DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PROPOSED CONSTRUCTION OF A DEDICATED ROAD-OVER-RAIL BRIDGE AND APPROACH ALIGNMENT AT THE MBAZWANA/SODWANA INTERSECTION OF ROUTE R22, HLUHLUWE, BIG 5 HLABISA LOCAL MUNICIPALITY, KWAZULU-NATAL PROVINCE.

DFFE REF: 14/12/16/3/3/2/2664

SEPTEMBER 2025

Prepared for

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No.1998/009584/30

Prepared by

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VERIFICATION PAGE

TITLE: Draft Environmental Impact Report for The Proposed Construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection Of Route R22, Hluhluwe, Big 5 Hlabisa Municipality, Kwazulu-Natal.

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SYNOPSIS

Draft Environmental Impact Report for the Proposed Construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 Hlabisa Municipality, KwaZulu-Natal

KEY WORDS:

R22 Road, Realignment, SANRAL, Environmental Impact Assessment; Specialist Studies; NEMA; Legislative Requirements; Listed Activities

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

VERIFICATION	CAPACITY	NAME	SIGNATURE	DATE
AUTHORED BY:	Environmental Scientist	Tyneal Chetty	n/a	18/08/2025
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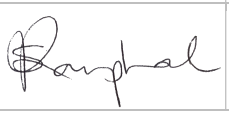
AUTHORISED BY:	Executive Associate	Suvritha Ramphal		10/09/2025
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ABBREVIATIONS

BRA	Building Restricted Areas
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CNS	Communication, Navigation, and Surveillance
DEIA	Draft Environmental Impact Assessment
DFFE	Department of Forestry, Fisheries and the Environment
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDTEA	Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EKZNW	Ezemvelo KZN Wildlife
EMPr	Environmental Management Programme
FEIA	Final Environmental Impact Assessment
FEIAR	Final Environmental Impact Assessment Report
FPD	Flight Procedure Design
FSR	Final Scoping Report
GNR	Government Notice, Regulation
Ha	Hectare
HIA	Heritage Impact Assessment
IAP	Interested and Affected Party
IDP	Integrated Development Plan
KZNARI	KwaZulu-Natal Amafa and Research Institute
LSDI	Lubombo Spatial Development Initiative
NDP	National Development Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management Waste Act (Act 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
OLS	Obstacle Limitation Surface
PoS	Plan of Study
PPP	Public Participation Process
RMAC	Radar Minimum Altitude Chart
RTCC	Radar Tracking and Control Centre
SACAA	South African Civil Aviation Authority

SDF	Spatial Development Framework
SDI	Spatial Development Initiative
SRL	Swaziland Rail Project

EXECUTIVE SUMMARY

BACKGROUND

Terratest (Pty) Ltd were appointed by Hatch (Pty) Ltd, the implementing agent on behalf of the South African National Roads Agency Limited (SANRAL), to undertake a Scoping and Environmental Impact Assessment (S&EIA) for the proposed construction of the R22 Hluhluwe road-over-rail bridge and associated approach alignment.

The activities will integrate with the authorised road realignment intended to bypass the town of Hluhluwe, located within the Big 5 Hlabisa Local Municipality in KwaZulu-Natal (DFFE Environmental Authorisation references: 14/12/16/3/3/2/1043, 14/12/16/3/3/2/1043/AM2, and 14/12/16/3/3/2/1043/AM4).

This report has been compiled based on the findings of the Scoping Report and the associated Plan of Study (PoS), which outline the recommended approach for proceeding with the Environmental Impact Assessment in accordance with the requirements set out in Government Notice Regulation (GNR) 982 of the Environmental Impact Assessment Regulations, 2014 (as amended).

PROJECT DESCRIPTION

Site Location

The proposed road-over-rail bridge and approach alignment is located northeast of the town of Hluhluwe, within the Big 5 Hlabisa Municipality, KwaZulu-Natal. The site is approximately 1.808km in extent. Access to the site is from the southern side, via the R22. The approximate coordinates of the centre of the site are 28° 0'34.96"S and 32°17'5.89"E.

Description Of Activities

The proposed development is a part of / features in the upgrade and expansion of the road and rail network of the greater Lubombo Spatial Development Initiative (LSDI). The development comprises the realignment of the R22 around Hluhluwe town and the construction of the road-over-rail bridge and approach alignment at the intersection of the R22 with the Sodwana/ Mbazwana R22 Road.

The proposed road-over-rail bridge will eliminate the existing at-grade railway crossing on the National Route R22 at km5.5 and will tie into realignment of the R22 around Hluhluwe Town. The entire bypass system forms part of the long-term expansion vision of the regional rail network that will service the greater northern KwaZulu-Natal and surrounds.

The activities will include:

- Construction of an approach alignment at the Mbazwana/Sodwana Intersection of Route 22.
- The Proposed Construction of a Dedicated Road-Over-Rail Bridge.
- A proposed Quarterlink access road into the town of Hluhluwe.
- 121 700m^2 of natural vegetation clearance.

DEVELOPMENT FOOTPRINT

The Application for the proposed road-over-rail-bridge falls within the proposed future development of road infrastructure in the Hluhluwe area. This entails a road bypass of Hluhluwe town, into which the proposed road-over–rail-bridge development will feed.

The Eastern Phase development will include the new 'road-over-rail-bridge' structure, the approach alignment to tie into the future planned Hluhluwe Bypass, as well as a proposed Quarterlink access road into the town of Hluhluwe. The quarterlink that is proposed to the east of the town links the bypass with MR2-7.

It must be highlighted that the drawings and other details presented are based on currently available information and some modifications may be made to these should the need arise at various stages of the project. If the changes trigger additional environmental approvals, these will be applied for accordingly.

Approach Alignment:

- Total width of road reserve: 60m.
- Total length of Road: 1.808km (from chainage 3000 to chainage 4808).
- Total width of road excluding road reserve: 13.4m.

Road over Rail Bridge:

- Total Bridge Width: 16.275m.
- Bridge Length: 8.1m.
- Bridge Lane Width: 3.8m wide in each direction.
- Shoulder width: 3m wide in each direction.
- Sidewalk: 1.5m wide on the southern side.

The bridge structure will be designed to **accommodate future lane widening** should this be required. The bridge openings will be designed to accommodate the anticipated doubling and electrification of the railway line as well as a future service road. The bridge structure will conform to both the SANRAL requirement as well as the requirements of Transnet.

Quarterlink Road:

A quarterlink is proposed to the east of the town linking the proposed bypass with MR2-7 (the portion of the R22 running in a north/south direction). The quarterlink enables vehicles from the north, south and the town centre to connect with the bypass. Vehicles from the town centre therefore have a choice to either:

- Travel eastwards along R22, northwards along the R22, turn left onto the quarterlink and right/left onto the bypass, or
- Travel westwards along R22 (MR453) and turn left/right onto the bypass.

The route vehicles would follow; depends largely on which direction they wish to travel and the EIA proximity to either route within the town centre.

The alignment of the Quarterlink will be parallel to the Hluhluwe airstrip in a north/south direction and will then curve to the left and tie in with a T-junction on the existing R22. The Quarterlink road will be required to provide an intersection 'Road over Rail' structure at the existing at-grade R22 and railway line. Access to Hluhluwe town will still be maintained from both the East and West approaches. Access will be accommodated by means of at-grade intersections and two short link roads.

Associated Infrastructure

Access Roads

Construction traffic will be placed on existing roads (including the existing R22 road and farm roads) or within the proposed road reserve. As such no agricultural land will be used as a transit for vehicles, unless access roads are existing or the applicable area has been surveyed to be included in the construction alignment. Access points onto the re-aligned road will be located at the most accessible points off the existing R22 road. These access roads will be based on the layout plan and will follow the proposed entry and exit points onto and off the existing R22 road. It is therefore anticipated that no new access roads will be required.

Traffic control and calming measures, including warning signage, points men and if necessary, rumble strips / speed bumps, will be located along the existing R22 at points of construction and at which access roads are located.

Site Camp

One site camp is established for the construction of both the road-over-rail bridge and Authorised approach alignment construction. The current site camp is located adjacent to the town and not on agricultural land. The site camp is located within the vicinity of an old warehouse (28°1'25.27"S 32°16'52.00"E). No site clearing was undertaken as the camp was established on land that has already been transformed.

NEED AND DESIRABILITY

The R22 forms a key link between Northern KwaZulu-Natal in South Africa and southern Mozambique. Both local, cross border and tourism traffic use this route as a main access both to and from the N2 in northern KwaZulu-Natal. The R22 also forms an integral economic and social connector between South Africa and neighbouring countries (Mothilal, A. & Bradley, C., 2015). To this end, the construction of the road-over-rail-bridge falls within a number of other planning initiatives which have been implemented but also proposed, for the greater region.

The R22 currently traverses an unguarded at grade rail level crossing to the east of Hluhluwe. This at grade crossing is regarded as unsafe as it is controlled only by a mandatory stop sign and painted lines. Future expansion of the regional rail network by Transnet to include doubling and the possible electrification of this line expedited the need to eliminate this at grade crossing in order to provide safe access for road users travelling between the N2 via Hluhluwe to the northern KZN coast. This option dramatically improves the safety of the intersection.

ALTERNATIVES

Site Alternative

Site Alternative 1 **(Preferred Alternative)**

During the initial route location process for the Western and Eastern Phases of the development, two corridors were identified for the potential realignment of the R22. These were a Southern Corridor located to the south of the existing R22 passing through the southern portion of Hluhluwe and a Northern Corridor passing through mainly agricultural land. The Northern Corridor was considered the favourable option for the following reasons:

- The Northern alignment corridor is shorter, thus reducing road construction costs, the amount of land required and the impact on the receiving environment.
- The Northern Corridor does not bisect the town of Hluhluwe and there is little or no impact on the LAP of Hluhluwe.
- The Northern Corridor alignment does not impact on the future expansion of Hluhluwe town.
- The Northern Corridor is bound by the Ngweni River to the north requiring only one potential water course crossing within this corridor.
- The alignment of the Northern Corridor passes through agricultural land which is completely transformed.

The Northern Corridor has a smaller development footprint, a reduced impact on the receiving environment, and does not negatively affect the LAP of Hluhluwe town. It would also tie into the already authorised realignment which is already under construction.

As such it is considered the Northern Corridor is the preferred site and the only feasible alternative. As such, this assessment report only makes reference to the Northern Corridor.

Site Alternative 2

An alternative site to the south of Hluhluwe Town was initially considered during the site selection process. This site, referred to as the Southern Corridor, had two layout options namely an alignment between the Hluhluwe River and Hluhluwe Town, or an alignment to the south of the Hluhluwe River. Both of these options were considered unsuitable for the following reasons:

- Extending the corridor to the south of the Hluhluwe River increases the length of the realignment substantially. This would require the acquisition of substantially more land.
- The increased alignment footprint would increase construction costs, as well as the impact on the receiving environment which, although disturbed, has not been completely transformed.
- In terms of the Big 5 False Bay Local Municipality Local Area Plan (LAP), any road located to the south of the existing R22 and north of the Hluhluwe River will effectively bisect the township developments within Hluhluwe. A route located here would create a similar situation with respect to uncontrolled access, vehicular and pedestrian movements that currently exist within Hluhluwe. These factors are undesirable for a National Route.
- The Southern Corridor has a number of smaller feeder tributaries which would require several structures to accommodate these streams.
- The development planning for the town of Hluhluwe will be severely curtailed should the realignment of the R22 pass along the Southern Corridor, which is directly through the primary development node as identified by the LAP.
- The Southern Corridor extends through the Bonamanzi Game Reserve and any road here would bisect the reserve and negatively impact on the habitat of the wildlife and operations of the reserve. This corridor also has an increased risk of vehicular collisions with wildlife.

The Southern Corridor is an undesirable option in terms of a site alternative, and as such the Northern Corridor is considered the only feasible option.

Activity Alternatives

Activity Alternative 1 **(Preferred Alternative)**

The primary reason for the construction of a dedicated road-over-rail-bridge and approach alignment at the intersection of Route R22 is the elimination of the at-grade railway crossing. The at-grade crossing compromises the safety of road users, whereas the road-over-rail bridge will enhance the safety of all road users in the Hluhluwe area (local and visitor traffic). Benefits to the town include improved safety of pedestrians within town as the bypass removes all through traffic (except those wishing to stop in town). The development will also improve the safety of all road users at the railway crossing as they will no longer have to cross directly over the railway line but will pass over the railway line on the bridge structure, thus directly removing the threat of a collision with trains. Improvement of road safety along the section of the MR453 that passes through the town centre, especially for pedestrians due to the reduction of vehicular and pedestrian conflict in the town area. Heavy vehicles which are not destined for the town centre will no longer pass through the town centre. The bypass will provide an alternative route for these vehicles, removing most of them from the town centre. This will increase the lifespan of the pavement of the MR453. Other reasons include:

- Noise and pollutant emission reduction in town area.
- Travel time saving for through traffic.
- Opportunity for local construction contractors and associated local community enterprises to gain economic benefits from the construction phase.
- Additional opportunities for skills transfer and education/training of local communities will be created.
- Potential positive socio-economic impacts likely to result from the project, such as increased local spending and the creation of local employment opportunities.
- The proposed development will assist in the upgrading of transport routes which link tourism centres.
- The project will complement the R22 Lubombo Spatial Development Initiative (LSDI) Corridor which links Hluhluwe to Mozambique.

Alternative 1, is the preferred activity option and would infer that the Proposed Construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 False Local Municipality, KwaZulu-Natal will be undertaken.

Activity Alternative 2

Activity Alternative two is the "no-go" option. In the case that the "no-go" alternative is exercised, the safety of road users crossing the railway line will continue to be compromised. In addition, this will also compromise the development of the Western Phase, which is an integral motivating factor in this application, as the Western and Eastern Phases form an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique. As such it is not recommended that the No-Go alternative is pursued.

Design Alternatives

Design Alternative 1 **(Preferred Alternative)**

The proposed layout follows the R22 alignment from the east, passes directly through where Gazebo Lodge is currently situated, and then rises above the railway line by way of a road-over-rail-bridge. The alignment extends past the north of the town and ties into the R22 west of the town. A desirable design speed of 100km/h will be able to be maintained with this layout alternative. The alignment passes to the North of the Hluhluwe Airfield (Runway 21) at chainage 2540. A Quarterlink junction at chainage 2706 provides access from the realigned R22 to Hluhluwe town. The route will be connected to the existing R22 via a bidirectional Quarterlink road. The alignment of the Quarterlink will be parallel to the airfield in a north/south direction for approximately 400m.

From a geometric perspective Alternative 1 is the preferred alignment as it has the most favourable horizontal geometry particularly in the proximity of the airfield and new road over rail bridge. Alternative 1 also provides the most acceptable sight distances along the route for the desired design speed. Based on the outcome of the traffic analysis Alternative 1 is recommended as the preferred alignment.

Design Alternative 2

The proposed layout follows the R22 alignment from the east, has a series of right and left curves to avoid the Gazebo Lodge and then rises above the railway line by way of a road-over-rail-bridge. The alignment extends past the north of the town and ties into the R22 west of the town.

The alignment passes to the North of the Hluhluwe Airfield (Runway 21) at chainage 2540. The road at this position is approximately 1m in fill i.e. has risen 1m above ground level and is within the approach requirements of the South Africa Civil Aviation Authority. A Quarterlink junction provides access from the realigned R22 to Hluhluwe town. The alignment at this point has a series of right and left curves to avoid the Gazebo Lodge. From here the alignment ties in with the existing R22 in the East.

The alignment of the Quarterlink will be parallel to the airfield in a north/south direction for approximately 400m and will then curve to the left with a radius of 130m. The link will tie in with a T-junction on the existing R22.

Technology Alternatives

Technology alternatives are limited to the illumination of the road-over-rail-bridge. Two separate illumination alternatives are available for the lighting of the bridge. These are solar energy powered lights, or lights that draw energy from the electricity mains. As per a Case Study established by SANRAL in the Cape Town region, the establishment of renewable energy sources at point forms along a road alignment is a viable solution to electricity lines. The case study notes that if the distance from the nearest electricity supply exceeded 1km, then the establishment of renewable energy sources is advised. "The total installation cost of the renewal equipment per camera location or VMS installation amounts to approximately R40 000 (US$6 000) which is comparable to the cost of laying an electrical cable, encasing it in concrete for 1 km and connecting it to the mains supply. In many locations along the route, the provision of renewable energy resulted in significant savings to the project.

The illumination source type for the lighting of the bridge will be finalised at a later stage during the construction phase.

Operational Aspects

The preferred and only operational aspects of the activity involve the maintenance of infrastructure. No alternatives to the operation aspect of the proposed development have been considered.

"No-Go" Alternative

The no-go alternative must be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The no-go alternative assumes that the proposed project will not go ahead i.e., the proposed development will not occur and therefore the site will remain as is. The purpose of the proposed road-over-rail-bridge and approach alignment is to provide a safe crossing point for vehicles, over the railway line. This is in light of the proposed application for the Western Phase Application (which will tie into the Eastern phase Application), and the future expansion of the railway line. If the no-go option is followed, the safety of road users crossing the railway line will continue to be compromised. In addition, this will compromise the development of the Western Phase, which is an integral motivating factor in this application, as the Western and Eastern Phases form an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique.

APPLICABLE LISTED ACTIVITIES

The Proposed Construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 Hlabisa Municipality, KwaZulu-Natal triggers listed activities in terms of the Environmental Impact Assessment (EIA) Regulations (2014) (as amended), Government Regulations (GNR) 983, 984 and 985, 2014 (as amended) read in conjunction with GN R. 982 and 983, 2014, (as amended), promulgated under the National Environmental Management Act (NEMA) (Act No 107 of 1998), as amended. The table overleaf provides a summary of the Listed Activities in terms of the EIA Regulations 2014 that are triggered by the proposed development.

Applicable Listed Activities:

ACTIVITY AND NOTICE NUMBER	LISTED ACTIVITY	DISCUSSION IN TERMS OF APPLICABILITY
Listing Notice 2 of GNR. 984, 2014 (as amended)		
Activity 27 **Listing Notice 2 of GNR. 984, 2014 (as amended)**	The development of a road- **(iii)** with a reserve wider than 30 metres; or	The total width of the road reserve is 60m. Total length of Road: 1.808km **Therefore, this activity will be triggered.**
Listing Notice 3 of GNR. 985, 2014 (as amended)		
Activity 12 **Listing Notice 3 of GNR. 985, 2014 (as amended)**	The clearance of an area of 300 square metres 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. **(d) In KwaZulu-Natal:** iv. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an	The approach alignment for site alternative 1 and 2 pass through vegetation types which, according to Rutherford & Mucina are classified as Vulnerable. The vegetation types are the Zululand Lowveld and Western Maputaland Clay Bushveld. These vegetation types have been listed as an endangered ecosystem listed in terms of section 52 of the NEMBA Approximately 121 700 square meters of indigenous vegetation will be cleared. **Therefore, this activity will be triggered.**

ACTIVITY AND NOTICE NUMBER	LISTED ACTIVITY	DISCUSSION IN TERMS OF APPLICABILITY
	area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;	
Activity 18 **Listing Notice 3 of GNR. 985, 2014 (as amended)**	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre **(d) In KwaZulu-Natal:** **xii.** Outside urban areas: **(aa)** Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve	Part of the existing R22 on the eastern portion will be decommissioned, the remainder will be lengthened to join the western phase of the project which is currently under construction. The total length of the Road to be lengthened is 1.808km (chainage 4500 to chainage 3000). The proposed road-over-rail-bridge and the approach alignment is situated within 10 kilometres and to the west of the Isimangaliso Wetland Park, a World Heritage Site. **Therefore, this activity will be triggered.**
Activity 23 **Listing Notice 3 of GNR. 985, 2014 (as amended)**	The expansion of- (xii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more. **(e) In KwaZulu-Natal:** **x**. Outside urban areas: **(aa)** Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;	The existing Road MR2-8 will be widened by 5,6m to tie into the quarterlink road and road-over-rail bridge. The footprint of the MR2-8 and the new quarterlink has a footprint of more than 10 square metres. The proposed construction is outside an urban area. The proposed road-over-rail-bridge and the approach alignment is situated within 10 kilometres and to the west of the Isimangaliso Wetland Park, a World Heritage Site. **Therefore, this activity will be triggered.**

The above evaluation of the NEMA: EIA Regulations (2014, as amended) reveals that the proposed **construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 Hlabisa Municipality, KwaZulu-Natal, triggers Listed Activities from Listing Notices 2 and 3, thus requiring Environmental Authorisation from the DFFE subject to a full Scoping and Environmental Impact Assessment (S&EIA) Process.**

Water Uses

Section 21 of the National Water Act (Act No. 36 of 1998) (NWA) provides the list of water use activities that will require an authorisation or registration in accordance with the Act. **The proposed project does not trigger any water use activities as defined in Section 21 of the NWA.**

PUBLIC PARTICIPATION

Adjacent Landowner Consultation

Adjacent Landowners were notified via email correspondence about the proposed development. In addition, SANRAL, as the applicant commenced with the relevant notification of landowners through their own mandated land acquisition processes. As land acquisition discussions between the applicant and the relevant landowners are deemed a separate process, they have not been included in this EIA process.

Interested and Affected Parties Register

The compilation of a comprehensive Interested and Affected Party database (I&AP Register) started during the initial public participation process in September 2024. The latest contact details of the relevant stakeholders are captured in the register. The register will be updated with the contact details of I&APs that respond to newspaper adverts, circulation of the BID, distribution of notification letters, the erection of site notices and other documentation made available to the public to view at local public venues during the Scoping and EIA phase.

Key Stakeholders

The following have been identified as key stakeholders of the project (as stipulated by the EIA Regulations):

- DFFE: Department of Forestry, Fisheries and the Environment (Competent Authority)
- Big 5 False Bay Municipality.
- Umkhanyakude District Municipality.
- EDTEA: Umkhanyakude District
- Department of Water and Sanitation (DWS).
- Department of Co-Operative Governance and Traditional Affairs (CoGTA).
- Eskom.
- KwaZulu-Natal Archaeological Research Institute (KZNARI)
- Ezemvelo KZN Wildlife.
- Isimangaliso Wetland Park.
- Transnet SOC (Ltd) Freight Rail.
- Telkom
- Civil Aviation Authority
- Project Rhino & Zapwing

Background Information Document (BID) and Written Notification

Notifications through Email and SMS accompanied by a copy of the BID were distributed on 25 September 2024. The purpose of this notification was to allow individuals to register as I&APs and to facilitate I&AP comments on the proposed Road-Over-Rail-Bridge and approach alignment project. This would allow the EAP to address any potential issues within the Scoping and EIA phases of the project.

Site Notices

Site notices were placed on 25 September 2024 in the vicinity of the proposed Road-Over-Rail-Bridge and approach alignment development site and around the Hluhluwe Town as part of the Public Participation Process.

Newspaper Advertisements

An English and isiZulu advert was placed in the Zululand Observer on 30 September 2024 notifying the I&APs of the proposed development.

Comments and Response Report

A comments and responses report were compiled for the Scoping phase of the project. The document will be updated as comments on the proposed development are received from I&APs during the ongoing PPP during the EIA phase of the project.

Circulation of the Draft Scoping Report

An email to key stakeholders, directly affected landowners, businesses, interested and affected parties, Government Departments, NGOs, ward councillors and community leaders were circulated to notify these parties of the application and availability of the draft scoping report for the minimum 30-day commenting period.

Hard copies of the draft report and supporting documentation were placed at the following public venues below:

Venue	Address	Contact Details
Hluhluwe Public Library	89 Zebra Street, Hluhluwe	Tel: 035 838 7200
Big 5 Hlabisa Local Municipality	163 Zebra Street, Library Building, Hluhluwe	Tel: 035 562 0040

The Draft Scoping Report was also placed on the Terratest (Pty) Ltd website for public viewing: www.terratest.co.za

Comments and issues that were received during the 30-day public participation period were incorporated into the Final Scoping report and a response was provided by the EAP and Project Team. The Final Scoping Report and Plan of Study was accepted on

Public Open Day

A public open day was held on 25 March 2025 to address any concerns arising from information contained in the DSR.

Circulation of the Draft Environmental Impact Assessment

The Draft Environmental Impact Assessment (DEIA) has been compiled based on the findings of the Scoping Report and the Plan of Study (PoS) and is aligned with the Environmental Impact Assessment requirements listed in GNR 982 of the EIA Regulations (2014, as amended). The report captures the findings from implementing the PoS, including the receiving environment, the proposed development and any relevant comment received from stakeholders and IAP's.

An email to key stakeholders, directly affected landowners, businesses, interested and affected parties, Government Departments, NGOs, ward councillors and community leaders will be circulated to notify these parties of the application and availability of the report for the minimum 30-day commenting period.

Hard copies of the draft report and supporting documentation will be placed at the following public venue:

Venue	Address	Contact Details
Hluhluwe Public Library	89 Zebra Street, Hluhluwe	Tel: 035 838 7200

ENVIRONMENTAL MANAGEMENT PROGRAMME

A site-specific Environmental Management Programme (EMPr) has been appended to this document and was based on the findings of the impact assessment, the Specialist Studies, and the I&AP feedback provided throughout the process to-date.

CONTENT OF AN ENVIRONMENTAL IMPACT ASSESSMENT REPORT

In accordance with the EIA Regulations, (2014, as amended), the DEIA has been drafted based on the requirements detailed in Appendix 3 of GNR 982 (as amended). The DEIA requirements and location of such in this report have been tabulated in **Table 0-1**.

Table 0-1: Content of an Environmental Impact Assessment Report (2014 EIA Regulations, as amended)

Description of EIA Regulations Requirements for Environmental Impact Assessment Reports	Section in this report
3 (1)(a) Details of – (i) The EAP who prepared the report; and the expertise of the EAP; and (ii) The expertise of the EAP, including a curriculum vitae.	**Section 1.2** **Appendix F**
3 (1)(b) The location of the activity, including – (i) The 21 digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties	**Section 2.1** **Section 2.8**
3 (1)(c) A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	**Section 2.1** **Appendix A**
3 (1)(d) A description of the scope of the proposed activity, including – (ii) all listed and specified activities triggered and being applied for; (iii) a description of the associated structures and infrastructure related to the development.	**Section 2.2** **Section 6** **Section 2.7**
3 (1)(e) A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	**Section 5**
3 (1)(f) A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	**Section 3**
3 (1)(h) A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:-	
(ii) details of the development footprint alternatives considered;	**Section 4**
(ii) details of the public participation process undertaken in terms of regulation 41 of the regulations, including copies of the supporting documents and inputs;	**Section 8** **Appendix C**
(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	**Appendix C**
(iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Section 9** **Section 10**
(v) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- (aa) Can be reversed;	**Section 12**

Description of EIA Regulations Requirements for Environmental Impact Assessment Reports	Section in this report
(bb) May cause irreplaceable loss of resources; and (cc) Can be avoided, managed, or mitigated.	
(vi) The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	**Section 12**
(vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects;	**Section 13**
(viii) The possible mitigation measures that could be applied and level of residual risk;	**Section 12**
(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	-
(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	**Section 13**
3 (1)(i) A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	**Section 12**
3 (1)(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; the degree to which the impact and risk can be reversed; (v) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vi) the degree to which the impact and risk can be mitigated;	**Section 12**
3 (1)(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	**Section 11** **Appendix D**
3 (1)(l) an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	**Section 13** **Section 14**

Description of EIA Regulations Requirements for Environmental Impact Assessment Reports	Section in this report
3 (1)(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	**Appendix D** **Section 10** **Section 13**
3 (1)(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	**Section 13.2.2**
3 (1)(o)	
An undertaking under oath or affirmation by the EAP in relation to- (i) The correctness of the information provided in the report; (ii) The inclusion of the comments and inputs from stakeholders and interested and affected parties; and (iii) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	**Appendix F**
An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment.	**Appendix F**
Where applicable, any specific information required by the competent authority.	-
Any other matter required in terms of section 24(4) (a) and (b) of the Act.	-

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1 INTRODUCTION

Terratest (Pty) Ltd were appointed by Hatch (Pty) Ltd, the implementing agent on behalf of the South African National Roads Agency Limited (SANRAL), to undertake a Scoping and Environmental Impact Assessment (S&EIA) for the proposed construction of the R22 Hluhluwe road-over-rail bridge and associated approach alignment.

The activities will integrate with the authorised road realignment intended to bypass the town of Hluhluwe, located within the Big 5 Hlabisa Local Municipality in KwaZulu-Natal (DFFE Environmental Authorisation references: 14/12/16/3/3/2/1043, 14/12/16/3/3/2/1043/AM2, and 14/12/16/3/3/2/1043/AM4).

This report has been compiled based on the findings of the Scoping Report and the associated Plan of Study (PoS), which outline the recommended approach for proceeding with the Environmental Impact Assessment in accordance with the requirements set out in Government Notice Regulation (GNR) 982 of the Environmental Impact Assessment Regulations, 2014 (as amended).

1.1 Project Overview

The proposed road-over-rail bridge and alignment of the R22 around Hluhluwe town will assist in diverting traffic that is not destined for Hluhluwe to the adjoining Mbazwana/Sodwana Bay Road. The diversion of traffic will reduce existing traffic volumes within the town, thereby reducing the risk to road users and pedestrians, reduce wear on town infrastructure and decrease road maintenance costs. In addition, travel time delays will be reduced for road users as a more direct route bypassing the town, will be available.

The requirements for the realignment are as follows:

- The Proposed Construction of a Dedicated Road-Over-Rail Bridge,
- Construction of an approach alignment at the Mbazwana/Sodwana Intersection of Route 22 and,
- A proposed Quarterlink access road into the town of Hluhluwe.

This report addresses the environmental impacts associated with the site and layout alternatives (refer to **Section 4**).

1.2 Environmental Assessment Practitioner

Terratest (Pty) Ltd. was appointed by Hatch (Pty) Ltd. - implementing agent to South African National Roads Agency Limited (SANRAL) - to undertake an Environmental Impact Assessment (EIA) for the realignment of the Route 22 around Hluhluwe Town in the Big 5 Hlabisa Municipality, KwaZulu-Natal.

In terms of Regulation 13 of the NEMA EIA Regulations (GNR 982) 2014 as amended, an independent Environmental Assessment Practitioner (EAP), must be appointed by the applicant to manage the application for an environmental authorisation. SANRAL and the compiler of this report are compliant with the definition of an EAP as defined in Regulations 1 and 13 of the NEMA EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that the EAP is:

- Objective and independent.
- Has expertise in conducting EIA's.
- Comply with the NEMA, the environmental regulations and all other applicable legislation.
- Considers all relevant factors relating to the application.
- Provides full disclosure to the applicant and the relevant environmental authority.

Table-1-1 overleaf provides a summary of the EAP Project Team. A detailed Curriculum Vitae of the Terratest (Pty) Ltd. Project Team is attached as **Appendix F.**

Table-1-1: Details of the EAP

COMPANY/ENTITY NAME	Terratest (Pty) Ltd.
PHYSICAL ADDRESS	6 Pin Oak Avenue, Hilton Pietermaritzburg, KwaZulu-Natal, 3245
POSTAL ADDRESS	6 Pin Oak Avenue, Hilton Pietermaritzburg, KwaZulu-Natal, 3245
CONTACT NUMBER	+27 (0)33 343 6700
EAP	**Ryan Emslie Jonas**
EMAIL ADDRESS	JonasR@terratest.co.za
QUALIFICATIONS	MSc (Environmental Science)
PROFESSSIONAL REGISTRATIONS AND AFFILIATIONS	**SACNASP** - Professional Natural Scientist (Environmental Science) (400159/15). **EAPASA** - Environmental Assessment Practitioner (2019/1674). **IAIAsa** - International Association of Impact Assessment (5065).
EXPERTISE	**Ryan Emslie Jonas** is a Senior Environmental Scientist and has acquired 17 years consulting experience in managing and executing various application processes for a diverse range of large infrastructure developments, mining, and renewable energy (solar and wind energy facilities) projects to obtain environmental authorisations, licenses for waste management, water uses, air emissions release and compiling and implementing environmental management programmes. His project management experience includes client liaison, business development, project scheduling, professional services contract management, progress reporting, managing sub-consultants (specialists) and junior staff, invoicing and ensuring the quality of deliverables to a Client. Also proficient in tender, expression of interest and proposal writing for local as well as IFC / World Bank projects. Ryan has gained an excellent working knowledge of African (i.e. South Africa, Zambia, Kenya, Lesotho, Mauritius, Namibia) and International Finance Corporation / World Bank environmental legislative requirements for major infrastructure, renewable energy, and mining developments.

2 PROJECT DESCRIPTION

The proposed development is a part of / features in the upgrade and expansion of the road and rail network of the greater Lubombo Spatial Development Initiative (LSDI). The development comprises the realignment of the R22 around Hluhluwe town and the construction of the road-over-rail bridge and approach alignment at the intersection of the R22 with the Sodwana/ Mbazwana R22 Road.

