at level crossings. The proposed project aligns with objectives set out in the current SDF to mitigate incidents at level crossings and the IDP, 2017 to upgrade road infrastructure to deal with current inadequacies. Furthermore, according to the SDF, 2017 convenient rail-based public transport system using the existing railway and Koelenhof station would help to functionally link the centre to Stellenbosch town. Hence this project would also add to the convenience and functionality of the rail system.

The basic needs of community were taken into account during the planning phase of the proposed project, which aims to reduce the amount of incidents at the level crossing. The community would also benefit from the ease that proposed construction will bring to accessing the Koelenhof station. Furthermore, the construction of the bridge and its associated infrastructure will improve the stormwater management in the Koelenhof area (see Stormwater Management Report in **Appendix H4)**. The cumulative impact of the proposed development will have a positive effect on the area by helping the Plankenbrug River flow better.

2 PROJECT LOCALITY

2.1 SITE LOCATION

The proposed road-over-rail bridge at Koelenhof level crossing is within the Stellenbosch Local Municipality and within the jurisdiction of Cape Winelands District Municipality in the Western Cape Province. See **Figure 2** below.

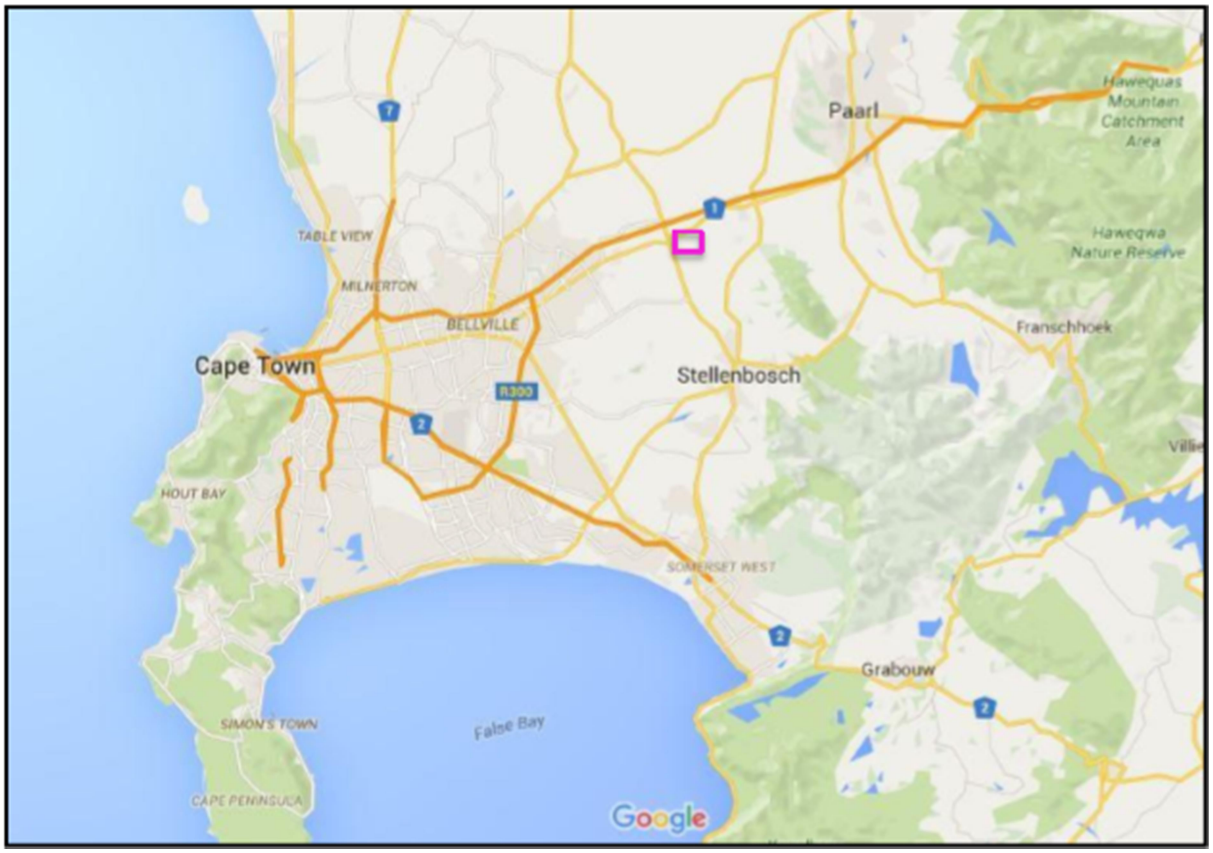


Figure 2: The location of the study area (pink block) within Stellenbosch Municipality
(Source: Google Maps in Emms et al., 2016)

The Koelenhof level crossing is located just north of the Koelenhof Station on the Stellenbosch-Paarl railway line and approximately 500m east of the R304/Bottelary Road intersection in Koelenhof. The crossing lies within close proximity of the Plankenbrug River which is a tributary of the Eerste River Catchment. The crossing therefore lies north of Stellenbosch in an area developed for agriculture. See **Figure 3** below.

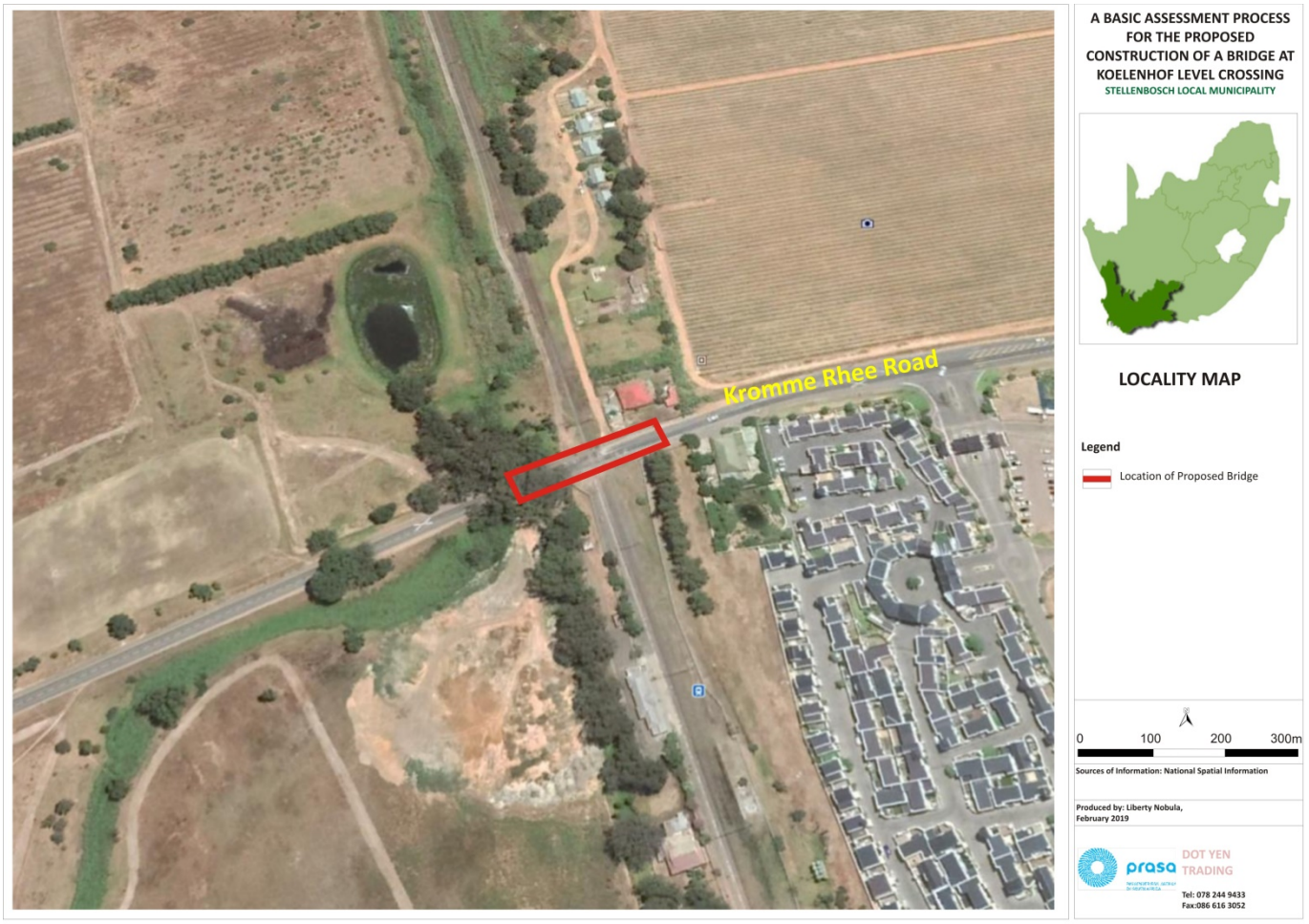


Figure 3: Locality Map

The locality Map is provided in **Appendix B.**

2.2 COORDINATES

The proposed bridge will be constructed on Farm 66 Portion 1 with project location centre coordinates of 33°52'22.26"S; 18°49'08.86"E. The position of the proposed two-span bridge over the existing Koelenhof Level Crossing across Kromme Rhee Road is indicated below in **Figure 4.**

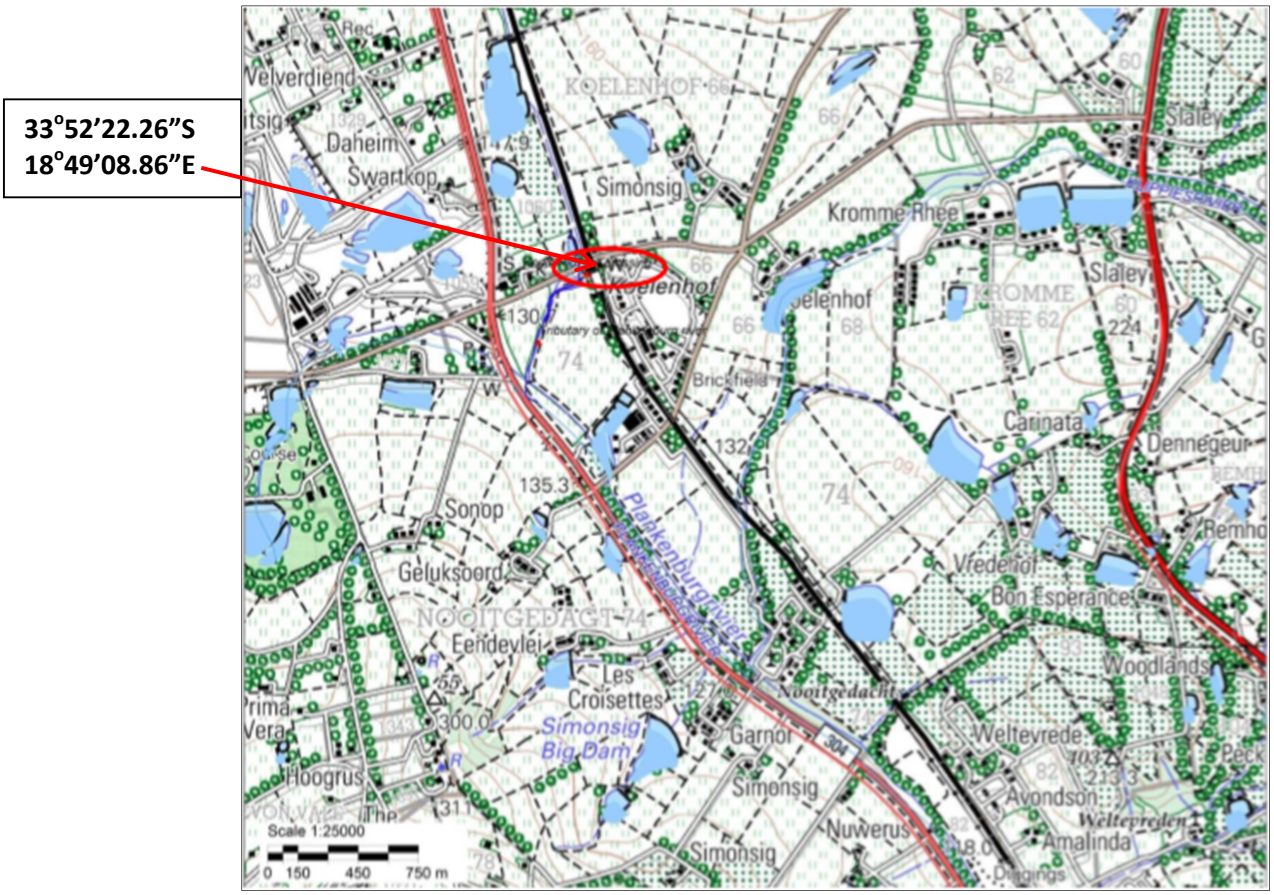


Figure 4: Location of the Koelenhof Level Crossing across Kromme Rhee Road (red circle)

2.3 PROPERTIES AFFECTED

In terms of the proposed two-span bridge over the existing Koelenhof Level Crossing, the affected properties were examined in terms of ownership, current land rights and possible restrictions. The affected property owners need to be consulted, with regards to the proposed development. Furthermore, the affected portions of land need to be negotiated with the relevant owners.

Table 2 and **Figure 5** depict the properties directly affected by the proposed two-span bridge over the existing Koelenhof Level Crossing.

Table 2: Property Summary

Property No.	Title Deeds	SG Diagram	Ownership
Farm 66 Portion 1	T11540/1905	1903/1905	Suid-Afrikaanse Spoorpendelkorporasie Ltd
Farm 66 Portion 2	T8867/1983	1163/1907	Koelenhof Plase Pty Ltd
Farm 66 Portion 5	T54693/2009	1183/1915	Breedt Johannes Jacobus
Farm 66 Portion 23	T11477/1957	2901/1957	Regional Services Council-Cape Metropole
Farm 66 Portion 31	T82397/1994	1643/89	Simonsig Landgoed Pty Ltd
Farm 74 Portion 23	T72816/2006	9574/53	Koelenhof Plase Pty Ltd
Farm 65 Portion 45	-	3507/69	Stellenbosch Municipality
Farm 65 Portion 47		3509/69	Stellenbosch Municipality
Farm 180 Portion 0	T2625/1940	Stq14-36/1861	Stellenbosch Municipality
Farm 245 Portion 0	T30072/1994	Stq18-13/1890	Saxenburg Estates Pty Ltd
Farm 1060	T82397/1994	3512/69	Simonsig Landgoed Pty Ltd
Farm 1551	T53002/2012	3304/2011	Oblate Sisters Of Saint Francis De Sale

Figure 5: Properties affected by the Proposed Bridge at Koelenhof level crossing
(Source: AECOM, 2014)

3 IDENTIFICATION OF ALTERNATIVE SCENARIOS

The BIA process is required to involve the identification of the alternatives based on the activity, location and technology. The alternatives that are identified must be feasible. The options should also include the do-nothing alternative. The BIA process involves assessment of these alternatives in terms of their potential impacts on the surrounding biophysical and socio-economic environment. The following alternative scenarios were investigated for this project:

3.1 ACTIVITY ALTERNATIVE

Four options are possible for the elimination of the level crossings at Kromme Rhee Road. This comprises:

1. **Option 1 (preferred):** – Road-over-Rail Bridge at Kromme Rhee Road and closing of the Elsenburg Road level crossing;
2. **Option 2** – Road-over-Rail Bridge at Kromme Rhee Road, as well as at Elsenburg Road level crossings (not recommended – the 2 crossings are 900m apart);
3. **Option 3** – Road-over-Rail Bridge at Elsenburg Road and closing of the Kromme Rhee Road level crossing; and
4. **Option 4** – Rail-over-Road Underpass at Kromme Rhee Road and closing of the Elsenburg Road level crossing.

Table 3: Reasons for the above options *(Source: AECOM, 2013)*

OPTION	REASONS
1 **2** **3**	For the Kromme Rhee Road and Elsenburg Road Level Crossings: ▪ It is proposed that due to their close proximity to each other, one be eliminated by means of a road-over-rail bridge and the that the other be closed. ▪ It is proposed that the Kromme Rhee Road level crossing be eliminated by constructing a road-over-rail bridge and that the Elsenburg Road level crossing be closed as described in Option 1 above. ▪ At this stage it is proposed that Option 2 and 3 not be investigated further, since Elsenburg Road currently does not does play a major role as a mobility route.
4 **(Underpass)**	In examining this option, three major problems were identified: ▪ *The stream which crosses Kromme Rhee Road:* The stream crosses Kromme Rhee Road approximately 40m west of the crossing and the water level is 2m below existing road level. This would mean that the vertical clearance between the rail level and underpass road level would be in excess of 8m making the approaches for an underpass longer than that of an overpass. ▪ *The slope of the existing road on the eastern approach to the crossing:* The eastern approach of Kromme Rhee Road to the crossing falls steeply towards the crossing. This means that in order for an underpass to 'daylight' an extremely long approach would be required. ▪ As Kromme Rhee Road forms part of a major arterial network, the road must be accessible to emergency and rescue vehicles during flooding.