The proposed road-over-rail bridge will eliminate the existing at-grade railway crossing on the R22 at km5.5 and will tie into the authorised realignment of the R22 around Hluhluwe Town. The entire bypass system forms part of the long-term expansion vision of the regional rail network that will service the greater northern KwaZulu-Natal and surrounds.[1]

2.1 Site Location

The proposed road-over-rail bridge and approach alignment is located northeast of the town of Hluhluwe, within the Big 5 Hlabisa Municipality, KwaZulu-Natal (refer to **Figure 2-1** to **Figure 2-4**). The site is approximately 1.808km in extent. Access to the site is from the southern side, via the R22. The approximate coordinates of the site are detailed in **Table 2-1** below.

Table 2-1: Co-ordinates of the proposed alignment and associated infrastructure

THE APPROACH ALIGNMENT		
Point	**Latitude**	**Longitude**
Start	28° 0'32.91"S	32°16'31.45"E
Middle	28° 0'35.71"S	32°17'4.69"E
End	28° 0'36.64"S	32°17'41.00"E
ROAD-OVER-RAIL BRIDGE		
Point	**Latitude**	**Longitude**
Start	28° 0'33.69"S	32°16'45.60"E
Middle	28° 0'33.84"S	32°16'47.15"E
End	28° 0'33.86"S	32°16'48.60"E
QUARTERLINK ROAD		
Point	**Latitude**	**Longitude**
Start	28° 0'34.16"S	32°16'39.64"E
Middle	28° 0'40.66"S	32°16'40.27"E
End (1)	28° 0'37.21"S	32°16'48.06"E
End (2)	28° 0'42.17"S	32°16'48.91"E
End (3)	28° 0'48.46"S	32°16'48.86"E

The proposed project is located on the R22, Section 1 on the outskirts of Hluhluwe town. The predominant land use to the north of the town is agriculture and tourism. In the west, the agricultural activities are centred around pineapple farming. To the north and east of the municipal boundary, the farming activities consist of mainly game farms, which support the tourism industry. iSimangaliso Wetland Park is located approximately 7.15km to the east of the realignment, and Bonamanzi Game Park is situated approximately 500m to the south-east of the proposed realignment.

[1] Mothilal, A., & Bradley, C., 2015: *Elimination of the at-grade Railway Crossing on R22 Section 1 at km5.5., Route Determination Report*, 2015: Hatch Goba (Pty) Ltd, Umhlanga.

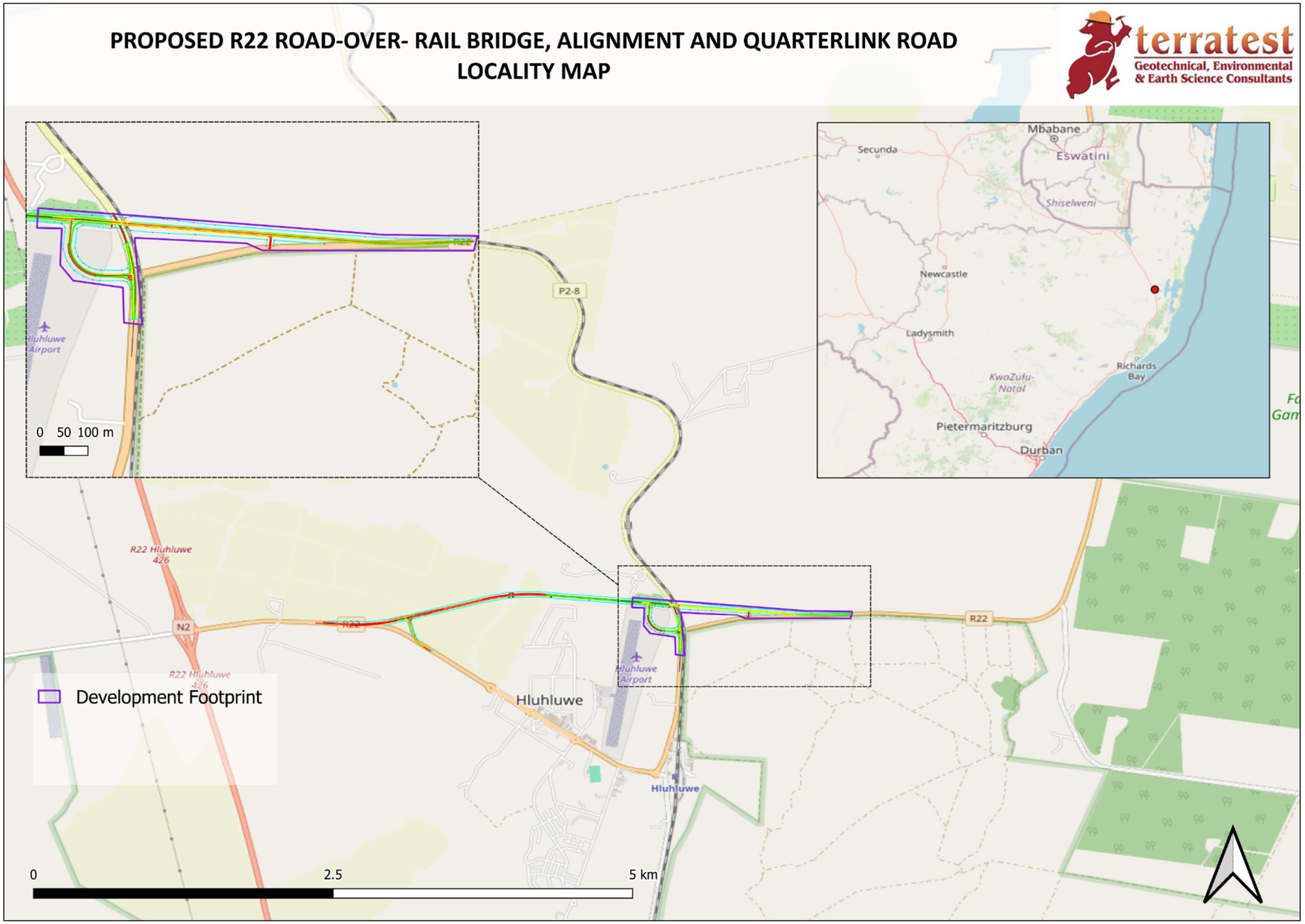


Figure 2-1: Locality of the proposed realignment in the context of the tie into the authorised realignment around Hluhluwe Town and the R22

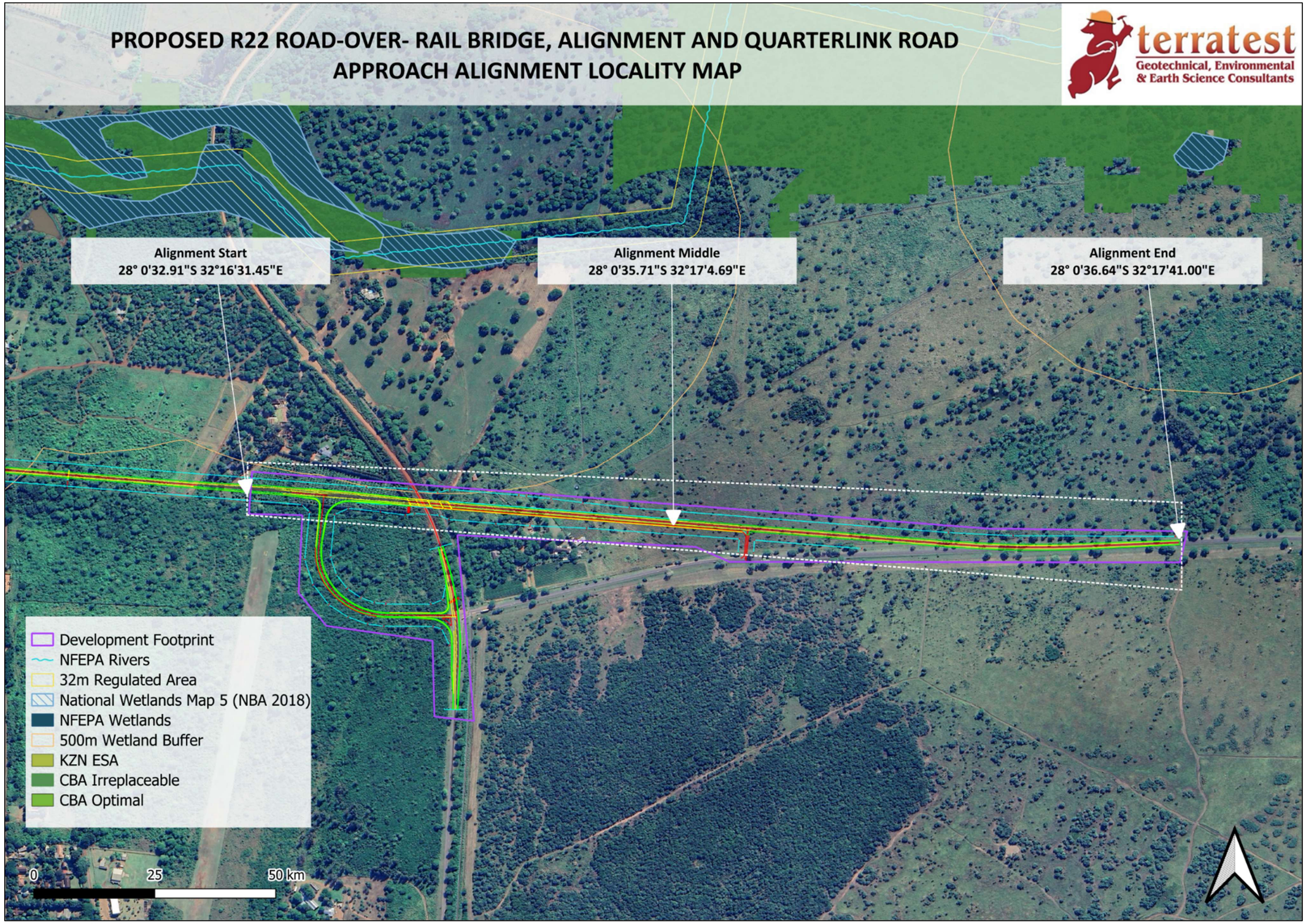


Figure 2-2: Locality of the proposed approach alignment

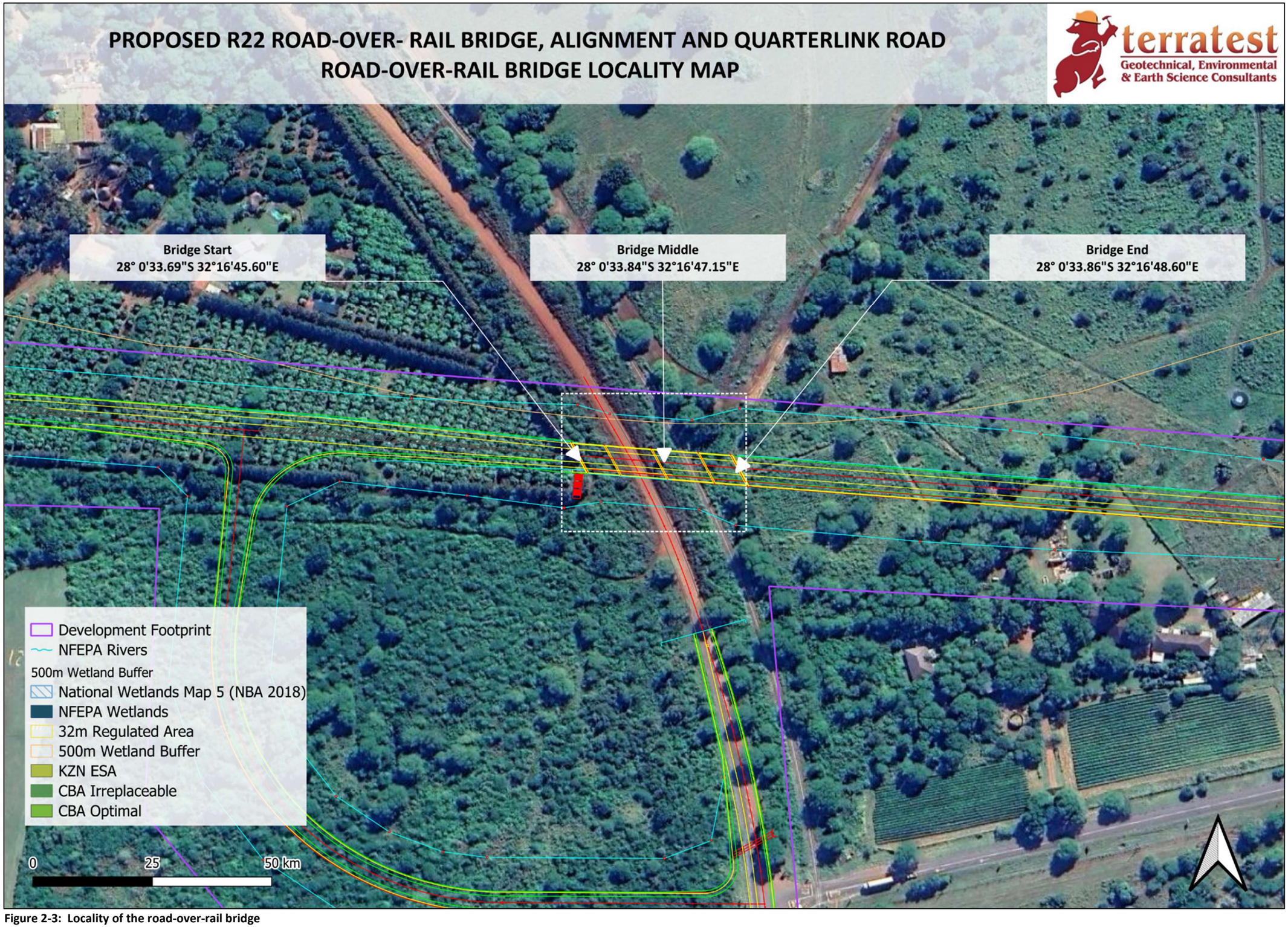


Figure 2-3: Locality of the road-over-rail bridge

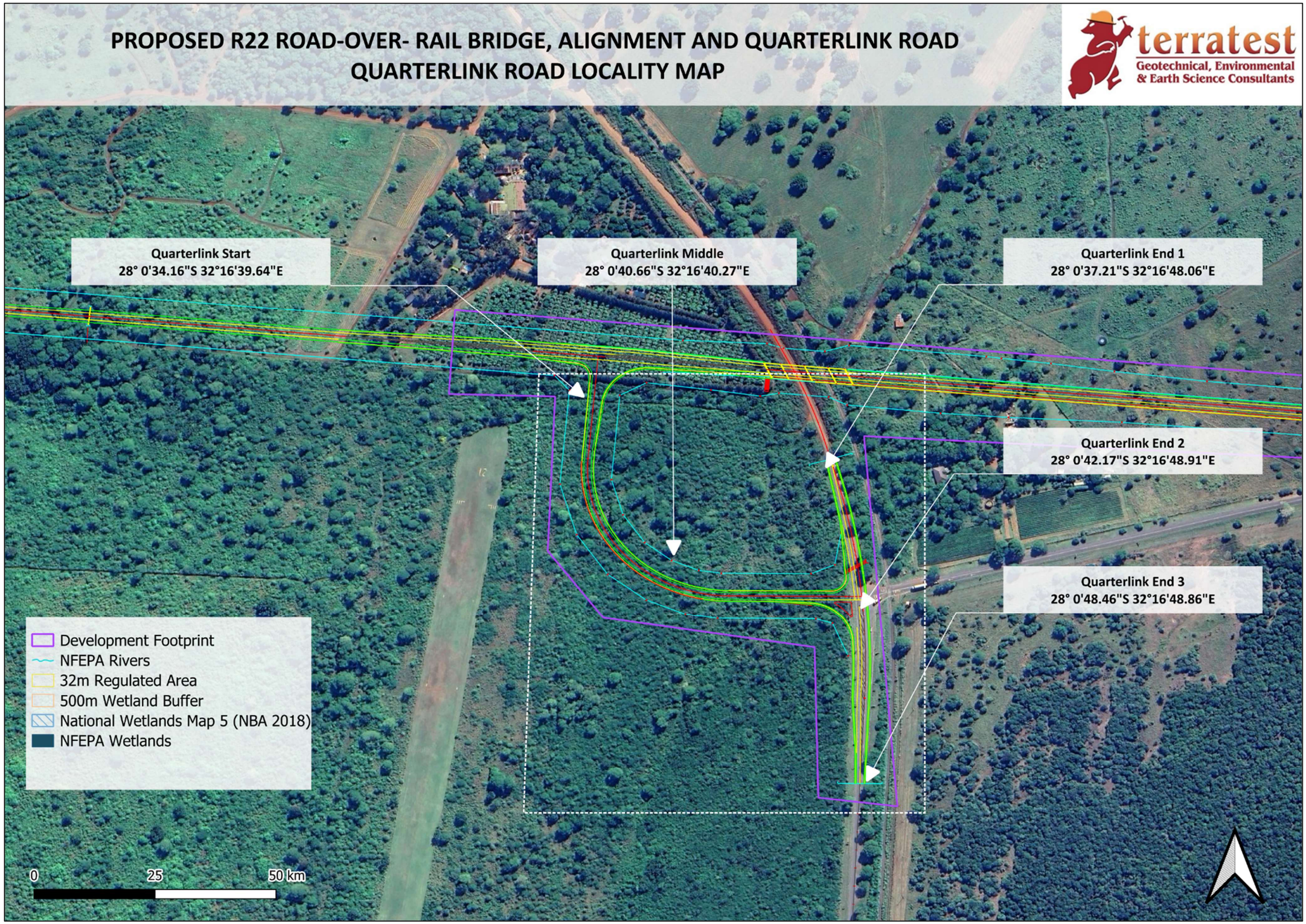


Figure 2-4: Locality of the quarterlink road

2.2 Description Of Activities

The proposed development is a part of / features in the upgrade and expansion of the road and rail network of the greater Lubombo Spatial Development Initiative (LSDI)[2]. The development comprises the realignment of the R22 around Hluhluwe town and the construction of the road-over-rail bridge and approach alignment at the intersection of the R22 with the Sodwana/ Mbazwana R22 Road.

The proposed road-over-rail bridge will eliminate the existing at-grade railway crossing on the National Route R22 at km5.5 and will tie into realignment of the R22 around Hluhluwe Town[1]. The entire bypass system forms part of the long-term expansion vision of the regional rail network that will service the greater northern KwaZulu-Natal and surrounds.

Activities will include:

- Construction of an approach alignment at the Mbazwana/Sodwana Intersection of Route 22.
- The Proposed Construction of a Dedicated Road-Over-Rail Bridge.
- A proposed Quarterlink access road into the town of Hluhluwe.
- 121 700m^2 of natural vegetation clearance.

2.2.1 The Approach Alignment

- Total width of road reserve: 60m.
- Total length of Road: 1.808km (from chainage 3000 to chainage 4808).
- Total width of road excluding road reserve: 13.4m.

2.2.2 The Road over Rail Bridge

- Total Bridge Width: 16.275m.
- Bridge Length: 8.1m.
- Bridge Lane Width: 3.8m wide in each direction.
- Shoulder width: 3m wide in each direction.
- Sidewalk: 1.5m wide on the southern side.

The bridge structure will be designed to **accommodate future lane widening** should this be required. The bridge openings will be designed to accommodate the anticipated doubling and electrification of the railway line as well as a future service road. The bridge structure will conform to both the SANRAL requirement as well as the requirements of Transnet.

2.2.3 The Quarterlink Road

A quarterlink is proposed to the east of the town linking the proposed bypass with MR2-7 (the portion of the R22 running in a north/south direction)[1]. The quarterlink enables vehicles from the north, south and the town centre to connect with the bypass. Vehicles from the town centre therefore have a choice to either:

- Travel eastwards along R22, northwards along the R22, turn left onto the quarterlink and right/left onto the bypass, or
- Travel westwards along R22 (MR453) and turn left/right onto the bypass.

The route vehicles would follow depends largely on which direction they wish to travel and their proximity to either route within the town centre. The alignment of the Quarterlink will be parallel to the Hluhluwe airstrip in a north/south direction and will then curve to the left and tie in with a T-junction on the existing R22. The Quarterlink road will be required to provide an intersection 'Road over Rail' structure at the existing at-grade R22 and railway line. Access to Hluhluwe town will still be maintained from both the East and West approaches. Access will be accommodated by means of at-grade intersections and two short link roads.

[2] Big 5-Hlabisa Local Municipality, IDP 2022/2023-2026/2027, 5th Generation/Hluhluwe

2.2.4 Intersections

Two intersections are planned within this Application, and include the following:

- R22 / R22 (MR453) Priority Intersection (new intersection)
- Eastern Phase / Quarterlink Priority Intersection (new intersection).

2.3 Materials Source

Approximately 155 000m³ of material is required for general fill. This material will be sourced from commercial sources such as the Afrimat Lancaster Quarry and the UCOSP Pty Ltd. Quarry. The Afrimat organisation has indicated that they have fill material derived from overburden as a potential source, as well as gravel and crushed stone products for the layerworks. Bedding material will be sourced from UCOSP. In this regard, no mining permits or rights are required to be applied for. Concrete will be sourced from a supplier such as Afrimat Hluhluwe, who have a concrete batching plant located adjacent to the existing R22 in Hluhluwe. Asphalt for the wearing course would be obtained from commercial sources.

2.4 Subsoil Drainage

Subsoil drainage will be required to be installed along all sections of roadway in cut[1]. The subsoil drainage details will be according to the SANRAL typical details with discharge into appropriate drainage channels.

2.5 Stormwater Control

It is expected that structures will be required to facilitate the movement of stormwater through the road prism i.e. the approach alignment. These consist of either 600mm, 900mm, or 1200mm diameter culverts[1]. The culverts will be located at appropriate positions to facilitate effective stormwater control. Inlet and outlet control structures to culverts will be in accordance with the SANRAL typical details, amended to suit where required.

2.6 Land Use

The predominant land use surrounding the existing at-grade railway crossing and R22 intersection is agriculture. In the west, the agricultural activities are centred on pineapple farming. To the north of the municipal boundary, the farming activities consist of mainly game farms and grazing lands with a mango orchard bordering on the existing P2-7 provincial gravel road. To the east, the land use is a combination of grazing lands, game farms and Thanda Game Reserve. To the south-west of the proposed development site is Bonamanzi Game Reserve.

2.7 Associated Infrastructure

2.7.1 Access Roads

Construction traffic will be placed on existing roads (including the existing R22 road and farm roads) or within the proposed road reserve. As such no agricultural land will be used as a transit for vehicles, unless access roads are existing or the applicable area has been surveyed to be included in the construction alignment. Access points onto the re-aligned road will be located at the most accessible points off the existing R22 road. These access roads will be based on the layout plan and will follow the proposed entry and exit points onto and off the existing R22 road. It is therefore anticipated that no new access roads will be required.

Traffic control and calming measures, including warning signage, points men and if necessary, rumble strips / speed bumps, will be located along the existing R22 at points of construction and at which access roads are located.

2.7.2 Site Camp

One site camp is established for the construction of both the road-over-rail bridge and Authorised realignment construction. The current site camp is located adjacent to the town and not on agricultural land. The site camp is located is located within a residential plot (28°01'05.1"S 32°15'57.6"E). No site clearing was undertaken as the camp was established on land that has already been transformed.

2.8 Land Acquisition

The layout for the proposed development will occur outside of the existing SANRAL road reserve and as such privately-owned property will need to be acquired under a land acquisition process. The land acquisition process is being run separately to the EIA Process and as such is not dealt with by the EAP.

The 21-digit Surveyor General Code for each cadastral land parcel that the proposed layouts will traverse are provided in **Table 2-2.**

Table 2-2: Properties affected by the proposed road-over-rail bridge and approach alignment project.

SG CODE	ACCORDING TO TITLE DEED	TITLE DEED #	FARM, LOT & PORTION #	STATUS
N0GV00000001353500000	NYATHI FAMILY TRUST-TRUSTEES	T28275/2014	LOT H 120 Farm 13535 Portion 0	Acquired by SANRAL
N0GV00000001341400000	BONAMANZI GAME RESERVE PROPRIETARY LIMITED	T10758/2015	LOT H74 Farm 13414 Portion 0	Acquired by SANRAL
N0GV00000001353100000	BONAMANZI GAME RESERVE PTY LTD	T26042/2005	LOT H75 Farm 13531 Portion 0	Acquisition not required.
N0GV00000001586000000	KLEYNSPAN BOERDERY CC	T18215/2014	KOORSBOOM 15860 Portion 0	Acquired by SANRAL
N0GV00000001341500000	D & D ERASMUS FAMILIE TRUST-TRUSTEES	T1738/1994	Lot H119 Farm Portion 0	Acquired by SANRAL
N0GV00000001351500000	Kwa Lala Property Investments (Pty) Ltd	T21651/2005	LOT H118 Farm 13515 Portion	Acquired by SANRAL
N0GV00000001594400000	THE BIG FIVE HLABISA LOCAL MUNICIPALITY			Acquisition not required.

2.9 Proposed Layout

During the initial route location process for the Western and Eastern Phases of the development, two corridors were identified for the potential realignment of the R22 (refer to **Figure 2-5** overleaf). These were a Southern Corridor (blue line) located to the south of the existing R22 passing through the southern portion of Hluhluwe and a Northern Corridor (red line) passing through mainly agricultural land.

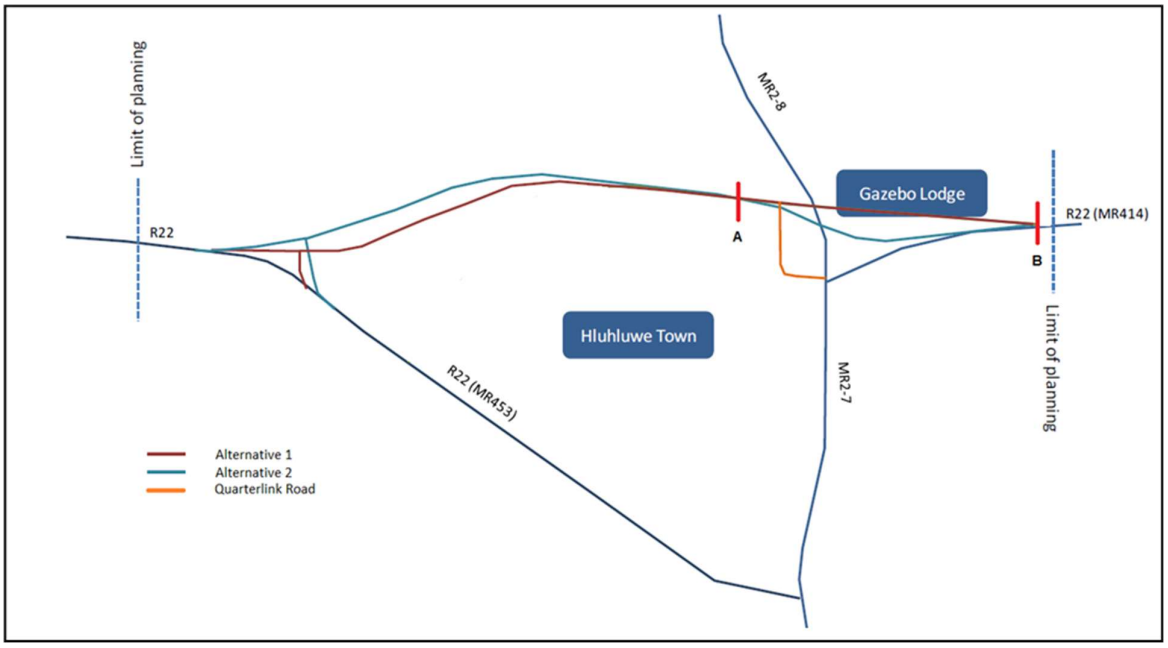


Figure 2-5: The two site alternatives proposed for the R22 road-over-rail application.

This application applies exclusively to the two approach alignments/road-over-rail-bridge structures marked between points A and B in Figure 2-5 above.

The Northern Corridor (refer to **Figure 2-6** overleaf) was considered the favourable option for the following reasons:

- The Northern alignment corridor is shorter, thus reducing road construction costs, the amount of land required and the impact on the receiving environment.
- The Northern Corridor does not bisect the town of Hluhluwe and there is little or no impact on the Local Area Plan (LAP) of Hluhluwe.
- The Northern Corridor alignment does not impact on the future expansion of Hluhluwe town.
- The Northern Corridor is bound by the Ngweni River to the north requiring only one potential water course crossing within this corridor.
- The alignment of the Northern Corridor passes through agricultural land which is completely transformed.

The Northern Corridor has a smaller development footprint, a reduced impact on the receiving environment, and does not negatively affect the LAP of Hluhluwe town. In addition to this, it is to tie into the existing authorised realignment. As such it is considered the preferred site and the only feasible alternative.

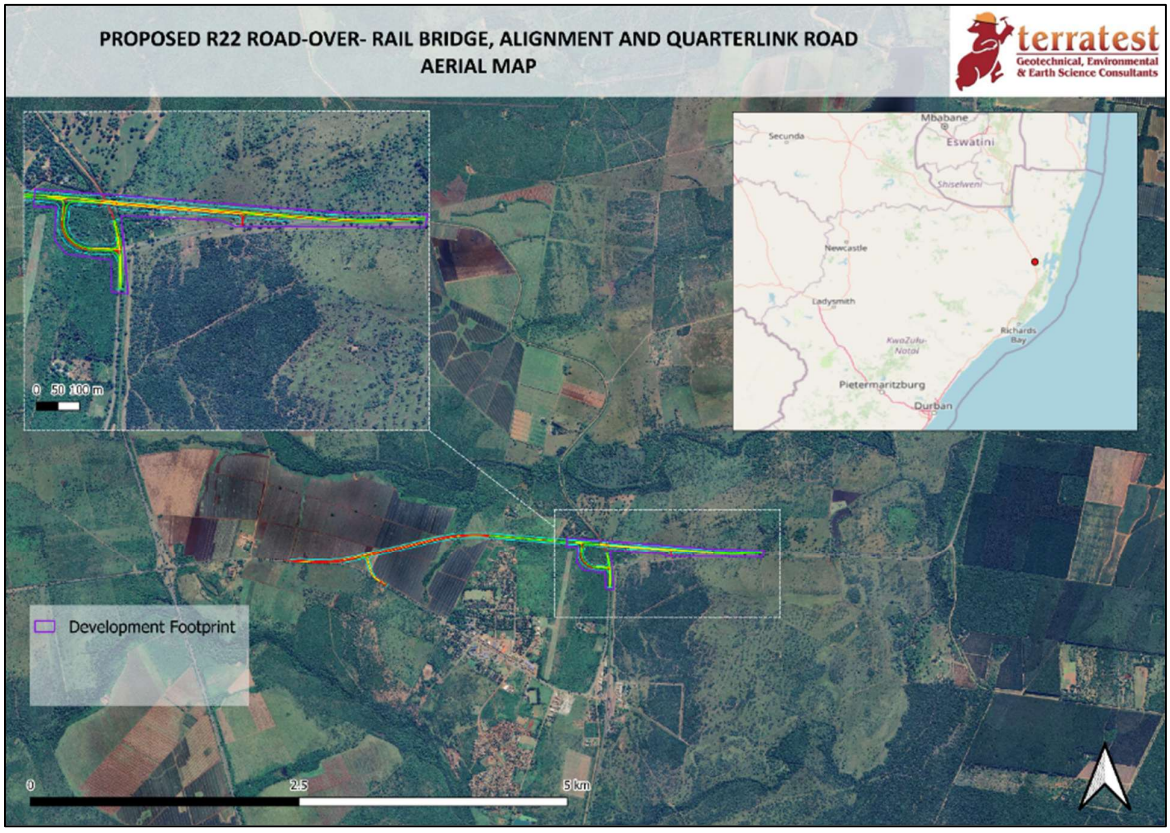


Figure 2-6: The preferred site alternative (Northern Corridor) follows a straight-line approach

An alternative site to the south of Hluhluwe Town was initially considered during the site selection process (refer to **Figure 2-7**). This site, referred to as the Southern Corridor, had two layout options namely an alignment between the Hluhluwe River and Hluhluwe Town, or an alignment to the south of the Hluhluwe River. Both of these options were considered unsuitable for the following reasons:

- Extending the corridor to the south of the Hluhluwe River increases the length of the realignment substantially. This would require the acquisition of substantially more land.
- The increased alignment footprint would increase construction costs, as well as the impact on the receiving environment which, although disturbed, has not been completely transformed.
- In terms of the Big 5 Hlabisa Municipality Local Area Plan (LAP), any road located to the south of the existing R22 and north of the Hluhluwe River will effectively bisect the township developments within Hluhluwe. A route located here would create a similar situation with respect to uncontrolled access, vehicular and pedestrian movements that currently exist within Hluhluwe. These factors are undesirable for this Route.
- The Southern Corridor has a number of smaller feeder tributaries which would require several structures to accommodate these streams.
- The development planning for the town of Hluhluwe will be severely curtailed should the realignment of the R22 pass along the Southern Corridor, which is directly through the primary development node as identified by the LAP.
- The Southern Corridor extends through the Bonamanzi Game Reserve and any road here would bisect the reserve and negatively impact on the habitat of the wildlife and operations of the reserve. This corridor also has an increased risk of vehicular collisions with wildlife.