3.2 LOCATION ALTERNATIVE

No alternative was identified as the proposed development involves the construction of a bridge at level crossings at Kromme Rhee Road, which is a high risk level crossing.

3.3 TECHNOLOGY / DESIGN ALTERNATIVES

Different bridge types and span configurations were considered during the conceptual design phase and a two span structure is proposed after consideration of all relevant inputs. The second span is to allow for a future link road from the R304 to the Koelenhof station (west of railway line). This is to service a large approved development just west of the R304. The following design criteria were considered (AECOM, 2014):

1. Road geometry:
- Proposed approach road cross section.
- Proposed horizontal and vertical geometric alignment.
- Minimum horizontal and vertical clearances.

2. Founding condition:
- Good founding conditions were assumed. A comprehensive geotechnical investigation is still to be done.

3. Spatial constraints:
- Working near and over electrified railway lines.
- Total bridge length optimised by means of closed abutments.
- Footprint of the approach fills reduced by means of retaining walls. Mechanically stabilised earth walls are proposed as they are more cost effective than conventional reinforced concrete retaining walls.

4. Construction Method:
- Preference for pre cast concrete deck to improve construction safety over electrified railway lines and to reduce construction duration.

5. Accommodation of existing and future infrastructure:
- Need to span existing railway lines.
- Need to span service road and future access roads.

6. Pedestrians:
- Pedestrian access to and from the station will be provided on either side of the bridge, by means of stairs.
- Ramp access to the station is also provided for differently-abled persons.

3.4 DO NOTHING ALTERNATIVE

The “Do Nothing” Alternative is the option of not undertaking the proposed development. The existing level crossing infrastructure would remain status quo and thus would continue providing inadequate capacity to manage the current and future stormwater volumes which would lead to increased safety risks for portions of Koelenhof area. As such, the “Do Nothing” Alternative would not be environmentally, socially or economically feasible in the long-term and is thus not deemed feasible. However, the “Do Nothing” Alternative is nevertheless considered and assessed in relation to the potential implications of the proposed project, as required in terms of NEMA and its EIA Regulations.

4 LEGISLATIVE FRAMEWORK

South Africa's policy and legislation for environmental management, including biodiversity conservation, has undergone profound changes in the past decade. The proposed project was considered in accordance with the legislation described below.

Of importance are also all provincial and municipal by-laws and regulations that are not listed here but which would be complied with during all phases of the proposed development. Some of the acts may have changed or are in the process of change. However, once the construction phase commences, legislation and all amendments that are current at that time will apply.

4.1 LEGISLATION RELATED TO THE PROPOSED PROJECT

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Constitution of the Republic of South Africa (Act 108 of 1996)	Section 24 of the Constitution makes provision for an environment that is not harmful to human well-being.	Republic of South Africa	1996
National Environmental Management Act (Act 107 of 1998, NEMA)	NEMA is South Africa's overarching environmental legislation. The Act sets out the principles of Integrated Environmental Management (IEM) and aims to promote sustainable development. The Act has implications for all three tiers of government and Section 2 of the Act contains a list of environmental principles that government must keep in mind when taking any decision that may significantly affect the environment. Section 24 of the Act (as amended) indicates that activities that may have a significant detrimental effect on the environment and require permission or authorisation in terms of the law must be assessed prior to decision-making.	Department of Environmental Affairs	1998
National Environmental Management: Biodiversity Act (Act 10 of 2004, NEM:BA)	This Act provides for the protection of those species and ecosystems that warrant national protection, the sustainable use of natural resources, the fair and equitable sharing of benefits arising from bio-prospecting that involves	Department of Environmental Affairs	2004

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	indigenous biological resources. It also outlines the authority and responsibility of the South African National Biodiversity Institute (SANBI).		
National Water Act 1998 (Act 36 of 1998, NWA)	This Act provides for the protection of water resources. In Section 21 of the Act certain activities are described that needs a Water Use License (WUL) in order to commence / continue. Some of the activities in this project triggers activities listed in Section 21 of the Act. A separate Water Use License Application (WULA) process is underway to address the activities identified in the light of this Act.	Department of Water and Sanitation	1998
National Heritage Resources Act (Act 25 of 1999)	This Act is aimed at an integrated system for the identification, assessment and management of heritage resources in South Africa. Under Section 28 of this Act, an agency wishing to establish a linear activity of more than 300 metres in length, the construction of a bridge or similar structure exceeding 50 m in length, any development or other activity which will change the character of a site exceeding 5 000 m^2, and the re-zoning of a site exceeding 10 000 m^2 in extent in extent must notify the responsible heritage resources agency of its intention.	South African Heritage Resources Agency (SAHRA)	1999

4.2 LISTED ACTIVITIES

EIA Regulations of 2014 promulgated in terms of NEMA under Government Notice (GN) No. 982 outline the activities for which EIAs should apply. Amendments to the 2014 EIA Regulations were promulgated with effect from 7 April 2017. The 2017 amendments retain the ethos of the 2014 EIA Regulations with some aspects clarified or deleted.

Developments which trigger activities within GN R983 and R985 require a Basic Impact Assessment (BIA) application process and those that trigger GN R984 activities require a full EIA application process. The proposed Bridge construction and associated activities are undergoing a BIA application process as the project triggers Listing Notice 1 and 3 activities.

The table below outlines the proposed project activities, their potential impacts and mitigation measures in relation to the activities applied for in terms of the EIA Regulations 2014, as amended. Furthermore, the description of the proposed project including its associated infrastructure, unpacks the activities applied for, provided in **SECTION 1.2** in this report.

Table 4: Activities listed within Government Notice No. R983 and R985 applicable to this project (as per numbering in the Government Notice)

Activity Number	Reasons For Listed Activities Triggered	Potential Impacts	Mitigation Measures
GN R983: LN 1 of 2014 EIA Regulations, as amended			
19 The infilling or depositing of any material of more than $10m^3$ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than $10m^3$ from a watercourse.	The proposed road-over-rail bridge construction site crosses the Plankenbrug River. As part of the construction activities, there will be removal or moving of soil, sand, pebbles or rock of more than $10m^3$ from a watercourse.	• Driving through watercourses during the construction and phase of the project will result in soil compaction within watercourse; • The above will further affect watercourse vegetation and result in erosion; • Flow, sedimentation and erosion changes in watercourses due to bridge construction refers to changes in the pattern of surface and subsurface flow in watercourses, as well as resultant sediment depositional impacts and erosion impacts.	• Driving should be done on existing roads and tracks as far as possible, in order to prevent vehicle track entrenchment and avoid the potential for new channel initiation and erosion. • If the construction of a crossing is unavoidable make sure that substrate continuity in the watercourse is maintained within upstream and downstream portions of the channel bed. • Construction works should preferably take place during the dry period. • Management of roadside drainage is the most effective way of controlling sediment runoff from unsealed roads that have to be constructed. To minimise sediment load, an unsealed road network should have an emphasis on slowing drainage flows and dispersing them more frequently.
GN R985: LN 3 of 2014 EIA Regulations, as amended			
12: (i) (ii): The clearance of an area of $300m^2$ or more of indigenous vegetation except where such	The construction site will require vegetation clearance of $300m^2$ or more, where the vegetation cover constitutes indigenous vegetation. The construction activity will entail a 2-span 30m bridge with culvert. The	• Clearing of surface vegetation that will expose the soils, which in rainy events would wash down into wetlands, causing sedimentation. • Indigenous vegetation	• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area • A vegetation rehabilitation plan should be implemented. Grassland

Activity Number	Reasons For Listed Activities Triggered	Potential Impacts	Mitigation Measures
clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (i) In Western Cape (ii) Within critical biodiversity area identified bioregional plans.	length of the road to be reconstructed will be approximately 900m. <u>Geographical Areas</u> The Plankenbrug River and the channelled valley bottom wetland along the river at the study site are indicated as an aquatic ESA that is surrounded by terrestrial CBAs (Belcher et al., 2016).	communities are unlikely to colonise eroded soils successfully. In addition, seeds from proximate alien invasive trees can spread easily into the eroded soil.	can be removed as sods and stored within transformed vegetation. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other or within sensitive environs. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks. • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
		Destruction of vegetation	• Incorporate proper planning for construction to avoid threatened or small vegetation communities where possible. • Erosion control should be implemented in all areas where soil erosion can be foreseen (e.g. slopes, destabilised soil and/or soils with high erodibility).

Activity Number	Reasons For Listed Activities Triggered	Potential Impacts	Mitigation Measures
14: (ii) (a) (c) (i) ii: (ff) The development of: (ii) infrastructure or structures with a physical footprint of 10m^2 or more; Where such development occurs: (a) within a watercourse; and (c) if no development setback has been adopted, within 32m of a watercourse, measured from the edge of the watercourse. excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. (i) In Western Cape:	The construction activity will entail a 2-span 30m bridge with culvert. The length of the road to be reconstructed will be approximately 900m. This will exceed a footprint of 10m^2. <u>Geographical Areas</u> The Plankenbrug River and the channelled valley bottom wetland along the river at the study site are indicated as an aquatic ESA that is surrounded by terrestrial CBAs (Belcher et al., 2016).	Changing the quantity and fluctuation properties of the watercourse due to: • Construction of the bridge within 32m of water resources may divert or impede flow; and • Lack of adequate rehabilitation resulting in invasion by alien invasive plant species.	• Construction around watercourses should be restricted to the dry season. • A temporary fence or demarcation must be erected around the works area to prevent access to sensitive environments. • Prevent pedestrian and vehicular access into wetlands buffer areas as well as riparian areas. • Access roads and bridges should span the wetland area, without impacting on the permanent or seasonal zones. • Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. • Management of on-site water use and prevent stormwater or contaminated water directly entering the watercourse. • Planning of construction site must include eventual rehabilitation / restoration of indigenous vegetative cover. • Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow-up control during construction.

Activity Number	Reasons For Listed Activities Triggered	Potential Impacts	Mitigation Measures
ii. Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.			• The amount of vegetation removed should be limited to the least amount possible. • Rehabilitation of damage that arise as a result of construction activities must be implemented immediately upon completion of construction. •

5 APPOINTMENTS OF THE ENVIRONMENTAL CONSULTANTS AND SPECIALISTS

5.1 ENVIRONMENTAL ASSESSMENT PRACTITIONOR (EAP)

Name of EAP: Judith Fasheun

Description: Master of Environment and Development:

Graduated from the School of Environmental Sciences, University of KwaZulu-Natal (UKZN). Judith majored in Geography and Environmental Management, studied a BSc honours degree in the latter, and completed a Master's degree through the Department of Centre of Environment, Agriculture and Development (CEAD) at UKZN. In terms of environmental consulting, Judith has 9 years relevant experience, and has been involved in undertaking a number of EIAs associated with powerline projects, amongst others. Judith is a member of the International Association for Impact Assessment (IAIA) and a member of the South African Council of Natural Scientific Professions (SACNASP) registered as *Cert Sci Nat 300019/14.*

The EAP has signed the Declaration of Interest and undertakings under oath regarding correctness of information and level of agreement in front of a commissioner of oaths. The signed document is provided in **Appendix C**.

The EAP's Curriculum Vitae (CV) is provided in **Appendix C**.

5.2 SPECIALISTS

Table 5: Team of Specialists Appointed

Field	Name / Company	Experience	Function
Botanical Assessment	Paul Emms	• Qualifications: ND Horticulture, BSc. (Biodiversity & Conservation Biology), Hons. (Botany), MSc (Botany). • Botanist with six years' experience in the field of botanical surveys. • Has conducted over 130 specialist botanical studies	To conduct a botanical assessment of the flora and vegetation in the area designated for the proposed project.
	David McDonald – Bergwinds Botanical Surveys & Tours cc	• Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany). • Botanical ecologist with over 30 years' experience in the field of Vegetation Science. • Founded Bergwind Botanical Surveys & Tours CC in 2006. • Has conducted over 300 specialist botanical / ecological studies. • Has published numerous scientific papers and attended numerous conferences both	

Field	Name / Company	Experience	Function
		nationally and internationally (details available on request).	
Freshwater Assessment	Antonia Belcher -	Due to Antonia's involvement in the development and implementation of the River Health Programme as well as the Resource Directed Measures directorate of the DWS in the Western Cape, Antonia have been a key part of the team that has undertaken six catchment 'state-of-river' assessments as well as routine monitoring and specialized assessments of rivers and wetlands in all the major catchments for the Western Cape. In the past eight years, Antonia has undertaken numerous freshwater assessments as input into both the environmental authorization and water use authorization process throughout the Western Cape as well as greater Southern Africa.	To conduct a Freshwater assessment (wetlands and riparian areas) in the area designated for the proposed project.
Traffic Impact Assessment	HJ Stander - AECOM		Analyses of present and future traffic volumes in respect of the proposed project area and linked road networks.

The Specialists' Declaration of Interest documents are provided in **Appendix C**.

6 OVERVIEW OF THE RECEIVING ENVIRONMENT

This section discusses the key characteristics of the biophysical and biodiversity aspects of the potentially affected area. For this project, the study area is defined as the development footprint and its immediate surroundings as well as to a larger scale; the local municipal areas, the broader district and region. The information pertaining to the receiving environment has been compiled with information from desktop studies, which represent basic literature survey and a review of available spatial data. Nonetheless, information gathered during the field survey is available in **Appendix H**, to inform the description of the various specialist assessments within the project study area.

6.1. CLIMATE

The area has a Mediterranean climate. Most of the rainfall occurs during cold winters while the summers are hot and dry. The months with the highest average rainfall are April (54 mm), July (46.6 mm) and August (40.1 mm) while February is dry (8.6 mm). Average temperatures range between 25°C during the day and 19°C at night in February. In July the average temperature ranges between 18°C and 8°C. See **Figure 6** below (Belcher et al., 2016)

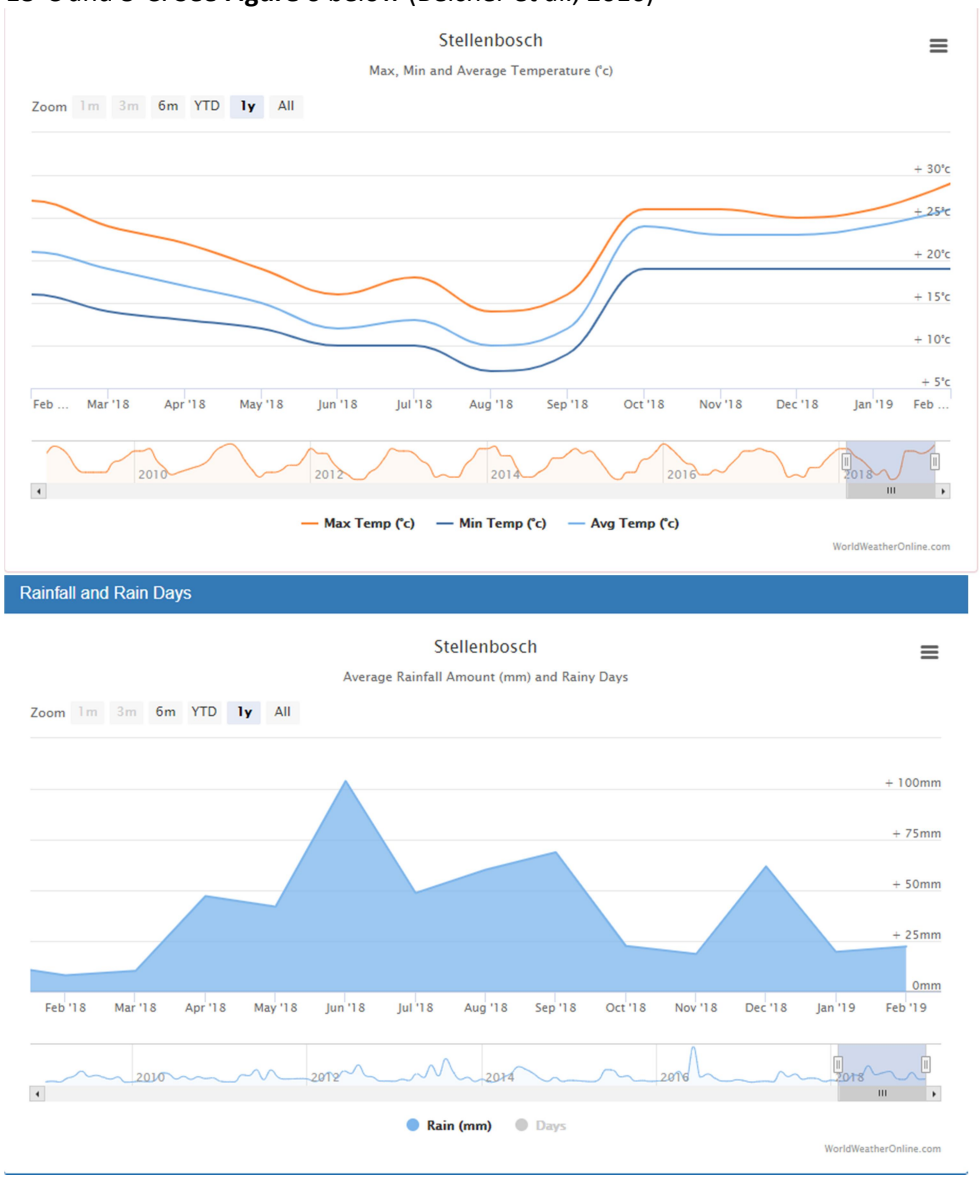


Figure 6: Temperatures (top chart) and rainfall (bottom chart) for the study area *(Source: Worldweatheronline, 2019)*

6.2. GEOLOGY AND SOILS

The area is underlain by Malmesbury Group shales and Cape Granite (Mucina & Rutherford, 2006). Within the immediate study area much of the site consists of alluvial deposits within the floodplain of the Plankenbrug River. The soils tend to be shallow and imperfectly drained with a plinthic horizon with (light brown area in **Figure 7**). The soils also have a marked clay accumulation and are relatively wet in the winter months. Wetland formation is common in these types of soils (Belcher et al., 2016).

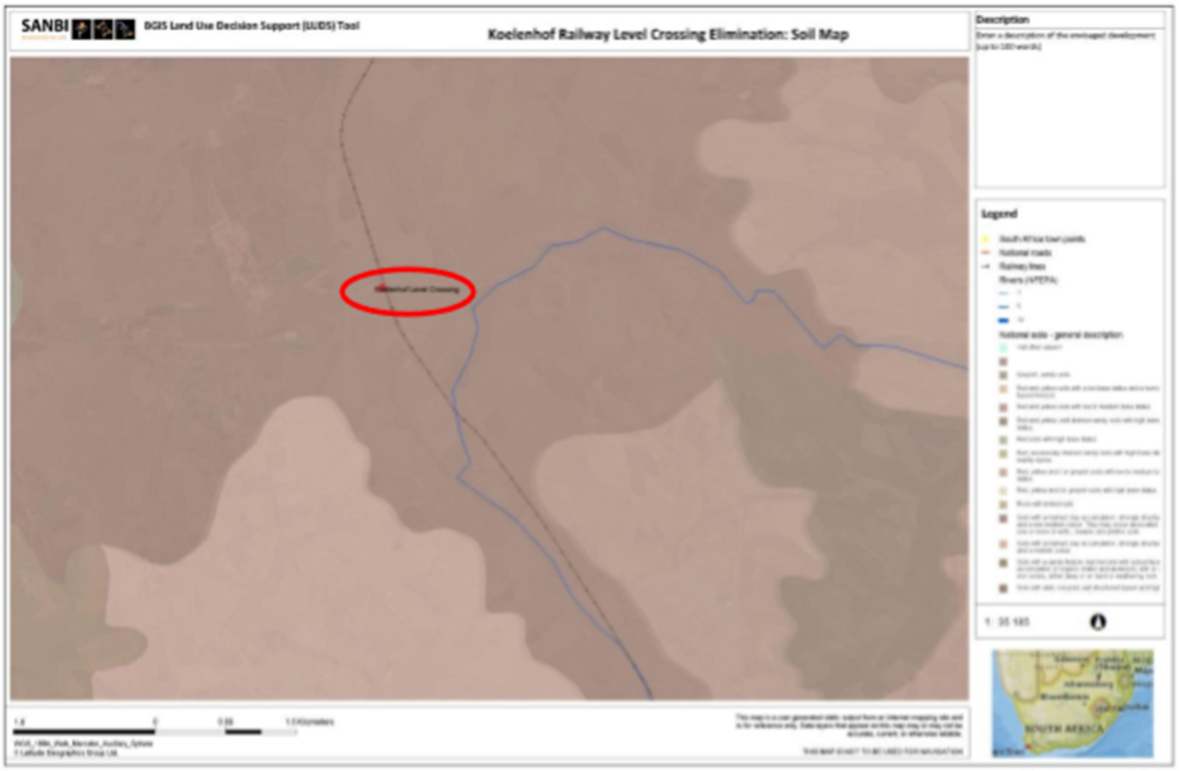


Figure 7: Soil map of the study area
(Sources: SANBI Biodiversity GIS, 2016 in Belcher et al., 2016)

6.3. VEGETATION

The natural vegetation at the site has been mapped as Swartland Shale Renosterveld (FRs9, pale blue area in **Figure 8**) with a band of Swartland Granite Renosterveld (FRg2, darker blue area) occurring on the granite to the east of the site (Mucina & Rutherford, 2006). These vegetation types are considered to be critically endangered as much of the vegetation occurs in lower lying areas where it has been lost to development. Within the study area most of the cover vegetation has also been transformed with little evidence of the indigenous vegetation cover. Similarly, the riparian zone of the river has largely been removed and now consists of alien invasive trees such as black wattle (Acacia mearnsii) and Eucalyptus trees. The understory is dominated by kikuyu grass (Pennisetum clandestinum). The instream vegetation within the river channel is dominated by the indigenous common reed (Phragmites australis) with clumps of sedges such as Cyperus textilis and C. thunbergii. The upstream off-channel dam is dominated by bulrushes (Typha capensis) while the wetland area immediately south of the M23 road consists of a mix of riverbed grass (Pennesetum macrourum), sedges (Carpha glomerata and C. textilis) and invasive plants such as kikuyu grass (Belcher et al., 2016).

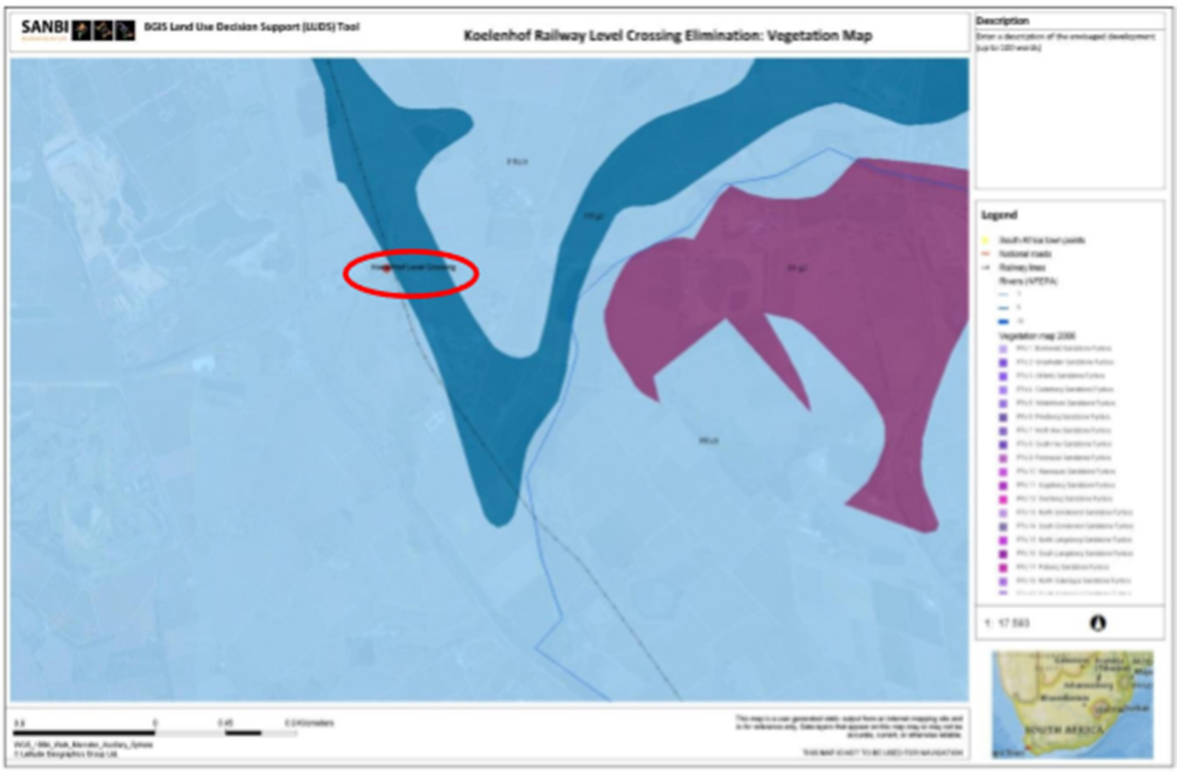


Figure 8: Vegetation types for the study area
(Sources: SANBI Biodiversity GIS, 2016 in Belcher et al., 2016)

6.4. WATER RESOURCES

Water resource features at the site consist of the Plankenbrug River and its associated valley bottom wetland area. The Plankenbrug is a south flowing tributary of the upper Eerste River which joins the Jonkershoek River in Stellenbosch to form the Eerste River **(Figure 9).** The river drains the northern side of the Stellenbosch Valley flowing through farmlands and the suburbs of Cloetesville and Khayamandi and in its lower reaches an industrial area at the foot of the Papegaaiberg. The Plankenbrug River is well known for its high level of faecal pollution below Khayamandi (Belcher et al., 2016).

The river flows within a narrow incised channel for much of its length, where agricultural lands have extended into the riparian zone, removing indigenous vegetation which has been replaced largely by exotic plants such as weeping willow, eucalyptus and poplar trees. The channel has also been modified and straightened in places and much of the flow diverted for irrigation purposes. The water quality of the river is deteriorated. The present ecological state is deemed to be a D/E category (largely to severely modified) with a low ecological importance and sensitivity.

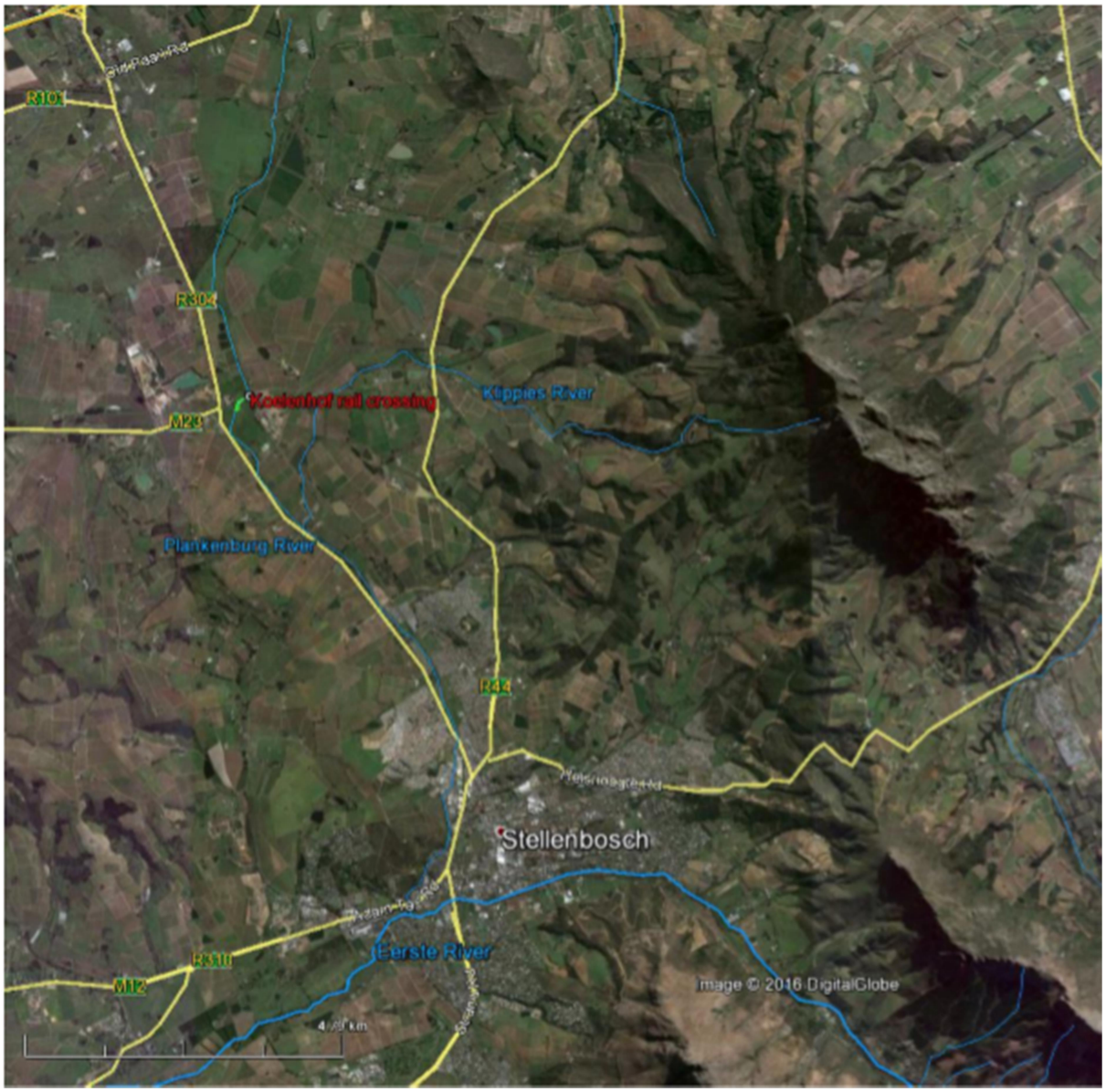


Figure 9: Mapped freshwater features for the larger catchment area
(Source: Google Earth in Belcher et al., 2016)

6.5. BIODIVERSITY CONSERVATION VALUE

There are two freshwater biodiversity conservation mapping initiatives of relevance to the study area, the National Freshwater Ecosystem Priority Areas (NFEPAs) and the City of Cape Town Biodiversity Network mapping. NFEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The Plankenbrug River catchment has not been mapped as a FEPA river and only the off-channel dam immediately upstream of the Kromme Rhee Road has been mapped as a FEPA wetland **(Figure 10).** The dam is an artificially created wetland feature that is not considered of high conservation value.

Figure 10: FEPA map for the area surrounding the study site
(Source: SANBI Biodiversity GIS, 2016 in Belcher et al., 2016)

The Critical Biodiversity Areas (CBA) map indicates areas of land as well as aquatic features which must be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. CBAs incorporate:

(i) areas that need to be safeguarded in order to meet national biodiversity thresholds
(ii) areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
(iii) important locations for biodiversity features or rare species.

Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature, e.g. the riparian habitat surrounding and supporting aquatic Critical Biodiversity Areas. The Plankenbrug River and the channelled valley bottom wetland along the river at the study site are mapped as an aquatic ESA (purple areas in **Figure 11**) that is surrounded by terrestrial CBAs (yellow areas) (Belcher et al., 2016).