The Southern Corridor is an undesirable option in terms of a site alternative, and as such the Northern Corridor is considered the only feasible option. As such, this assessment report only makes reference to the northern corridor i.e. the preferred Site Alternative.

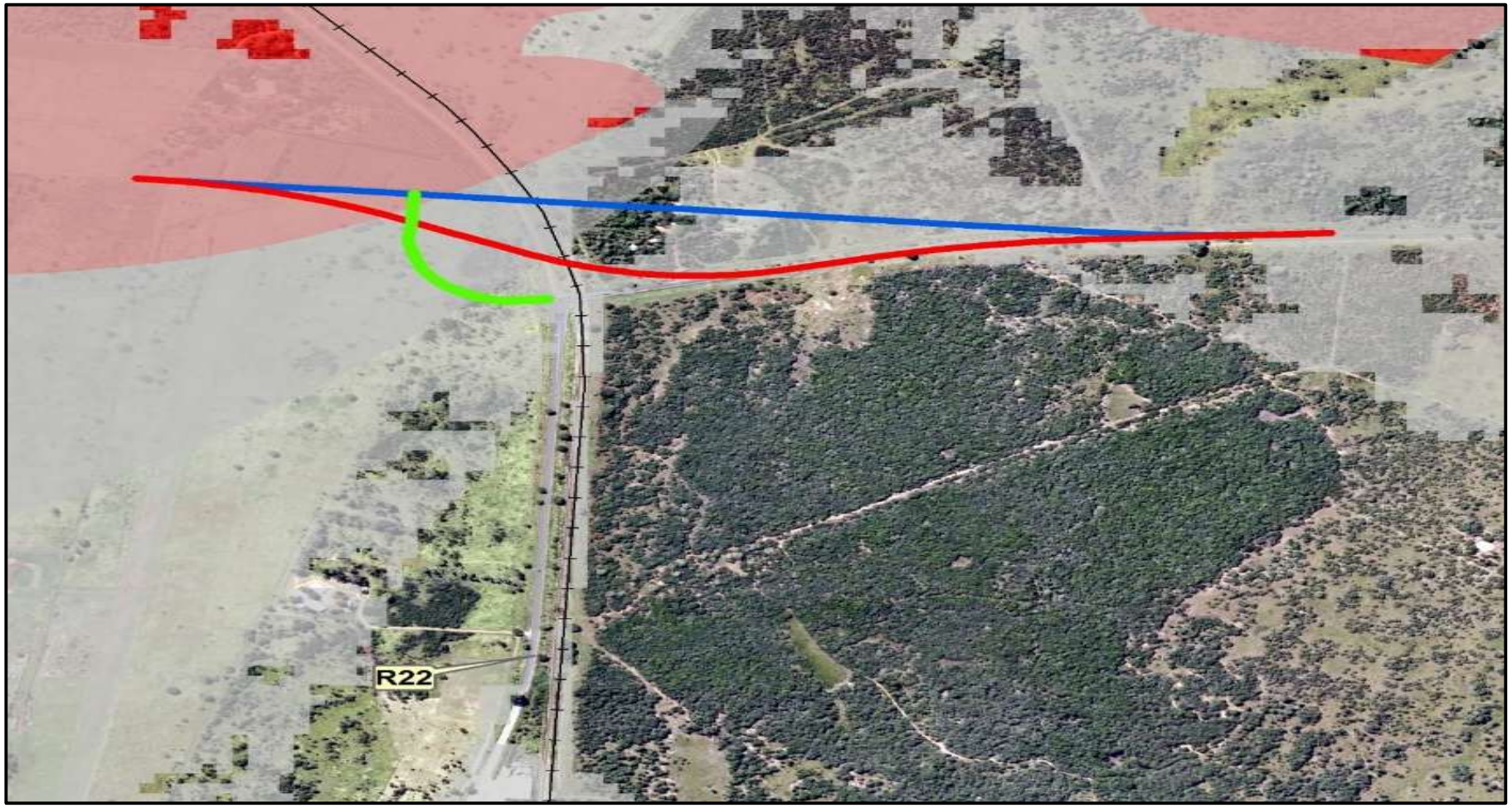


Figure 2-7: The proposed approach alignment follows the existing R22 alignment from the east and then rises above the existing railway line by way of a road-over-rail-bridge

3 NEED & DESIRABILITY

GN 792 of 2017: Integrated Environmental Management Guideline on Need and Desirability, defines the **need** as being the **timing** of a development and its **desirability** as being the **location** of said development. The associated Need and Desirability of this Application are included below:

3.1 Planning Context

A critical action within the National Development Plan for 2030 is as follows: "Public infrastructure investment at 10 percent of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes and loans and focused on transport, energy and water." The proposed realignment seeks to pursue this vision by providing safe, more easily accessible and direct transport infrastructure. In addition, the realignment of the R22 will assist in realising a number of other regional planning initiatives, including the following:

- The first of these is the existing Lubombo Spatial Development Initiative (LSDI) route which was upgraded to asphalt in the 1990's and is prioritised as a Spatial Development Initiative (SDI) of national significance. It has greatly improved access to large parts of the Zululand Region to the north of Hluhluwe. The route extends from Hluhluwe, on the R22, through to Mbazwana to join the only other asphalt road in the region at Pelindaba, before heading north-east through KwaNgwanase to the Mozambique border at Farazel.

- The second of these is the proposed Transnet Swaziland Rail Project (SRL) which aims to divert traffic from road to rail, optimising capacity on the Coal Line, through alternative accommodation of General Freight (GF) traffic, creating a logistics corridor linking the hinterland to the eastern seaboard ports. This entails the doubling and electrification of the railway line and provides a viable connection for rail freight from western Swaziland to markets in South Africa, Mozambique and internationally. The upgrading and proposed expansion of the railway line will have a direct impact on the safety of road users at the present at-grade railway crossing, hence the need for the establishment of the road-over-rail bridge. The authorised road-over-rail bridge has therefore taken into consideration the future expansion of the railway line.

- As part of the last Local Economic Development (LED) planning undertaken in 2009, a Strengths, Weakness, Opportunities and Threats (SWOT) analysis was undertaken for the Big 5 Hlabisa Local economy. This SWOT analysis confirmed that the strategic location of the municipality remains one of its most important strengths. Good connectivity due to the road systems, the airfield and railway line, as well as the existence of a diversified economy was further identified as strengths for the future development of the local economy.

3.2 Transport Network

Currently, the R22 receives a low but consistent volume of traffic, including heavy, light and long-distance movement from local, cross border and tourism traffic. This traffic is routed through Hluhluwe town. Four (4) traffic circles are intercepted along the current routing which necessitates the need for braking and stopping. The stopping and acceleration of a vehicles increases fuel consumption, particularly for heavy vehicles. This increases expenditure in terms of fuel costs. Further, the deterioration of road infrastructure through the town can be attributed to daily traffic, particularly heavy delivery trucks. Heavy loads contribute substantially to road wear and tear, which increases maintenance needs and costs.

Traffic volumes also contribute to road and pedestrian safety impacts, as well as traffic flow in terms of congestion and ultimately, inconvenience for road users. Conversely, traffic volumes stimulate the local economy along the route, namely fuel filling stations, convenience stores and the informal market.

3.3 Need

The need of the proposed development is as follows:

- Hluhluwe is the starting point of the LSDI, which links the N2 with Sodwana, Kosi Bay and Mozambique. The realignment of the R22 will ensure continued ease of use of the LSDI.
- The road-over-rail bridge alignment ties directly into the authorised realignment of the R22, which consequently also enables the realisation of the widening of the railway line, a component of the Transnet Swaziland Rail Project (SRL).

3.4 Desirability

The desirability of the proposed development is as follows:

- The primary reason for the road-over-rail bridge is the elimination of the present R22 at-grade railway crossing. This enhances the safety of all road users in the Hluhluwe area (local and visitor traffic).
- Concurrently, the alignment would provide an alternative route for the vehicles identified which are not destined for the town centre, removing most of them from the town centre. This would increase the lifespan of the existing road infrastructure within Hluhluwe town.
- The alignment provides an opportunity for through traffic to bypass Hluhluwe north of the town reducing travel time by 50%.
- The alignment of the road will improve road safety along the section of the R22 that passes through the town centre, especially for pedestrians. This will be due to the reduction of vehicular and pedestrian conflict in the town area.
- The reduction of heavy volumes of traffic through the town, reducing noise and vehicle emissions within the town.
- The Spatial Development Framework (SDF) Situational Analysis records that the lack of appropriate road infrastructure has a negative impact on overall service delivery. The alignment and road-over-rail bridge will improve road infrastructure for all road users in the local and regional context.

The proposed project is located on the National Road R22, Section 1 on the eastern outskirts of Hluhluwe town, 2km off the N2. The municipality is therefore highly accessible at both a regional and national level.

4 ALTERNATIVES

"Alternatives" as set out in the NEMA EIA Regulations 2014 (as amended), in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

a) the property on which or location where it is proposed to undertake the activity
b) the type of activity to be undertaken.
c) the design or layout of the activity.
d) the technology to be used in the activity.
e) the operational aspects of the activity; and
f) the option of not implementing the activity.

Alternatives must include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes, etc.) or both is appropriate, needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

4.1 Assessment of Alternatives

The proposed construction activities described in **Section 2.2** were used as a baseline for the assessment of the alternatives. The alternatives assessed within **Sections 4.2** to **4.7** are:

- Location (Site) alternatives
- Activity Alternatives
- Technology Alternatives
- Operational Aspects
- The No-Go Alternative

4.2 Site Alternative

4.2.1 Site Alternative 1 (Preferred Alternative)

During the initial route location process for the Western and Eastern Phases of the development, two corridors were identified for the potential realignment of the R22 **(Figure 2-5)**. These were the Southern Corridor **(Figure 2-7)** located to the south of the existing R22 passing through the southern portion of Hluhluwe and a Northern Corridor **(Figure 2-6)** passing through mainly agricultural land. The Northern Corridor was considered the favourable option for the following reasons:

- The Northern alignment corridor is shorter, thus reducing road construction costs, the amount of land required and the impact on the receiving environment.
- The Northern Corridor does not bisect the town of Hluhluwe and there is little or no impact on the LAP of Hluhluwe.
- The Northern Corridor alignment does not impact on the future expansion of Hluhluwe town.
- The Northern Corridor is bound by the Ngweni River to the north requiring only one potential water course crossing within this corridor.
- The alignment of the Northern Corridor passes through agricultural land which is completely transformed.

The Northern Corridor has a smaller development footprint, a reduced impact on the receiving environment, and does not negatively affect the LAP of Hluhluwe town. It would also tie into the already authorised realignment which is already under construction.

As such it is considered the Northern Corridor is the preferred site and the only feasible alternative. As such, this assessment report only makes reference to the Northern Corridor.

4.2.2 Site Alternative 2

An alternative site to the south of Hluhluwe Town was initially considered during the site selection process. This site, referred to as the Southern Corridor, had two layout options namely an alignment between the Hluhluwe River and Hluhluwe Town, or an alignment to the south of the Hluhluwe River. Both of these options were considered unsuitable for the following reasons:

- Extending the corridor to the south of the Hluhluwe River increases the length of the realignment substantially. This would require the acquisition of substantially more land.
- The increased alignment footprint would increase construction costs, as well as the impact on the receiving environment which, although disturbed, has not been completely transformed.
- In terms of the Big 5 False Bay Local Municipality Local Area Plan (LAP), any road located to the south of the existing R22 and north of the Hluhluwe River will effectively bisect the township developments within Hluhluwe. A route located here would create a similar situation with respect to uncontrolled access, vehicular and pedestrian movements that currently exist within Hluhluwe. These factors are undesirable for a National Route.
- The Southern Corridor has a number of smaller feeder tributaries which would require several structures to accommodate these streams.
- The development planning for the town of Hluhluwe will be severely curtailed should the realignment of the R22 pass along the Southern Corridor, which is directly through the primary development node as identified by the LAP.
- The Southern Corridor extends through the Bonamanzi Game Reserve and any road here would bisect the reserve and negatively impact on the habitat of the wildlife and operations of the reserve. This corridor also has an increased risk of vehicular collisions with wildlife.

The Southern Corridor is an undesirable option in terms of a site alternative, and as such the Northern Corridor is considered the only feasible option.

4.3 Activity Alternatives

4.3.1 Activity Alternative 1 (Preferred Alternative)

The primary reason for the construction of a dedicated road-over-rail-bridge and approach alignment at the intersection of Route R22 is the elimination of the at-grade railway crossing. The at-grade crossing compromises the safety of road users, whereas the road-over-rail bridge will enhance the safety of all road users in the Hluhluwe area (local and visitor traffic). Benefits to the town include improved safety of pedestrians within town as the bypass removes all through traffic (except those wishing to stop in town). The development will also improve the safety of all road users at the railway crossing as they will no longer have to cross directly over the railway line but will pass over the railway line on the bridge structure, thus directly removing the threat of a collision with trains. Improvement of road safety along the section of the MR453 that passes through the town centre, especially for pedestrians due to the reduction of vehicular and pedestrian conflict in the town area. Heavy vehicles which are not destined for the town centre will no longer pass through the town centre. The bypass will provide an alternative route for these vehicles, removing most of them from the town centre. This will increase the lifespan of the pavement of the MR453. Other reasons include:

- Noise and pollutant emission reduction in town area.
- Travel time saving for through traffic.
- Opportunity for local construction contractors and associated local community enterprises to gain economic benefits from the construction phase.
- Additional opportunities for skills transfer and education/training of local communities will be created.
- Potential positive socio-economic impacts likely to result from the project, such as increased local spending and the creation of local employment opportunities.
- The proposed development will assist in the upgrading of transport routes which link tourism centres.

- The project will complement the R22 Lubombo Spatial Development Initiative (LSDI) Corridor which links Hluhluwe to Mozambique.

Alternative 1 is the preferred activity option and would infer that the Proposed Construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 False Local Municipality, KwaZulu-Natal will be undertaken.

4.3.2 Activity Alternative 2

Activity alternative two is the "no-go" option. In the case that the "no-go" alternative is exercised, the safety of road users crossing the railway line will continue to be compromised. In addition, this will also compromise the development of the Western Phase, which is an integral motivating factor in this application, as the Western and Eastern Phases form an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique. As such it is not recommended that the No-Go alternative is pursued.

4.4 Design Alternatives

4.4.1 Design Alternative 1 (Preferred Alternative)

The proposed layout follows the R22 alignment from the east, passes directly through where Gazebo Lodge is currently situated, and then rises above the railway line by way of a road-over-rail-bridge. The alignment extends past the north of the town and ties into the R22 west of the town. A desirable design speed of 100km/h will be able to be maintained with this layout alternative. The alignment passes to the North of the Hluhluwe Airfield (Runway 21) at chainage 2540. A Quarterlink junction at chainage 2706 provides access from the realigned R22 to Hluhluwe town. The route will be connected to the existing R22 via a bidirectional Quarterlink road. The alignment of the Quarterlink will be parallel to the airfield in a north/south direction for approximately 400m.

From a geometric perspective Alternative 1 is the preferred alignment as it has the most favourable horizontal geometry particularly in the proximity of the airfield and new road over rail bridge. Alternative 1 also provides the most acceptable sight distances along the route for the desired design speed. Based on the outcome of the traffic analysis Alternative 1 is recommended as the preferred alignment.

4.4.2 Design Alternative 2

The proposed layout follows the R22 alignment from the east, has a series of right and left curves to avoid the Gazebo Lodge and then rises above the railway line by way of a road-over-rail-bridge. The alignment extends past the north of the town and ties into the R22 west of the town.

The alignment passes to the North of the Hluhluwe Airfield (Runway 21) at chainage 2540. The road at this position is approximately 1m in fill i.e. has risen 1m above ground level and is within the approach requirements of the South Africa Civil Aviation Authority. A Quarterlink junction provides access from the realigned R22 to Hluhluwe town. The alignment at this point has a series of right and left curves to avoid the Gazebo Lodge. From here the alignment ties in with the existing R22 in the East.

The alignment of the Quarterlink will be parallel to the airfield in a north/south direction for approximately 400m and will then curve to the left with a radius of 130m. The link will tie in with a T-junction on the existing R22.

4.5 Technology Alternatives

Technology alternatives are limited to the illumination of the road-over-rail-bridge. Two separate illumination alternatives are available for the lighting of the bridge. These are solar energy powered lights, or lights that draw energy from the electricity mains. As per a Case Study established by SANRAL in the Cape Town region, the establishment of renewable energy sources at point forms along a road alignment is a viable solution to electricity lines. The case study notes that if the distance from the nearest electricity supply exceeded 1km, then the establishment of renewable energy sources is advised. "The total installation cost of the renewal equipment per camera location or VMS installation amounts to approximately R40 000 (US$6 000) which is comparable to the cost

of laying an electrical cable, encasing it in concrete for 1 km and connecting it to the mains supply. In many locations along the route, the provision of renewable energy resulted in significant savings to the project.

The illumination source type for the lighting of the bridge will be finalised at a later stage during the construction phase.

4.6 Operational Aspects

The preferred and only operational aspects of the activity involve the maintenance of infrastructure. No alternatives to the operation aspect of the proposed development have been considered.

4.7 "No-Go" Alternative

The no-go alternative must be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The no-go alternative assumes that the proposed project will not go ahead i.e., the proposed development will not occur and therefore the site will remain as is. The purpose of the proposed road-over-rail-bridge and approach alignment is to provide a safe crossing point for vehicles, over the railway line. This is in light of the authorised application for the Western Phase (which will tie into the Eastern phase Application), and the future expansion of the railway line. If the no-go option is followed, the safety of road users crossing the railway line will continue to be compromised. In addition, this will compromise the development of the Western Phase, which is an integral motivating factor in this application, as the Western and Eastern Phases form an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique.

5 LEGAL FRAMEWORK

5.1 Constitution of the Republic of South Africa (Act 108 of 1998)

Section 24 of the Constitution of South Africa provides the main national legislative obligation towards sustainable environmental management and development. This section forms the foundation of all other subsequent environmental legislation and governance in South Africa. Section 24 states the following:

"Every person shall have the right -

(a) to an environment that is not harmful to their health nor well-being; and

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

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The following sections provide an overview of the environmental legislation, policies, plans and guidelines relevant to the proposed project, and which have been taken into account in the preparation of this report.

5.2 National Documents

5.2.1 National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)

The NEMA is the framework legislation governing EIA and subsequent EA processes under the authority of the Department of Forestry, Fisheries and the Environment.

NEMA makes provision for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment; institutions that will promote co-operative governance; procedures for co-ordinating environmental functions exercised by Organs of State and to provide for matters connected therewith.

Section 2 of the Act establishes a set of principles which apply to the activities of all Organs of State that may significantly affect the environment. These include the following:

- Development must be sustainable.
- Pollution must be avoided or minimised and remedied.
- Waste must be avoided or minimised, reused or recycled.
- Negative impacts must be minimised, and positive impacts enhanced; and
- Responsibility for the environmental health and safety consequences of a policy, project, product or service exists throughout its entire life cycle.

These principles are taken into consideration when a Governmental Department needs to exercise its powers for example, during the processes of granting permits or Environmental Authorisations or the enforcement of existing legislation or conditions of approval.

Section 23 of NEMA furthermore provides for general objectives of Integrated Environmental Management (IEM). In alignment with these objectives, the potential impacts of proposed development activities on the biophysical and socio-economic environments are identified and evaluated. These potential environmental impacts have been assessed during the Scoping Report phase and mitigation measures are provided where relevant.

The subsequent Environmental Impact Assessment Regulations, 2014 (as amended) (published in Government Notices R 983, R 984 and R 985, 2014 (as amended) , which are also referred to as Listing Notices 1, 2 and 3 respectively, list development activities which will trigger the necessity to conduct either a Basic Assessment or a

full Scoping and EIA process prior to EA being obtained for a proposed project. Listing notices 1 and 3 activities require only a Basic Assessment to be conducted while Listing Notice 2 activities trigger the requirement for a full Scoping and EIA process to be conducted.

Considering the nature and scale of the development activities triggered by this proposed project, it is required that a full Scoping and EIA process be conducted to provide sufficient information to the Competent authority in order for them to make an informed decision regarding the approval or rejection of the EA applied for.

Only once the EA is granted and the required supporting permits have been issued, may the Applicant lawfully commence with the proposed project. The Scoping and EIA process is therefore a critical component in the feasibility and planning stage of any proposed project.

5.2.2 National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA)

The NEMBA aims to provide for the management and conservation of the country's rich biodiversity within the framework of NEMA. It aids in the protection of species and ecosystems which warrant national protection and provides for the sustainable usage of the country's indigenous biological resources.

NEMBA and its Regulations were therefore utilised for determining the ecological/biodiversity significance, value and subsequently the adequate management of the proposed project area with regards to ecosystems, habitats and individual species.

The proposed project does not cross any sensitive areas, including drainage lines or wetland areas. An analysis of the Ezemvelo KZN Wildlife transformation land cover indicates that the greater site is largely transformed (See Appendix A-vegetation map for a larger copy thereof). The alignment passes through a small area which has been designated as an irreplaceable critical biodiversity area. However, it is to be noted that ground truthing of this area found that the site is transformed, and that the alignment passes along an existing farm road. As such, the approval of this application will not compromise the integrity of the existing environmental management priorities for the area.

The DFFE is responsible for the implementation and overseeing of this legislation along with the South African National Biodiversity Institute (SANBI).

5.2.3 Conservation of Agricultural Resources Act (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA) is an Act of the National Department of Agriculture and makes provision for the conservation of the natural agricultural resources of South Africa through:

- Maintaining the production potential of land;
- Combating and prevention of erosion;
- Preventing the weakening or destruction of water sources;
- Protecting vegetation; and
- Combating weeds and invader plants.

Amended Regulations 15 and 16 of CARA were promulgated on 30 March 2001. These changes were necessitated by the accelerating deterioration of South Africa's natural resources due to invasion by alien invasive plants, as well as a heightening public awareness with regards to environmental matters. With the amendments, the Act now boasts a far more comprehensive list of species that are declared weeds and invader plants and has also divided the species into three categories.

Category 1 species (e.g. Triffid Weed, *Lantana*) are generally the worst offenders. They are declared weeds and many not occur on any land or on any inland water surface throughout South Africa. No person is allowed to sell, advertise, exhibit, transmit, send, deliver for sale, exchange or dispose of any weed. It is also illegal to cause or permit the dispersal of any weed from one place to another.

Category 2 species (such as pine and *eucalyptus*) are also problematic but are commonly grown for commercial purposes or any viable and beneficial function, such as woodlots, fire belts, wind breaks, building material, animal fodder and soil stabilization. These invader plants can only be grown in areas demarcated as sites where such plants may be established, retained and strictly controlled.

The land user also has to ensure that steps are taken to curb the spread of propagating material of the invader plants to land and inland water surfaces outside the demarcated areas. Category 2 species are regarded as weeds outside of these demarcated areas, and landowners are required to take steps to control the species where they occur on their properties.

Category 3 plants (such as Jacarandas) are generally ornamental plants, which may be retained, but no new planting or trade of propagating of these plants is permitted.

If weeds or invader plants occur contrary to the provisions of these regulations, the land user must control them by means of any of the control methods that are appropriate for the species concerned. Any action taken to control weeds of invader plants must be executed with caution and in a manner that will have minimal environmental impact. If a landowner fails to comply with these regulations, a criminal case may then be brought against the landowner, and the National Department may issue a directive setting a date by when the property must be cleared.

The new road route consists of slightly transformed typical Zululand Lowveld vegetation but most of the study area has been severely transformed.

5.2.4 National Water Act, 1998 (Act 36 of 1998) (NWA)

The NWA aims to ensure sustainable use of water through the protection of the quality of water resources for the benefit of all water users. Its principal focus is the rectification and equitable allocation and use of the scarce and disproportionately distributed water resources of South Africa.

Section 21 of NWA defines the types of water uses which require a Water Use Authorisation to be applied for. The Act stipulates that an application for water use authorisation must be submitted if a development takes place within 100 m of the edge of a natural watercourse, or within a 500-m radius of the edge of a natural wetland.

The proposed project does not cross any sensitive areas, including drainage lines or wetland areas, neither does the project trigger water uses as defined in the National Water Act (Section 21 (c) and (i) water uses).

The Department of Water and Sanitation (DWS) is responsible for the implementation and overseeing of this legislation and is also the Responsible Authority for the issuing of authorisations for water use.

5.2.5 National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA)

The NHRA aims to provide for the integrated and interactive management and conservation of the national heritage resources in South Africa so that they may be bequeathed for future generations.

The National Heritage Resources Act (Act No. 25 of 1999) governs the management of heritage resources which are of cultural significance. The KwaZulu-Natal Amafa and Research Institute (KZNARI is the KwaZulu-Natal body responsible for the protection of the province's cultural heritage resources. The NHRA is read in conjunction with the KwaZulu-Natal Amafa and Research Institute Act, 2018.

In terms of Section 38 of the Heritage Resources Act (Act 25, 1999), a Heritage Impact Assessment has to be undertaken for the following developments:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m 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 m² in extent; or
  - Involving three or more existing erven or subdivisions thereof; or

- Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resource authority;

- The re-zoning of a site exceeding 10 000 m² in extent; or
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

5.2.6 National Development Plan – 2030 (NDP)

The National Development Plan aims to eliminate poverty and reduce inequality by 2030. It provides a broad strategic framework to guide key choices and actions. While the achievement of the objectives of the National Development Plan requires progress on a broad front, three priorities stand out:

- Raising employment through faster economic growth;
- Improving the quality of education, skills development and innovation; and
- Building the capability of the state to play a developmental, transformative role.

A critical action within the National Development Plan for 2030 is as follows: "Public infrastructure investment at 10 percent of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes and loans and focused on transport, energy and water."

The proposed realignment seeks to pursue the above mentioned by providing safe, more easily accessible and direct transport infrastructure. In addition, the realignment of the R22 will assist in realising a number of other regional planning initiatives, including the following:

- The first of these is the existing Lubombo Spatial Development Initiative (LSDI) route which was upgraded to asphalt in the 1990's and is prioritised as an SDI of national significance. It has greatly improved access to large parts of the Zululand Region to the north of Hluhluwe. The route extends from Hluhluwe, on the R22, through to Mbazwana to join the only other asphalt road in the region at Pelindaba, before heading northeast through KwaNgwanase to the Mozambique border at Farazel.
- The second of these is the proposed Transnet Swaziland Rail Project (SRL) which aims to divert traffic from road to rail, optimising capacity on the Coal Line, through alternative accommodation of General Freight (GF) traffic, creating a logistics corridor linking the hinterland to the eastern seaboard ports. This entails the doubling and electrification of the railway line and provides a viable connection for rail freight from western Swaziland to markets in South Africa, Mozambique and overseas. The upgrading and proposed expansion of the railway line will have a direct impact on the safety of road users at the present at-grade railway crossing, hence the need for the establishment of the road-over-rail bridge. The authorised road-over-rail bridge has therefore taken into consideration the future expansion of the railway line.
- As part of the last Local Economic Development (LED) planning undertaken in 2009, a Strengths, Weakness, Opportunities and Threats (SWOT) analysis was undertaken for the Big 5 Hlabisa Local economy. This SWOT analysis confirmed that the strategic location of the municipality remains one of its most important strengths. Good connectivity due to the road systems, the airfield and railway line, as well as the existence of a diversified economy was further identified as strengths for the future development of the local economy.

5.3 Provincial Documents

5.3.1 The 2016 Kwazulu-Natal Provincial Growth and Development Strategy (2016)

The Provincial Growth and Development Strategy (2016) clearly set out the Development vision statement to 2035 for KwaZulu-Natal defined as follows:

- "By 2035 KwaZulu-Natal will be a prosperous Province with a healthy, secure and skilled population, living in dignity and harmony, acting as a gateway to Africa and the World."
- "By 2035, the Province of Kwazulu-Natal should have maximized its position as a gateway to South and Southern Africa, as well as its human and natural resources so creating a safe, healthy and sustainable living environment."
- "Abject poverty, inequality, unemployment and current disease burden should be history, basic services must have reached all its' people, domestic and foreign investors are attracted by world class infrastructure and a skilled labour force."
- "The people shall have options on where and how they opt to live, work and play, where the principle of putting people first, living together in dignity and harmony, and where leadership, partnership and prosperity in action has become a normal way of life."

A Growth and Development Strategy must respond to the challenges and opportunities that the Province faces. A sustainability approach governs the development of the KZN strategic framework, namely the inter-related nature of the environmental, human and social development and the economic landscape, supported by the strategic infrastructure and spatial pillars with the governance and policy being the foundation, as depicted in the diagram above.

The inter-related complexities of poverty illustrate that all economic and societal formations rest on factors of human and social capital. Poverty is a leading indicator of lack of resources and lack of access to resources. Poor provision of social services, especially health and education services are debilitating. A growing reliance on welfare programmes is noted. The backlogs in access to water, sanitation, electricity and transport / roads in rural areas is an ongoing cause for concern.

2016 PGDS Strategic Goals and Objectives

1. Inclusive Economic Growth.
2. Human Resource Development.
3. Human and Community Development.
4. Infrastructure Development.
5. Environmental Sustainability.
6. Governance ad Policy.
7. Spatial Equity.

The primary reason for the construction of a dedicated road-over-rail-bridge and approach alignment at the intersection of Route R22 is the elimination of the at-grade railway crossing. The at-grade crossing compromises the safety of road users, whereas the road-over-rail bridge will enhance the safety of all road users in the Hluhluwe area (local and visitor traffic). Benefits to the town include improved safety of pedestrians within town as the bypass removes all through traffic (except those wishing to stop in town).

Other benefits include the reduction of large truck traffic through the town which also reduces noise and vehicle emissions within the town. The development will also improve the safety of all road users at the railway crossing as they will no longer have to cross directly over the railway line but will pass over the railway line on the bridge structure, thus directly removing the threat of a collision with trains.

This development will aim to promote social, economic, and environmental sustainability.

5.3.2 Provincial Spatial Economic Development Strategy

The Provincial Spatial Economic Development Strategy (PSEDS) recognises that social and economic development is never evenly distributed and spatial disparities will always exist due to the spatial

distribution of natural resources, historical imperatives and cultural factors. These spatial disparities have been aggravated by apartheid spatial planning. This has resulted in a disjuncture between where people live and where social and economic opportunities are concentrated. This spatial marginalization from economic opportunities of

the majority of the population needs to be addressed in order to reduce poverty and inequality and ensure shared growth. The sectors of the provincial economy identified as the drivers of growth of the province to address unemployment and poverty are the following sectors:

- Agriculture – including agri-industry.
- Industry including heavy and light industry and manufacturing.
- Tourism including domestic and foreign tourism.
- Service sector including financial, social, transport, retail and government.

The PSEDS builds on the concept of developing a comprehensive network of centres throughout the province which would support the delivery of services. In identifying the hierarchy of places existing service centres are strengthened and new or emerging service centres are developed.

The R22 forms a key link between Northern KwaZulu-Natal in South Africa and southern Mozambique. Both local, cross border and tourism traffic use this route as a main access both to and from the N2 in northern KwaZulu-Natal. The R22 also forms an integral economic and social connector between South Africa and neighbouring countries (Mothilal, A. & Bradley, C., 2015). To this end, the construction of the road-over-rail-bridge falls within a number of other planning initiatives which have been implemented but also proposed, for the greater region.

The proposed realignment seeks to pursue this vision by providing safe, more easily accessible and direct transport infrastructure. In addition, the realignment of the R22 will assist in realising a number of other regional planning initiatives.

5.3.3 Provincial Spatial Development Framework

The spatial vision for KwaZulu-Natal is summarised as follows in the Provincial Spatial Development Framework:

"Optimal and responsible utilisation of human and environmental resources, building on addressing need and maximising opportunities toward greater spatial equity and sustainability in development."