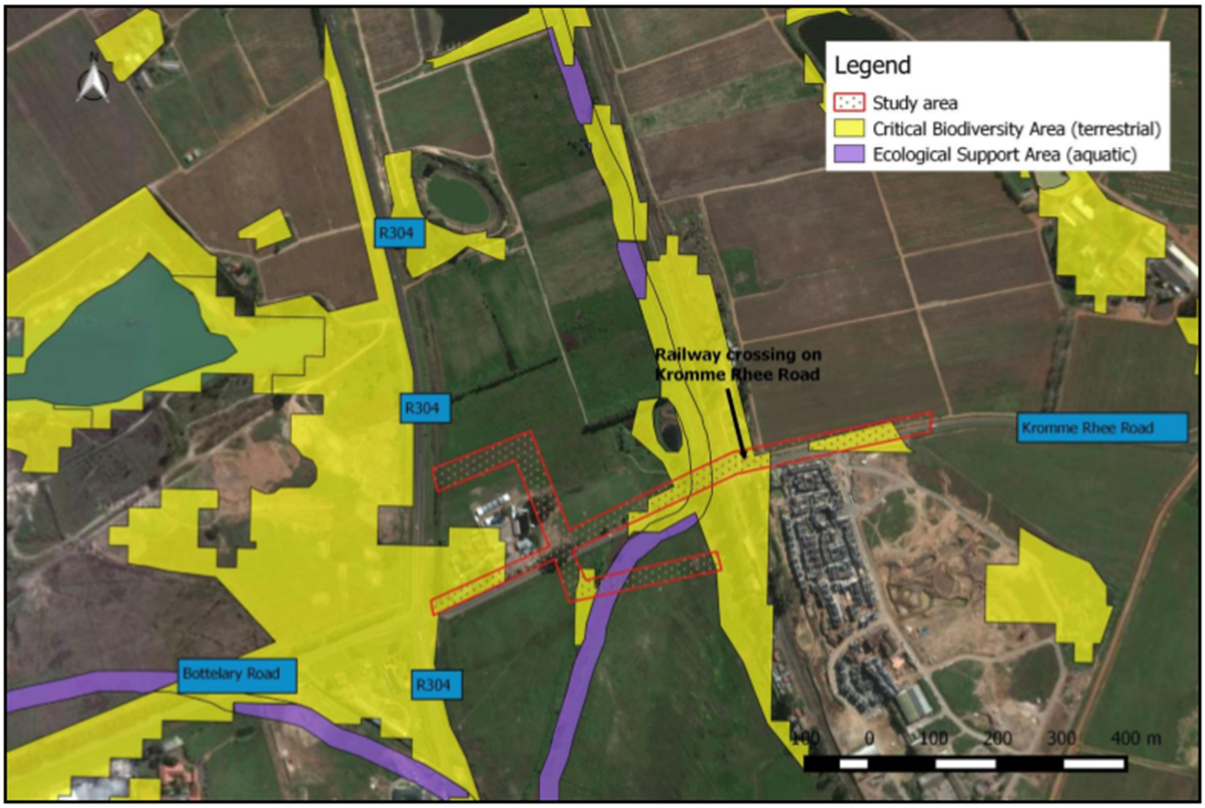


Figure 11: Critical Biodiversity Areas Map for the study area
(Source: SANBI Biodiversity GIS, 2016 in Belcher et al., 2016)

6.6 LAND USE

The land cover is mapped at the site and surrounding area is primarily mapped in the land cover map (**Figure 12**) as degraded and cultivated (brown and yellow areas respectively). A narrow corridor of natural vegetation cover exists along the Plankenbrug River (pale green area in **Figure 12**). Only small pockets of natural vegetation remain within the larger landscape. Urbanised areas of Stellenbosch (grey areas) occur to the south of the site. The railway line occurs immediately to the east of the site.

The Spatial Development Plan for Stellenbosch **(Figure 13)** has mapped the area for future institutional, housing and mixed use development with only the north-eastern portion remaining as agricultural areas.

Figure 12: Land Cover map for study area
(Source: SANBI Biodiversity GIS, 2016 in Belcher et al., 2016)

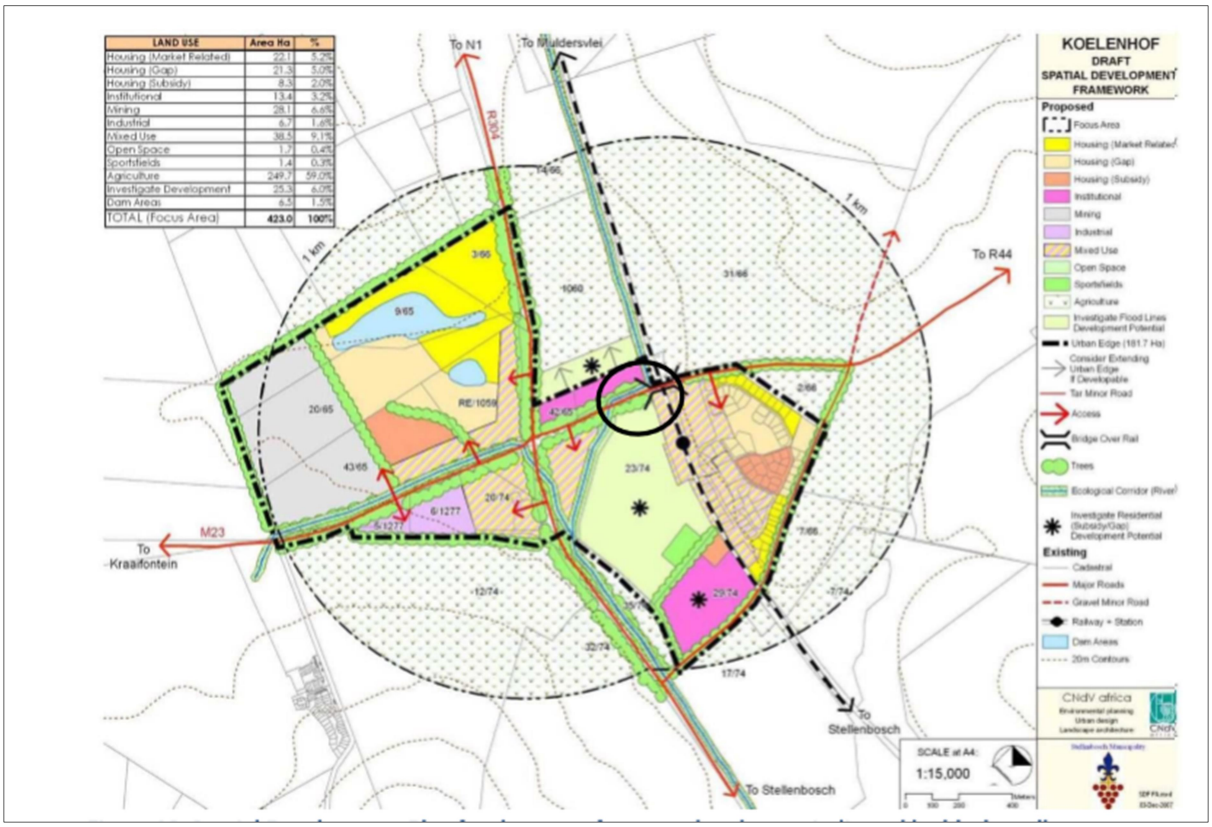


Figure 13: Spatial Development Plan for the area of concern (study area indicated by black oval)
(Source: Stellenbosch SDF, 2017)

6.7 HERITAGE AND CULTURAL FEATURES

No cultural and heritage features were noted during the initial site inspection undertaken for the proposed Bridge at Koelenhof level crossing. Although no sensitive heritage features were identified, should any heritage and cultural resources be identified during construction and earthmoving activities, work must cease and SAHRA must be contacted.

The DEA desktop screening of environmental sensitivity identified the following assessment outcomes for Archaeological and Cultural Heritage for the proposed site:

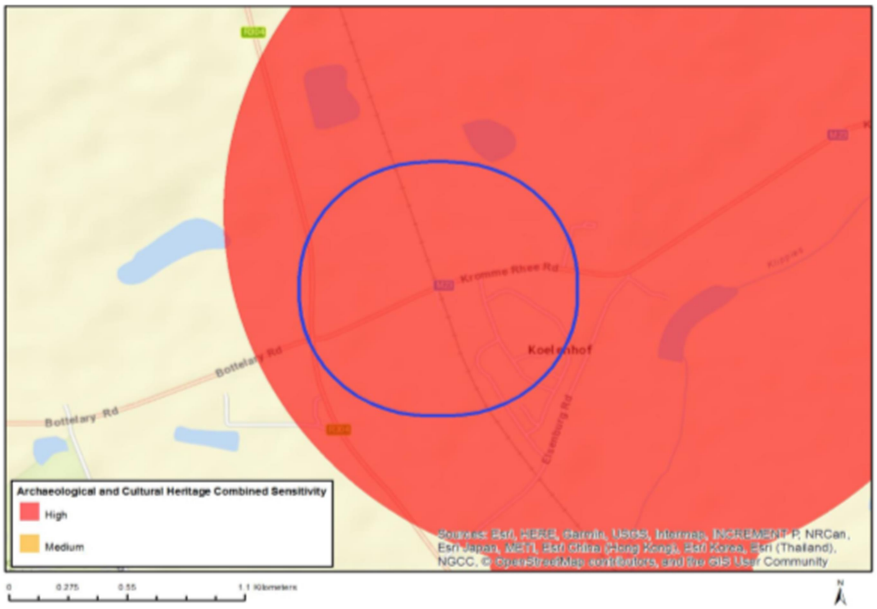


Figure 14: Archaeological and Cultural Heritage Combined Sensitivity
(Source: DEA screening tool, 2019)

High sensitivity: Proposed site is within 500m of important river
High sensitivity: Proposed site is within 500m of a heritage site
High sensitivity: Proposed site is within 500m of a provincial heritage site

6.8 VISUAL CHARACTERISTICS

Much of the surrounding landscape has been transformed by agriculture. Alien and invasive trees largely occur along the river, road and rail margins with very little indigenous vegetation remaining. Much of the site is flat and lies within the original floodplain of the river with the edge of the floodplain banking steeply at the eastern extent of the site and east of the railway line.

Figure 15: View of Koelenhof and the surrounding floodplain area with the Plankenbrug River in the Eucalyptus trees on the right of the photograph
(Source: Belcher et al., 2016)

7 BASIC IMPACT ASSESSMENT (BIA) PROCESS

7.1 BIA PROCESS

The following objectives were met during the BIA process:

- To identify and evaluate potential environmental impacts that could emanate from activities at different stages of the implementation of the proposed bridge at Koelenhof Level Crossing. These could either be positive and or negative impacts. This was done through a desktop review of existing literature as well as conducting field assessments.

- To ensure considerable evaluation of all alternatives including the “do nothing option”.

- To identify key environmental, biophysical and social issues associated with the proposed bridge construction.

- To conduct an open participatory and transparent process and facilitate the inclusion of Interested and Affected Parties (I&APs) and Stakeholders’ concerns of the proposed project in the decision making process.

- To provide the competent authorising body with sufficient information to identify the issues that require assessment as well as the nature and extent of specialist studies required during the BIA process.

Figure 16 below provides a summary illustration of the BIA approach.

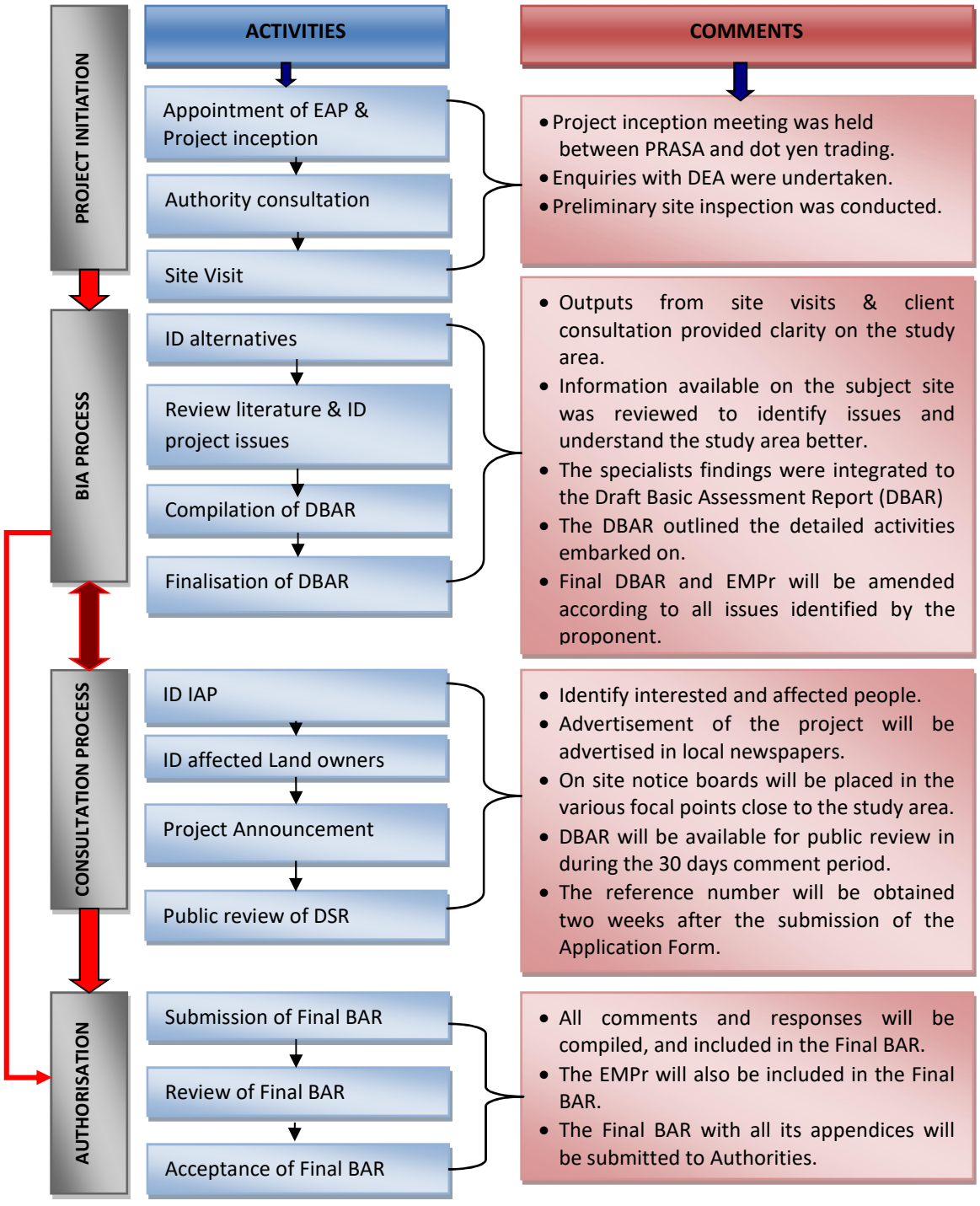


Figure 16: BIA Approach for the proposed Bridge at Koelenhof Level Crossing

7.2 TECHNICAL PROCESS

7.2.1 Inception Meeting With Client

On notification and receipt of the appointment letter from PRASA, a project inception meeting was convened between PRASA and Dot Yen Trading. During this project kick-off meeting the following was discussed:

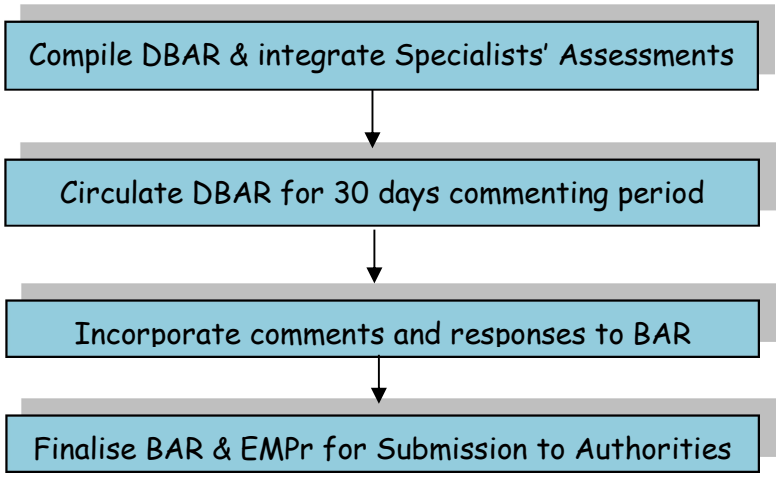
- Project Scope and requirements (confirmation of scope of work);
- Project Schedule;
- Identification of key stakeholders and role players; and
- Preliminary analysis for the bridge construction.

7.2.2 Application for Environmental Authorisation in Terms of GN R982 of 2014, as amended

An application for Environmental Authorisation (EA) will be submitted together with the Draft BAR to the Department of Environmental Affairs (DEA). This avoids the timeframe constraints for the final submission of the Final BAR to the Authorities. The Application form is provided in **Appendix D1.**

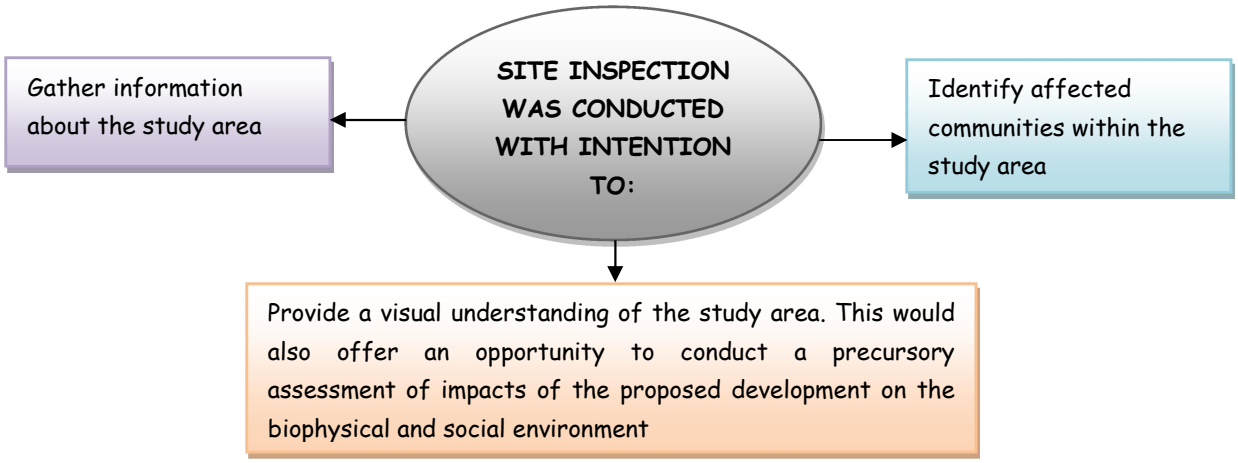
The Department of Environmental Affairs and Development Planning (DEADP), Western Cape is regarded as the provincial commenting authority for the BAR of this project and has been included on the list of key stakeholders.

To secure approval for the BAR from the authorities, the following activities will be embarked on:



7.2.3 Site Inspection

A preliminary site inspection was conducted during the inception phase of the project in January 2019. The purpose of the site inspection is outlined below:



Site inspection photographs are provided in **Appendix E.**

7.2.4 Issues Identified

In order to compile the Basic Assessment Report (BAR), issues identified by the I&APs and stakeholders will be considered. Furthermore, it was necessary to conduct specialist assessment studies to determine more potential impacts that would need to be avoided or minimised by the development. The specialist assessment findings and recommendations are discussed in Chapter 9 in this report.

7.2.5 Collection of Information

Basic information was gathered from existing literature on the study area with inputs from the specialists' assessment surveys.

7.2 6 Review of Basic Assessment Report

The final BAR will be prepared on the basis of specialists' findings and issues identified during the Public Participation Process (PPP). Thereafter the Final BAR will be submitted to the relevant authorities for final review and acceptance.

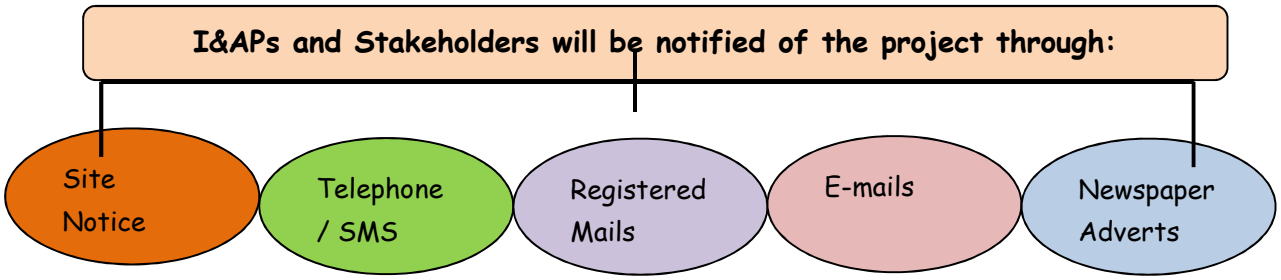
7.3 PUBLIC AND STAKEHOLDER PARTICIPATION DURING DRAFT BAR

7.3.1 Background Information Document

A Background Information Document (BID) / notification letter, was circulated to all identified I&APs in March 2019. The BID encouraged all individuals to contact the consultant should they wish to be registered on the I&AP database and / or make a comment regarding the proposed project.

The BID / notification letter is provided in **Appendix F1**. Email Notification of the BID is provided in **Appendix F2.** Knock and drop register to affected properties is provided in **Appendix F3.**

7.3.2 Registration as Interested and Affected Parties (I&APs)



The I&APs database has been provided in **Appendix F4**.

7.3.3. Newspaper Adverts

A Newspaper advert was published in the Stellenbosch gazette in in English and Afrikaans on the 12th of March 2019. This newspaper is widely read in the Koelenhof community area. The advertisement was a notification to the public of the proposed project and was calling for registration of I&APs on the project register. The next advert will be announcing the availability of the DBAR as well as notification of the public meetings which are to be undertaken during the 30 days commenting period.

The newspaper advert is provided in **Appendix F5.**

7.3.4. Site Notices

Site notices were posted at focal points within the communities close to the study area. Similar to the newspaper adverts, the site notices were calling for registration of I&APs on the project register.

The site notice photographs are provided in **Appendix F6.**

7.3.5. Involvement of Key Stakeholders

The affected local authorities and organisations were contacted to introduce the project and identify relevant people to engage with during the project execution process. Names of representatives from these authorities and organisations are included in the I&APs database. The I&APs database is provided in **Appendix F4**.

7.3.6. Public Meetings

Public meetings will be held in the areas close to the proposed project area. The anticipated month would be in May 2019. Venues, dates and times for the public meetings will be notified as indicated in section 7.3.2 above.

The purpose of the meetings will be to:

- introduce the project to the local I&APs;
- identify issues pertinent to the project;
- invite people to register as I&APs;
- link PRASA, the consultant and local communities; and

- provide I&APs with an opportunity to provide comments.

A focus group meeting with adjacent land owners will be held in May to address issues related to project activities and property rights.

7.3.7. Public Review of Basic Assessment Report

All I&APs and Stakeholders will be given the opportunity to review and comment on the draft BAR for a minimum of 30 days. The Draft BAR will be circulated for public review in the month of April 2019. The report will be placed at focal points for public access such as government department / offices and libraries.

All I&APs and stakeholders will be given an opportunity to forward their written comments, objections, inputs and queries within the 30 days commenting period. All comments received from stakeholders and I&APs will be acknowledged and responded to in the Comments and Response Report (CRR). The Final BAR will include the CRR. All issues will have to be considered and dealt with before submission to the Authorities.

7.4 Basic Assessment Process Timeframes

The following work programme would be followed during the BIA process.

Table 6: Proposed Project Schedule

ACTIVITY	TIME FRAME	STATUS
Preliminary Site Visit	January 2019	**Complete**
Circulation of Notifications/BID to I&APs	March 2019	**Complete**
PPP for Draft BAR phase	April 2019	In progress
Circulation of Draft BAR 30-day comment period	May 2019	In progress
SUBMISSION OF DBAR / APLICATION FORM TO DEA	May 2019	In progress
PREPARE FINAL BAR	June 2019	Pending
SUBMISSION OF FBAR TO DEA	June 2019	Pending
Anticipated Environmental Authorisation	Aug /Sep 2019	Pending

8 METHODOLOGY OF THE ASSESSMENT OF POTENTIAL IMPACTS

All impacts identified during S&EIAR phases are classified in terms of their significance. The broad significance categories are as follows:

- The **Nature** of the impact: This will describe the cause and the effect, what will be affected and how it will be affected.

- **Mitigation level:** The degree at which the impact can be mitigated.

- The **Extent** of the impact: This will be categorised as either local, regional or national.

- The **Magnitude** of the impact: This will be quantified as either:
    - Low: Will cause a low impact on the environment;
    - Moderate: Will result in the process continuing but in a controllable manner;
    - High: Will alter processes to the extent that they temporarily cease; and
    - Very High: Will result in complete destruction and permanent cessation of processes.

- The **Probability:** which shall describe the likelihood of impact occurring and will be rated as follows:
    - Extremely remote: Which indicates that the impact will probably not happen;
    - Unusual but Possible: Distinct possibility of occurrence;
    - Can Occur: there is a possibility of occurrence;
    - Almost Certain: Most likely to occur; and
    - Certain/Inevitable: Impact will occur despite any preventative measures put in place.

- **The duration (Exposure)**: wherein it will be indicated whether:

    - The impact will be immediate;
    - The impact will be of a short tem (Between 0-5 years);
    - The impact will be of medium term (between 5-15 years);
    - The impact will be long term (15 and more years); and
    - The impact will be permanent.

- **Reversibility/Replaceability:** The degree at which the impact can be **reversible or the lost resource can be replaced.**

To determine the significance ranking, the following ranking (or similar) was applied to each specialist's impact identified. Furthermore, the summary of the significance ranking of the specialists' impact assessment is provided in **Appendix G.** It outlines the significance of the potential impacts that the proposed powerline may impose on the biophysical, biodiversity, social, visual and cultural aspects of the environment.

Table 7: Significance ranking

RANKING	MAGNITUDE	REVERSIBILITY	EXTENT	DURATION	PROBABILITY
5	Very high/ don't know	Irreversible	International	Permanent	Certain/inevitable
4	High		National	Long term (impact ceases after operational life of asset)	Almost certain
3	Moderate	Reversibility with human intervention	Provincial	Medium term	Can occur
2	Low		Local	Short term	Unusual but possible
1	Minor	Completely reversible	Site bound	Immediate	Extremely remote
0	None		None		None

Significance = Consequence (Magnitude+ Duration+ Extent + Reversibility) X Probability

9 SUMMARY: SPECIALISTS IMPACT ASSESSMENTS

The information provided in this section summarises findings and recommendations of specialist reports. The detailed Specialist Reports are provided in **Appendix H.**

9.1 BOTANICAL ASSESSMENT

The botanical survey was required to identify all vegetation on the property and assess the potential impacts of the project. Impacts were measured against the habitat sensitivity, which is based on a number of criteria, including (1) conservation status of the vegetation type(s), (2) strategic geographical allocation and ecological functioning, (3) presence or absence of threatened plant species, (4) ecological sensitivity and (5) long-term environmental changes to the site that may occur due to the development activities.

9.1.1 Botanical Findings

GENERAL AREA: Description, Conservation Status and Biodiversity Plans

Even though very little natural vegetation remains in the area due to transformation of the land (farming, roads, housing and shopping centres) patches of natural vegetation and patches of threatened species are known to occur in the area. For example: the brick works **(Figure 17)** immediately west of the R304 and north of Bottelary Road supports one of the last remaining populations of the CRITICALLY ENDANGERED Babiana regia (Emms et al., 2016).

Figure 17: Identified patches of remaining natural and threatened vegetation
(Source: Google Earth™ aerial image in Emms et al., 2016)

The farmland within the study area would historically have supported two vegetation types. This would have included *Swartland Shale Renosterveld* on the land to the west of the railway crossing and *Swartland Granite Renosterveld* to the east of the crossing (Mucina & Rutherford, 2006). See **Figure 18** below.

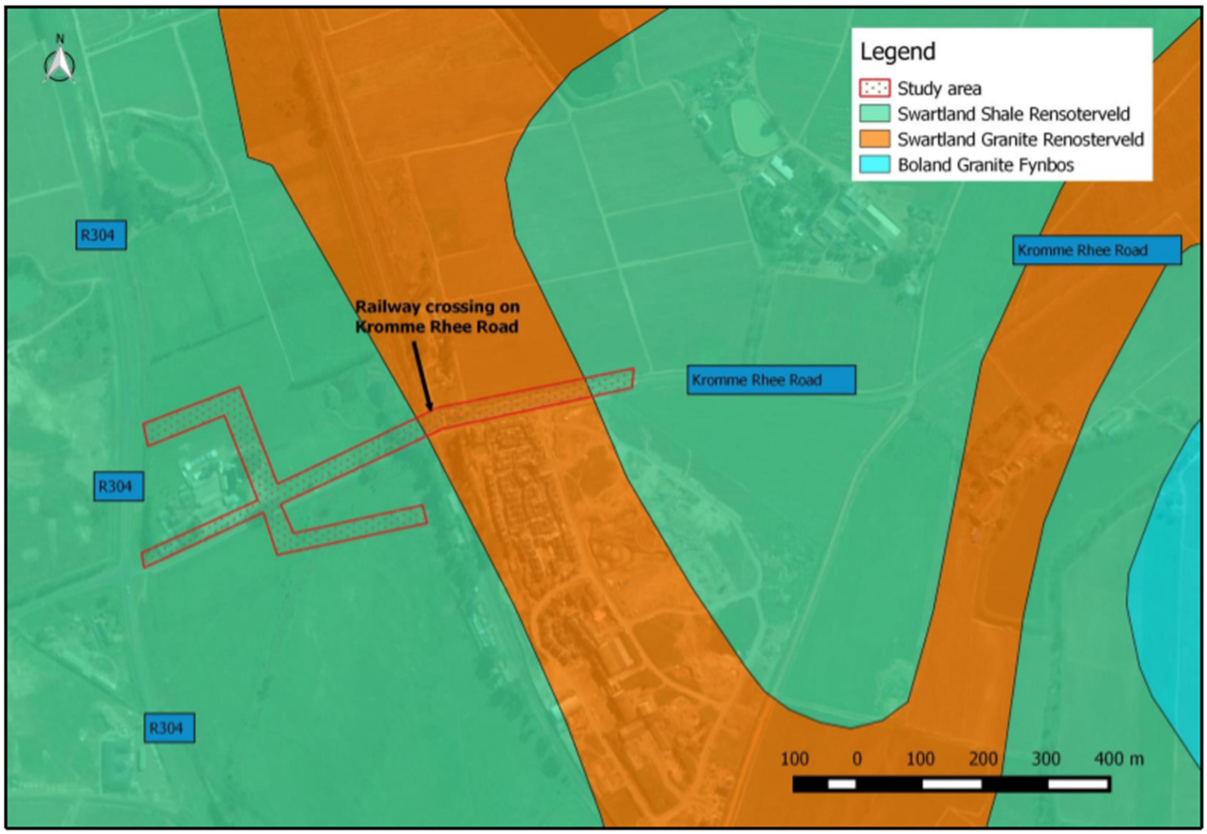


Figure 18: Vegetation Map
(Source: Mucina, Rutherford and Powrie, 2009 in Emms et al., 2016)

Both vegetation types (*Swartland Shale Renosterveld and Swartland Granite Renosterveld*) are listed as CRITICALLY ENDANGERED (A1 & D1). The criterion A1 pertains to irreversible loss of habitat whereas D1 pertains to threatened species associations. The land associated with the stream that traverses the site from the railway crossing to the southwest falls within both Critical Biodiversity (CBA – terrestrial) and Ecological Support Areas (ESA: aquatic) according to the Western Cape Biodiversity Framework (WCBF), (Pence, 2014 in Emms et al., 2016). See **Figure 19** below.

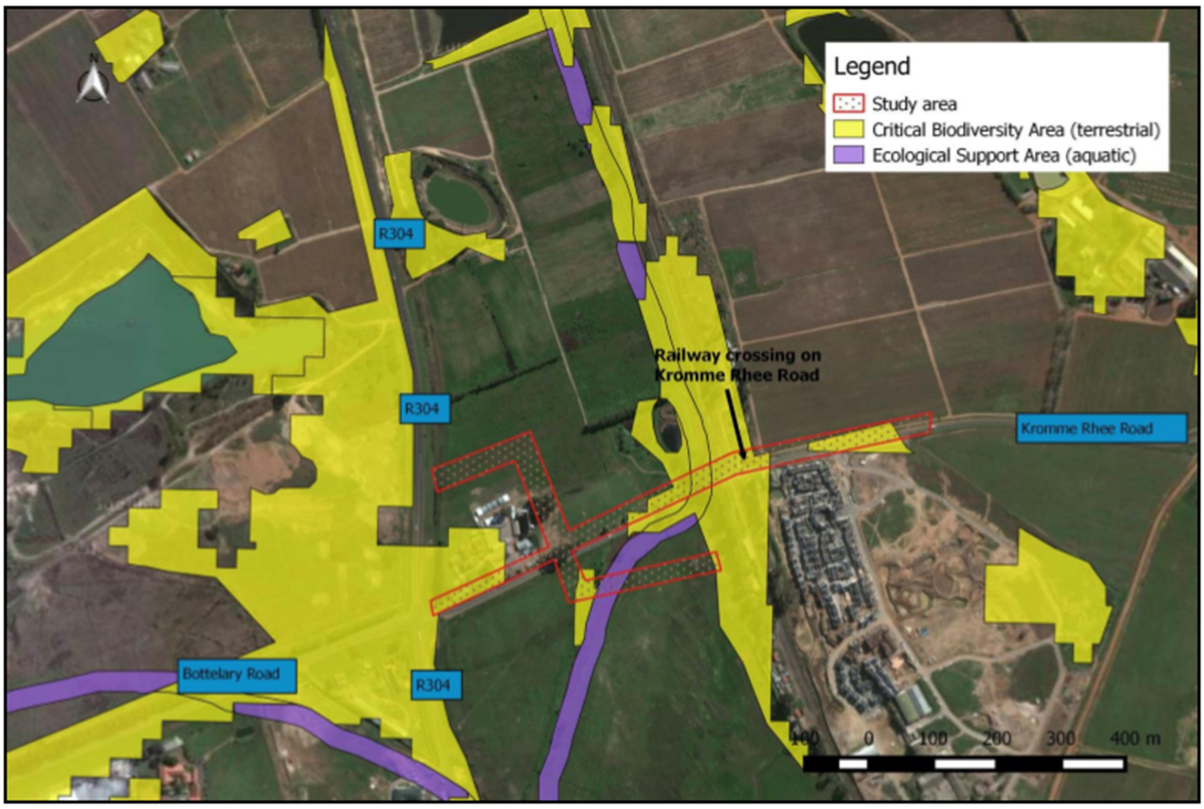


Figure 19: Conservation Map: Study area shown in relation to the WCBF for the Stellenbosch Municipality
(Source: Pence, 2014 in Emms et al., 2016)

STUDY AREA VEGETATION
The study area contains two broad habitat types:

1. wetlands and stream
2. cultivated farmland

The sample waypoints and features referred to in the text below are indicated in **Figure 20.**

Figure 20: Survey Map: Study area (red outline), Sample waypoints (numbered yellow circle icons) and tracks (blue lines)
(Source: Google Earth™ aerial image in Emms et al., 2016)

WETLAND AND STREAMS

The wetlands merge with the farmland southwest of the railway crossing at waypoint **010** (33° 52' 27.56" S'; 18° 49' 5.36" E) but are only evident due to the presence of common reed (Phragmites australis) in the cultivated fields. See **Figure 21** below. The stream and riparian zone supports homogeneous vegetation dominated by common reed (Phragmites australis) with comparatively lower cover of River Caperose (Cliffortia strobilifera).