The KZN Provincial Spatial Development Strategy sets out to:

- Be the spatial expression of the Provincial Growth and Development Strategy (PGDS) and provide spatial context for proposed strategic interventions;
- Provides a set of normative principles or departure points that guide the province's approach to dealing with socio-economic issues that are manifested spatially;
- Provide a basis for informed consensus on the province's spatial priorities by providing a map giving guidance for the future spatial development of the province based on Broad Provincial Spatial Planning Categories (BPSPCs) and a series of other relevant features;
- Assist to prioritise and align where government directs its investment and development initiatives to ensure sustainable and maximum impact;
- Capitalise on complementarities and facilitate consistent and focused decision making;
- Guide municipal integrated development plans (IDPs), spatial development frameworks (SDFs) and provincial and municipal framework plans (i.e. sub-SDF spatial plans); with normative principles, approach and content;
- Provide clear intent to the private sector about desired development directions; and,
- Increase predictability in the development environment.

The R22 forms a key link between Northern KwaZulu-Natal in South Africa and southern Mozambique. Both local, cross border and tourism traffic use this route as a main access both to and from the N2 in northern KwaZulu-Natal. The R22 also forms an integral economic and social connector between South Africa and neighbouring countries (Mothilal, A. & Bradley, C., 2015).

The proposed realignment seeks to pursue this vision by providing safe, more easily accessible and direct transport infrastructure. In addition, the construction of the road-over-rail-bridge falls within a number of other planning initiatives which have been implemented but also proposed, for the greater region, including the following:

- The first of these is the existing Lubombo Spatial Development Initiative (LSDI) route which was upgraded to asphalt in the 1990's and is prioritised as an SDI of national significance. It has greatly improved access to large parts of the Zululand Region to the north of Hluhluwe. The route extends from Hluhluwe, on the R22, through to Mbazwana to join the only other asphalt road in the region at Pelindaba, before heading northeast through KwaNgwanase to the Mozambique border at Farazel.
- The second of these is the proposed Transnet Swaziland Rail Project (SRL) which aims to divert traffic from road to rail, optimising capacity on the Coal Line, through alternative accommodation of General Freight (GF) traffic, creating a logistics corridor linking the hinterland to the eastern seaboard ports. This entails the doubling and electrification of the railway line and provides a viable connection for rail freight from western Swaziland to markets in South Africa, Mozambique and overseas. The upgrading and proposed expansion of the railway line will have a direct impact on the safety of road users at the present at-grade railway crossing, hence the need for the establishment of the road-over-rail bridge. The authorised road-over-rail bridge has therefore taken into consideration the future expansion of the railway line.
- As part of the last Local Economic Development (LED) planning undertaken in 2009, a Strengths, Weakness, Opportunities and Threats (SWOT) analysis was undertaken for the Big 5 Hlabisa Local economy. This SWOT analysis confirmed that the strategic location of the municipality remains one of its most important strengths. Good connectivity due to the road systems, the airfield and railway line, as well as the existence of a diversified economy was further identified as strengths for the future development of the local economy.

The primary reason for the construction of a dedicated road-over-rail-bridge and approach alignment at the intersection of Route R22 is the elimination of the at-grade railway crossing. The at-grade crossing compromises the safety of road users, whereas the road-over-rail bridge will enhance the safety of all road users in the Hluhluwe area (local and visitor traffic). Benefits to the town include improved safety of pedestrians within town as the bypass removes all through traffic (except those wishing to stop in town). Other benefits include the reduction of large truck traffic through the town which also reduces noise and vehicle emissions within the town. The development will also improve the safety of all road users at the railway crossing as they will no longer have to cross directly over the railway line but will pass over the railway line on the bridge structure, thus directly removing the threat of a collision with trains.

This development will aim to promote social, economic, and environmental sustainability.

5.4 Local Municipality

5.4.1 Integrated Development Plan (IDP)

The focus of integrated development plan (IDP[3]) is to reduce poverty and social economics issues at the local level. The IDP is a radical plan of municipal government and administration, it gives reality to the model shift in terms of how municipalities should integrate development planning, using community-based goals through the process of integrated development planning, to identify the needs of the community and equalities projects programmers a five-year strategic plan for service.

Big 5 Hlabisa Municipality takes the IDP Phases as an analysis phase, aimed at ensuring that decision will be based on people 's priority needs, problems and accessible resources, profound understanding of the dynamic influencing development in the municipality.

Big 5-Hlabisa Local Municipality is located in the Northern- western part of KwaZulu-Natal Province. It is one of four local municipalities that make up uMkhanyakude District family and is centrally located among all local

[3] Big 5-Hlabisa Local Municipality, IDP 2022/2023-2026/2027, 5th Generation/Hluhluwe

municipalities of uMkhanyakude family. The municipality is a product of a type C amalgamation process between the former Big 5 False Bay and Hlabisa Local Municipality, initiated by the Demarcations Board in terms of the Municipal Structures Act

A large proportion of the land is used for agriculture and game lodge activities and is sparsely settled. The north-eastern parts of the municipality are occupied by fairly densely settled three rural traditional communities (Makhasa, Mnqobokazi and Nibela).

The name of the municipality is reflective of the historical context of the two former municipalities. The Municipality is predominantly rural with only one semi-urban area being Hluhluwe in ward 5. The municipality is demarcated into 13 wards and has twenty-three (25) councillors. Hluhluwe and Hlabisa are the main towns that are centres of employment opportunities, shopping and recreational facilities Easily accessible off the N2 national route, the municipality lies adjacent to the False Bay (western) side of the Isimangaliso Wetland Park (previously known as the Greater St Lucia Wetlands Park).

The major draw card of Hlabisa is the tourism industry centred on the Hluhluwe-Umfolozi Game Reserve, located 280 km north of Durban, and is the oldest proclaimed park in Africa. It consists of 960 km² (96,000 ha) of hilly topography in central Zululand, KwaZulu-Natal, South Africa and is known for its rich wildlife and conservation efforts. The park is the only state-run park in KwaZulu-Natal where all the Big Five Game occurs. Due to conservation efforts, the park now has the largest population of white rhino in the world. The municipality has infrastructure development backlogs and therefore commits itself to reduce backlogs by 2030.

The municipality has a low revenue base and depends on grant funding from the Government. However, the municipality will employ sound revenue strategies to enhance revenue collection. The Big 5-Hlabisa Local Municipality forms part of the uMkhanyakude District, which has been identified as an ISRDP Node by the Presidency. This programme has been put in place, to, inter-alia, assist the Municipality with human, technical and financial capacity to ensure development and alleviate poverty.

The mission of the Big 5 Hlabisa Municipality is as follows:

"A sustainable economy achieved through service delivery and development facilitation for prosperity and improved quality of life."

The Municipal Development Goals as stated in the IDP Review are as follows:

- Institutional Development and Transformation.
- Basic Service Delivery.
- Local Economic Development.
- Basic Service Delivery.
- Financial Viability and Management.
- Good Governance and Public Participation.
- Cross Cutting.

The proposed realignment seeks to pursue this vision by providing safe, more easily accessible and direct transport infrastructure. The proposed realignment of the R22 contributes to a variety of these goals, including sustainable infrastructure, short term job creation and consequent poverty alleviation and improved safety.

5.4.2 Big 5 False Bay Spatial Development Framework

The SDF[2] for the municipality, as a forward planning document, is informed by a number of current trends as well as the municipal strategic focus areas.

The main road linkages in the district are the N2 which is major route which links Hluhluwe with Richards Bay and Pongola and the R22, also known as the Lobamba Spatial Development (LSDI) Initiative, which links Hluhluwe to the Mozambique Border and the R618 linking the south western part of the municipality to the Zululand district. These roads have also been identified as Major Corridors within the uMkhanyakude District.

The strategic focus areas of the municipality that have an impact that can be affected and presented spatially are depicted hereunder:

- To create an enabling environment for effective service delivery.
- To actively pursue social and economic development.
- To maintain a strong environmental focus The SDF for Big 5 Hlabisa is based on land use and natural features (as well as existing community facilities), the transportation network and nodes, i.e. areas of development or investment.

The following type of Tourism routes are identified in the SDF:

- The R22 route is a gateway route for Hluhluwe and a tourism corridor
- Secondly, the route from Hluhluwe in a westerly direction, across the N2, towards the northern entrance of the Hluhluwe Umfolozi Game Reserve is proposed as a tourism route in the SDF. A portion of this route is the entrance into Hluhluwe town from the N2.

6 LISTED ACTIVITIES TRIGGERED BY THE PROPOSED DEVELOPMENT

6.1 National Environmental Management Act 107 Of 1998, EIA Regulations (2014, As Amended)

In terms of the Environmental Impact Assessment (EIA) Regulations (GNR 982), as amended (07 April 2017), promulgated in terms of NEMA, certain Listed Activities are specified for which either a Basic Assessment (GNR 983 and / or GNR 985) or an EIA Process (GNR 984) is required.

The Proposed Construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 Hlabisa Municipality, KwaZulu-Natal triggers listed activities in terms **Listing Notice 2 of GN R 984** and **Listing Notice 3 of GN R 985** of the Environmental Impact Assessment (EIA) Regulations (2014) (as amended),

Table 6-1 provides a summary of the Listed Activities in terms of the EIA Regulations 2014 that are triggered by the proposed development:

Table 6-1: Applicable Listed Activities in terms of the EIA Regulations, as amended

ACTIVITY AND NOTICE NUMBER	LISTED ACTIVITY	DISCUSSION IN TERMS OF APPLICABILITY
Listing Notice 2 of GNR. 984, 2014 (as amended)		
Activity 27 **Listing Notice 2 of GNR. 984, 2014 (as amended)**	The development of a road- **(iii)** with a reserve wider than 30 metres; or	The total width of the road reserve is 60m. Total length of Road: 1.808km **Therefore, this activity will be triggered.**
Listing Notice 3 of GNR. 985, 2014 (as amended)		
Activity 12 **Listing Notice 3 of GNR. 985, 2014 (as amended)**	The clearance of an area of 300 square metres 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. **(d) In KwaZulu-Natal:** iv. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;	The approach alignment for Site Alternative 1 and 2 pass through vegetation types which, according to Rutherford & Mucina are classified as Vulnerable. The vegetation types are the Zululand Lowveld and Western Maputaland Clay Bushveld. These vegetation types have been listed as an endangered ecosystem listed in terms of section 52 of the NEMBA Approximately 121 700 square meters of indigenous vegetation will be cleared. **Therefore, this activity will be triggered.**
Activity 18 **Listing Notice 3 of GNR. 985, 2014 (as amended)**	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre	Part of the existing R22 on the eastern portion will be decommissioned, the remainder will be lengthened to join the western phase of the project which is currently under construction.

ACTIVITY AND NOTICE NUMBER	LISTED ACTIVITY	DISCUSSION IN TERMS OF APPLICABILITY
	(d) In KwaZulu-Natal: **xii.** Outside urban areas: **(aa)** Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve	The total length of the Road to be lengthened is 1.808km (chainage 4500 to chainage 3000). The proposed road-over-rail-bridge and the approach alignment is situated within 10 kilometres and to the west of the Isimangaliso Wetland Park, a World Heritage Site. **Therefore, this activity will be triggered.**
Activity 23 **Listing Notice 3 of GNR. 985, 2014 (as amended)**	The expansion of- (xii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more. **(e) In KwaZulu-Natal:** **x**. Outside urban areas: **(aa)** Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;	The existing Road MR2-8 will be widened by 5,6m to tie into the quarterlink road and road-over-rail bridge. The footprint of the MR2-8 and the new quarterlink has a footprint of more than 10 square metres. The proposed construction is outside an urban area. The proposed road-over-rail-bridge and the approach alignment is situated within 10 kilometres and to the west of the Isimangaliso Wetland Park, a World Heritage Site. **Therefore, this activity will be triggered.**

The above evaluation of the NEMA: EIA Regulations (2014, as amended) reveals that the Proposed Construction of a Dedicated Road-Over-Rail Bridge, Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22 and quarterlink access road in the Hluhluwe Town, Big 5 Hlabisa Municipality, KwaZulu-Natal, triggers Listed Activities from Listing Notices 2 and 3, thus requiring Environmental Authorisation from the DFFE subject to a full Scoping and Environmental Impact Assessment (S&EIA) Process.

6.2 National Water Act (Act No 36 Of 1998)

The National Water Act (Act No. 36 of 1998) (NWA) makes provisions for the protection of surface water and groundwater resources and their sustainable management for the prevention and remediation of the effects of pollution, and for the control of emergency occurrences. The primary purpose of this Act is to ensure that South Africa's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account, amongst other factors:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Facilitating social and economic development;
- Providing for growing demands for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety.

Section 21 of the National Water Act (Act No. 36 of 1998) (NWA) provides the list of water use activities that will require an authorisation or registration in accordance with the Act. **The proposed project does not trigger any water use activities as defined in Section 21 of the NWA.**

The following has also been taken into consideration:

According to a desktop screening, the proposed development site falls within 500m of an NFEPA Wetland. After ground truthing no wetlands or watercourses were observed along the route. **Therefore, the proposed construction will not constitute Water Uses as defined in the National Water Act.**

7 APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE

The objective of the EIA Phase is to review impacts identified in more detail so as to adequately assess the environmental impacts of the project. The EIA Phase therefore includes a thorough review of environmental data relevant to the project site and receiving environment, as well as a detailed review of environmental issues and impacts, including direct, indirect and cumulative impacts. All aspects of the biotic, physical, socio-economic, legislative and planning environments are considered in terms of their applicability to the proposed development, as well as to determine any constraints that these features may impose on the development. Mitigation measures are consequently provided and are based on the impacts identified, legislated requirements and input from the Specialist Studies completed.

7.1 Legislated Process

The methodology for the Scoping and EIA Process is based on the procedures detailed in Appendices 2, 3 and 4 of the EIA Regulations (2014, as amended), promulgated in terms of NEMA, GNR 982.

Timeframes are fixed according to the relevant legislation, to allow for timeous consideration and issuing of decisions in terms of the respective legislation. **Figure 7-1** provides a schematic of the EIA Process in its entirety, including timeframes and the submission process, as well as the relationship between other government departments and the EIA Process.

Based on the legislated timeframes, the Scoping and EIA Process is to take 300 days to complete, from the time that the Environmental Authorisation Application form is submitted to and acknowledged by the DFFE. Should the EAP, for whatever reason, not be able to adhere to these timeframes, the Application will lapse, and the Scoping and EIA Process will have to begin anew.

The Environmental Authorisation Application was lodged with the DFFE on 17 January 2025. The Draft Scoping Report (DSR) was simultaneously circulated to Key Stakeholders and registered I&APs. Following the commenting period, the FSR and PoS was produced and submitted to the DFFE for review and decision making. As the FSR and PoS was accepted on the 14 April 2025, the EIA Phase commenced. This report, the DEIA, will be made available for stakeholder and I&AP review for a period of 30 days, following which the information received will be collated, and the Final EIA will be submitted to the DFFE for review and decision making.

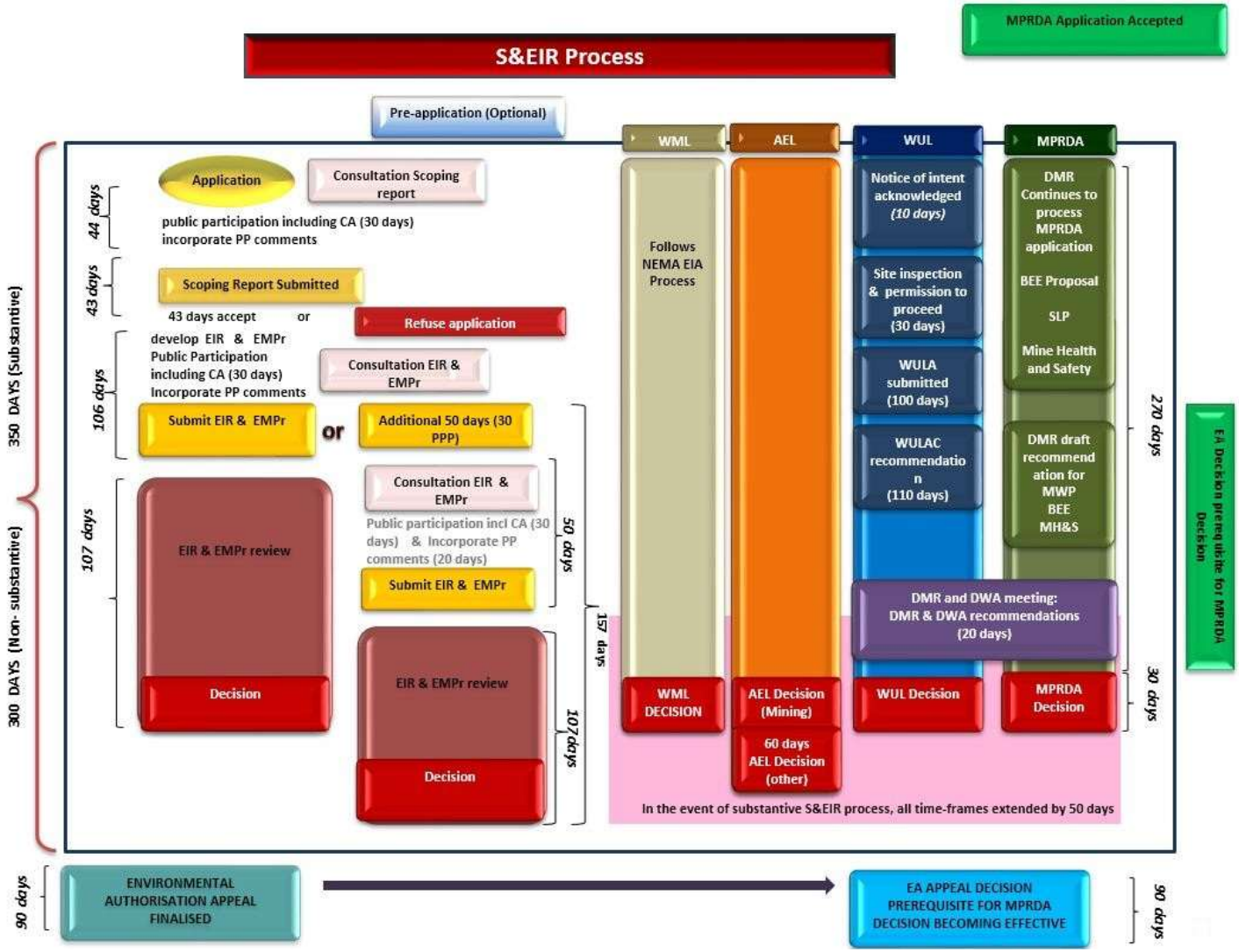


Figure 7-1: The Scoping and EIA Process

7.2 Public Participation Process (PPP)

Chapter 6 of the EIA Regulations (2014, as amended), details the requirements of the PPP and notes that any persons who may be affected by and/or have an interest in a proposed project, are entitled to submit comments on the development proposal. Procedures for informing Stakeholders about a project and engaging their participation requires an inclusive and transparent process of engagement. **Section 8** contains the legislated requirements and the associated methodology adopted for this project.

7.3 Identification of Potential Issues and Impacts

Impact identification, as conducted in the Draft and Final Scoping Reports, is conducted through a systematic process of identifying the baseline environmental conditions, an understanding of the activity being proposed and the potential future impacts as a result of that activity's interaction with the baseline environmental conditions.

Two mechanisms used to identify potential issues and impacts include:

- Stakeholder and I&AP issue trail; and
- Specialist and engineering input.

The issues and impacts identified during the Scoping Phase were used as a guide to determine the preferred alternative and the level of studies that need to be undertaken in the EIA Phase. These impacts have been assessed in greater detail in the DEIA, as well as guiding the Specialist Studies undertaken.

7.4 Submission of the DEIA For Stakeholder And Public Review

As per the EIA Regulations (2014), as amended, the DEIA Report will be circulated to all registered Stakeholders and I&APs for a period of 30 days. Chapter 2: Timeframes, Section 3 (4) of the EIA Regulations (2014) notes:

"*When a State Department is requested to comment in terms of these Regulations, such State Department must submit its comment in writing within 30 days from the date on which it was requested to submit comments and if the State Department fails to submit comments within such 30 days, it will be regarded that such State Department has no comments*."

Therefore, should no comment be received from Stakeholders or IAPs within the 30-day timeframe of a report being circulated, they will not be considered in the EIA Process. This is imperative to note, as any delay in terms of legislated commenting timeframes may ultimately, result in the Application for Environmental Authorisation lapsing.

The DEIA Report will be made available for public comment at the Hluhluwe Public Library. In addition, the document will be made available on the Terratest (Pty) Ltd website (www.terratest.co.za) for download, review and comment.

8 PUBLIC PARTICIPATION (PPP)

The purpose of the PPP for the proposed development site is outlined below:

- Provide Interested and Affected Parties (I&APs) with an opportunity to obtain information with regard to the project.
- Allowing I&APs to express their views, issues and concerns with regard to the proposed project.
- Granting I&APs and opportunity to recommend measures to avoid or decrease negative impacts and enhance positive impacts that are associated with the proposed project.
- Granting I&APs and opportunity to contribute any pertinent, locally known, information; and
- Lastly, to enable the project team to incorporate the needs, concerns and recommendation that are made by the I&APs about the proposed project, where feasible.

The PPP that was followed for the proposed project is governed by NEMA and GNR No. 326 of the 2014 EIA Regulations, as amended in April 2017, and the Public Participation guideline (2017) developed and issued by the Department of Environmental Affairs, Pretoria, South Africa. All public participation material can be referred to in **Appendix C**.

8.1 Adjacent Landowner Consultation

Adjacent landowners were notified via email correspondence about the proposed development. In addition, SANRAL commenced with the relevant notification of landowners through their mandated land acquisition processes. As land acquisition discussions between the applicant and the relevant landowners are deemed a separate process, they have not been included in this EIA process.

8.2 Interested and Affected Parties Register

The compilation of a comprehensive Interested and Affected Party database (I&AP Register) began during the Initial Notification Phase. The latest contact details of the relevant key stakeholders, government departments, NGOs, ward councillors, community leaders and directly affected landowners and businesses will be updated in the register. The register will be updated with the contact details of I&APs that respond to newspaper adverts, circulation of the BID, distribution of notification letters, the erection of site notices and other documentation made available to the public to view at local public venues (libraries, community halls, municipality offices etc.) during the Scoping and EIA phase. Please see the I&AP register attached as **Appendix C2** to this document.

8.3 Key Stakeholders

The following have been identified as key stakeholders of the project (as stipulated by the EIA Regulations):

- Big 5 False Bay Municipality.
- Umkhanyakude District Municipality.
- EDTEA: EIA Umkhanyakude District.
- Department of Water and Sanitation (DWS).
- Department of Co-Operative Governance and Traditional Affairs (CoGTA).
- Eskom.
- KwaZulu-Natal Archaeological Research Institute (KZNARI).
- Ezemvelo KZN Wildlife.
- DFFE: Department of Forestry, Fisheries and the Environment.
- Isimangaliso Wetland Park.
- Transnet SOC (Ltd) Freight Rail.
- Telkom.
- Civil Aviation Authority.
- Project Rhino & Zapwing.

8.4 Background Information Document (BID) and Written Notification

Notifications through Email and SMS accompanied by a copy of the BID were distributed on **25 September 2024** (attached as **Appendix C1**). The purpose of this notification was to allow individuals to register as I&APs and, to facilitate I&AP comments on the proposed Road-Over-Rail-Bridge and approach alignment project. This would allow the EAP to address any potential issues within the Scoping and EIA phases of the project.

8.5 Site Notices

Site notices were erected on **25 September 2024** in the vicinity of the proposed Road-Over-Rail-Bridge and approach alignment development site as part of the Public Participation Process (attached as **Appendix C1**).

8.6 Newspaper Advertisements

An English and isiZulu advert was placed in the Zululand Observer on **30 September 2024** notifying the public of the proposed development (attached as **Appendix C1**).

8.7 Comments and Response Report

A Comments and Responses Report (C&R) was compiled for the Scoping phase of the project. This document will continue to be updated with comments received from key stakeholders, neighbouring landowners, businesses, interested and affected parties, Government Departments, NGOs, ward councillors and community leaders and members of the public as part of the ongoing PPP that will extend into the EIA phase of the project. The C&R Report is attached as **Appendix C3.**

8.8 Circulation of the Draft Scoping Report

The **minimum 30-day commenting period** took place between **17 January 2025 to the 17 February 2025**. An email to I&APs was circulated around the 17 January 2025. This email was to notify I&APs of the application and availability of the report to review. Proof is attached as **Appendix C1.** Hard copies of the draft scoping report and supporting documentation was placed at the following public venues, provided in **Table 8-1** below. The Draft Scoping Report was also placed on the Terratest (Pty) Ltd website for public viewing: www.terratest.co.za.

Table 8-1: Details of Public Venues- Draft Scoping Report

VENUE	ADDRESS	CONTACT DETAILS
Hluhluwe Public Library	89 Zebra Street, Hluhluwe	Tel: 035 838 7200
Big 5 Hlabisa Local Municipality	163 Zebra Street, Library Building, Hluhluwe	Tel: 035 562 0040

8.9 Public Open Day

A public open day was held on **25 March 2025** to address any concerns arising from information contained in the DSR. Proof of consultation is attached as **Appendix C1.**

8.10 Circulation of the Draft Environmental Impact Assessment Report

The Draft Environmental Impact Assessment (DEIA) Report has been compiled based on the findings of the Scoping Report and the Plan of Study (PoS), which recommended a way forward in terms of undertaking the Environmental Impact Assessment in accordance with the requirements listed in GNR 982 of the EIA Regulations (2014, as amended). The PoS is based on the findings of this report, including the receiving environment, the proposed development and any relevant comment received from stakeholders and IAP's.

An email to key stakeholders, directly affected landowners, businesses, interested and affected parties, Government Departments, NGOs, ward councillors and community leaders will be circulated to notify these parties of the application and availability of the report for the minimum 30-day commenting period.

Hard copies of the draft report and supporting documentation will be placed at the following public venue:

Table 8-2: Details of Public Venue- Draft Environmental Impact Assessment Report

VENUE	ADDRESS	CONTACT DETAILS
Hluhluwe Public Library	89 Zebra Street, Hluhluwe	Tel: 035 838 7200

9 DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE

The information presented below, represents a brief demographic profile as per the 2021-2022 mid-year population estimates projected by Statistics South Africa. This section will take into account the information presented when undertaking the impact assessment.

9.1 Umkhanyakude District Municipality

Umkhanyakude district is one among the districts with a young population (between 15-34), this is depicted in the population estimates in **Table 9-1** and **Table 9-2** below. Such a young population is characterized by high dependency ratio, it is possible that the district has high fertility while at the same time its location may also have some impact on the number of children represented in the pyramid, the district is near the border of Mozambique.

Table 9-1: Mid-year population estimates by District, 2021 and 2022.

DETAILS	2021	2022
KwaZulu-Natal	11 533 104	11 653 713
DC27: Umkhanyakude	679 404	684 435
Evidence based planning informed by population age structure indicated above is therefore important in order to meet the needs of each age cohort. STATSSA		

Table 9-2: Umkhanyakude District Municipality – Midyear Population Estimates MYPE 2021 and 2022

MUNICIPALITY	2021 ESTIMATES		2022 ESTIMATES	
	Number	%	Number	%
Umhlabuyalingana	168 763	25	170 118	24.8
Jozini	198 795	29.2	199 633	29.1
Mtubatuba	200 719	29.5	203 216	29.7
Big 5 Hlabisa	111 126	16.3	111 468	16.3
Umkhanyakude	**679 403**	**100**	**684 435**	**100**

Source: STATS SA, midyear population estimates MYPE 2021and 2022

With **Figure 9-1**represented below, it is imperative that planning in this district should prioritize investment in children. Such investment incorporates high quality education, ECDs, healthcare programmes. The imperative of also services that are beneficially to youth cannot be overlooked, Umkhanyakude does not have a high number of youth, the reason could be that they migrate to other districts/provinces or the impact of mortality. Nevertheless, it is imperative that Umkhanyakude district must also cater for the needs of youth in order to retain them, this is an economic active group and their needs encompass; education, economic/employment opportunities, health services including sexual reproductive health and rights services, sports, recreation services.

The following information from Statistics South Africa derives from Community survey (CS) 2016 and the Mid-Year Population Estimates (MYPE) 2022-2023.

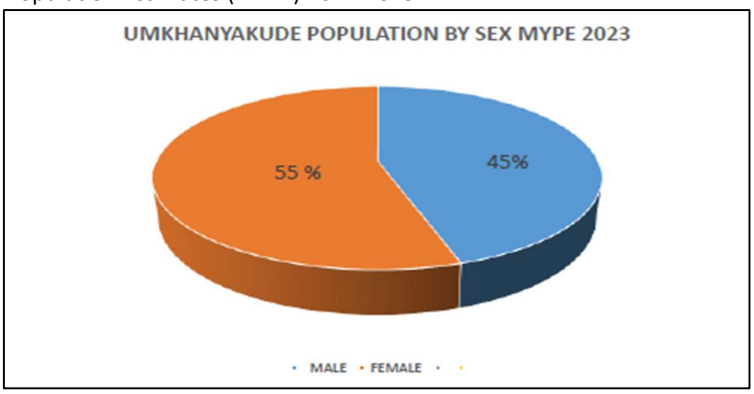


Figure 9-1: Umkhanyakude District Total Population by Gender

9.1.1 Population by Gender

Table 9-3: Umkhanyakude District Municipality – Midyear Population Gender Estimates MYPE 2021 and 2022

Umkhanyakude district Population by Gender		Male	Female	Total
	Number	316 843	387 755	704 598
	Percent	45%	55%	100

***Source: Mid-Year Population Estimates 2023, STATS SA**

Umkhanyakude district is one among the districts with very young population, this is depicted in the pyramid population below:

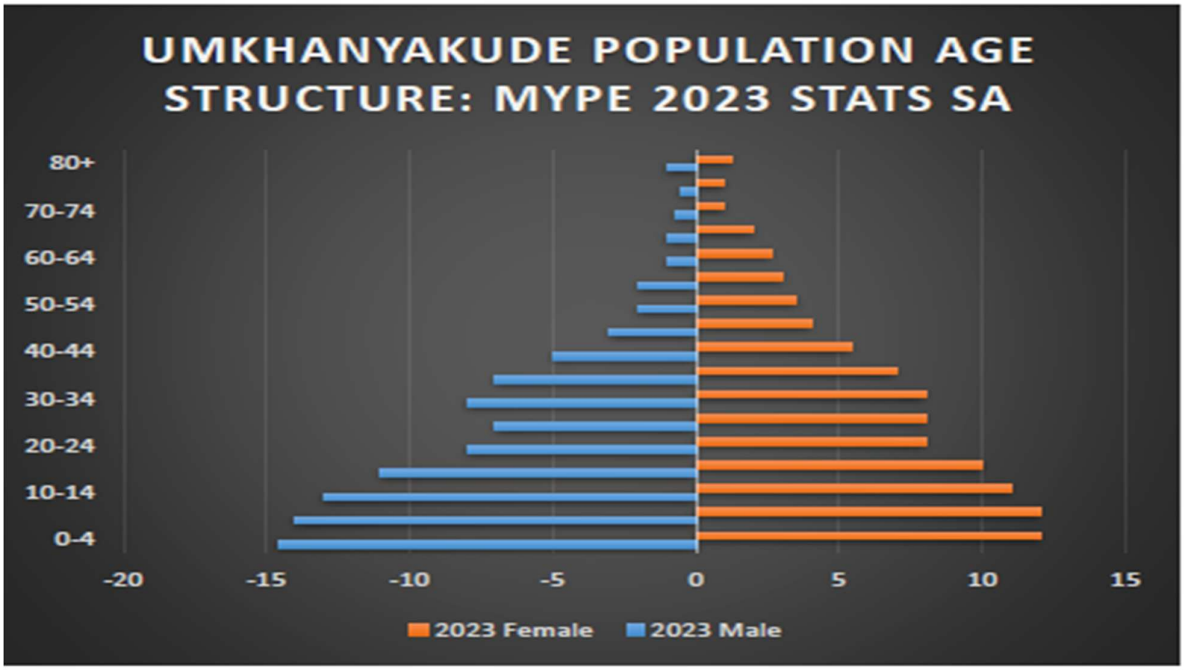


Figure 9-2: Umkhanyakude district Population Age Structure: MYPE 2023 STATS SA.

The young population age structure is characterized by high dependency ratio, it is possible that the district has high fertility while at the same time its location may also have some impact on the number of children represented in the pyramid, the district is near the border of Mozambique, Swaziland. With the picture represented below, it is imperative that planning in this district should prioritize investment in children. Such investment incorporates high quality education, ECDs, healthcare programmes. The imperative of also services that are beneficially to youth

cannot be overlooked, Umkhanyakude does not have a high number of youths, the reason could be that they migrate to other districts/provinces or the impact of mortality.