Figure 21: Cultivated farmland on the south side of Kromme Rhee Road at waypoint **010** (33° 52' 27.56"S; 18° 49' 5.36" E) where the underlying wetland can be distinguished by the presence of common reed (Phragmites australis) (green shoots in the foreground) emerging in the recently cut crops.

The road reserve supports several large trees between the railway crossing and school (Figure 20, left image). These include sugar gum (Eucalyptus camaldulensis), gum tree (Eucalyptus sp.) and Australian blackwood (Acacia melanoxylon). These large trees are also present to the northwest of the railway crossing along with numerous alien grasses and weeds (Figure 20, right image).

View of the road reserve along Kromme Rhee Road (westerly direction) at waypoint **002** (33° 52' 24.67" S; 18° 49' 4.12" E) with (a) wetland on the left dominated by common reed and (b) mature gum trees on the right hand side

Transformed habitat on the northwestern side of the railway crossing at waypoint **007** (33° 52' 21.60" S; 18° 49'8. 05" E). Note the tall gum trees (background), stream with common reed (centre) and alien grasses (foreground).

Figure 22: Large trees within the study area

CULTIVATED FARMLAND

The cultivated fields to the east of the railway crossing and north and south sides of Kromme Rhee Road do not support any natural vegetation apart from the aforementioned common reed (**Figure 20** above). The land has been ploughed for crop cultivation but due to the season (mid-summer) the area is dominated by dried out grasses and several scattered plants of Port Jackson Willow (Acacia saligna), along the stream edge. Dominant weeds and grasses include wild oats (Avena fatua), ripgut brome (Bromus diandrus), kweek (Cynodon dactylon), Paterson's curse (Echium plantagineum), Italian rye grass (Lolium multiflorum) and wild mustard (Rapistrum rugosum).

The cultivated field north of Kromme Rhee Road (**Figure 20** above) supports the same array of alien grasses and weeds in addition to scattered apple trees. See **Figure 23** below. The service road on the western side of the railway station along the edge of the farmland supports high numbers of exotic species and invasive weeds including gum trees (Eucalyptus sp.), Port Jackson Willow (Acacia saligna) and exotic purple top (Verbena bonariensis).

Figure 23: Cultivated farmland on the north side of Kromme Rhee Road at waypoint **012** (33° 52' 21.88" S; 18° 48' 55.70" E) showing alien grasses and scattered apple trees, Vehicles travelling along the R304 can be seen in the background.

Figure 24 below shows more sample waypoints and features that are indicated in **Figure 20** above.

The school parking area at waypoint 011 (33° 52' 25.17"S; 18° 48' 58.77"E), where the service road would pass either or on the right hand side of the stands of gum trees (Eucalyptus sp.)

The railway crossing at waypoint 006 (33° 52' 22.83" S; 18° 49' 9.26 "E) does not support any remnant vegetation or important species. Note the cleared edges, service roads and tall gum trees in the background.

Figure 24: More sample waypoints and features that are indicated in Figure 20

From the above findings, the study area does not support any remnant vegetation, important species or spatially valuable habitat (i.e. ecological connectivity) since the area has been transformed.

9.1.2 Botanical Impacts and Mitigation Measures

The impact assessment is a measure of the impacts likely to occur on the affected environment, specifically the vegetation, ecological processes, important species and habitats.

The impact rating relating to the existing vegetation and habitat are assessed and detailed in the Significant Scoring Matrix provided in **Appendix G.**

The nature of the impacts and mitigation measures are outlined in **Table 8** and **Table 9** below.

Table 8: Impact: Loss of Vegetation

NATURE OF IMPACT	MITIGATION MEASURES
LOSS OF VEGETATION	**CONSTRUCTION PHASE**
IMPACT: This includes intact vegetation, ecologically important species and species of conservation concern.	Mitigation is not recommended, nor would it be reasonable to implement any conditions for approval of the construction since the road reserve is generally maintained as a mowed landscape. The only scope for improving biodiversity would be to make use of locally indigenous shrub species along any sloped bridge surfaces. This is recommended if soil is to be graded along the bridge edges.

Table 9: Impact: Loss of Ecological Processes

NATURE OF IMPACT	MITIGATION MEASURES
LOSS OF ECOLOGICAL PROCESSES	**CONSTRUCTION PHASE**
IMPACT: This includes ecologically important species and species of conservation concern.	Mitigation is not recommended, nor would it be reasonable to implement any conditions for approval of the construction since the road reserve is generally maintained as a mowed landscape. The only scope for improving biodiversity would be to make use of locally indigenous shrub species along any sloped bridge surfaces. This is recommended if soil is to be graded along the bridge edges.

Table 10: Cumulative Impacts of the crossing on the surrounding vegetation

CUMULATIVE IMPACT:	MITIGATION MEASURES
Since no loss of natural vegetation would occur and no areas have restoration potential there would be zero percent loss of both Swartland Shale Renosterveld and Swartland Granite Renosterveld habitat	Mitigation is not recommended.

9.1.3 Botanical: Conclusion

The proposed Koelenhof railway crossing and service road would not impact any natural vegetation, important species or obvious ecological processes. The project would not have any far reaching impacts (Low to Very Low Negative) and is therefore supported from a botanical perspective.

Recommendations:
Make use of locally indigenous shrub species along any sloped bridge surfaces. This is recommended if soil is to be graded along the bridge edges.

9.2 FRESHWATER ASSESSMENT

9.2.1 Freshwater Findings

The Plankenbrug River upstream of the study area consists of a modified river channel that has largely been straightened and confined within a narrow channel immediately west of the railway line. A number of relatively small in-channel and off-channel farm dams occur within these upper reaches of the river. The surrounding natural vegetation has also mostly been transformed into cultivated fields. The Klippies Tributary and a number of smaller tributaries drain Simonsberg and flow in a westerly direction to join the Plankenbrug River between the Koelenhof and Stellenbosch. See **figure 25** below.

Figure 25: Water resource features within the study area
(Source: Google Earth image)

Upstream of the proposed bridge that is to cross the Plankenbrug River consists largely of a straightened channel that is dominated with the common Phragmites reeds with patches of Cyperus sedges. Little of the indigenous riparian vegetation remains but has been replaced by primarily invasive alien trees. See **figure 26** below.

Figure 26: View of the Plankenbrug River at the proposed rail crossing
(Source: Belcher et al., 2016)

A large off-channel dam is located on the western bank **(Figure 27).** Immediately downstream of the Kromme Rhee Road, the river channel is less impacted and portions of the associated valley bottom wetland area remains. The wetland area is however in a very disturbed condition and has been fragmented by the construction of a farm road as well as the excavation of stormwater drains and dumping of material. The wetland is also overgrowth with kikuyu grass and other alien invasive plants. See **Figure 28** below.

Figure 27: View of the off-channel dam immediate upstream of Kromme Rhee Road, west of the Plankenbrug River
(Source: Belcher et al., 2016)

Figure 28: View of the wetland area associated with the Plankenbrug River
(Source: Belcher et al., 2016)

9.2.2 Freshwater Impacts and Mitigation Measures

The impact assessment is a measure of the impacts likely to occur on the affected environment. The impact rating relating to the affected water resources are assessed and detailed in the Significant Scoring Matrix provided in **Appendix G.** The nature of the impacts and mitigation measures are outlined in the tables set out below.

Table 11: Loss of Wetland and Riparian Habitat

NATURE OF IMPACT	MITIGATION MEASURES
LOSS OF AQUATIC HABITAT	**CONSTRUCTION PHASE**
IMPACT: The riparian and wetland habitat in the area are already disturbed, however some loss of aquatic habitat and longer term disturbance of the remaining aquatic habitats adjacent to the crossing is expected.	• The minimum area required for the construction of the proposed crossing should be demarcated. • The area within the wetland or adjacent to the river channel should be treated as a no-go area. • Prior to the commencement of work, the topsoil within the area to be disturbed should be set aside for use in the rehabilitation and establishment of the areas adjacent to the crossing. • If possible wetland related plants within the area to be disturbed could also be set aside for the revegetation of the area after construction is complete. • The advice of a suitably qualified wetland specialist should be sought with regards to the rehabilitation of the disturbed areas and the clearing of alien vegetation. • Construction works should be undertaken in the drier summer months that revegetation of the disturbed areas can be undertaken immediately following the construction activities and prior to the onset of winter. • Any rubble resulting from the proposed works should be removed from the banks of the river. • Ongoing monitoring of the bank adjacent to the new crossing should be undertaken to immediately mitigate any erosion that should take place or clear any invasive alien plant growth.

Table 12: Flow modification

NATURE OF IMPACT	MITIGATION MEASURES
MODIFICATION OF FLOW	**CONSTRUCTION PHASE**
IMPACT: The construction of a structure within the river channel and immediate surrounding area may impact on the runoff characteristics and river hydraulics at the site which in turn may alter the aquatic habitats adjacent and downstream of the proposed crossing.	• The structure at the river should not impede low flow in the river and should be designed such that it does not provide a barrier for the migration of biota in the river. • Care should also be taken that the structure also does not confine/intensify flow in the channel, alter the base level of the stream bed and the direction of flow in the river. • Activities within the river channel should be limited as far as possible in terms of the spatial and temporal extent. • Construction works should preferably take place during the dry period. • All rubble, siltation and debris associated with the construction works in and adjacent to the river channel should be removed. • Where possible the banks should be reshaped and revegetated. • Stormwater runoff from the crossing and associated infrastructure should be adequately addressed in the design of the crossing to ensure that the runoff from the crossing is not concentrated and likely to cause erosion of the river bank.

Table 13: Water Quality Impairment and an increase in turbidity

NATURE OF IMPACT	MITIGATION MEASURES
WATER QUALITY IMPACTS IN THE PLANKENBRUG RIVER	**CONSTRUCTION PHASE**
IMPACT: There is some potential associated with the proposed activities for some impairment of the surface water quality to occur, primarily sedimentation.	• The water quality impacts during the proposed activities would be limited if the activities were to take place during the lower flowing months of the year (before the onset of the winter rainfall months in May/June). • Silt and vegetation removed from the area to be disturbed should be removed away from the river channel, wetland area and riparian zone. • No contaminated runoff associated with any construction works should be discharged into the river. • Housekeeping measures at the construction site should be addressed in the construction environmental management plan for the project. • The longer term rehabilitation and management of the river channel at the river crossing should be managed by means of an approved Management Maintenance Plan (MMP) for the site. • The MMP should include method statements for the removal of sediment and debris upstream of the crossing as well as revegetation of indigenous plants and control of alien invasive plants as well as erosion control measures should they be required.

Table 14: Cumulative Impacts of the crossing over the Plankenbrug River

CUMULATIVE IMPACT:	MITIGATION MEASURES
• The potential impacts of the proposed crossing over the Plankenbrug River are all on a local scale. • The activity is very unlikely to have impacts upon the larger Plankenbrug River system, downstream of the site as the river has already been significantly modified by the Kromme Rhee Road crossing and surrounding land use activities. • Currently the riparian vegetation along the river at the site is also dominated by alien vegetation however the disturbance caused by the proposed activities will further facilitate the spread of most of the alien species observed at the site.	• After completion of the construction phase, rehabilitate the disturbed areas and the clearing of alien vegetation.

9.2.3 Freshwater Conclusion and Recommendations

The proposed rail crossing will cross over the Plankenbrug River and the associated valley bottom wetland area at a point where the river is located within a narrow and confined river channel. The associated valley bottom wetland area is largely none existent at the proposed crossing. The instream vegetation consists primarily of Phragmites reeds while the riparian zone is dominated by alien invasive kikuyu grass and Eucalyptus trees. The crossing is also immediately upstream of the Kromme Rhee Road and downstream of the off-channel dam on the western bank of the river. The river is thus highly disturbed at this point. The crossing is thus located at the point at which the impact of the proposed crossing would be of the least significance from a freshwater ecology point of view.

Recommendations:

The significant rating (Appendix G) for the proposed activity is low and should the mitigation measures be implemented, the impacts will have a very low significance. The Department of Water and Sanitation will need to be approached with regards to the need for a water use authorisation for the proposed bridge.

9.3 TRAFFIC IMPACT ASSESSMENT (TIA)

PRASA has identified the level crossing of the railway line with the Kromme Rhee Road as one of a number in the Western Cape which should be eliminated through the construction of bridges. PRASA has recorded 21 incidents at this crossing between 1994 and 2011 (Stander, 2014). The crossing is located just north of the Koelenhof station on the Stellenbosch – Paarl railway line and approximately 500m east of the Klipheuwel /Bottelary Road intersection in Koelenhof.

ACCESS

The existing Koelenhof station building is accessible for vehicles through

(i) a dirt road on the western side close to the railway line from the Kromme Rhee Road, and

(ii) (ii) a dirt track on the western side (rail service road), which links with the Elsenburg Road to the south and currently serve some residences just south of the station. Both these roads are not proclaimed roads, so in effect there is no public access to the station building.

The majority of rail users currently approach the station on foot from Kromme Rhee Road, by walking a short distance on the dirt road mentioned above or walking along the rail track before reaching the station platform. With the development of Nooitgedacht to the east of the station, vehicular access to the PRASA property to the east of the station, and potential pedestrian access from the east, has been cut off. For this reason, as well as the lack of public access to the station, and the fact that the proposed bridge over the railway line will cut off the existing informal access, a new access road from Kromme Rhee Road to the west of the station is proposed, which is located approximately 400m west of the Kromme Rhee rail crossing. This access road should be designed to serve the existing school and church in the north eastern quadrant of the Kromme Rhee/R304 intersection, as well as the potential new developments in the north eastern and south eastern quadrants. See **Figure 29.**

Figure 29: New access road from Kromme Rhee road (outline in pink)
(Source: AECOM, 2014 detail figure no. Koel 2)

The only other access of importance to the rail crossing of the Kromme Rhee Road is the existing entrance to the Nooitgedacht development, which is located approximately 220m to the east of the rail crossing. In view of the importance of this entrance to serve the Nooitgedacht development, it is important to ensure that adequate sight distance (stopping and shoulder sight distance) is available at this point, after the road-over-rail bridge has been constructed. In view of the development proposals for the Koelenhof node, a design speed of 70 km/h is considered suitable for Kromme Rhee Road where it crosses the railway line.

The TIA was required for this project to determine:

- The existing traffic volumes in the study area;
- The predicted traffic volumes in the study area in the medium term;

• The predicted levels of service in the study area (now and in the medium term); and
• The proposed modifications to adjacent roads to address the impact of the construction of the road-over-rail bridge.

9.3.1 TIA Findings

Existing Traffic Volumes

In order to obtain the present traffic demand in the vicinity of the proposed road-over-railway crossing, the traffic counts have been obtained. The existing traffic volumes for the weekday morning and afternoon peak hours[1] are available at intersections 3,4 & 5, and are summarised in **Figures 30 and 31.** The values shown represent all vehicle types.

[1] Weekday morning peak hour occurs between 06:45 and 07:45 and the afternoon peak hour from 16:45 to 17:45.

Site: Intersection 3: Total (Koelenhof Node 100% Developed) AM - Bottelary/R304

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R304 (To Stellenbosch)											
1	L2	542	0.0	0.282	5.2	LOS A	0.0	0.0	0.00	0.92	52.5
2	T1	1	0.0	0.001	5.8	LOS A	0.0	0.0	0.53	0.92	49.4
3	R2	289	0.0	0.221	12.5	LOS B	1.2	8.6	0.58	1.52	44.3
Approach		833	0.0	0.282	7.7	LOS A	1.2	8.6	0.20	0.56	49.1
East: Kromme Rhee											
4	L2	226	0.0	1.566	562.1	LOS F	133.6	935.1	1.00	9.31	3.7
5	T1	432	0.0	1.566	561.9	LOS F	133.6	935.1	1.00	8.90	3.7
6	R2	237	0.0	1.566	570.7	LOS F	103.6	725.1	1.00	8.15	3.8
Approach		895	0.0	1.566	564.3	LOS F	133.6	935.1	1.00	4.40	3.7
North: R304 (To Klipheuwel)											
7	L2	268	0.0	0.831	51.2	LOS D	9.3	65.4	1.00	2.76	24.9
8	T1	1	0.0	0.831	50.0	LOS D	9.3	65.4	1.00	2.76	24.9
9	R2	258	0.0	1.205	256.5	LOS F	37.9	265.6	1.00	5.33	8.0
Approach		527	0.0	1.205	151.6	LOS F	37.9	265.6	1.00	2.01	12.0
West: Bottelary											
10	L2	221	0.0	0.874	16.5	LOS B	15.6	109.2	0.99	2.32	42.1
11	T1	653	0.0	0.874	15.2	LOS B	15.6	109.2	0.99	2.32	42.1
12	R2	1137	0.0	0.966	31.7	LOS C	31.3	219.3	1.00	2.94	33.3
Approach		2011	0.0	0.966	24.7	LOS C	31.3	219.3	1.00	1.33	36.5
All Vehicles		4265	0.0	1.566	150.3	LOS F	133.6	935.1	0.84	1.91	12.1

Site: Intersection 4: Total (Koelenhof Node 100% Developed) AM – Kromme Rhee/School/Church Access

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Access to Station											
1	L2	68	0.0	0.577	55.9	LOS E	3.3	23.2	1.00	0.78	23.7
2	T1	3	0.0	0.577	47.7	LOS D	3.3	23.2	1.00	0.78	23.7
3	R2	11	0.0	0.082	53.0	LOS D	0.5	3.2	0.96	0.67	24.3
Approach		82	0.0	0.577	55.2	LOS E	3.3	23.2	1.00	0.77	23.7
East: Kromme Rhee											
4	L2	26	0.0	0.515	11.4	LOS B	11.7	82.1	0.37	0.36	53.0
5	T1	774	0.0	0.515	3.2	LOS A	11.7	82.1	0.37	0.36	53.0
6	R2	5	0.0	0.060	56.7	LOS E	0.2	1.7	0.99	0.63	23.3
Approach		805	0.0	0.515	3.9	LOS A	11.7	82.1	0.37	0.36	52.6
North: Access to School and Church											
7	L2	11	0.0	0.961	75.7	LOS E	4.4	30.8	1.00	1.05	19.4
8	T1	3	0.0	0.961	67.6	LOS E	4.4	30.8	1.00	1.05	19.4
9	R2	63	0.0	0.961	75.9	LOS E	4.4	30.8	1.00	1.05	19.4
Approach		77	0.0	0.961	75.5	LOS E	4.4	30.8	1.00	1.05	19.4
West: Kromme Rhee											
10	L2	37	0.0	1.014	94.6	LOS F	82.4	577.0	1.00	1.47	17.3
11	T1	958	0.0	1.014	86.4	LOS F	82.4	577.0	1.00	1.47	17.3
12	R2	216	0.0	0.546	17.1	LOS B	5.1	36.0	0.56	0.80	40.8
Approach		1211	0.0	1.014	74.3	LOS E	82.4	577.0	0.92	1.35	19.2
All Vehicles		2175	0.0	1.014	47.5	LOS D	82.4	577.0	0.72	0.95	25.4

Site: Intersection 5: Total (Koelenhof Node 100% Developed) AM – Kromme Rhee/Nooitgedaght Access

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Nooitgedaght Access											
1	L2	374	0.0	0.488	8.5	LOS A	4.2	29.3	0.82	1.54	46.2
3	R2	95	0.0	0.488	14.4	LOS B	4.2	29.3	0.82	1.54	46.2
Approach		468	0.0	0.488	9.7	LOS A	4.2	29.3	0.82	0.77	46.2
East: Kromme Rhee											
4	L2	116	0.0	0.568	9.9	LOS A	5.6	39.2	0.85	1.64	47.1
5	T1	437	0.0	0.568	9.0	LOS A	5.6	39.2	0.85	1.64	47.1
Approach		553	0.0	0.568	9.2	LOS A	5.6	39.2	0.85	0.82	47.1
West: Kromme Rhee											
11	T1	532	0.0	0.668	5.3	LOS A	9.1	63.4	0.58	1.08	47.0
12	R2	458	0.0	0.668	12.2	LOS B	9.1	63.4	0.58	1.08	47.0
Approach		989	0.0	0.668	8.5	LOS A	9.1	63.4	0.58	0.54	47.0
All Vehicles		2011	0.0	0.668	9.0	LOS A	9.1	63.4	0.71	0.67	46.9

Figure 30: Summary of Intersections 3,4,5 for AM *(Source: Stander, 2014)*

Site: Intersection 3: Total (Koelenhof Node 100% Developed) PM - Bottelary/R304

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R304 (To Stellenbosch)											
1	L2	832	0.0	0.432	5.2	LOS A	0.0	0.0	0.00	0.92	52.5
2	T1	1	0.0	0.001	5.9	LOS A	0.0	0.0	0.54	0.93	49.4
3	R2	311	0.0	0.239	12.6	LOS B	1.4	9.5	0.60	1.54	44.2
Approach		1143	0.0	0.432	7.2	LOS A	1.4	9.5	0.16	0.54	49.8
East: Kromme Rhee											
4	L2	379	0.0	2.889	1739.2	LOS F	401.2	2808.4	1.00	14.21	1.2
5	T1	726	0.0	2.889	1738.8	LOS F	401.2	2808.4	1.00	13.70	1.3
6	R2	505	0.0	2.889	1747.8	LOS F	311.0	2176.8	1.00	12.29	1.3
Approach		1611	0.0	2.889	1741.7	LOS F	401.2	2808.4	1.00	6.69	1.3
North: R304 (To Klipheuwel)											
7	L2	221	0.0	0.926	77.7	LOS E	10.7	74.9	1.00	3.05	19.1
8	T1	1	0.0	0.692	30.3	LOS C	6.3	44.3	1.00	2.41	30.9
9	R2	242	0.0	0.692	37.2	LOS D	6.3	44.3	1.00	2.41	30.9
Approach		464	0.0	0.926	56.5	LOS E	10.7	74.9	1.00	1.36	24.2
West: Bottelary											
10	L2	232	0.0	0.836	15.4	LOS B	12.7	88.9	0.95	2.24	43.0
11	T1	563	0.0	0.836	14.2	LOS B	12.7	88.9	0.95	2.24	43.0
12	R2	1095	0.0	0.964	32.8	LOS C	30.6	214.1	1.00	3.05	32.8
Approach		1889	0.0	0.964	25.1	LOS C	30.6	214.1	0.98	1.36	36.2
All Vehicles		5107	0.0	2.889	565.3	LOS F	401.2	2808.4	0.80	2.86	3.8

Site: Intersection 4: Total (Koelenhof Node 100% Developed) PM – Kromme Rhee/School/Church Access

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Access to Station											
1	L2	332	0.0	1.051	113.1	LOS F	23.3	162.9	1.00	1.43	14.6
2	T1	3	0.0	1.051	104.9	LOS F	23.3	162.9	1.00	1.43	14.6
3	R2	37	0.0	0.113	35.4	LOS D	1.1	7.7	0.88	0.73	30.3
Approach		372	0.0	1.051	105.3	LOS F	23.3	162.9	0.99	1.36	15.4
East: Kromme Rhee											
4	L2	16	0.0	1.011	77.7	LOS E	83.3	582.8	1.00	1.55	19.9
5	T1	1253	0.0	1.011	69.6	LOS E	83.3	582.8	1.00	1.55	19.9
6	R2	11	0.0	0.050	26.6	LOS C	0.3	1.8	0.71	0.72	34.5
Approach		1279	0.0	1.011	69.3	LOS E	83.3	582.8	1.00	1.54	20.0
North: Access to School and Church											
7	L2	5	0.0	0.416	46.1	LOS D	1.6	11.5	1.00	0.73	26.5
8	T1	3	0.0	0.416	37.9	LOS D	1.6	11.5	1.00	0.73	26.5
9	R2	37	0.0	0.416	46.2	LOS D	1.6	11.5	1.00	0.73	26.5
Approach		45	0.0	0.416	45.6	LOS D	1.6	11.5	1.00	0.73	26.5
West: Kromme Rhee											
10	L2	63	0.0	0.808	19.7	LOS B	24.5	171.5	0.73	0.73	42.9
11	T1	895	0.0	0.808	11.5	LOS B	24.5	171.5	0.73	0.73	42.9
12	R2	147	0.0	1.302	325.4	LOS F	19.8	138.9	1.00	1.87	6.0
Approach		1105	0.0	1.302	53.9	LOS D	24.5	171.5	0.77	0.89	23.6
All Vehicles		2801	0.0	1.302	67.6	LOS E	83.3	582.8	0.91	1.24	20.5

Site: Intersection 5: Total (Koelenhof Node 100% Developed) PM – Kromme Rhee/Nooitgedaght Access

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Nooitgedaght Access											
1	L2	658	0.0	1.106	130.8	LOS F	77.2	540.1	1.00	6.55	13.2
3	R2	168	0.0	1.106	136.7	LOS F	77.2	540.1	1.00	6.55	13.2
Approach		826	0.0	1.106	132.0	LOS F	77.2	540.1	1.00	3.27	13.2
East: Kromme Rhee											
4	L2	126	0.0	0.826	18.5	LOS B	15.4	107.7	1.00	2.32	40.5
5	T1	632	0.0	0.826	17.5	LOS B	15.4	107.7	1.00	2.32	40.5
Approach		758	0.0	0.826	17.7	LOS B	15.4	107.7	1.00	1.16	40.5
West: Kromme Rhee											
11	T1	442	0.0	0.697	5.9	LOS A	9.3	65.3	0.75	1.21	45.9
12	R2	500	0.0	0.697	12.8	LOS B	9.3	65.3	0.75	1.21	45.9
Approach		942	0.0	0.697	9.6	LOS A	9.3	65.3	0.75	0.61	45.9
All Vehicles		2526	0.0	1.106	52.1	LOS D	77.2	540.1	0.91	1.65	24.9

Figure 31: Summary of Intersections 3,4,5 for PM *(Source: Stander, 2014)*

Three of the intersections (3, 4 & 5) adjacent to the proposed road-over-rail bridge, are discussed below: Present Traffic Volume Counts; Present Analyses; and Future Analyses.

Table 15: Traffic Volume Counts relating to the project at Intersections 3, 4 and 5

Intersection 3: Bottelary/R304	Intersection 4: Kromme Rhee/Future Access to Koelenhof Station	Intersection 5: Kromme Rhee/Nooitgedacht Access
➢ The highest volumes are the movement from north to south during the morning peak hour and the reverse movement (south to north) in the afternoon peak hour. ➢ High turning volumes are evident from west to south in the morning peak hour and from south to west in the afternoon peak hour, whilst the reverse movements during both periods are also substantial.	➢ Future Access to Koelenhof Station does not exist as such at present. ➢ There is an access to the north (school site) with some turning movements towards and from the school, and whilst it has not been counted, it is considered low, likely to be less than ten vehicles in the peak hour.	➢ The highest volumes are the movement from west to east during the morning peak hour. The reverse movement is dominant during the afternoon peak hour. ➢ Relatively low turning movements (not higher than 15 vehicles/hour) towards/from Nooitgedacht have been recorded in 2013. These turning movements are likely to increase steadily as more new development takes place in Nooitgedacht.

Table 16: Present Situation: Results for the analysed intersections during the morning and afternoon peak hours for 2013

Intersection 3: Bottelary/R304	Intersection 4: Kromme Rhee/Future Access to Koelenhof Station	Intersection 5: Kromme Rhee/Nooitgedacht Access
➢ This intersection currently operates at a volume ratio of >0.9 and LOS[2] during the morning peak hour. ➢ During the afternoon peak hour the situation is better with the worst volume ratio of 0.76 and an LOS. ➢ It has been proposed that the intersection be upgraded to a traffic circle. The timing of this upgrade is unknown, but it is clear that it will be required soon to avoid the demand of the intersection exceeding its capacity.	➢ Currently there are accesses to the school and church to the north of Kromme Rhee Road, with low traffic volumes. ➢ No link to the south exists. Due to this situation, this intersection was not analysed for the present circumstances.	➢ This intersection currently operates at volume ratios of 0.16 and 0.19 respectively, during both the morning and afternoon peak hours. ➢ Development of the Nooitgedacht area has only recently started, but the available spare capacity should be able to serve the intersection adequately for some time. ➢ No upgrading of the intersection is required in the short term, unless development of

[2] Performance of intersections is expressed in terms of level of service (LOS). The LOS is based on the average control delay (overall delay with geometric delay).

		Nooitgedacht proceeds at rapid pace.

Table 17: Future Situation including all developments

Intersection 3: Bottelary/R304	Intersection 4: Kromme Rhee/Future Access to Koelenhof Station	Intersection 5: Kromme Rhee/Nooitgedacht Access
➢ The proposed upgrading of this intersection to an interchange will not be able to provide adequate capacity for the traffic expected for the full development of the Koelenhof node. ➢ The predicted high right turn movement from west to south causes the demand on the eastern approach to exceed the available capacity by a big margin. ➢ The volume for the morning peak hour and afternoon peak hour is predicted to reach 1.6 and 2.9 respectively. ➢ A LOS is indicated for both periods. It is clear that either a larger shift to public transport should be achieved, or additional road improvements will be required to avoid serious congestion at this intersection. ➢ It could take 30-40 years for the full Koelenhof node development to materialise or it could not happen at all. ➢ The traffic conditions at this intersection should be monitored and alternative measures to accommodate the predicted future traffic should be investigated.	➢ The overall functioning of this intersection, with one approach lane, turning lanes and signal control, would be at LOS D during the morning peak hour, with the volume ratio approximately at 1.0. ➢ The situation during the afternoon peak hour is predicted to be worse, with a LOS E and a volume ratio of 1.3. ➢ Additional lanes will eventually be required should the full Koelenhof node development take place as envisaged. ➢ The traffic conditions at this intersection should be monitored and measures to upgrade the intersection should be investigated, should the eventual traffic demand reach the predicted level.	➢ It was previously suggested that this intersection be changed to a single lane roundabout in future. ➢ The volume for the morning peak hour and afternoon peak hour is predicted to reach 0.67 and 1.1 respectively. ➢ The predicted future demand on the southern approach (access from Nooitgedacht) does not have adequate capacity during the afternoon peak hour. ➢ It is agreed that this intersection be upgraded to a traffic circle when the capacity of the existing priority controlled intersection is reached.

NON MOTORISED TRANSPORT (NMT)

Traffic, pedestrian and bicycle surveys were conducted at the Kromme Rhee Road Crossing. The counts showed that for the Kromme Rhee Road crossing, 600 movements (vehicles, pedestrians and cycles – about 100 pedestrians) cross the railway line during the morning and afternoon peak hours with three train movements. It is important that the cross section of the proposed bridge over the railways line adequately allows for pedestrian movements.

Koelenhof Railway Station is situated immediately to the south of the Kromme Rhee Road level crossing. The station platform is positioned on the western side of the tracks and the platform is accessed by rail users from Kromme Rhee Road via an informal path leading from Kromme Rhee Road west of the crossing. Although a new access road to the station is suggested (from Kromme Rhee Road), it is recommended that ramps/stairs be added to the southern side of the road-over-rail bridge, to allow for pedestrians to access the station also from the bridge. School children walking to/from the school (north of Kromme Rhee Road) during early morning and at midday have been observed, as well as some picking up of school children alongside Kromme Rhee Road during midday. Allowance for the picking up of school children either on the school site or adjacent to Kromme Rhee Road should be investigated and allowed for.