Nevertheless, it is imperative that Umkhanyakude district must also cater for the needs of youth in order to retain them, this is an economic active group, and their needs encompass; education, economic/employment opportunities, health services including sexual reproductive health and rights services, sports, recreation services. All interventions must consider the importance of gender equality in their implementation. The pyramid also shows the trends of population aging and particularly elderly women, given this, it is important that services/ plans/programmes meet their basic needs, considering that in most cases they look after their grandchildren. The district is predominantly rural and as such, it requires that intensive rural development programmes be also effectively implemented.

The challenge of high dependency existed also during the Community Survey 2016 data observation in Umkhanyakude as depicted in the table below.

Table 9-4: Population Broad Age CS 2016

Location	0–14 (Children	15–34 (Youth)	35–64 (Adults)	65+ (Elderly)	Total	Dependency Ratio
DC27: Umkhanyakude	281 781	260 716	107 736	38 857	689 090	87,0
KZN271 : Umhlabuyalingana	70 050	62 597	29 062	10 368	172 077	87,7
KZN272 : Jozini	82 344	76 241	29 911	9 719	198 215	86,7
KZN275 : Mtubatuba	82 443	77 479	30 748	11 506	202 176	86,8
KZN276 : Big Five Hlabisa	46 945	44 398	18 015	7 264	116 622	86,9

Community survey 2016

As the country and the province of KwaZulu-Natal embracing the phenomenon of Demographic Dividend, a call is for Umkhanyakude through various stakeholder intervention ensure that the status quo depicted in terms of dependency ratio is collectively addressed.

Demographic Dividend will be realised in Umkhanyakude district if mortality and fertility rates decline, the working-age population increases substantially in relation to the non-working-age population, indicating that more people have potential to contribute to growth of the economy for a limited period of time. The demographic dividend refers to the additional increase in growth per capita income arising from the growing number of people in the workforce relative to the number of dependents.

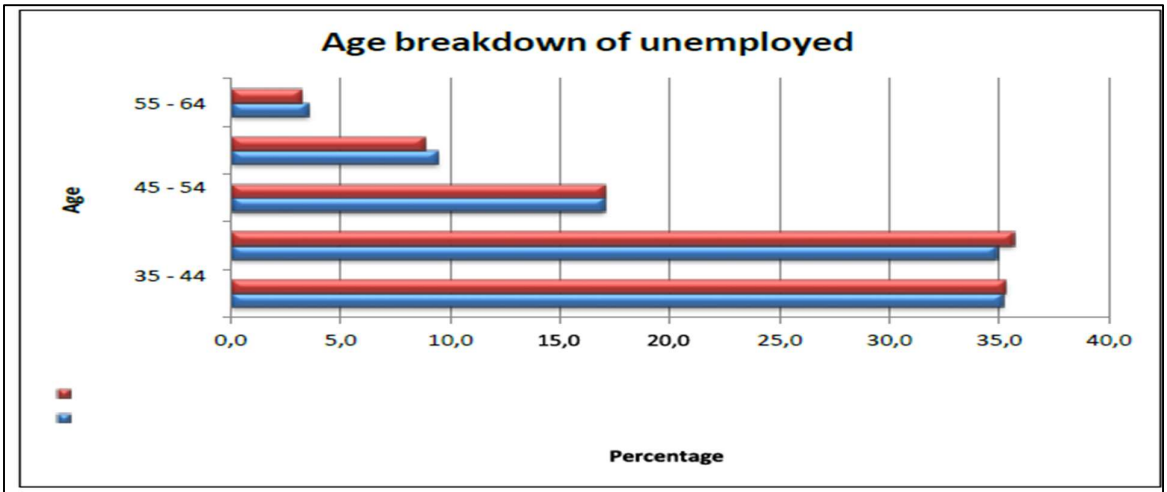
9.1.2 Overview of the District Economy

One of the critical challenges identified in the National Development Plan 2030 is the extremely high occurrence of unemployment amongst the youth of South Africa. The age breakdown of the unemployed population in UKDM is very similar to the overall figures for KZN. As much as 35.2% of the unemployed population is younger than 25 years of age with a further 34.9% between 25 and 34 years. This implies that more than 70% of the unemployed population is younger than 35 years of age.

As illustrated in Figure 9-3, the proportion of unemployed population younger than 25 years of age does not differ significantly between the various district municipalities. The age profile of the unemployed population is also very similar across the five local municipalities, although the percentage of the unemployed younger than 25 years is an extraordinarily high figure of 40% in the Hlabisa LM. The information indicated on the attached thematic map indicates that there are no clear spatial concentrations or clusters of unemployed population younger than 25 years of age at individual settlement level within the district. Individual settlements with more than 50% of the

unemployed population younger than 25 years of age are a widespread occurrence across all five local municipalities in the district.

One of the critical challenges identified in the National Development Plan 2030 is the extremely high occurrence of unemployment amongst the youth of South Africa. The information depicted below reflects on the occurrence and characteristics of this phenomenon within the district. The age breakdown of the unemployed population in UKDM is very similar to the overall figures for KZN. As much as 35.2% of the unemployed population is younger than 25 years of age with a further 34.9% between 25 and 34 years. This implies that more than 70% of the unemployed population is younger than 35 years of age.



	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64
KwaZulu-Natal	35,3	35,7	17,0	8,8	3,2
Umkhanyakude	35,2	34,9	17,0	9,4	3,5
	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64
KwaZulu-Natal	35,3	35,7	17,0	8,8	3,2
Umkhanyakude	35,2	34,9	17,0	9,4	3,5

Data Source: Statistics SA, Census 2011

Figure 9-3: Age Breakdown of Unemployed Population (UKDM vs KZN)

9.1.3 Education levels of economically active population

The relationship between the levels of employment and the education levels of the population older than 20 years of age is reflected in **Figure 9-4** to **Figure 9-5**. Approximately 14% of the unemployed population UKDM has received no formal schooling and a further 17% only primary level education. Significantly, the largest proportion of the unemployed population has completed their Grade 12 education and a further 30% some form of secondary education. A very clear trend is also the fact that only a fraction of the unemployed population has completed any form of tertiary education. The patterns across the five local municipalities are a very similar with the only significant difference the relatively lower levels of unemployed population who received no formal schooling in the Hlabisa and Mtubatuba LMs (9% and 10% respectively). The implications of these figures are that the completion of secondary school education provides very little guarantee of finding any form of formal employment within the district. It also confirms the importance of tertiary education to successfully enter the employment market, even in districts with limited availability of formal sector employment opportunities.

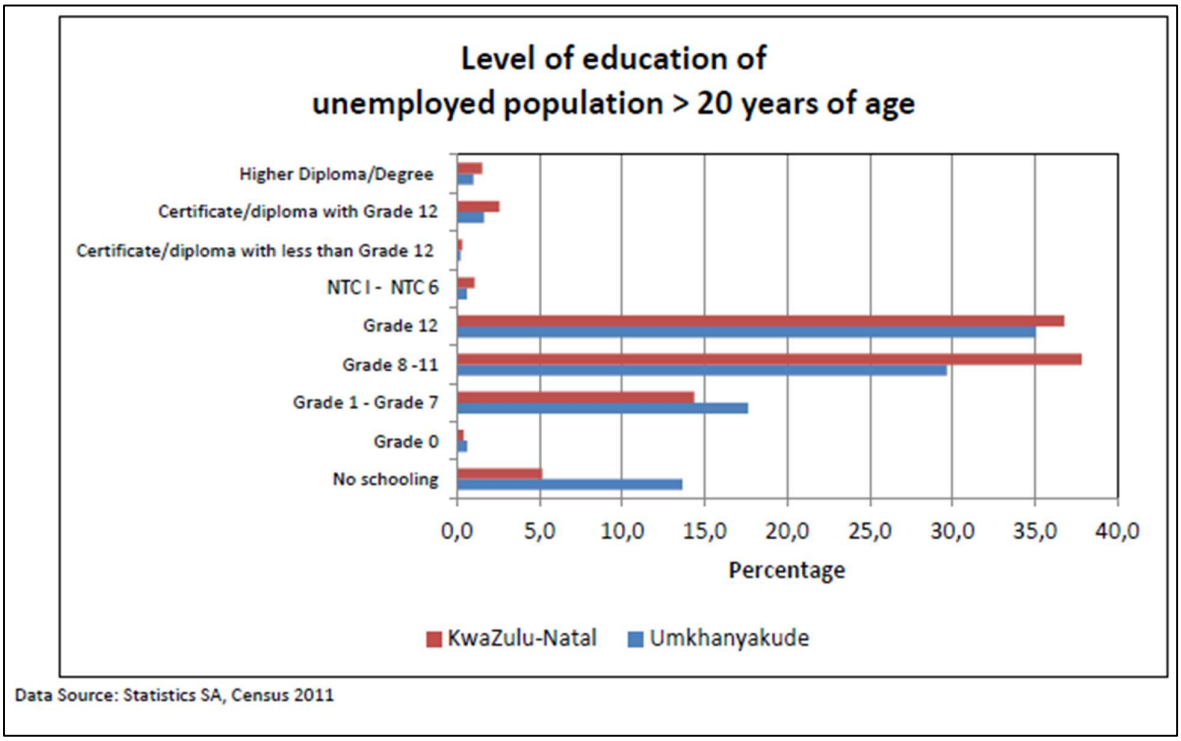
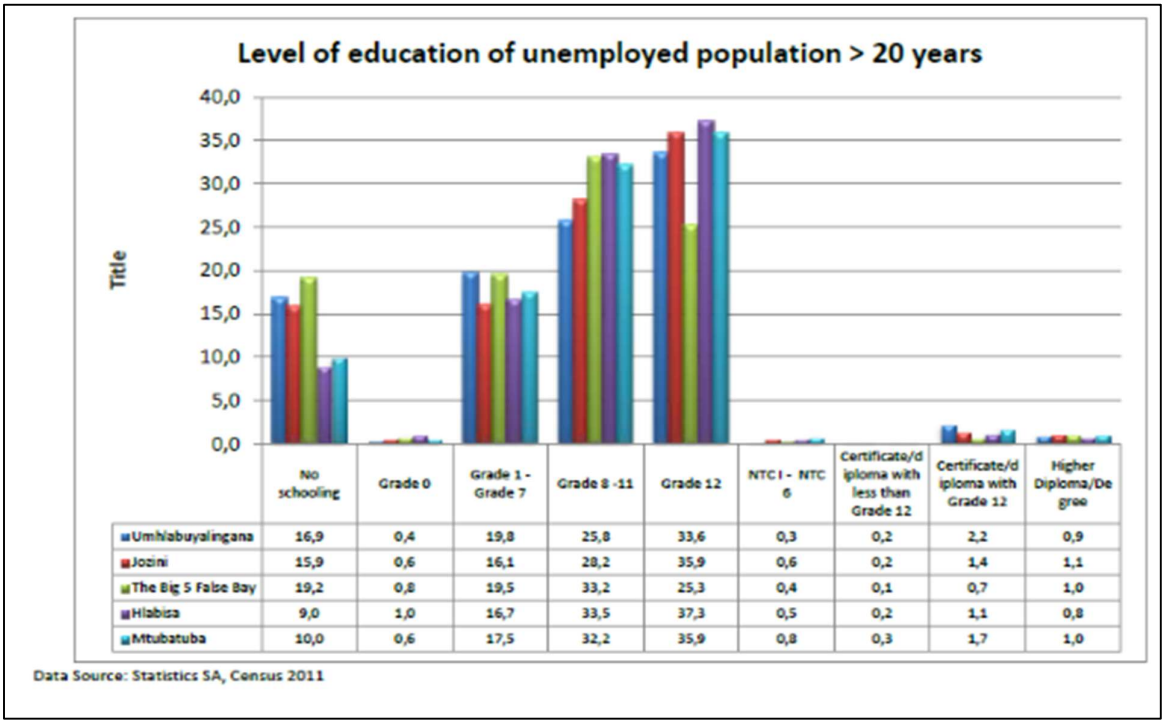


Figure 9-4: Level of education of unemployed population older than 20 years (UKDM vs KZN)



	No schooling	Grade 0	Grade 1 - Grade 7	Grade 8 -11	Grade 12	NTC I - NTC 6	Certificate/diploma with less than Grade 12	Certificate/diploma with Grade 12	Higher Diploma/Degree
Umhlabuyalingana	16,9	0,4	19,8	25,8	33,6	0,3	0,2	2,2	0,9
Jozini	15,9	0,6	16,1	28,2	35,9	0,6	0,2	1,4	1,1
The Big 5 False Bay	19,2	0,8	19,5	33,2	25,3	0,4	0,1	0,7	1,0
Hlabisa	9,0	1,0	16,7	33,5	37,3	0,5	0,2	1,1	0,8
Mtubatuba	10,0	0,6	17,5	32,2	35,9	0,8	0,3	1,7	1,0

Figure 9-5: Level of education of unemployed population older than 20 yrs (LM level)

The project will alleviate unemployment to some degree during the construction, operation and maintenance phases.

9.2 Big 5 Hlabisa Municipality

This section reflects the demographic characteristics of Big 5 Hlabisa Municipality area. This will cover qualitative where possible quantitative summary of demographic variable and social infrastructure of the area. The population figures and projections used are based on Statistics South Africa, Census 1996, 2001 and 2011 and Community Survey 2016 and has been extracted from The Big 5 Hlabisa Municipality Final IDP 2022/2023……2026/2027 (5th Generation).

The following has been noted in The Big 5 Hlabisa Municipality Final IDP 2022/2023….2026/2027 (5th Generation):

The municipality has not commissioned any studies or surveys to assist with the situational analysis (commonly referred to as backlog studies) due to financial and capacity constraints. Embarking upon the analysis process for Big 5-Hlabisa Municipality has required widespread research into the most reliable sources of data to use.

9.2.1 Population

In relation to the population figures at a Provincial level the population for the district family of uMkhanyakude contributes 5.9% and Big 5 Hlabisa contributes 0.3%. Corrections to be made) Big 5 Hlabisa Municipality had a population of 28 857 in 1996, 31484 in 2001 and further increased to 116 622.The percentage growth was 1, 7%. According to census 2011 the population increased from 31 482 in 2001 to 35 258. The percentage growth was 1, 1%. It is therefore evident that the growth rate slightly decreased in the period between 2001- 2011 as compared to 1996 to 2001 and The Big 5 Hlabisa is least populated within the district as depicted in **Table 9-5**.

According to Census 2011 the combined population of 13 wards under the new Big Five Hlabisa Municipality was 107 147.

Table 9-5: Big 5 Hlabisa Population Size

Category	2011 Individuals	2011 Household	2016 Community Survey Population
UMkhanyakude DM	625 846	128 195	689 090
Big 5 False Bay LM	35 258	7 998	39 357
Hlabisa LM	71 925	12586	77 265
Big 5 Hlabisa LM	107 183	20 584	**116 622**

Source Stats SA, Census 2011, Community Survey 2016

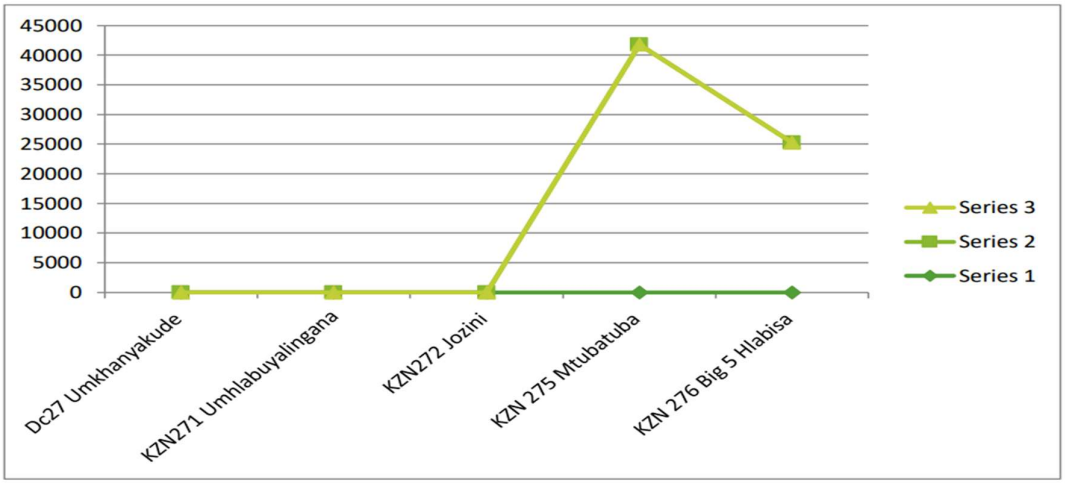


Figure 9-6: Big 5 Hlabisa Population size.

9.2.2 Population Distribution

With regards to the population distribution within Big 5 Hlabisa Municipality majority of the households are found in the informal dwelling as compared to formal and traditional dwelling. The stats are depicted in the tables and figure below.

Table 9-6: Distribution of households by type of main dwelling and municipality 1996, 2001 and 2011, Source: Stats SA census 2011

Municipality	Main dwelling		
	Formal housing	Informal housing	Traditional housing
DC27: UMkhanyakude	106 090	5 028	38 306
KZN271: Umhlabuyalingana	27 731	968	10 896
KZN272: Jozini	29 196	1 681	13 111
KZN275: Mtubatuba	31 439	1 843	7 442
KZN276: Big 5 Hlabisa	17 724	536	6 856

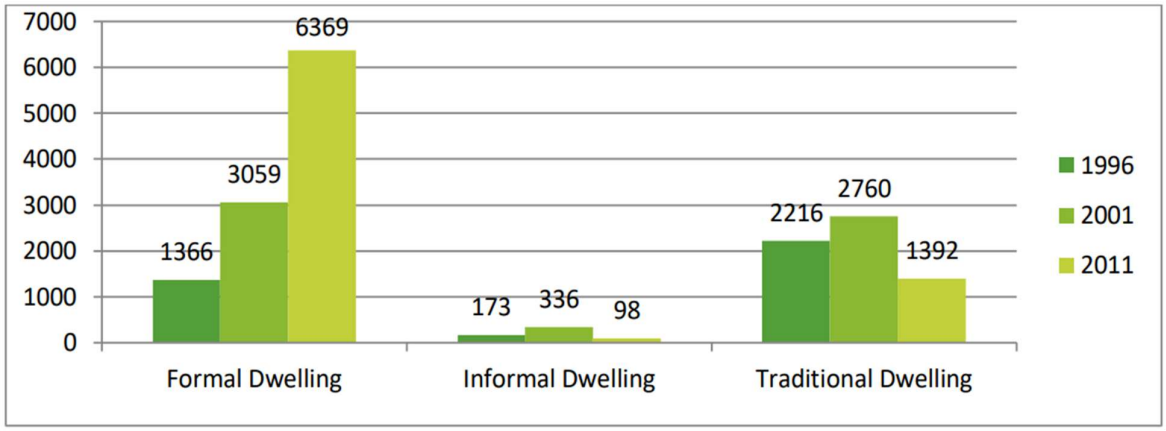


Figure 9-7: Population Distribution by Type of Dwelling, Source Stats SA census 2011.

9.2.3 Population Composition

The dependency ratio within uMkhanyakude family has been increasing rapidly since 1996 and in particular Big 5-hlabisa Municipality. In 1996 the dependency ratio on population aged 65 yrs and older was 1 080 in 1996 and increased to 1 423 in 2001 the figures went up to 1535 in 2011. The increase can be attributed to a number of factors.

The implication on this pattern indicates that people on the ages above 65 are becoming more and more depended on economically active people. Population on the age 14 yrs and younger growth on dependency can be as a result of the increase in birth rate and are dependent on the economically active group.

Table 9-7: Population Composition (Source: Stats SA 2011, 2016)

Municipality	Population age 14 yrs and younger			Population aged 65 yrs and older			Population aged between 15 and 64yrs			Dependency ratio		
	1996	2001	2011	1996	2001	2011	1996	2001	2011	1996	2001	2011
DC27: UMkhanyakude	2254632	249280	251930	22072	26451	28051	247419	297610	345865	100,0	92,6	81,0
KZN271:Umhlabuyalingan	56327	62230	62934	6564	7748	7930	61202	72588	85872	102,8	96,4	82,5
KZN272:Jozini	69393	83238	76949	5915	7397	7330	74789	93571	102223	100,7	96,9	82,4
KZN 275:Mtubatuba	56697	59193	69069	5614	6557	7793	65097	80069	98564	95,7	82,1	78,0
KZN 276: Big 5 Hlabisa	43045	44620	42979	3979	4750	4998	46331	51382	59207	194,1	187,4	157,8

Population Distribution by Race

The table above indicates population groups at Big 5 Hlabisa Municipality, the majority of population group is black followed by whites however majority of whites are in Hluhluwe. The race composition of Big 5-Hlabisa and Municipality the entire Umkhanyakude district region is predominantly black, followed by whites making a small proportion. It is however noted that whites are mostly found in Hluhluwe (ward 05). The rest of other groups are very few. A characteristic well in line with the demographic profile of that part of the country. Blacks make up 95.8% of the population groups followed by whites making up 3.2%, the coloured make up 0.3% and the Asians/Indian make up 0.24%. The population groups are depicted in the table below.

Table 9-8: Distribution of population by group 2001 Source, 2007 Community Survey and Stats SA Census 2011.

MUNICIPALITY	BLACKAFRICAN	COLOURED	INDIAN OR ASIAN	WHITE	OTHER	TOTAL
DC27Umkhanyakude	618130	1153	1390	4189	984	625846
KZN271 UMhlabuyalina	155712	141	192	527	164	156736
KZN272 Jozini	184 962	184	444	533	380	186502
Big 5 Hlabisa	105 308	197	530	1671	251	107 957
Mtubatuba	172148	631	555	1902	189	175425

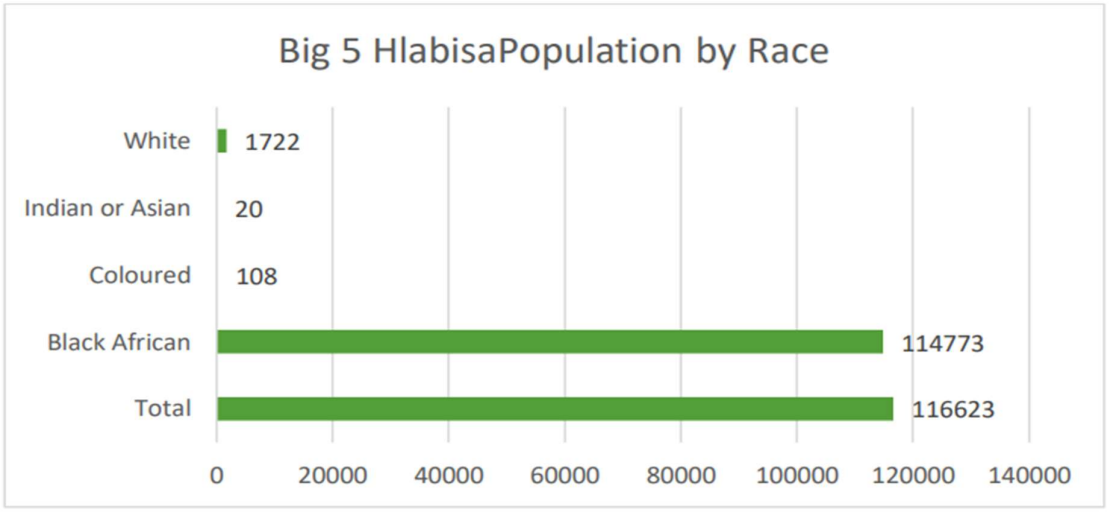


Figure 9-8: Distribution of population by group 2001 Source, 2007 Community Survey and Stats SA Census 2011.

Distribution of Population by Gender

Out of all local municipalities in Umkhanyakude, Big 5 Hlabisa Municipality has the smallest imbalance in gender ratios, i.e. the most evenly matched proportion of males and females. The most significant implication of this is that the migration of male family members to find work away from home might occur less than in other parts of the district.

The gender breakdown of the individual wards of Big 5 Hlabisa shows a stark difference between gender proportions in Ward 3 (urban areas, commercial farms and game lodges) and the traditional areas. Higher proportions of males in Ward 3 could be accounted for by farm workers living on the commercial farms (possibly originally residing in one of the tribal wards). None of the tribal wards (1, 2 and 4) display unusually high proportions of females to males; the distinction is none-the-less pronounced.

Population Pyramid

The figure overleaf indicates the age distribution within Big 5 Hlabisa Municipality are where the ages of 0-4 are the most dominant followed by ages 10- 14 which is still within the formal description of youth.

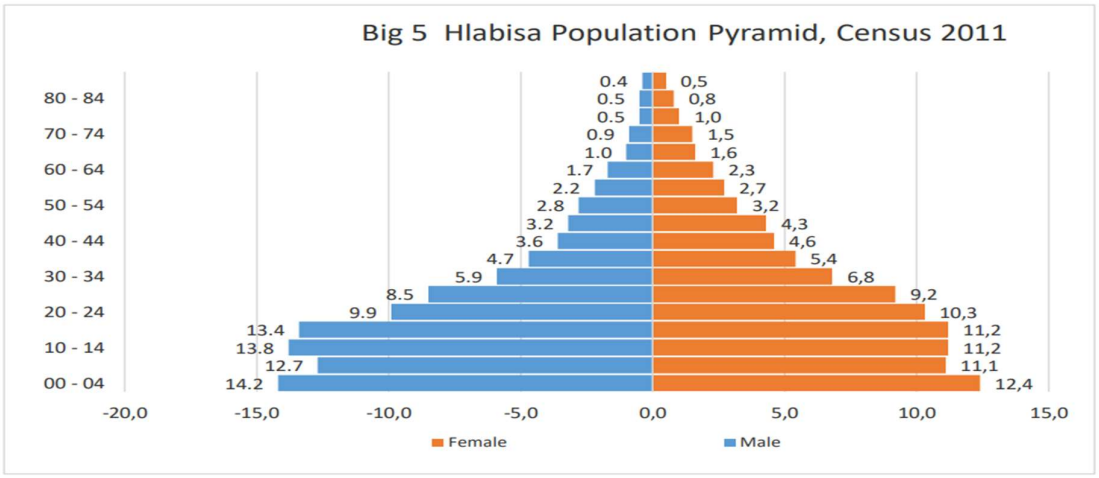


Figure 9-9: Big 5 Hlabisa Population Pyramid, Census 2011

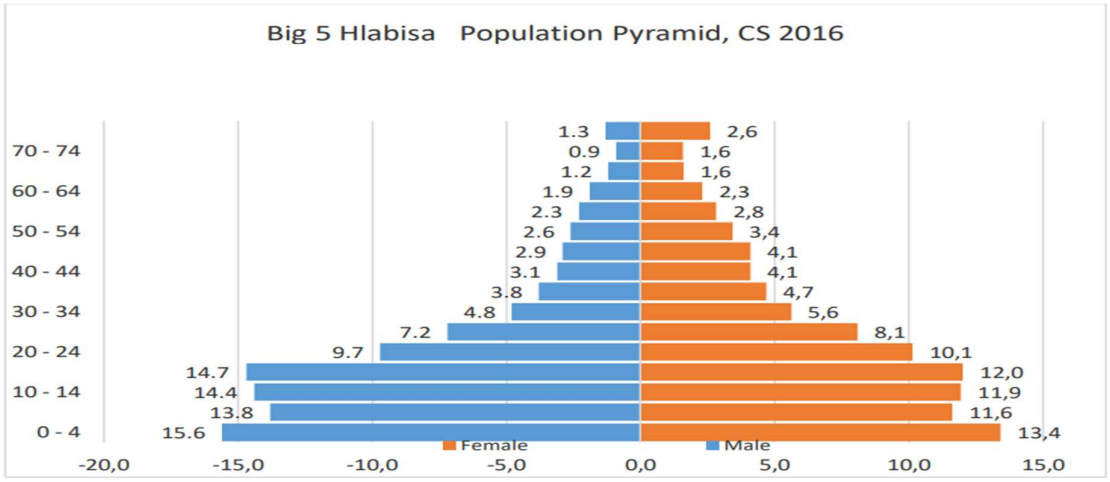


Figure 9-10: Population Pyramid, Distribution of population by Age and Sex, Source: Stats SA Census 2011.

9.2.4 Population by Households

The table overleaf indicates the number of households for Big 5-Hlabisa Municipality in terms of statistics information for 2001 was 6214 and 7998 in 2011. There has been a slight increase, and various factors might have impacted on this pattern. It is noted that Big 5 Hlabisa has the second smallest number of households as compared to other municipalities within uMkhanyakude District. Big 5 Hlabisa total population in 2001 was 16825 in 2011 was 20584 and in 2016 moved to 25255.

Table 9-9: Distribution of population by household's income in Source Stats Census 2001 and 2011.

MUNICIPALITY	2001	2011	2016
DC27: UMkhanyakude	**101563**	**128195**	**151 245**
KZN271: Umhlabuyalingana	26324	33857	39614
KZN272: Jozini	33589	38849	44584
KZN276 The Big 5 Hlabisa	**16825**	**7998**	**25255**
KZ 275 Mtubatuba	24826	34905	41792

9.2.5 Population by Education Level

Majority of the Youth population at Big 5 Hlabisa Municipality. More than 50% (i.e. 34% primary schooling and 24% attending schooling) are school-going kids. This is an indication of youthfulness of the population of Big 5 Hlabisa. Based on the above figure, 16% of the total population has no schooling. A trend similar to other local municipalities within the District indicates decrease in number of student acquiring post grade twelve qualification, which implies that a number of students get lost along the system.

9.2.6 Employment Status

Almost half of the total population is not economically active. A trend consistent to the District indicates that a bulk of those unemployed and not economically active comprises of youth.

Figure 9-11 below indicated employment status district wide.

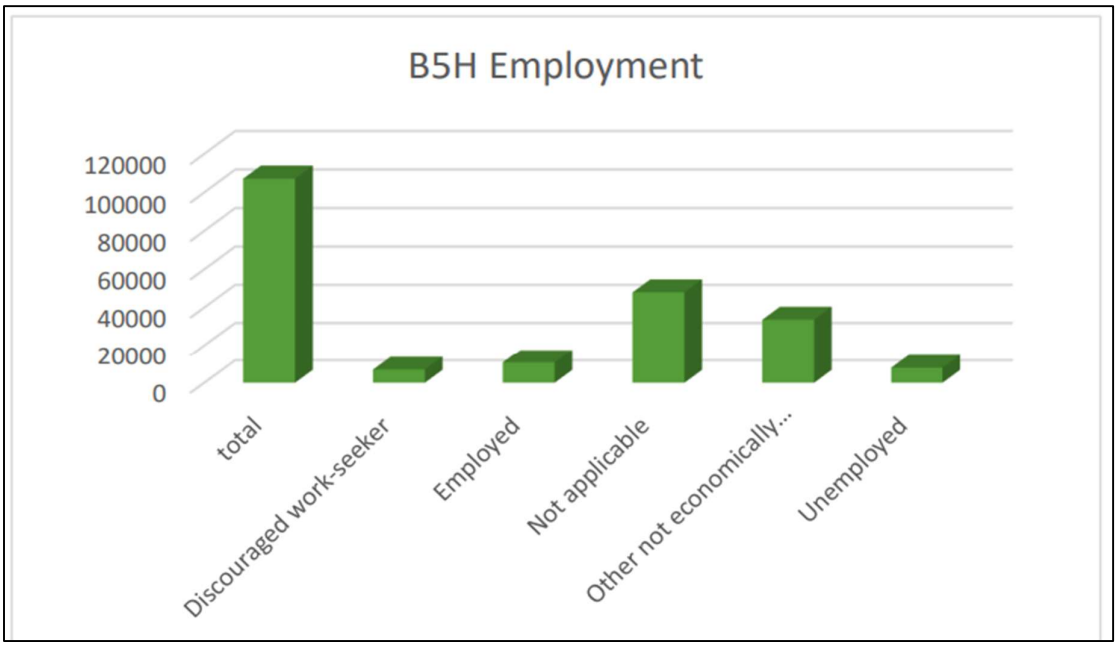


Figure 9-11: Distribution of population by employment status, Source Census 2011.

9.2.7 Household Services

The number of households using electricity in 1996 in KZN was 61, 7 in 2001 and increased to 779 in 2011. At a district level, the uMkhanyakude figures were 29, 4 in 2001 and increased to 38, 4 in 2011 in Big 5 Hlabisa.

Households with Access to Refuse Removal

Majority of the household use their own disposal site for refuse. In 1996 2422 households used their own refuse dump and in 2001, the number increased 3868 and out 7998 in 2011 households 5092 utilize their own refuse. The number of households with access to refuse removal by the municipality has been increasing as follow, in 1996 165 households had access, and in 2001 the number increased to 1062 and further increased to 111972 in 2011. The trend is depicted in the table overleaf.

Table 9-10: Households with access to refuse removal Census 2011

	Removed by local authority/private company at least once a week	Removed by local authority/ private company less often	Communal refuse dump	Own refuse dump	No rubbish disposal	Other	Unspecified	Not Applicable	Total
The Big 5 Hlabisa Municipality	1473	499	196	4896	795	140	-	-	7998
Ward 1	91	12	6	1713	26	11	-	-	1859
Ward 2	99	10	43	1017	221	38	-	-	1428
Ward 5	1234	472	139	939	129	59	-	-	2972
Ward 4	48	5	8	1227	419	32	-	-	1740

9.2.8 Distribution of Households by type of Toilet Facility

The number of households with access to flush or chemical toilet facility in the municipal area are depicted in the table below as 399 in 1996, 1737 in 2001 and 3118 in 2011. In 1996, 348 households have access to pit latrine, the figure increased to 886 in 2001 and further to 3629 in 2011. The census information indicates that in 1996, 15 households were using bucket latrine, in 2001 the number increased to 45 and further to 74 in 2011. Though these figures are reported but the municipality confirms no bucket system in the area.

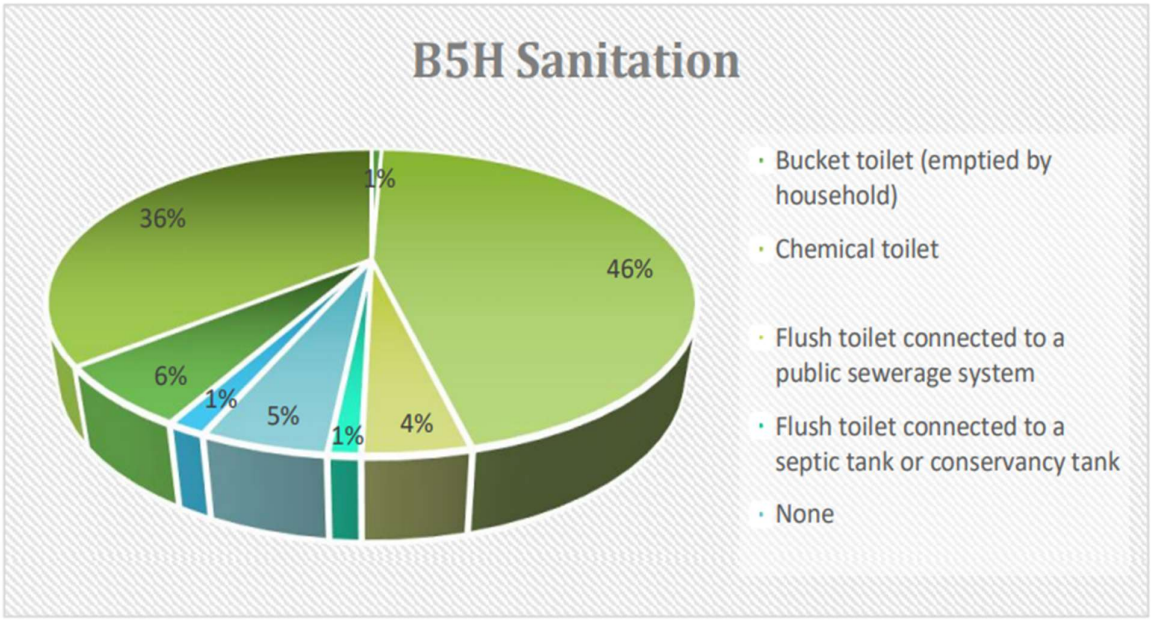


Figure 9-12: Distribution of household by type of toilet facility, Sources: Census 2011, Stats SA

9.2.9 Households with Access to Piped Water

The number of households with access in 1996 was 11996, 2001 and 2011. The table below shows households with access to piped water between the ages of 14 years and from 1996, 2001 and 2011. The number of households with access to piped water inside the dwelling at uMkhanyakude is very low as compared to the rest of the districts and is depicted in the **Table 9-11**.

Table 9-11: Distribution of Households with Access to Piped Water 1996, 2001, 2016 (Stats)

Water Source	Population
Borehole in Yard	880
Borehole Outside Yard	12183
River	41825
Neighbours Tap	2408
Other	546
Piped Water Inside Dwelling House	7094
Piped Water inside Yard	16221
Piped Water on Communal Stand	5306
Public Communal Tap	2268
Rain-Water Tank inside Yard	6928
Spring	2123
Water Carrier/Tanker	18635
Well	203
Total	116 620

10 DESCRIPTION OF THE BASELINE ENVIRONMENT

The receiving environment in which the project is proposed, are discussed in this Section in terms of the biophysical environment.

10.1 Climate

The Köppen-Geiger climate classification for Hluhluwe **(Figure 10-1)**, is Aw. This classification indicates a climate with distinct wet and dry seasons, characterised by warm temperatures and moderate to high rainfall during the summer months. The Hluhluwe area is also situated within the Coastal Summer Rainfall region with an average annual rainfall of between 800mm and 1000mm[4]. The area is characterised by a rainy summer season and experiences intermittent rain in winter. Much of the summer rain falls in thunderstorm events. The area is generally frost-free with a climate that ranges in temperature from a minimum of 7.8°C to a maximum 38.5°C.

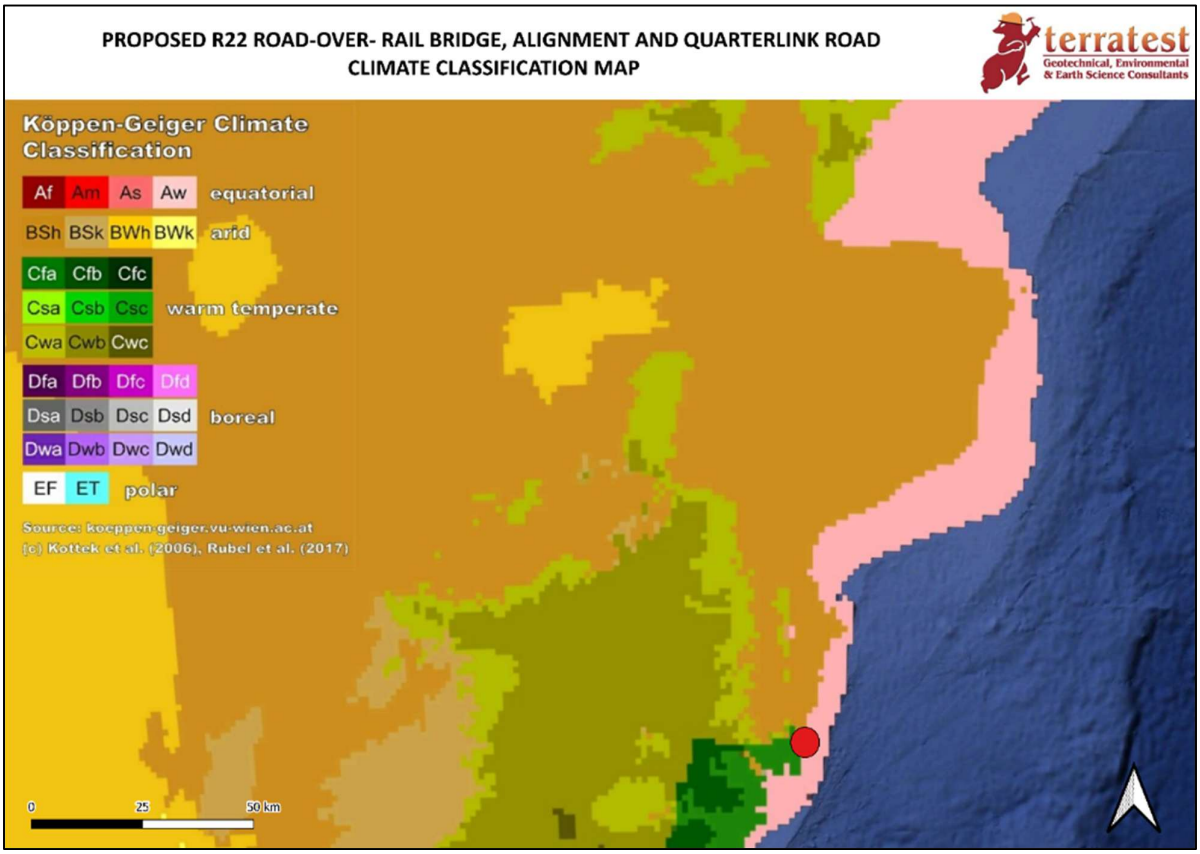


Figure 10-1: Köppen-Geiger climate classification

Climate Change Predictions for the area

A Climate Change Vulnerability Assessment was conducted through the Local Government Climate Change Support Programme (LGCCS), an initiative of the DFFE for the District municipality[2]. A Climate Change Response Strategy has been drafted for uMkhanyakude and is in the process of being adopted. Key vulnerabilities for the district include increased food and water insecurity resulting in human health impacts, increased isolation of rural communities, and increased impact on strategic infrastructure and houses.

[4] https://en.climate-data.org/africa/south-africa/kwazulu-natal/hluhluwe-189596/

Droughts

The District is at a low to medium risk of drought as a result of climate change. The northern area is mostly vulnerable, with a medium to high level of risk. There is a drought relief programme in place throughout the local municipalities to manage current drought impacts.

Flooding

A large area of the District is under wetlands and floodplain. Flooding risks associated with changing rainfall patterns and sea level rise is a concern along the low-lying coastal floodplains and settlements near major Rivers.

10.2 Topography

The proposed realignment route traverses relatively flat topography at an elevation of around 65m above mean sea level, with only one area where there are steeper grades descending into a moderate valley line, located at approximately chainage 1950[1].

10.3 Geology and Soil Conditions

The site is expected to span the geological contact between basalt (west) and Cretaceous age sedimentary bedrock (east). The basalt in this area is known to be deeply weathered and generally very closely jointed (blocky) through its upper weathered zone, while the Cretaceous bedrock is expected to include, in addition to sandstone and siltstone, relatively extensive conglomerate, a rock which comprises hard pebbles and cobbles in a relatively soft, weathered sandy matrix[1].

At the time of this report the centre line materials investigation results were unavailable. During the field investigations the following was observed:

- Phase 1 - Eastern Portion: Predominantly highly consolidated clay horizons approximately 2m deep throughout the bulk of the eastern portion overlaying weathered bed rock. DCP testing suggests underlying stiff material at a depth of approximately 3m. One of the test pits indicated that bed rock may be close to the surface at approximately 400mm depth.

10.4 Current Land Use of the Site

The predominant land use surrounding the existing at-grade railway crossing and R22 intersection is agriculture. In the west, the agricultural activities are centred on pineapple farming[1]. To the north of the municipal boundary, the farming activities consist of mainly game farms and grazing lands with a mango orchard bordering on the existing P2-7 provincial gravel road. To the east, the land use is a combination of grazing lands, game farms and Thanda Game Reserve. To the south-west of the proposed development site is Bonamanzi Game Reserve.

The properties through which the approach alignment/road-over-rail traverses are zoned as agricultural land. It is to be noted that the alignments predominantly fall within disturbed/developed land such as the existing R22 (to the east) as well as an existing farm road (to the west). The zoning of agriculture does not preclude the development of a road infrastructure on the land. In addition, only a small portion of the agriculturally zoned land is going to be bisected by the R22 approach alignment/road-over-rail-bridge and thus cannot be considered a significant loss of land.

Low density residential[1]: The Site Alternative 1 (Preferred Alternative) will pass through Gazebo lodge, which is considered a low-density residential site. If Alternative 1 is Authorised, then it will require the acquisition of the land, and the razing of the house. However, if Alternative 2 is Authorised, then Gazebo lodge will remain as it is. Access will also be required off the realigned portion of the R22 for the Gazebo Lodge property once the redundant portion of the R22 is permanently closed. This access type will be a gated type 1 Farm Access.

Railway line[1]: At present, the R22 passes directly over the railway line at an at-grade crossing. This poses safety concerns to road users, as the crossing is governed purely by a stop-sign and road user's awareness of oncoming trains. The proposed road-over-rail-bridge will replace the existing at-grade crossing via a bridge structure, thus ensuring a free flow of traffic over the railway line, and a safe crossing for all road users. The impact on the railway line during the construction period is proposed to be mitigated through the following: Staging (scaffolding) will be erected alongside and over the railway line, at a height which will not impact on the trains using the railway line. Pre-cast structures will then be erected to provide the body of the bridge structure. It is not anticipated that railway traffic will be impeded or halted at any point of the construction phase.

Airport[1]: The Hluhluwe Airfield is found to the south-west of the proposed site. The engineering layout designs have taken all of the South Africa Civil Aviation Authority Regulations into consideration with regards to line of sight, height restrictions etc. As such it is not anticipated that the proposed development will have any negative impact on the Hluhluwe Airfield.

Agriculture[1]: Agricultural land is scattered around the proposed development site but will not be impacted on by the road over rail bridge.

10.5 Catchment Characteristics

The most significant watercourse in close proximity to Hluhluwe town include the Ngweni River to the north[5] (**Figure 10-2**). The Ngweni River and its tributaries eventually flow into the Mzinene River. The Mzinene River meanders in excess of 15km before it eventually becomes the headwaters for the north-western shores of Lake St Lucia.

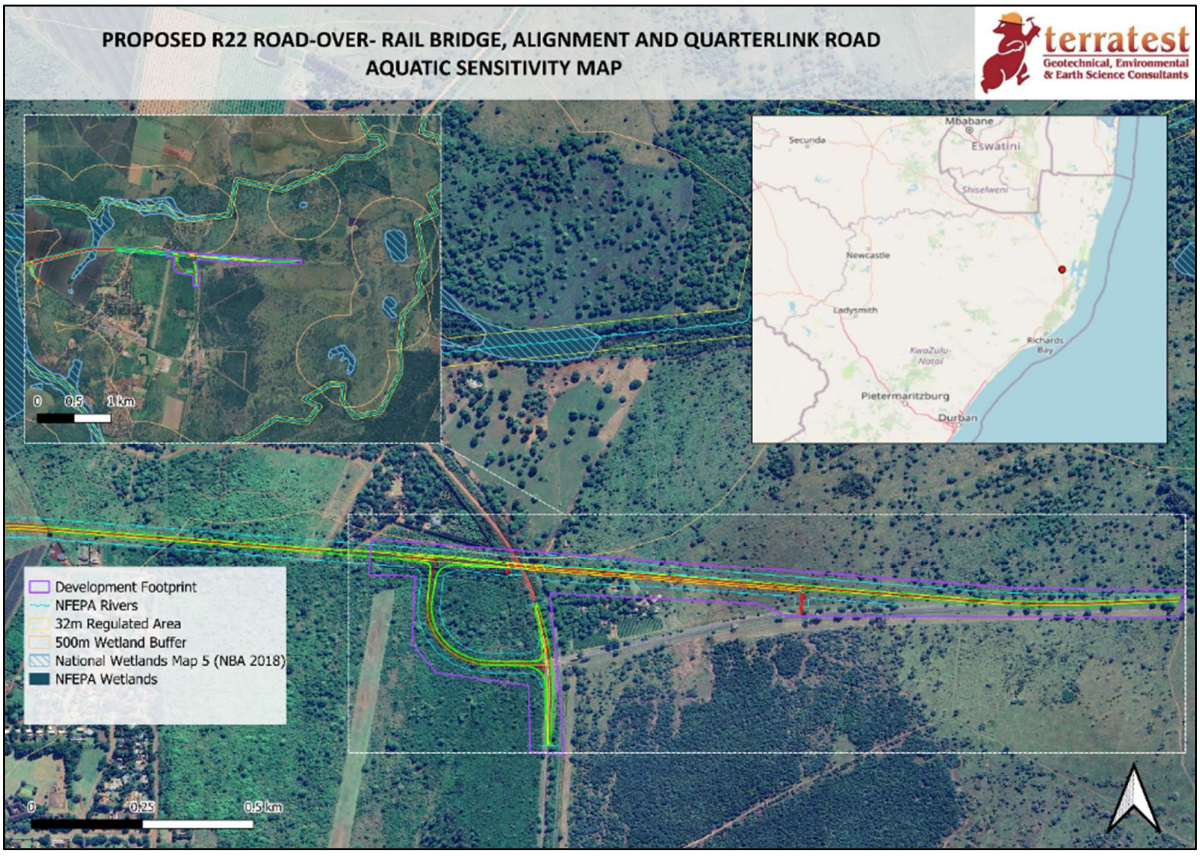


Figure 10-2: The proposed R22 road-over-rail bridge and approach alignment in relation to aquatic sensitivities

The proposed R22 road-over-rail bridge and approach alignment is not found, in, along or within close proximity of does not cross any sensitive areas, including drainage lines or wetland areas [5].

10.6 Vegetation

The original indigenous at the site is classified by the South African National Biodiversity Institute's Database, National Vegetation Types (2018), as being Zululand Lowveld (Type SVI 23). This savanna type is described as bushveld units ranging from dense thickets of *Dichrostachys cinerea* and *Acacia* species, through park-like savanna with flat-topped *A. tortilis* to tree dominated woodland with broadleaved open bushveld with *Sclerocarya birrea* subsp. *caffra* and *A. nigrescens*[5]. Tall grassveld types with sparsely scattered solitary trees and shrubs form a mosaic with the typical savanna thornveld, bushveld and thicket patches.

Grassland consisting of *Eragrostis capensis* (Heart-seed Lovegrass), *Eragrostis curvula* (Weeping Lovegrass) and *Heteropogon contortus* (Spear Grass) is also evident[5].

The eastern portion of the new road route consists of slightly transformed typical Zululand Lowveld vegetation but most of the study area has been severely transformed for the establishment of pineapple plantations (refer to **Figure 10-3** and **Appendix A**).

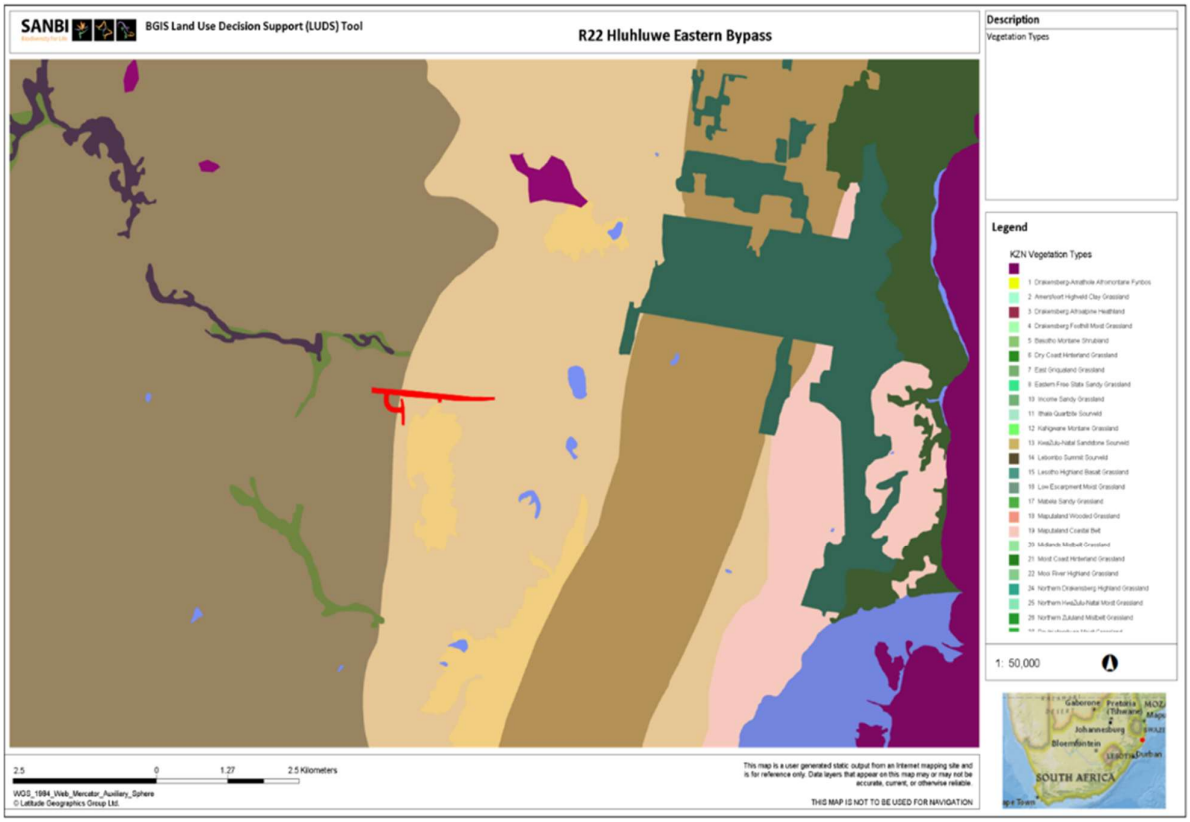


Figure 10-3: Vegetation Map in relation to the dedicated road over rail bridge and approach alignment at the Mbazwana/Sodwana intersection of the Route 22 (R22), Hluhluwe.

10.7 Terrestrial Biodiversity

Vegetation/Flora

The terrestrial biodiversity in the area which will be covered by the eastern portion of the R22 Hluhluwe town bypass is varied in terms of its condition. At the end of the road section to the west of Roads R22 and P2-8 the route passes through an area which is so highly transformed from its natural state the virtually no traces of the local veld type (Zululand Lowveld, Type SVl 23) can be found. The area was used for agricultural purposes in the

[5] Alletson, J., 2024: *Wetland And Terrestrial Biodiversity Assessment Associated With The Realignment Of The Eastern Section Of National Road R22 Around The Town Of Hluhluwe, Kwazulu-Natal*, Terratest (Pty) Ltd.

past and a part of it remains under fruit tree orchards up to the present time. Elsewhere the vegetation which is adjacent to the Hluhluwe Airport consists of a dense scrub dominated by *Dichrostachys cinerea* and *Chromolaena odorata*. A link road from the new R22 section to the junction of the old R22 and the P2-8 passes through this area.

To the east of Roads R22 and P2-8 conditions change considerably. The vegetation type is Western Maputaland Clay Bushveld (SVl 20) and, although had been totally destroyed for agriculture in the past, is now recovering well. The first 250 m passes through the Gazebo Lodge complex, but the road then enters an area of open savanna. The area around the lodge includes gardens with indigenous plants and is shaded by Fever Trees but thereafter the road route is through open vegetation for the final 1.25 km.

Fauna

The birds located within the study area are Passerines and are common species such as Fork-tailed Drongo *Dicrurus adsimilis*, Dark-capped Bulbul *Pycnonotus tricolor,* Paradise Flycatcher *Terpsiphone viridis,* Southern Fiscal *Lanius collaris,* and Kurrichane Thrush *Turdus libonyana*.

10.8 Sensitive Areas: Critical Biodiversity Areas and Ecological Support Areas

As per **Figure 10-4** below, CBA Irreplaceable Areas are located towards the upper north western and eastern area and Ecological Support Areas are located towards the lower south eastern area of the proposed dedicated road over rail bridge and approach alignment at the Mbazwana/Sodwana intersection of the Route 22 (R22), Hluhluwe. The proposed construction therefore will not intersect any environmentally sensitive areas.

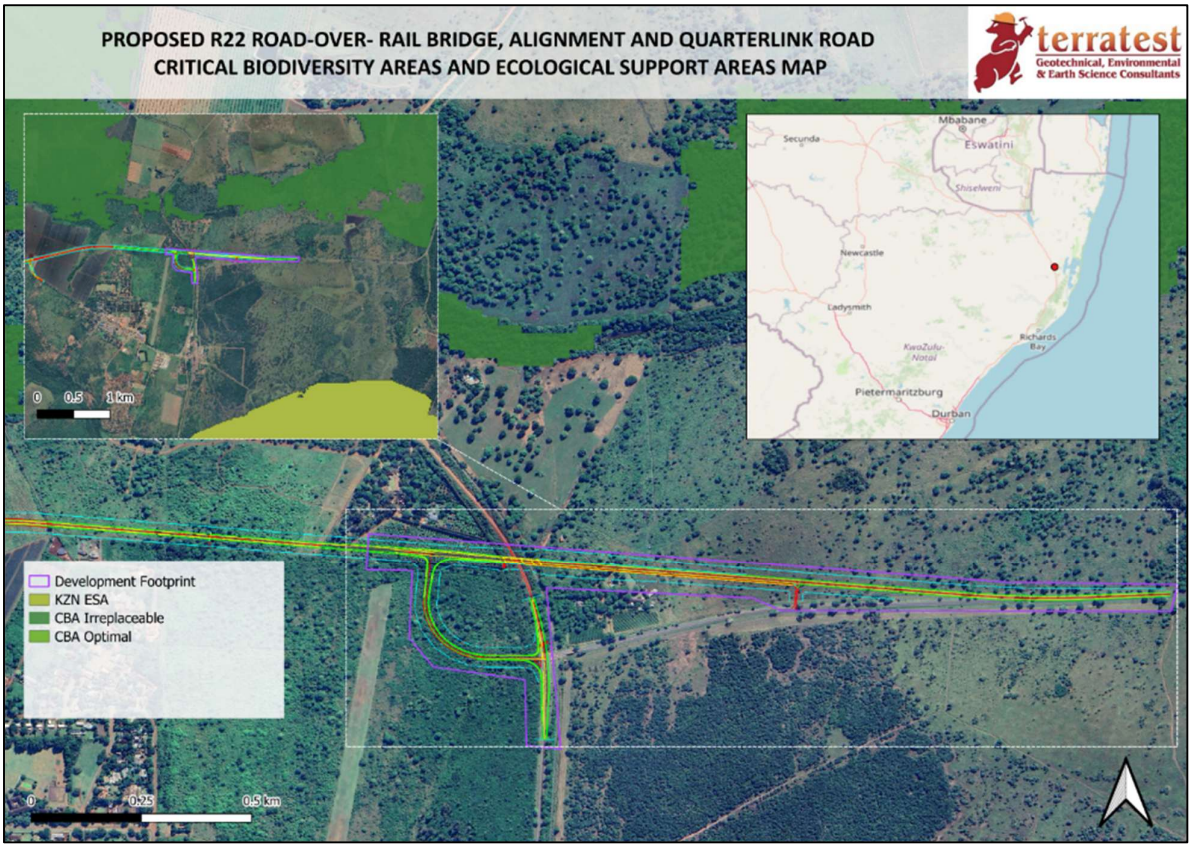


Figure 10-4: Map showing the CBAs and ESAs in relation to the dedicated road over rail bridge and approach alignment at the Mbazwana/Sodwana intersection of the Route 22 (R22), Hluhluwe.

It is to be noted that ground truthing of this area found that the site is transformed, and that the alignment passes along an existing farm road. As such, the approval of this application will not compromise the integrity of the existing environmental management priorities for the area.

11 DFFE SCREENING TOOL AND SPECIALIST STUDIES

11.1 DFFE Screening Tool Report

A Screening Tool Report was generated for the project using the national web-based Environmental Screening Tool, as required by the NEMA: EIA Regulations 2014 (as amended) and is attached as **Appendix G**.

Table 11-1 indicates the level of sensitivity of each of the environmental themes identified within the National Web-based Screening Tool Report.

Table 11-1: Summary of the Screening Tool Report Outcome

SENSITIVITY				
Aspect	**Very High Sensitivity**	**High Sensitivity**	**Medium Sensitivity**	**Low Sensitivity**
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

A **site sensitivity verification report** (SSVR) (**Appendix G**) was compiled as an assessment of the applicability for each of the identified environmental sensitivities highlighted by the screening tool. The findings from the EAP' analyses informed the relevant specialist studies to be undertaken. The following studies were commissioned:

- Wetland, Vegetation and Terrestrial Biodiversity Assessment
- Heritage Impact Assessment
- Palaeontological Impact Assessment
- Agricultural Impact Assessment
- Aviation Impact Assessment

The findings of the specialist studies are presented in **Section 11.2.**

11.2 Specialist Studies Findings

11.2.1 Wetland, Vegetation and Terrestrial Biodiversity Assessment

A Wetland, Vegetation and Terrestrial Biodiversity Assessment was undertaken by Terratest (Pty) Ltd. The assessment was conducted in accordance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA): Environmental Impact Assessment (EIA) Regulations (2014)

Findings

A wetland and terrestrial biodiversity study for the eastern section of the R22 Hluhluwe town bypass found no wetlands will be affected. Two veld types—Zululand Lowveld (SVI 23) and Western Maputaland Clay Bushveld (SVI 21)—are present, with their boundary crossing the proposed road-over-rail bridge site.

The area was heavily transformed for agriculture in the 1960s, abandoned in the 1990s, and has since shown uneven vegetation recovery. Western Maputaland Clay Bushveld has regrown into Acacia tortilis savanna, while

Zululand Lowveld is dominated by invasive species such as Chromolaena odorata and Dichrostachys cinerea, likely due to its use as grazing land and later a game farm.

Recommendations

There are no fatal flaws in the proposed road section, provided all recommended mitigation measures are implemented and monitored. Monthly monitoring by an independent Environmental Control Officer (ECO) is recommended during the implementation phase.

11.2.2 Heritage Impact Assessment

A Heritage Impact Assessment (HIA) and Desktop Palaeontological Impact Assessment (PIA) was undertaken by Umlando: Archaeological Surveys and Heritage Management. The assessment was undertaken in compliance with the requirements of the South African Heritage Resources Agency (SAHRA) requirements. The field survey was incorporated both the authorised Realignment and the proposed road-over-rail alignment The resultant HIA and desktop PIA Report is attached as **Appendix D.**

Findings

The report notes that most of the route footprint passes through existing pineapple fields that have been extensively ploughed over the years. Six finds were noted throughout the site and included a stone tool and, flakes, while a pottery shard was noted on a portion of the site. The pottery shard indicates that there was most probably an Iron Age settlement on the hill in the past. The systematic ploughing of the land would have destroyed any grave markers, especially if they were subsurface. The bulldozed remains of a bricked structure were noted just west of the railway. However, the structure does not appear on the older maps and appears to be recent and therefore is not considered to be of heritage importance.

The locations of the finds are listed in **Table 11-2** and illustrated in **Figure 11-1.**

Table 11-2: GPS co-ordinates of the HIA finds noted during the site visit

FINDS	CO-ORDINATES	
Middle Stone Age (MSA) Flake	-28.010730075	32.259052048
MSA Flake	-28.008388665	32.262295273
MSA Flake	-28.009622306	32.268027951
MSA Flake	-28.010111288	32.274491558
Ruins	-28.009263914	32.274251431
Shard	-28.012686504	32.261018030

Recommendations

The HIA report notes that the finds are not of significance and that no mitigation is required. No permit from Amafa KZN is required. Due to the low significance, these artefacts need not be removed / collected / cordoned off or buffered prior to construction taking place and do not affect the proposed alignment or the construction thereof.

However, a protocol for human remains is required as these artefacts might occur due to the existence of a settlement in the general area. The protocol is as follows:

- The construction company should be made aware that archaeological human graves may occur on this hill, and if any are uncovered, then work in that area needs to cease immediately.
- The identified area needs to be demarcated with a 20m buffer and the ECO, Amafa KZN and the SAPS need to be informed.
- Construction activity may continue elsewhere.

This protocol has been included in the site specific EMPr, attached as **Appendix E**

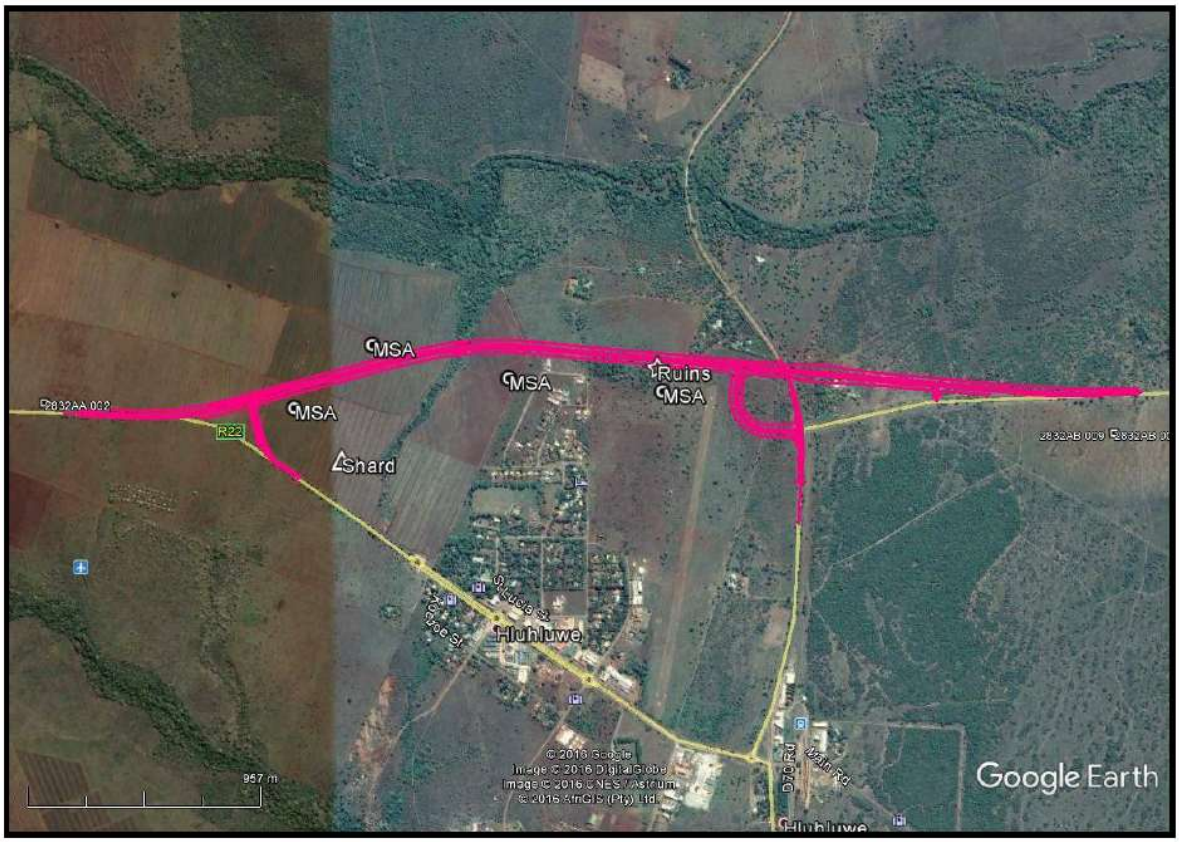


Figure 11-1: Location of the HIA finds noted

11.2.3 Palaeontological Impact Assessment

A Palaeontological Impact Assessment (PIA) was conducted by AS Consulting in accordance with the National Environmental Management Act (Act 107 of 1998) and EIA regulations **(Appendix D).** The assessment aims to identify and manage significant palaeontological resources before development, ensuring protection of South Africa's fragile heritage while allowing responsible development.