9.3.2 TIA Impacts and Mitigation Measures

Table 18: Traffic impacts in relation to the bridge construction

NATURE OF IMPACT	MITIGATION MEASURES
Construction of the bridge	**Construction / Operational Phase**
Access to the general dealer (Mikes General Dealer) located just east of the railway line and south of Kromme Rhee Road, will be cut off by the fill (or retaining wall) of the road over rail bridge.	To provide access to the shop after the bridge construction, is considered virtually impossible and buying out this property appears to be the only solution. PRASA should proceed with this process immediately.
The informal road to the east and north of the rail crossing, providing access to farmhouses on Simonsig Wine Farm and two dwellings on PRASA property, will be cut off by the bridge fill.	It is proposed that PRASA enter into negotiations to sell their piece of land to Simonsig, as some portion of vineyards will be required as road reserve. Access to all dwellings can then be provided from the Simonsig property.
Positive Impact	
The road-over-rail bridge will cut off the present informal vehicular and pedestrian access to Koelenhof station.	• A new vehicular access to the station is suggested from Kromme Rhee Road as shown on **Figure 29**. This access can in future also serve possible developments south of Kromme Rhee Road. • Pedestrians from the west can also use this access. In the future a second access from the north can be constructed underneath Kromme Rhee Road as shown in Figure 8 (the new bridge is to allow an extra opening for this road). • Pedestrians from the east are unlikely to use the new access on the western side (due to the substantially longer walking distance involved). To accommodate them, it is proposed that ramps/stairs be constructed down the southern fill of the new bridge, to link the new sidewalks

	on the Kromme Rhee Road bridge with the station building.
No impact on adjacent dwellings	A number of dwellings exist just to the south of the Koelenhof station in the rail reserve. They are being accessed via a service road (in poor condition) from Elsenburg Road on the western side of the rail line. This access can remain as is, as the new Kromme Rhee bridge has no impact on this situation.

9.3.3 TIA Conclusion and Recommendations

Capacity analyses at the three intersections adjacent to the proposed new-road over-rail bridge, indicated:

1. **Intersection 3: Bottelary/R304**
   Ideally the intersection should be upgraded in the near future. It has been proposed that the intersection be upgraded to a traffic circle. This upgrade is required soon to avoid the demand of the intersection exceeding its capacity. The proposed eventual upgrading of this intersection to (effectively) an interchange will not be able to provide adequate capacity for the traffic expected for the full development of the Koelenhof node.

   Recommendation: The traffic conditions at this intersection should be monitored and alternative measures to accommodate the predicted future traffic should be investigated.

2. **Intersection 4: Kromme Rhee/Future Access to Koelenhof Station**
   The predicted demand will eventually exceed the capacity of this intersection, with one approach lane on all legs, turning lanes and signal control. Additional lanes will eventually be required, should the full Koelenhof node development take place as envisioned.

   Recommendation: The traffic conditions at this intersection should be monitored and measures to upgrade the intersection should be investigated, if the eventual traffic demand reaches the predicted level.

3. **Intersection 5: Kromme Rhee/Nooitgedacht Access**
   No upgrading of the intersection is required in the short term, unless development of Nooitgedacht proceeds at rapid pace.

   Recommendation: It is agreed that this intersection be upgraded to a traffic circle when the capacity of the existing priority controlled intersection is reached. As for Intersection 3, it is suggested that the traffic operation be monitored and upgrading then be implemented as required.

4. **Pedestrians**

   Recommendations:

- The cross section of the proposed bridge over the rail line will adequately allow for pedestrian movements.

- Ramps/stairs should be added to the southern side of the road-over-rail bridge, to allow for pedestrians to access the station also from the bridge.
- Allowance for the picking up of school children either on the school site or adjacent to Kromme Rhee Road should be investigated and allowed for in the design phase.
- In order to force pedestrians in future to make use of the road over rail bridge, versus crossing the rail line on foot, it should be considered to fence the rail line on both sides for some distance north and south of the Koelenhof station (1km on both sides).

5. In view of the development proposals for the Koelenhof node, a design speed of 70 km/h is considered suitable for Kromme Rhee Road where it crosses the railway line.

6. The consequences of the proposed Kromme Rhee road-over-rail bridge on future roads and access provision have been summarised in Section 3.6 in the TIA Report. It is important that all related actions proceed immediately.

10 ENVIRONMENTAL IMPACT STATEMENT

It is the opinion of the EAP that the proposed development of a road-over-rail bridge at Koelenhof level crossing should be constructed. PRASA has identified Koelenhof level crossing as one of the high risk level crossings in the Western Cape due to the high number of accidents that have occurred in the recent years. Socially, the proposed development is desirable, as the project aims to enhance the safety of both people and property by reducing the number of occurrences, fatalities and injuries which occur when road and rail vehicles intersect at level crossings. From an environmental perspective, the development will not have a significant detrimental impact on the environment, as the development will occur within a transformed and disturbed site.

The Road-over-Rail Bridge at Kromme Rhee Road and closing of the Elsenburg Road level crossing was found to the most feasible proposed development. ii. Road-over-Rail Bridge at Kromme Rhee Road and at Elsenburg Road level crossings is not feasible because the 2 crossings are in close proximity (900m apart). iii. The Road-over-Rail Bridge at Elsenburg Road and closing of the Kromme Rhee Road level crossing is not feasible because Elsenburg Road currently does not does play a major role as a mobility route. iv. A rail-over-road underpass at Kromme Rhee Road and closing of the Elsenburg Road level crossing is not feasible, as Kromme Rhee Road forms part of a major arterial network, the road must be accessible to emergency and rescue vehicles during flooding (amongst other two major constraints).

The potential environmental impacts have been assessed for the The Road-over-Rail Bridge at Kromme Rhee Road. Based on the summary of environmental observations presented, the majority of impacts are expected to occur during the construction phase of the project. All negative impacts related to project activities (both during construction and operations) are rated 'LOW' to 'VERY LOW' significance after mitigation (see Significant Scoring Matrix, Appendix G). Implementation of the Do Nothing alternative would mean failure to safe guide the public and the community and thus would continue providing inadequate capacity to manage the current and future stormwater volumes which would lead to increased safety risks for portions of Koelenhof area. As such, the "Do Nothing" Alternative would not be environmentally, socially or economically feasible in the long-term and is thus not deemed feasible.

The following is a summary of the key findings and well as impacts presented in the Specialists Impact Assessment Reports (reports are provided in Appendix H).

10.1 SUMMARY OF KEY FINDINGS

Vegetation Findings

Very little natural vegetation remains in the area due to transformation of the land. Nonetheless, patches of natural vegetation and patches of threatened species are known to occur in the area such as the last remaining populations of the Critically Endangered *Babiana regia.* The farmland within the study area would historically have supported *Swartland Shale Renosterveld* on the land to the west of the railway crossing and *Swartland Granite Renosterveld* to the east of the crossing. The land associated with the stream that traverses the site from the railway crossing to the southwest falls within both Critical Biodiversity (CBA – terrestrial) and Ecological Support Areas (ESA: aquatic).

Freshwater Findings

Upstream of the proposed bridge that is to cross the Plankenbrug River consists largely of a straightened channel that is dominated with the common Phragmites reeds with patches of Cyperus sedges. Little of the indigenous riparian vegetation remains but has been replaced by primarily invasive alien trees.

Immediately downstream of the Kromme Rhee Road, the river channel is less impacted and portions of the associated valley bottom wetland area remains. The wetland area is however in a very disturbed condition and has been fragmented by the construction of a farm road as well as the excavation of stormwater drains and dumping of material. The wetland is also overgrowth with kikuyu grass and other alien invasive plants.

Traffic Impact Findings
Future developments of the Koelenhof node may cause traffic demands to exceed the road network capacity. Three of the intersections adjacent to the proposed road-over-rail bridge would require future upgrades to meet the future traffic demands.

As part of the construction activities, the road-over-rail bridge will cut off:

- The present informal vehicular and pedestrian access to Koelenhof station;
- Access to the general dealer (Mikes General Dealer) located just east of the railway line and south of Kromme Rhee Road; and
- The informal road to the east and north of the rail crossing, providing access to farmhouses on Simonsig Wine Farm and two dwellings on PRASA property.

10.2 SUMMARY OF IMPACTS

Loss of Vegetation and Ecological processes
The clearance of vegetation and plants of conservation concern would cause habitat loss. However for this particular site, mitigation is not recommended, nor would it be reasonable to implement any conditions for approval of the construction since all activities will be maintained within the road reserve. The only scope for improving biodiversity would be to make use of locally indigenous shrub species along any sloped bridge surfaces. This is recommended if soil is to be graded along the bridge edges.

Loss of Aquatic habitat
The riparian and wetland habitat in the area are already disturbed, however some loss of aquatic habitat and longer term disturbance of the remaining aquatic habitats adjacent to the crossing is expected. Ongoing monitoring of the bank adjacent to the new crossing should be undertaken to immediately mitigate any erosion that should take place or clear any invasive alien plant growth.

Flow modification
The construction of a structure within the river channel and immediate surrounding area may impact on the runoff characteristics and river hydraulics at the site which in turn may alter the aquatic habitats adjacent and downstream of the proposed crossing. The structure at the river should not impede low flow in the river and should be designed such that it does not provide a barrier for the migration of biota in the river.

Water Quality Impairment and an increase in turbidity
There is some potential associated with the proposed activities for some impairment of the surface water quality to occur, primarily sedimentation. The water quality impacts during the proposed activities would be limited if the activities were to take place during the lower flowing months of the year (before the onset of the winter rainfall months in May/June). The longer term rehabilitation and management of the river channel at the river crossing should be managed by means of an approved MMP for the site. The MMP should include method statements for the removal of sediment and debris upstream of the crossing as well as revegetation of indigenous plants and control of alien invasive plants as well as erosion control measures should they be required.

Bridge construction cut offs to some areas
Access to the general dealer (Mikes General Dealer) will be cut off by the fill of the road-over-rail bridge. Access to farmhouses on Simonsig Wine Farm will be cut off by the bridge fill. Negotiations with PRASA and the property owners is required to resolve the impacts on these properties. On a positive note, the road-over-rail bridge will cut off the present informal vehicular and pedestrian access to Koelenhof station providing new improved and safe pedestrian access to Koelenhof station.

Cumulative impacts
The activity is very unlikely to have impacts upon the larger Plankenbrug River system, downstream of the site as the river has already been significantly modified by the Kromme Rhee Road crossing and surrounding land use activities. Currently the riparian vegetation along the river at the site is also dominated by alien vegetation however the disturbance caused by the proposed activities will further facilitate the spread of most of the alien species observed at the site. After completion of the construction phase, rehabilitate the disturbed areas and the clearing of alien vegetation.

10.3 RECOMMENDATIONS

It is recommended that the proposed construction of the two-span bridge over the existing Koelenhof Level Crossing across Kromme Rhee Road be considered, as the project would not have any far reaching impacts (Low to Very Low Negative) and is therefore supported from an environmental perspective.

In this regard it is fundamental that the Environmental Management Programme (EMPr) and all other mitigation measures in this Basic Impact Assessment Report be instituted during all phases of the proposed project. The following recommendations must form part of the conditions of approval:

The following mitigation measures have been included in the Draft EMPr provided in **Appendix I:**

Vegetation and Rehabilitation

- Ensure as little disturbance to indigenous vegetation and banks of the river as possible. Once the design is finalised and the associated construction site is determined, the area located outside of the site should be demarcated and regarded as a no-go area.
- Rehabilitate disturbed areas by planting appropriate indigenous riparian vegetation along the banks of the river to ensure bank stabilisation also planting of indigenous vegetation or grass in the wetland area that has being disturbed.
- Implement an alien eradication programme to remove and maintain invasive and exotic vegetation within the construction footprint. A systematic programme of alien vegetation clearing and replanting of suitable indigenous vegetation should be undertaken for the river as a whole.
- Additional mitigation may be required to ensure that the soil around the structures does not get washed away which would undermine the integrity of the structures.
- Upon construction completion, a habitat assessment must be undertaken annually for three years to ensure that rehabilitation work is stable; failing which remedial action must be undertaken to rehabilitate the affected area.

- On completion of repair works, a close out report must be drafted by the Engineer and the Environmental Control Officer (ECO) and submitted to the DWS.

Freshwater Ecology

- Construction activities in the river or on the river bank should, as far as possible, take place in the dry season.
- Limit construction activities within (including the entry of heavy machinery into) the river channel in terms of spatial and temporal extent.
- Portable ablution facilities should be located at least 30 m away from the river bank and should be serviced regularly.
- Any runnels or erosion channels developed during the construction period should be backfilled and prevented

General Construction Activities

The following impacts associated with construction are deemed to be of very low to low significance due to the fact that the impacts are of short duration. Mitigation measures, however, have been provided in the EMPr to reduce disturbance on the surrounding landowners and the local environment.

- Noise: Maintain all construction machinery and vehicles in good working order. The appointed Contractor shall be familiar with and adhere to, any local by-laws and regulations regarding the generation of noise and hours of operation. The Contractor shall avoid construction activities outside of “normal working hours”.
- Dust: The appointed Contractor shall ensure that the generation of dust is minimised and shall implement a dust control programme (e.g. wetting areas being disturbed) to maintain a safe working environment and minimise nuisance for the surrounding landowners and businesses. The Contractor shall ensure that the exposed soil and material stockpiles are adequately protected against the wind.
- Traffic: Where necessary, implement appropriate traffic control measures and bypass roads to alleviate traffic blockages and access to local residents and businesses. Ensure that suitable sign boards are clearly displayed in areas affected by the proposed project.
- Storage of Hazardous Substances: All fuel, oil and other hazardous substances (i.e. bitumen, paint, etc.) shall be confined to demarcated areas and stored in suitable labelled containers. Drip trays shall be provided for stationary plant (such as compressors, pumps, generators, etc.) and for "parked" plant (e.g. mechanised equipment). Where reasonably practical, vehicles shall only be refuelled in a demarcated refuelling / servicing area. The surface under the refuelling / servicing area shall be protected against pollution (e.g. the use of drip trays) to the reasonable satisfaction of the ECO prior to any refuelling activities.
- Solid Waste Management: The appointed Contractor shall provide suitable containers (with lids) for the collection and storage of solid waste on site. On completion of the project, the appointed Contractor shall ensure that all structures, equipment, materials, waste, rubble, notice boards and temporary fences used during construction are removed. All construction waste shall be disposed of off-site at an approved landfill site.

The final EMPr should be approved as part of the Environmental Authorisation and be strictly adhered to during the construction and operational phase of the proposed development to ensure that activities are environmentally sound.

A suitably qualified independent Environmental Control Officer (ECO) must be appointed to guide the contractor through the construction phase and ensure compliance with the EMPr and the conditions of Environmental Authorisation.

All parties involved in the construction and ongoing maintenance of the bridge (including contractors, engineers, and administrators) are, in terms of NEMA's "Duty of Care" and "Remediation of Damage" principals (Section 28), required to prevent any pollution or degradation of the environment, be responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment. Removal of alien invasive plants with specific follow-up control measures, and reclamation and management of soil erosion within the study area is an ongoing requirement in terms of national legislation.

11 CONCLUSION

Dot Yen Trading was appointed by PRASA to conduct the BIA process for the construction of the a two-span bridge over the existing Koelenhof Level Crossing across Kromme Rhee Road. PRASA has identified the railway line level crossing with the Kromme Rhee Road as a high risk for public safety and hence should be eliminated through the construction of a road-over-rail bridge.

Four activity alternatives were considered. The regarded preferred option 1, which is "Road-over-Rail Bridge at Kromme Rhee Road and closing of the Elsenburg Road level crossing", has considered the technical feasibility, minimum biophysical, biodiversity, social, and other impacts. The specialist assessments that have been undertaken at the study area, have found low to very low levels of significant impacts "with and without" mitigation measure, respectively. This is due to the the development occurring within an already transformed and disturbed site.

I&APs and stakeholders in this Draft BIA phase were identified, contacted, informed of the project through electronic mailing system and hard copies of letters were sent through the post. Notices of the project and invitations to register on the I&AP database were posted at focal points at Koelenhof level crossing study area. Notice of the project was also published in the Stellenbosch gazette. All I&APs and Stakeholders will be given the opportunity to review and comment on the draft BAR for a minimum of 30 days. The Draft BAR will be circulated for public review in the month of April 2019. The report will be placed at focal points for public access such as government department / offices and libraries. The draft EMPr developed also needs to be reviewed for public comment and be implemented as a final EMPr. The final EMPr shall be adhered to during the construction and operational phase under the supervision of the site Engineer / Project Manager and / or Environmental Control Officer.

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