Findings

The paleo-sensitivity underlying the proposed R22 upgrade site is illustrated in **Figure 11-2**. This area comprises Cretaceous-aged rocks, which are coded red. The proposed project is underlain by the Cretaceous-aged Zululand Group. The rock is very weathered and forms a flat featureless plain with little outcrop.

Recommendations

Fossils are likely to be present but are unlikely to be found during a pre-excavation palaeontological field trip. It is recommended that a Paleontological Field Visit be undertaken, post road excavation and pre-road cladding. The results of this investigation will dictate any further palaeontological processes required. A pre-excavation field visit is unlikely to yield anything due to weathering and loose sand covering the rock. A "Chance Find Protocol" should be followed if any finds are uncovered when a palaeontologist is not on site. This "Chance Find Protocol" must be incorporated into the EMPr.

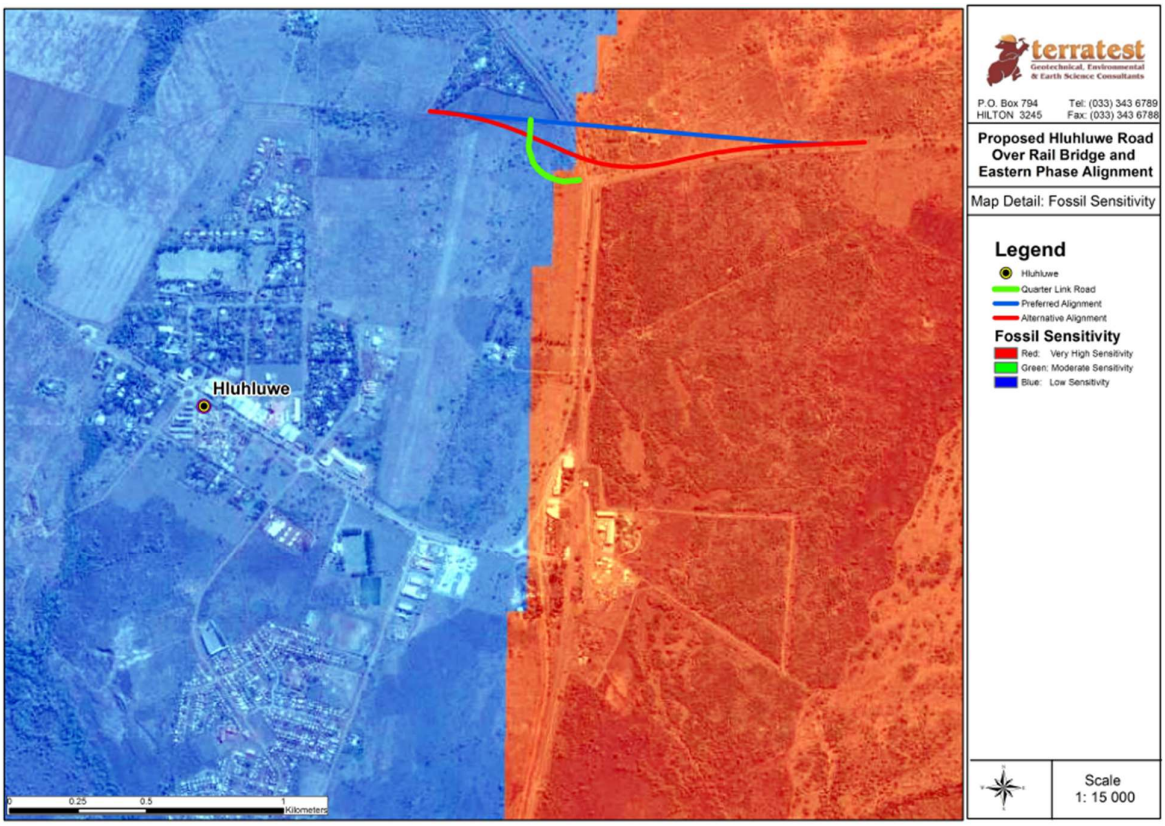


Figure 11-2: Map showing the paleo-sensitivity of the site

11.2.4 Agricultural Impact Assessment

An Agricultural Impact Assessment was conducted by Mzanzi Agriculture. The objective behind this assessment has been to determine whether the soil quality and crop yield potential justify a change of land use from mixed savannah used for game farming to the proposed interchange. The report aims to comply with 'the Protocols' for specialist assessment and minimum report requirements for impacts on agricultural resources.

Findings

The project area consists entirely of Bonheim Soil Form, a high-potential agricultural soil, though its value is underutilized as the land is used solely as a game farm. No evidence of food or industrial crops, domestic livestock, or water sources was found. Vegetation is indigenous Zululand Lowveld bush in pristine condition, with typical tree density variation.

Recommendations

For all practical purposes the bypass site has a low economic output, at the same time rendering an important public service. Furthermore, the change of land use will have no impact whatsoever on the physical properties of the soil, impacting only on what is being currently grown on this soil. It is therefore recommended that the application be approved. This recommendation complies fully with the policy of the Institute for Soil, Climate and Water (ARC-ISCW), the ultimate authority on change of land use.

11.2.5 Aviation Impact Assessment

An Aviation Impact Assessment was conducted by Tsela Obstacle Safeguarding. The evaluation was conducted using the principles of Obstacle Limitation Surfaces (OLS), Flight Procedure Design (FPD) and Communication, Navigation, and Surveillance (CNS). The assessment focussed on the highest points of elevation in the road development (namely the rail over road bridge).

Findings

The full report outlining the detailed methodology, findings and recommendations is attached as **Appendix D5** of this report. **Table 11-3** presents a summary of the key findings against the assessment focus areas.

Table 11-3: Findings from the Aviation Impact Assessment

ASSESSMENT FOCUS AREAS	FINDINGS
Obstacle Limitation Surface (OLS)	All relevant points are underneath the OLS. **Penetrations were detected.** A safety margin is maintained; obstacles are within the buffer zone but do not intrude into the critical airspace.
Flight Procedure Design (FPD)	The Obstacles are outside any pans ops areas. **No penetrations were detected.** A safety margin is maintained; obstacles are within the buffer zone but do not intrude into the protected areas.
Building Restricted Areas (BRA)	All relevant points are outside the BRA. **No penetrations detected.** A safety margin is maintained; obstacles are within the buffer zone but do not intrude into the critical airspace
Airspace	All relevant points are outside the airspace limits. **No penetrations detected.** A safety margin is maintained; obstacles are within the buffer zone but do not intrude into the critical airspace.
Communication, Navigation, and Surveillance (CNS)	**There are no infringements** on CNS Building Restricted Areas. The development **will not interfere with the operational integrity of CNS systems.**
RMAC (Radar Minimum Altitude Chart) and RTCC (Radar Tracking and Control Centre)	The proposed development **does not impact the published Minimum Vectoring Altitudes**. Air traffic control procedures can proceed without modification.

Recommendations

The outcome from the assessment of the OLS determined that while all relevant points were underneath the OLS penetrations were detected. No major action is required other than acquiring confirmation from the landowner of the Hluhluwe Aerodrome I&AP:

- Acknowledging the findings from the Aviation Impact Assessment
- Confirming that there are no objections to the proposed development (a no objections letter was signed together with feedback from the Hluhluwe Aerodrome I&AP. This is included in the end of the specialist report).

Overall, the proposed development aligns with the regulatory requirements and does not threaten the safety or efficiency of aerodrome operations, flight procedures, or CNS systems. Modifications to existing flight procedures or minimum vectoring altitudes are NOT required.

Measures to ensure ongoing safety to be included in the EMPr are:

- The proposed development's proximity to any airport's OLS should be continuously monitored to ensure ongoing compliance with safety standards.

- Regular reviews of CNS facilities and operational procedures should be maintained to pre-emptively address any future concerns.

Important to note:

- The Impact Assessment Report shared by the specialist, does not constitute an approval by the South African Civil Aviation Authority (SACAA).
- A separate application process to the SACAA will be made by the specialist on behalf of the application to obtain the necessary approvals/permits.
- The application process to the SACAA will run parallel to this EA application.
- No construction on the bridge may commence until receipt of the formal approval from SACAA.

12 IMPACT ASSESSMENT AND MITIGATION MEASURES

This section of the Report highlights and evaluates potential impacts that are likely to be associated with the proposed road realignment.

12.1 Assessment Of the Significance Of the Potential Impacts

A Scoping and EIA Application in line with the requirements of the EIA Regulations, (2014, as amended) has been undertaken and the results thereof provided below. The impacts on all elements of the receiving environment have been considered, however, only the significant impacts identified have been rated to determine the Impact Risk. The Impact Assessment was undertaken by using the methodology provided for in **Section 12.2.**

12.2 Impact Assessment Methodology

The EIA Regulations (2014, as amended) prescribe requirements to be adhered to when undertaking Impact Assessments. These are noted in the following sections contained within the EIA Regulations (2014, as amended):

- Government Notice Regulation 982 (as amended), Appendix 1 – Basic Assessment Impact Requirements; and
- Government Notice Regulation 982 (as amended) , Appendix 2 & 3– Environmental Impact Assessment Requirements.

In terms of these Regulations, the following should be considered when undertaking an Impact Assessment:

A description and assessment of the significance of any environmental impact including:

a) Cumulative impacts that may occur as a result of the undertaking of the activity during the project life cycle;
b) Nature of the impact;
c) Extent and duration of the impact;
d) The probability of the impact occurring;
e) The degree to which the impact can be reversed;
f) The degree to which the impact may cause irreplaceable loss of resources; and
g) The degree to which the impact can be mitigated.

A description of the method for assessing the above criteria, as well as the method for determining impact risks, is provided for in **Section 12.3.**

12.3 Determination Of Identified Impact Significance

The overall significance of an impact / effect has been ascertained by attributing numerical ratings to each identified impact. The numerical scores obtained for each identified impact have been multiplied by the probability of the impact occurring before and after mitigation. High values suggest that a predicted impact / effect is more significant, whilst low values suggest that a predicted impact / effect is less significant. The interpretation of the overall significance of impacts is presented in **Table 12-1.**

Table 12-1: Interpretation of the significance scoring of a negative impact / effect.

SCORING VALUE	SIGNIFICANCE
>35	High - **The impact is total / consuming / eliminating** - In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. Mitigation may not be possible / practical. Consider a potential fatal flaw in the project.
25 - 35	High - **The impact is profound** - In the case of adverse impacts, there are few opportunities for mitigation that could offset the impact, or mitigation has a limited effect on the impact. Social, cultural and economic activities of communities are disrupted to such an extent that their operation is severely impeded. Mitigation may not be possible / practical. Consider a potential fatal flaw in the project.
20 – 25	Medium - **The impact is considerable / substantial** - The impact is of great importance. Failure to mitigate with the objective of reducing the impact to acceptable levels could render the entire project option or entire project proposal unacceptable. Mitigation is therefore essential.
7 – 20	Medium - **The impact is material / important to investigate** - The impact is of importance and is therefore considered to have a substantial impact. Mitigation is required to reduce the negative impacts, and such impacts need to be evaluated carefully.
4 – 7	Low - **The impact is marginal / slight / minor** - The impact is of little importance but may require limited mitigation; or it may be rendered acceptable in light of proposed mitigation.
0 – 4	Low - **The impact is unimportant / inconsequential / indiscernible** – no mitigation required, or it may be rendered acceptable in light of proposed mitigation.

The significance rating of each identified impact / effect was further reviewed by the EAP by applying professional judgement.

For the purpose of this assessment, the impact significance for each identified impact was evaluated according to the following key criteria outlined in the sub-sections below.

12.3.1 Nature of impact

The environmental impacts of a project are those resultant changes in environmental parameters, in space and time, compared with what would have happened had the project not been undertaken. It is an appraisal of the type of effect the activity would have on the affected environmental parameter. Its description includes what is being affected and how.

12.3.2 Spatial extent

This addresses the physical and spatial scale of the impact. A series of standard terms and ratings used in this assessment relating to the spatial extent of an impact / effect are outlined in **Table 12-2.**

Table 12-2: Rating scale for the assessment of the spatial extent of a predicted effect / impact

RATING	SPATIAL DESCRIPTOR
7	**International** - The impacted area extends beyond national boundaries.
6	**National** - The impacted area extends beyond provincial boundaries.
5	**Ecosystem** - The impact could affect areas essentially linked to the site in terms of significantly impacting ecosystem functioning.
4	**Regional** - The impact could affect the site including the neighbouring areas, transport routes and surrounding towns etc.
3	**Landscape** - The impact could affect all areas generally visible to the naked eye, as well as those areas essentially linked to the site in terms of ecosystem functioning.
2	**Local** - The impacted area extends slightly further than the actual physical disturbance footprint and could affect the whole, or a measurable portion of adjacent areas.
1	**Site Related** - The impacted area extends only as far as the activity e.g. the footprint; the loss is considered inconsequential in terms of the spatial context of the relevant environmental or social aspect.

12.3.3 Severity / intensity / magnitude

This provides a qualitative assessment of the severity of a predicted impact / effect. A series of standard terms and ratings used in this assessment which relate to the magnitude of an impact / effect are outlined in **Table 12-3.**

Table 12-3: Rating scale for the assessment of the severity / magnitude of a predicted effect / impact[6]

RATING	MAGNITUDE DESCRIPTOR
7	**Total / consuming / eliminating** - Function or process of the affected environment is altered to the extent that it is permanently changed.
6	**Profound / considerable / substantial** - Function or process of the affected environment is altered to the extent where it is permanently modified to a sub-optimal state.
5	**Material / important** - The affected environment is altered, but function and process continue, albeit in a modified way.
4	**Discernible / noticeable** - Function or process of the affected environment is altered to the extent where it is temporarily altered, be it in a positive or negative manner.
3	**Marginal / slight / minor** - The affected environment is altered, but natural function and process continue.
2	**Unimportant / inconsequential / indiscernible** - The impact temporarily alters the affected environment in such a way that the natural processes or functions are negligibly affected.
1	**No effect / not applicable**

12.3.4 Duration

This describes the predicted lifetime / temporal scale of the predicted impact. A series of standard terms and ratings used in this assessment are included in **Table 12-4.**

Table 12-4: Rating scale for the assessment of the temporal scale of a predicted effect / impact.

RATING	TEMPORAL DESCRIPTOR
7	**Long term** – Permanent or more than 15 years post decommissioning. The impact remains beyond decommissioning and cannot be negated.
3	**Medium term** – Lifespan of the project. Reversible between 5 to 15 years post decommissioning.
1	**Short term** – Quickly reversible. Less than the project lifespan. The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the project phases or within 0 -5 years.

[6] **Source:** adapted from Glasson J, Therivel R & Chadwick A. Introduction to Environmental Impact Assessment, 2nd Edition. 1999. pp 258. Spoon Press, United Kingdom.

12.3.5 Irreplaceable loss of resources

Environmental resources cannot always be replaced; once destroyed, some may be lost forever. It may be possible to replace, compensate for or reconstruct a lost resource in some cases, but substitutions are rarely ideal. The loss of a resource may become more serious later, and the assessment must take this into account. A series of standard terms and ratings used in this assessment are included in **Table 12-5**.

Table 12-5: Rating scale for the assessment of loss of resources due to a predicted effect / impact.

RATING	RESOURCE LOSS DESCRIPTOR
7	**Permanent** – The loss of a non-renewable / threatened resource which cannot be renewed / recovered with, or through, natural process in a time span of over 15 years, or by artificial means.
5	**Long term** – The loss of a non-renewable / threatened resource which cannot be renewed / recovered with, or through, natural process in a time span of over 15 years, but can be mitigated by other means.
4	**Loss of an 'at risk' resource** - one that is not deemed critical for biodiversity targets, planning goals, community welfare, agricultural production, or other criteria, but cumulative effects may render such loss as significant.
3	**Medium term** – The resource can be recovered within the lifespan of the project. The resource can be renewed / recovered with mitigation or will be mitigated through natural process in a span between 5 and 15 years.
2	**Loss of an 'expendable' resource** - one that is not deemed critical for biodiversity targets, planning goals, community welfare, agricultural production, or other criteria.
1	**Short-term** – Quickly recoverable. Less than the project lifespan. The resource can be renewed / recovered with mitigation or will be mitigated through natural process in a span shorter than any of the project phases, or in a time span of 0 to 5 years.

12.3.6 Reversibility / potential for rehabilitation

The distinction between reversible and irreversible impacts is a very important one and the irreversible impacts not susceptible to mitigation can constitute significant impacts in an EIA (Glasson et al, 1999). The potential for rehabilitation is the major determinant factor when considering the temporal scale of most predicted impacts. A series of standard terms and ratings used in this assessment are included in **Table 12-6.**

Table 12-6: Rating scale for the assessment of reversibility of a predicted effect / impact.

RATING	REVERSIBILITY DESCRIPTOR
7	**Long term** – The impact / effect will never be returned to its benchmark state.
3	**Medium term** – The impact / effect will be returned to its benchmark state through mitigation or natural processes in a span shorter than the lifetime of the project, or in a time span between 5 and 15 years.
1	**Short term** – The impact / effect will be returned to its benchmark state through mitigation or natural processes in a span shorter than any of the phases of the project, or in a time span of 0 to 5 years.

12.3.7 Probability

The assessment of the probability / likelihood of an impact / effect has been undertaken in accordance with ratings and descriptors provided in **Table 12-7.**

Table 12-7: Rating scale for the assessment of the probability of a predicted effect / impact[6]

RATING	PROBABILITY DESCRIPTOR
1.0	Absolute certainty / will occur
0.9	Near certainty / very high probability
0.7 – 0.8	High probability / to be expected
0.4 - 0.6	Medium probability / strongly anticipated
0.3	Low probability / anticipated
0.2	Possibility
0.0 - 0.1	Remote possibility / unlikely

12.3.8 Mitigation

In terms of the assessment process, the potential to mitigate the negative impacts is determined and rated for each identified impact. The mitigation objective is to create a measurable reduction or to enhance the impacts which are identified (positive). The significance of environmental impacts has therefore been assessed considering any proposed mitigation measures. The significance of the impact "without mitigation" is therefore the prime determinant of the nature and degree of mitigation required.

12.3.9 Impact assessment

A list of potential issues and concerns based on the anticipated aspects, has been generated as per **Table 12-8**, divided into the Construction and Operational Phases. This is based on the initial scoping work conducted with regards to the receiving environment, as well as input from stakeholders and IAP's based on the PPP undertaken to-date. It is thus expected that the issues and concerns raised at this Phase of the EIA Process may increase as the EIA is undertaken.

Table 12-8: Potential construction and operational aspects

CONSTRUCTION PHASE IMPACTS	OPERATIONAL PHASE IMPACTS
Employment opportunities	Alignment with IDP and LSDI
Skills development	Improved efficiency of travel
Fragmentation of land	Change in sense of place
Disturbance to watercourse	Stormwater implications e.g. erosion
Stormwater implications e.g. erosion	Socio-economic impacts: Reduced traffic through Hluhluwe
Construction traffic impacts	Road and pedestrian safety
Construction nuisance from noise, dust	Operational nuisance from noise, vibration
Security issues	Fauna disturbance along the Bonamanzi access gate 2.
Faunal disturbance	Economic impacts: Potential loss of income to business in Hluhluwe town
Floral disturbance / loss	Change to land values

The potential impacts associated with the aspects identified in **Table 12-8** above are addressed in detail in **Table 12-9** (Site Alternatives) and **Table 12-10** (Layout Alternatives) below. The direct, indirect and cumulative impacts associated with the Planning & Design Phase, the Construction Phase and the Operational Phase have been addressed. Mitigation measures have been provided for all the impacts identified and are based on the Specialist Studies, the nature of the receiving environment, IAP input and professional experience. Impact scores have consequently been provided for all the impacts identified, both with and without mitigation.

12.3.9.1 Potential Impacts for: Planning and design, construction and operational phases for the Site Alternatives

Table 12-9: The potential impacts identified, and scores assigned to the planning and design, construction and operational phases fo

Nature of Impact	Impact summary		Without Mitigation						S
			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability						
PLANNING & DE									
Direct Im									
Ecology **Health and safety** **Stakeholder participation** **Cost implications** **Planning implications**	**Site Alternative 1 (Preferred)**	• Disturbance of flora and / or agricultural land may be created through activity on-site, such as the site inspection or surveys; • If not properly designed, with adequate construction planning and safety measures considered, the proposed realignment could pose a health and safety risk to road users, as well as impacting negatively on the surrounding receiving environment; • If not adequately designed, the realignment will not retain the proposed and required design lifetime and structural integrity; • Identification and acknowledgement of concerns raised by landowners, stakeholders and IAP's; • Discussions established with landowners regarding the loss of land etc.	4	3	1	1	1	0.7	
	Site Alternative 2	• Disturbance of flora and / or agricultural land may be created through activity on-site, such as the site inspection or surveys; • If not properly designed, with adequate construction planning and safety measures considered, the proposed realignment could pose a health and safety risk to road users, as well as impacting negatively on the surrounding receiving environment; • If not adequately designed, the realignment will not retain the proposed and required design lifetime and structural integrity; • Identification and acknowledgement of concerns raised by landowners, stakeholders and IAP's; • Discussions established with landowners regarding the loss of land etc.; • Additional design requirements associated with the extended length of realignment; • In terms of the Local Municipality Local Area Planning any road located to the south of the existing R22 and north of the Hluhluwe River will effectively bisect the township developments within Hluhluwe; • A route located here will create a similar situation as is presently experienced with respect to uncontrolled access, vehicular and pedestrian movements that currently exist within Hluhluwe. These factors are undesirable for a National Route; • The development planning for the town of Hluhluwe will be severely curtailed should the realignment of the	4	4	3	4	3	0.8	

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
		R22 pass directly through the primary development node as identified by the Local Area Plan (LAP); • Extending the corridor to the south of the Hluhluwe River increases the length of the realignment substantially and will require the acquisition of substantially more land; • The southern corridor extends through the Bonamanzi Game Reserve and any road here would bisect the reserve and negatively impact on the habitat of the wildlife and operations of the reserve; and • The southern corridor is limited by the Hluhluwe River and several smaller feeder tributaries which would require several structures to accommodate these streams.															
Indirect Impacts																	
Social anxiety	**Site Alternative 1 (Preferred)**	• Social anxiety in respect of concerned I&APs i.e. Movement on-site could create social anxiety in the landowners.	4	4	3	3	1	1	15	• Notification of landowners of the proposed process and progress.	3	3	1	2	1	0.5	5
	Site Alternative 2	• Social anxiety in respect of the loss of land and houses due to the location of the southern corridor.	4	5	3	3	1	1	16	• As the Southern Corridor influences settlement patterns, it is not considered the preferred alignment.	4	4	1	2	1	0.7	8.4
Cumulative impacts																	
Social anxiety	**Site Alternative 1 (Preferred)**	• Social anxiety may arise should the landowners not be adequately notified of the proposed activity; and • Potential disturbance to local fauna and flora in the immediate area.	3	3	3	2	1	0.6	7.2	• Notification of landowners of the proposed process and progress. • Disturbance to potentially sensitive flora and fauna during site assessments must be avoided.	2	2	1	1	1	0.4	2.8
Ecology **Layout**	Site Alternative 2	• If the Southern Corridor were to be authorised it would change the future settlement patterns within Hluhluwe town, as expansion of the town to the south would not be possible; • The existing town layout would be bisected; • Fauna and flora would be directly impacted upon.	4	4	3	3	1	0.8	12	• As the Southern Corridor influences settlement patterns, it is not considered the preferred alignment.	4	3	3	1	1	0.6	7.2
CONSTRUCTION PHASE																	
Direct impacts																	
Pollution	**Site Alternative 1 (Preferred)**	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community and possibly the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment may be polluted due to accidental spillages of petrochemicals from the vehicles and equipment, or bitumen from the constructing the road; • The construction phase will generate some noise pollution which is not considered significant;	3	5	3	3	3	0.8	13.6	• All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum; • A Community Liaison Officer could assist in raising any concerns / complaints noted by the landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource; • Any spills on-site are to be immediately dealt with and if large enough, must be reported to the relevant Authority; • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South	2	3	1	2	1	0.6	5.4

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		• Air pollution related to particulate and dust generation will occur during construction, however, this is not considered to be significant; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.								African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation; • Research and implement alternative energy sources for road lighting where possible.							
	Site Alternative 2	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community, wildlife and the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment, including Bonamanzi Reserve, may be polluted due to accidental spillages of petrochemicals from the vehicles and equipment, or bitumen from the constructing the road; • General / construction waste being dumped / left within Bonamanzi Reserve; • The construction phase will generate noise pollution which will affect wildlife and the aesthetic and nature of the receiving environment in Bonamanzi Reserve; • Air pollution related to particulate and dust generation will occur during construction; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.	4	6	3	4	7	0.9	21.6	• A Liaison Officer could assist in raising any concerns / complaints noted by the reserve / landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource; • Any spills on-site must be reported to the relevant Authority. • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation. • Research and implement alternative energy sources for road lighting where possible.	2	4	1	3	3	0.6	7.8
Stormwater control	**Site Alternative 1 (Preferred)**	• The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion, particularly within agricultural land and erosion adjacent to and within the town of Hluhluwe; • Litter or pollution such as hydrocarbons may wash into the watercourse.	3	4	3	3	3	0.7	11.2	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development.	2	3	1	2	1	0.3	2.7
	Site Alternative 2	• The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion adjacent to and within the town of Hluhluwe as well as Bonamanzi Reserve.	4	5	3	4	3	0.8	15.2	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development.	3	3	1	3	1	0.3	3.3
Erosion	**Site Alternative 1 (Preferred)**	• Physical disturbance of the soil and plant removal may result in soil erosion; • Erosion and potential soil loss from cut and fill activities; • During the construction phase, soils will be cleared for the realignment construction. Potential disturbances include compaction, physical removal and potential pollution by hydrocarbons. Furthermore, if standard	3	4	3	3	3	0.8	12.8	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development; The area surrounding the realignment must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken; • Soil erosion prevention measures must be implemented such as gabions, sandbags etc. whilst energy dissipaters	3	3	1	3	1	0.3	3.3

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		storm water control measures are not implemented during the construction phase, soil erosion and sedimentation may occur, both along the alignment and within the watercourse.								must be constructed at any surface water outflow points. The site should be monitored by the Contractor weekly for any signs of off-site siltation. All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • Various types of drainage structures have been incorporated into the design, all of which are accordance with the SANRAL typical details, amended to suit where required.							
	Site Alternative 2	• Physical disturbance of the soil and plant removal may result in soil erosion; • Erosion and potential soil loss from cut and fill activities; • During the construction phase, soils may be cleared for the realignment construction. Potential disturbances include compaction, physical removal and potential pollution by hydrocarbons. Furthermore, if standard storm water control measures are not implemented during the construction phase, soil erosion and sedimentation may occur.	4	5	3	4	3	0.8	15.2	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development; • The area surrounding the realignment must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken immediately; • Soil erosion prevention measures must be implemented such as gabions, sandbags etc. whilst energy dissipaters must be constructed at any surface water outflow points. The site should be monitored by the Contractor weekly for any signs of off-site siltation. All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • Various types of drainage structures have been incorporated into the design, all of which are accordance with the SANRAL typical details, amended to suit where required.	3	3	1	3	1	0.3	3.3
Vegetation removal	**Site Alternative 1 (Preferred)**	• Clearing of vegetation during the construction phase will increase surface runoff and therefore adequate stormwater measures will need to be implemented; • Clearing of vegetation on agricultural lands could include the clearing of agricultural crops and a consequent loss of productivity and crops possibly destined for export.	4	5	7	4	7	0.8	21.6	• The construction footprint must be limited in its size and be demarcated should any confusion arise as to its extent; • Demarcated vehicle travelling routes must be always adhered to; • Vegetation clearing must be limited to the construction area and care must be taken to avoid the removal of trees if not necessary; • One indigenous tree is to be planted adjacent to the route alignment for every tree that is cut down; • Access to agricultural land must be maintained and the loss of agricultural land must be limited as far as possible.	4	4	3	4	3	0.8	14.4
	Site Alternative 2	• Clearing of vegetation during the construction phase will increase surface runoff and therefore adequate stormwater measures will need to be implemented; and • Clearing of vegetation in Bonamanzi Reserve will result in the loss of relatively untransformed Makatini Clay Thicket and Western Clay Maputaland Bushveld.	4	5	7	4	7	0.8	21.6	• The construction footprint must be limited in its size and be demarcated should any confusion arise as to its extent; • Demarcated vehicle travelling routes must be always adhered to and should preferably not fall within Bonamanzi Reserve;	4	3	3	3	3	0.8	12.8

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										• Vegetation clearing must be limited to the construction area and care must be taken to avoid the removal of trees if not necessary; • One indigenous tree is to be planted adjacent to the route alignment for every tree that is cut down; and • Tree removal permits are to be obtained where required.							
Loss and fragmentation of agricultural land	**Site Alternative 1 (Preferred)**	• The proposed realignment will bisect a portion of agricultural land. The bisection of the land will result in the fragmentation of this land; • The realignment will result in the loss of arable agricultural land; • Clearing of arable lands could include the clearing of agricultural crops and a consequent loss of productivity and crops possibly destined for export.	4	5	7	4	7	0.8	21.6	• Access to the fragmented portion of the land has been considered in the design phase of the realignment. • Agricultural land will be lost through the construction of the realignment. However, as the realignment provides important safety benefits and improves travel time due to a more direct route. Cumulatively, the loss of agricultural land is not considered significant in relation to the benefits provided for the greater region.	4	4	3	4	3	0.8	14.4
	Site Alternative 2	• Whilst portions of the land in the Southern Corridor appeared to be portioned off and may have historically been used for agricultural activities, the lands appear to lie fallow/undeveloped at present. As such it appears that no agricultural land will be lost along the southern corridor.	0	0	0	0	0	0	0	• No mitigation measures are anticipated to be required.	0	0	0	0	0	0	0
Alien vegetation encroachment	**Site Alternative 1 (Preferred)**	• Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a threat to the agricultural potential of the lands near the development.	3	4	3	4	3	0.8	13.6	• Alien plant encroachment must be addressed in the EMPr; • An Alien Vegetation Control Programme, as provided by the Contractor, and submitted to the ECO and Engineer for approval prior to implementation, is to be implemented on site; • Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous indigenous grasses are very effective at covering exposed soil. It is important to note, that the any use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into any drainage lines to avoid any possible eutrophication impacts; • Necessary rehabilitation measures, if required, (e.g. burning, seeding, removing alien plants etc.) should be introduced to ensure species composition reverts to a more natural state (with regards to affected areas). Indigenous vegetation with deep set root systems is advisable to limit further soil loss on site. Alternatively, water dissipating mechanisms such as gabions or reno-mattresses may be implemented on-site to help stabilize the surrounding soil and provide a platform for the growth of vegetation; • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilize the soil and prevent the growth of alien vegetation.	1	3	1	3	1	0.6	5.4

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	Site Alternative 2	• Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a direct threat to the habitat integrity of the Bonamanzi Reserve near the development. • The proliferation of alien vegetation could replace the forage available for herbivores within the reserve.	3	4	3	4	3	0.8	13.6	• An Alien Vegetation Control Programme, as provided by the Contractor, and submitted to the ECO and Engineer for approval prior to implementation, is to be implemented on site; • Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous indigenous grasses are very effective at covering exposed soil. It is important to note, that the any use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into any drainage lines to avoid any possible eutrophication impacts; • Necessary rehabilitation measures, if required, (e.g. burning, seeding, removing alien plants etc.) should be introduced to ensure species composition reverts to a more natural state (with regards to affected areas). Indigenous vegetation with deep set root systems is advisable to limit further soil loss on site. Alternatively, water dissipating mechanisms such as gabions or reno-mattresses may be implemented on-site to help stabilize the surrounding soil and provide a platform for the growth of vegetation; • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilize the soil and prevent the growth of alien vegetation.	1	3	1	3	1	0.6	5.4
Stockpiling	**Site Alternative 1 (Preferred)**	• Incorrect stockpiling may cause the mobilisation of sediments and the contamination surrounding watercourses; • Stockpiles may obscure drivers' line of site; • Incorrect stockpiling could result in the contamination of topsoil.	2	4	3	3	1	0.7	9.1	• Should temporary stockpiling become necessary, the areas for the stockpiling of excavated / imported material shall be indicated and demarcated on the site plan submitted in writing to the ECO for approval, together with the Contractor's proposed measures for prevention, containment and rehabilitation against environmental damage. • Areas affected by stockpiling shall be reinstated to the satisfaction of the ECO; • The Contractor shall remove topsoil from all areas where topsoil will be impacted on by construction activities, including temporary activities such as storage and stockpiling areas, and detours; • Topsoil stockpiles shall be convex and no more than 2m high. Stockpiles shall be shaped so that no surface water ponding takes place; • Topsoil stockpiles shall be protected from erosion by wind and rain by providing suitable stormwater and cut-off drains (approved by the ECO) and/or the establishment of temporary indigenous vegetation.	1	3	3	2	1	0.4	4
	Site Alternative 2	• Incorrect stockpiling may cause the mobilisation of sediments and the contamination of watercourses; • Stockpiles may obscure drivers' line of site;	2	4	3	3	1	0.7	9.1	• Should temporary stockpiling become necessary, the areas for the stockpiling of excavated / imported material shall be indicated and demarcated on the site plan submitted in writing to the ECO for approval,	1	3	3	2	1	0.4	4

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		• Incorrect stockpiling could result in the contamination of topsoil.								together with the Contractor's proposed measures for prevention, containment and rehabilitation against environmental damage. • Areas affected by stockpiling shall be reinstated to the satisfaction of the ECO; • The Contractor shall remove topsoil from all areas where topsoil will be impacted on by construction activities, including temporary activities such as storage and stockpiling areas, and detours; • Topsoil stockpiles shall be convex and no more than 2m high. Stockpiles shall be shaped so that no surface water ponding takes place; • Topsoil stockpiles shall be protected from erosion by wind and rain by providing suitable stormwater and cut-off drains (approved by the ECO) and/or the establishment of temporary indigenous vegetation.							
Waste generation	**Site Alternative 1 (Preferred)**	• Waste could be generated through the following: – Chemical waste - petrochemicals, resins and paints; – Sewage as may be generated by on site employees; – Construction waste – construction materials, bags, aggregates etc. – General waste. • Impacts to the receiving environment include contamination of the watercourse, contamination of soil, wind-blown litter etc.	4	5	3	3	3	0.6	10.8	• Site personnel (i.e. construction staff) must undergo Environmental Training and be educated on keeping any vegetation disturbance to a minimum and on the separation and correct disposal of different types of waste; • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported; • All solid wastes should be disposed of at a registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers should be supplied to control solid waste on-site; • The construction site should be inspected for litter daily. Extra care should be taken on windy days. Precautions should be taken to avoid litter from entering any watercourses; • Methods for reducing and managing waste e.g. recycling, reuse of materials, should be considered; • Soil that is contaminated with, e.g. cement, petrochemicals or paint, should be disposed of at a registered waste disposal site and is NOT to be deposited into any watercourses or buried on site; • Drip trays and spill kits are to be made readily available for use should any construction machinery develop a leak; • Chemical waste should be stored in appropriate containers and disposed of at a licensed disposal facility • Any leftover material must be appropriately disposed of (i.e. recycled or issued to the local community for the use);	3	4	1	2	1	0.4	4.4
	Site Alternative 2	• Waste could be generated through the following: – Chemical waste - petrochemicals, resins and paints;	4	5	3	3	3	0.6	10.8	• Site personnel (i.e. construction staff) must undergo Environmental Training and be educated on keeping any	3	4	1	2	1	0.4	4.4

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		– Sewage as may be generated by on site employees; – Construction waste – construction materials, bags, aggregates etc. – General waste. • Impacts to the receiving environment include contamination of the watercourse, contamination of soil, wind-blown litter etc.								vegetation disturbance to a minimum and on the separation and correct disposal of different types of waste; • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported; • All solid wastes should be disposed of at a registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers should be supplied to control solid waste on-site; • The construction site should be inspected for litter daily. Extra care should be taken on windy days. Precautions should be taken to avoid litter from entering any watercourses; • Methods for reducing and managing waste e.g. recycling, reuse of materials, should be considered; • Soil that is contaminated with, e.g. cement, petrochemicals or paint, should be disposed of at a registered waste disposal site and is NOT to be deposited into any watercourses or buried on site; • Drip trays and spill kits are to be made readily available for use should any construction machinery develop a leak; • Chemical waste should be stored in appropriate containers and disposed of at a licensed disposal facility • Any leftover material must be appropriately disposed of (i.e. recycled or issued to the local community for the use); • No storage of waste is to take place with the Reserve.							
Contamination of surface and groundwater	**Site Alternative 1 (Preferred)**	• Hazardous (diesel, oils, cement) waste will be generated during the construction phase and if spilled can cause contamination of the surrounding environment, including the watercourse; • Waste generated during the construction phase may enter the environment through surface water runoff.	5	6	7	5	7	0.5	15	• All hazardous contaminants are to be stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination); • Any contaminated water associated with construction activities must be contained in separate areas or receptacles such as Jo-Jo tanks or water-proof drums, and must not be allowed to enter natural drainage systems; • Any spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation) and must be remediated as per the EMPr; • Ensure all contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded adequately (i.e. 110% of total capacity contained within the bund) to prevent the bio-physical contamination of the environment;	3	4	3	3	1	0.3	4.2

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										• Routine checks must be done on all machinery on site, and these must be kept in good working order. No washing of machinery or vehicles may take place on site and container washing must take place in a designated, bunded washing areas.							
	Site Alternative 2	• Hazardous (diesel, oils, cement) waste will be generated during the construction phase and if spilled can cause contamination of the surrounding environment; and • Waste generated during the construction phase may enter the environment through surface water runoff.	5	6	7	5	7	0.5	15	• All hazardous contaminants are to be stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination); • Any contaminated water associated with construction activities must be contained in separate areas or receptacles such as Jo-Jo tanks or water-proof drums, and must not be allowed to enter natural drainage systems; • Any spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation) and must be remediated as per the EMPr; • Ensure all contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded adequately (i.e. 110% of total capacity contained within the bund) to prevent the bio-physical contamination of the environment; • Routine checks must be done on all machinery on site, and these must be kept in good working order. No washing of machinery or vehicles may take place on site and container washing must take place in a designated, bunded washing areas. • All efforts are to be made to ensure that contamination of surface and / or groundwater does not take place.	3	4	3	3	1	0.3	4.2
Health and Safety	**Site Alternative 1 (Preferred)**	• Incorrect road traffic control measures may result in serious injury to road users, as well as to employees working on the construction of the realignment; • Slow-moving construction vehicles on the surrounding roads may cause congestion and / or accidents; • If not properly maintained, the increased activity on the existing infrastructure by construction personnel may cause damage; • Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users and residents; • There is potential for construction labour to use the surrounding vegetation and farmlands for ablutions; • Disruption to residents through increased activity and noise in the area; and • If not properly managed, there may be damage to landowners fencing, crops etc.	2	2	1	1	1	0.3	2.1	• Relevant road traffic signage is to be always erected and visible to control traffic activities and to provide a safe environment for all; • Personnel must not be allowed to trespass onto neighbouring properties and poaching or harvesting of indigenous flora / fauna is strictly forbidden; • Appropriate temporary traffic control and warning signage must be erected and implemented on all affected roads in the vicinity; • Construction worker's / construction vehicles must take heed of normal road safety regulations; thus, all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • Construction worker's / construction vehicles should take heed of normal road safety regulations; thus, all personnel must obey and respect the law of the road. A	1	1	0	0	0	0.1	0.2

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										courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • No-go areas must be demarcated; • An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the construction phase. These must be maintained in a satisfactory condition and a minimum of 100m away from any watercourses.							
	Site Alternative 2	• Incorrect road traffic control measures may result in serious injury to road users, as well as to employees working on the construction of the realignment; • Slow-moving construction vehicles on the surrounding roads may cause congestion and / or accidents; • If not properly maintained, the increased activity on the existing infrastructure by construction personnel may cause damage; • Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users and residents; • There is potential for construction labour to use the surrounding vegetation for ablutions; • Disruption to residents through increased activity and noise in the area; • If not properly managed, there may be damage to landowners fencing, crops etc. • Possible attack from wild animals in Bonamanzi Reserve.	2	2	1	1	1	0.3	2.1	• Relevant road traffic signage is to be always erected and visible to control traffic activities and to provide a safe environment for all; • Personnel must not be allowed to trespass onto neighbouring properties and poaching or harvesting of indigenous flora / fauna is strictly forbidden; • Appropriate temporary traffic control and warning signage must be erected and implemented on all affected roads in the vicinity; • Construction worker's / construction vehicles must take heed of normal road safety regulations; thus, all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • Construction worker's / construction vehicles should take heed of normal road safety regulations; thus, all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • No-go areas must be demarcated; • An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the construction phase. These must be maintained in a satisfactory condition and a minimum of 100m away from any watercourses. • Placing a game guard on duty to protect employees.	1	1	0	0	0	0.1	0.2
Alignment with IDP and LSDI	**Site Alternative 1 (Preferred)**	• The IDP notes that future development within Hluhluwe town is planned to the south and the west of the existing town. For this reason, development to the north of the town is preferred as it will allow future expansion of the town to the south and does not conflict with the LAP or IDP. • The proposed realignment falls within the extent of the LSDI and will form an integral economic and social connector between the surrounding regions.	5	6	7	7	7	1	33 (positive)	• Sufficient communication is required with the Local Big 5 Hlabisa Local Municipality to ensure that the proposed development remains in line with the local IDP.	5	6	7	7	7	1	33 (positive)
	Site Alternative 2	• The IDP notes that future development within Hluhluwe town is planned to the south and the west of the existing town. For this reason, any development to	5	6	7	7	7	0	32 (negative)	• No mitigation measures are considered sufficient.	5	6	7	7	7	0	32 (negative)

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
		the south of the town limits any township development and recreates issues which are presently experienced within the town. The Southern Corridor is therefore considered to be in conflict with the LAP and IDP. • The proposed realignment falls within the extent of the LSDI and will form an integral economic and social connector between the surrounding regions.															
Indirect impacts																	
Employment/ skills development and transfer	**Site Alternative 1 (Preferred)**	• Provision of temporary employment opportunities during construction (for engineers, labourers etc.); • Revenue for local businesses supplying the contractors (i.e. construction materials, machine hire etc.); • Increased temporary employment and skills development for local community members; • Skills development and transfer during construction phase to members of the local community employed to assist in construction.	3	3	1	0	1	0.8	6.4 (doesn't need mitigation as is a positive impact)	• Local labour is to be sourced as far as possible; • Local materials are to be sourced as far as possible; • Toolbox talks are to be undertaken regularly to ensure skills development and knowledge transfer.	3	3	1	0	1	0.8	6.4 (doesn't need mitigation as is a positive impact)
	Site Alternative 2	• Provision of temporary employment opportunities during construction (for engineers, labourers etc.); • Revenue for local businesses supplying the contractors (i.e. construction materials, machine hire etc.); • Increased temporary employment and skills development for local community members; • Skills development and transfer during construction phase to members of the local community employed to assist in construction.	3	3	1	0	1	0.8	6.4 (doesn't need mitigation as is a positive impact)	• Local labour is to be sourced as far as possible; • Local materials are to be sourced as far as possible; • Toolbox talks are to be undertaken regularly to ensure skills development and knowledge transfer.	3	3	1	0	1	0.8	6.4 (doesn't need mitigation as is a positive impact)
Social anxiety	**Site Alternative 1 (Preferred)**	• Loss of agricultural land along which the realignment falls; • If surrounding landowners are not adequately informed of the process and the related construction activities, social anxiety may arise.	4	4	3	3	1	1	15	• Compensation/buying of land from landowners on which the realignment falls; • All IAPs should be contacted to inform them of the starting date of construction and the proposed duration; • All IAPs should be notified of the construction process and the manner to which it should be implemented via public notices; and • All IAPs should be given the correct correspondence information should they wish to contact the Contractor during the construction phase.	3	3	1	2	1	0.5	5
	Site Alternative 2	• Loss of homes along which the realignment falls; • If surrounding landowners are not adequately informed of the process and the related construction activities, social anxiety may arise.	4	5	3	3	1	1	16	• Compensation/buying of land from landowners on which the realignment falls; • All IAPs should be contacted to inform them of the starting date of construction and the proposed duration; • All IAPs should be notified of the construction process and the manner to which it should be implemented via public notices; and • All IAPs should be given the correct correspondence information should they wish to contact the Contractor during the construction phase.	4	4	1	2	1	0.7	8.4
Alien vegetation encroachment	**Site Alternative 1 (Preferred)**	• Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel;	3	4	3	4	3	0.8	13.6	• A monitoring programme must be implemented to enforce the continual eradication of alien and invasive species during the construction phase;	1	3	1	3	1	0.6	5.4

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
		• Soil disturbance and plant removal – increased competition from alien plant species;															
	Site Alternative 2	• Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel; • Soil disturbance and plant removal – increased competition from alien plant species; • Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a direct threat to the habitat integrity of the Bonamanzi Reserve in close proximity to the development. • The proliferation of alien vegetation could replace the forage available for herbivores within the reserve. • This negative impact is considered medium to high because whilst it can be reversed, it is affecting an ecosystem which is stable and relatively undisturbed.	4	4	3	4	3	0.8	14.4	• A monitoring programme must be implemented to enforce the continual eradication of alien and invasive species during the construction phase;	2	3	1	3	1	0.6	6
Pollution	**Site Alternative 1 (Preferred)**	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community, wildlife and the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment may be polluted due to accidental spillages of petrochemicals from the vehicles and equipment, or bitumen from the constructing the road; • The construction phase will generate noise pollution which will affect wildlife and the aesthetic and nature of the receiving environment in Bonamanzi Reserve; • Air pollution related to particulate and dust generation will occur during construction; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.	4	5	3	3	3	0.6	10.8	• A Liaison Officer could assist in raising any concerns / complaints noted by the reserve / landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource; • Any spills on-site must be reported to the relevant Authority. • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation; • Research and implement alternative energy sources for road lighting where possible.	3	4	1	2	1	0.4	4.4
	Site Alternative 2	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community, wildlife and the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area;	4	5	3	3	3	0.6	10.8	• A Liaison Officer could assist in raising any concerns / complaints noted by the reserve / landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource; • Any spills on-site must be reported to the relevant Authority.	3	4	1	2	1	0.4	4.4

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
		• The receiving environment, including Bonamanzi Reserve, may be polluted due to accidental spillages of petrochemicals from the vehicles and equipment, or bitumen from the constructing the road; • The construction phase will generate noise pollution which will affect wildlife and the aesthetic and nature of the receiving environment in Bonamanzi Reserve; • Air pollution related to particulate and dust generation will occur during construction; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.								• All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation. • Research and implement alternative energy sources for road lighting where possible.							
Health and safety	**Site Alternative 1 (Preferred)**	• The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; • Faunal disturbance may occur potentially from the additional noise from increased vehicular movement at the construction site; and • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs. • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel;	2	2	1	1	1	0.3	2.1	• Hours of work should be limited to between 7am and 5pm on weekdays and Saturdays; • No work is to be permitted on Sundays or Public Holidays; • Construction personnel should be made aware of the need to prevent unnecessary noise such as hooting and shouting; • A designated speed limit should be set by the developer to limit possible road strikes.	2	2	1	1	1	0.3	2.1
	Site Alternative 2	• The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; • Faunal disturbance may occur potentially from the additional noise from increased vehicular movement at the construction site; and • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs. • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel;	2	2	1	1	1	0.3	2.1	• Hours of work should be limited to between 7am and 5pm on weekdays and Saturdays; • No work is to be permitted on Sundays or Public Holidays; • Construction personnel should be made aware of the need to prevent unnecessary noise such as hooting and shouting; • A designated speed limit should be set by the developer to limit possible road strikes.	2	2	1	1	1	0.3	2.1
Aesthetics	**Site Alternative 1 (Preferred)**	• The surrounding landowners, road users, tourists etc. may be exposed to an aesthetically unpleasant environment during the construction phase.	2	2	1	1	1	0.8	5.6	• If possible, the Construction Camp should be positioned on previously disturbed areas; • The Construction Camp must be contained so as to prevent any visual intrusion and be kept in a clean and orderly state at all times. This will also deter rodents and other fauna from entering the camp; • The roofing of the proposed construction camp should be neutral shades and constructed with non-reflective	1	1	0	0	0	0.4	0.8

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
										materials; Housekeeping is to be maintained for the duration of the							
	Site Alternative 2	• The surrounding landowners, road users, tourists etc. may be exposed to an aesthetically unpleasant environment during the construction phase.	2	2	1	1	1	0.8	5.6	• If possible, the Construction Camp should be positioned on previously disturbed areas; • The Construction Camp must be contained so as to prevent any visual intrusion and be kept in a clean and orderly state at all times. This will also deter rodents and other fauna from entering the camp; • The roofing of the proposed construction camp should be neutral shades and constructed with non-reflective materials. • Under no circumstance is the site-camp to be placed within Bonamanzi Game Reserve.	1	1	0	0	0	0.4	0.8
Poaching of local fauna and flora	**Site Alternative 1 (Preferred)**	• Due to the species rich region in which the construction site is found, poaching of fauna and flora by employees may take place.	2	4	3	2	3	0.2	2.8	• No hunting is permitted on-site or in the surrounding areas; • No animals required for hunting e.g. dogs, under the supervision of construction workers, should be allowed into the area; • All construction personnel should be informed of this ruling; and • Any construction personnel found to be poaching in the area should be subjected to a disciplinary hearing.	1	1	1	1	1	0.1	0.5
	Site Alternative 2	• Due to the species rich region in which the construction site is found, poaching of fauna and flora by employees may take place. • Due to potential construction activities within Bonamanzi Game Reserve, the likelihood of impacts to fauna and flora is increased.	3	5	3	3	3	0.2	3.4	• No hunting is permitted on-site or in the surrounding areas; • No animals required for hunting e.g. dogs, under the supervision of construction workers, should be allowed into the area; • All construction personnel should be informed of this ruling; and • Any construction personnel found to be poaching in the area should be subjected to a disciplinary hearing.	2	2	1	2	1	0.1	0.8
Cumulative Impacts																	
General	**Site Alternative 1 (Preferred)**	• Environmental degradation; • Additive disturbance to IAPs during the construction phase; • Increased runoff and water turbidity from run-off and construction activities; • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents; • Increased temporary employment and skills development for local community members; • Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel; • Soil erosion, disturbance and plant removal – increased competition from alien plant seeds;	3	5	3	3	3	0.9	15.3	• Ensure that original mitigatory impacts regarding soil erosion, flora, fauna disturbance and social anxiety are enforced and adhered to in the construction phase; and • All mitigation measures as detailed above will be included in the EMPr.	2	4	3	1	1	0.6	6.6

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
		• Noise impacts generated from construction activity i.e. vehicles, equipment and personnel; • Construction personnel may illegally poach local fauna; • The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; and • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs; • Increased runoff and water turbidity from run-off and construction activities.															
	Site Alternative 2	• Environmental degradation; • Additive disturbance to IAPs during the construction phase; • Increased runoff and water turbidity from run-off and construction activities; • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents; • Increased temporary employment and skills development for local community members; • Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel; • Soil erosion, disturbance and plant removal – increased competition from alien plant seeds; • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel; • Construction personnel may illegally poach local fauna; • Loss of indigenous, relatively untransformed flora; • The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; and • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs; • Increased runoff and water turbidity from run-off and construction activities.	3	5	3	5	3	0.9	17.1	• Ensure that original mitigatory impacts regarding soil erosion, flora, fauna disturbance and social anxiety are enforced and adhered to in the construction phase; and • All mitigation measures as detailed above will be included in the EMPr.	2	4	3	4	1	0.6	8.4
OPERATIONAL PHASE																	
Direct impacts																	
Road safety	**Site Alternative 1 (Preferred)**	• Regular maintenance of built infrastructure; • Improved road safety for pedestrians in Hluhluwe town.	4	6	7	7	7	1	31 (Positive Impact)	• Appropriate traffic signage must be installed to alert road users of speed limits; • Road safety measures such as rumble strips and speed bumps may be installed to prevent speeding during the construction phase; • Safety implements such as guardrails, fencing and appropriate road signs should be erected where necessary to assist in addressing safety measures on the road.	4	6	7	7	7	1	31 (Positive Impact)

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
	Site Alternative 2	• Regular maintenance of built infrastructure; • Improved road safety for pedestrians in Hluhluwe town. • Possible increase in encounters with animals whilst driving through the Bonamanzi Reserve portion of the alignment.	4	6	7	5	7	0.1	2.9	• Appropriate traffic signage must be installed to alert road users of speed limits; • Road safety measures such as rumble strips and speed bumps may be installed to prevent speeding during the construction phase; • Safety implements such as guardrails, fencing and appropriate road signs should be erected where necessary to assist in addressing safety measures on the road. • Acquisition of that portion of Bonamanzi Reserve through which the Southern Corridor runs will reduce road safety issues/	4	6	7	5	7	0.1	2.9
Improved efficiency of travel	**Site Alternative 1 (Preferred)**	• The realigned route will allow for faster, safer and more direct travel for commuters.	4	6	7	7	7	1	31 (Positive Impact)	• Mitigation measures required include the relevant safety signage and standards along the realigned route.	4	6	7	7	7	1	31 (Positive Impact)
	Site Alternative 2	• This corridor also has an increased risk of vehicular collisions with wildlife.	4	6	7	5	7	0.1	2.9	• Mitigation measures required include the relevant safety signage and standards along the realigned route.	4	6	7	5	7	0.1	2.9
Loss and fragmentation of agricultural land	**Site Alternative 1 (Preferred)**	• The construction footprint will result in the loss of agricultural land, which will continue to be experienced during the operational phase. • Arable land will remain fragmented during the operational phase.	3	4	7	5	7	1	26	• It is anticipated that SANRAL will compensate the landowner for any loss of agricultural land and consequent earnings. This is however being dealt with as a separate process to this assessment; • The land which will be fragmented from the main portion of agricultural land will be accessed through an agricultural underpass.	1	3	3	4	7	1	18
	Site Alternative 2	• Whilst portions of the land in the Southern Corridor appeared to be portioned off and may have historically been used for agricultural activities, the lands appear to lie fallow/undeveloped at present. As such it appears that no agricultural land will be lost along the southern corridor.	0	0	0	0	0	0	0	• No mitigation measures are anticipated to be required.	0	0	0	0	0	0	0
Alignment with IDP and LSDI	**Site Alternative 1 (Preferred)**	• The various objectives listed in the IDP and LSDI, in relation to the realignment of the R22, will be realised once the Preferred Layout is constructed and in operation.	5	7	7	5	7	1	31 (Positive Impact)	• No mitigation measures required.	5	7	7	4	7	1	30 (Positive Impact)
	Site Alternative 2	• The IDP notes that future development within Hluhluwe town is planned to the south and the west of the existing town. For this reason, any development to the south of the town limits any township development and recreates issues which are presently experienced within the town. The Southern Corridor is therefore considered to conflict with the LAP and IDP. • The proposed realignment falls within the extent of the LSDI and will form an integral economic and social connector between the surrounding regions.	5	7	7	7	7	0.2	6.6 (Negative impact, unlikely to happen)	• No mitigation measures are considered sufficient.	5	7	7	7	7	0.2	6.6 (Negative impact, unlikely to happen)
Stormwater control	**Site Alternative 1 (Preferred)**	• Stormwater run-off from the hardened surface of the road may create erosion. • Additional vehicles travelling to and from the site will	2	4	3	3	3	0.5	7.5	• Velocity dissipating measures with regards to stormwater management should be installed; and • The site, and surrounding areas, must be monitored for	1	3	2	2	1	0.2	1.8

Nature of Impact		Impact summary	Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
		increase traffic on the surrounding roads. • The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion adjacent to and within the town of Hluhluwe. • Litter or pollution such as hydrocarbons may wash into the watercourse.								signs of erosion, excess construction material, waste etc. Should any signs be noted, the erosion mitigation measures, as will be noted in the relevant EMPr, must be implemented. • Appropriate stormwater / surface water management measures must be maintained throughout the lifetime of the development.							
	Site Alternative 2	• Stormwater run-off from the hardened surface of the road may create erosion. • Additional vehicles travelling to and from the site will increase traffic on the surrounding roads, as well as noise. • The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion adjacent to and within the town of Hluhluwe as well as Bonamanzi Reserve. • Litter or pollution such as hydrocarbons may wash into the watercourses, including the Hluhluwe River, which eventually feeds into the iSimangaliso Wetland Park.	2	4	3	3	3	0.5	7.5	• Velocity dissipating measures with regards to stormwater management should be installed; and • The site, and surrounding areas, must be monitored for signs of erosion, excess construction material, waste etc. Should any signs be noted, the erosion mitigation measures, as will be noted in the relevant EMPr, must be implemented. • Appropriate stormwater / surface water management measures must be maintained throughout the lifetime of the development.	1	3	2	2	1	0.2	1.8
Alien vegetation	**Site Alternative 1 (Preferred)**	• Alien plants may invade the site if not monitored and removed on an on-going basis. Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control.	3	3	3	3	3	0.7	10.5	• Alien plant encroachment must be monitored and prevented as will be outlined in the EMPr.	2	2	1	2	1	0.2	1.6
	Site Alternative 2	• Alien plants may invade the site if not monitored and removed on an on-going basis. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a direct threat to the habitat integrity of the Bonamanzi Reserve near the development. • The proliferation of alien vegetation could replace the forage available for herbivores within the reserve.	3	4	3	3	3	0.8	12.8	• An Alien Vegetation Control Programme, as determined by the Contractor, and submitted to the ECO and Engineer for approval prior to implementation, is to be implemented on site.	2	4	1	2	1	0.3	3
Cumulative impacts																	
Traffic	**Site Alternative 1 (Preferred)**	• Decrease in traffic volumes in Hluhluwe town. • Increase in pedestrian safety in Hluhluwe town due to decreased traffic volumes. • Change in traffic patterns / increased traffic volumes could result in increased noise levels and an increase in 'road kill' accidents along the road (fauna).	3	5	7	1	7	1	23 (Positive impact)	• Increase in traffic volumes is difficult to mitigate against as the purpose of the realignment is to transfer road traffic from Hluhluwe, out of town.	3	5	7	1	7	1	23 (Positive Impact)
	Site Alternative 2	• Decrease in traffic volumes in Hluhluwe town. • Increase in pedestrian safety in Hluhluwe town due to decreased traffic volumes. • Change in traffic patterns / increased traffic volumes could result in increased noise levels and an increase in 'road kill' accidents along the road (fauna).	3	5	7	1	7	0.1	2.3	• Increase in traffic volumes is difficult to mitigate against as the purpose of the realignment is to transfer road traffic from Hluhluwe, out of town.	3	5	7	1	7	0.1	2.3

Nature of Impact	Impact summary	Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
		SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
		SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
ACTIVITY: DECOMMISSIONING AND CLOSURE PHASE																
It is not anticipated that the site location and consequent realigned route will be decommissioned or closed at any point as it ties in directly with other planned future expansions within the greater area namely the expansion of the railway line and the Lubombo Spatial Development Initiative. As such it is not envisaged that the realigned route will ever be decommissioned or closed.																
ACTIVITY: NO-GO OPTION																
The purpose of the proposed realignment is to provide a safe more direct commute for passengers using the R22 and surrounds, to improve the safety of pedestrians within Hluhluwe town, to comply with national standards regarding regional routes passing through towns, and also for the R22 to tie in directly with the authorised road-over-rail bridge. If the no-go option is followed, the safety of road users and pedestrians within Hluhluwe town will continue to be compromised. In addition, this will compromise the development of the road-over-rail bridge and the expansion of the railway line, which are integral motivating factors in this application, as the realignment forms an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique. As such it is not recommended that the No-Go alternative is pursued.															

<u>Please note</u>: In summary it can be seen that in terms of the Site Alternatives provided i.e. the Northern and Southern Corridors, the Northern Corridor is the Preferred Site as it has no 'high negative impact' ratings and fewer significant impacts on the receiving environment. For this reason, the Southern Corridor is not the preferred site location and therefore has not been further considered as a site alternative, as the negative impacts are too significant.

12.3.9.2 Proposed direct, indirect and cumulative impacts for: Planning and design, construction and operational phases for the Design Alternatives

Table 12-10: The proposed direct, indirect and cumulative impacts identified, and scores assigned to the planning and design, construction and operational phases for the Design Alternative 1 and Design Alternative 2

Nature of Impact	Impact summary		Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
PLANNING & DESIGN PHASE																	
Direct Impacts																	
Ecology **Health and safety** **Stakeholder participation** **Cost implications** **Planning implications**	**Design Alternative 1 (Preferred)**	• Disturbance of flora and / or agricultural land may be created through activity on-site, such as the site inspection or surveys; • If not properly designed, with adequate construction planning and safety measures taken into account, the proposed realignment could pose a health and safety risk to road users, as well as impacting negatively on the surrounding receiving environment; • If not adequately designed, the realignment will not retain the proposed and required design life time and structural integrity; • Identification and acknowledgement of concerns raised by landowners, stakeholders and IAP's; • Discussions established with landowners regarding the loss of land, access etc.	3	4	3	4	3	0.8	13.6	• Disturbance to potentially sensitive flora and fauna during site assessments must be avoided; • Timeous notification of and consultation with IAPs and landowners; • Measures must be taken to mitigate concerns raised by IAPs, including notification, consultation and interaction; • Consultation and discussion with relevant SANRAL personnel and landowners, regarding the land on which the realignment falls; and • All relevant planning, acquisition, environmental and design parties are to maintain contact with one another and the land owner to ensure a co-operative and transparent process.	2	3	3	3	1	0.6	7.2
	Design Alternative 2	• Disturbance of flora and / or agricultural land may be created through activity on-site, such as the site inspection or surveys; • If not properly designed, with adequate construction planning and safety measures taken into account, the proposed realignment could pose a health and safety risk to road users, as well as impacting negatively on the surrounding receiving environment; • If not adequately designed, the realignment will not retain the proposed and required design life time and structural integrity; • Identification and acknowledgement of concerns raised by landowners, stakeholders and IAP's; • Discussions established with landowners regarding the loss of land, access etc.; • Additional design requirements associated with the extended length of the link road and different tie-in point.	3	4	3	4	3	0.8	13.6	• Disturbance to sensitive flora and fauna during site assessments must be avoided; • Measures must be taken to mitigate concerns raised by IAPs, including notification, consultation and interaction; • Consultation and discussion with relevant SANRAL personnel and landowners, regarding the land on which the realignment falls; and • All relevant planning, acquisition, environmental and design parties are to maintain contact with one another and the landowner to ensure a co-operative and transparent process.	2	3	3	3	1	0.6	7.2
Indirect Impacts																	
Social anxiety	**Design Alternative 1 (Preferred)**	• Social anxiety in respect of concerned IAPs i.e. Movement on-site could create social anxiety in the landowners.	4	4	3	3	1	1	15	• Notification of landowners of the proposed process and progress.	3	3	1	2	1	0.5	5
	Design Alternative 2	• Social anxiety in respect of the loss of land and houses due to the location of the southern corridor.	4	5	3	3	1	1	16	• Notification of landowners of the proposed process and progress.	4	4	1	2	1	0.7	8.4

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Cumulative impacts																	
Social anxiety **Ecology** **Layout**	**Design Alternative 1 (Preferred)**	• Social anxiety may arise should the landowners not be adequately notified of the proposed activity; and • Potential disturbance to local fauna and flora in the immediate area.	3	3	3	2	1	0.6	7.2	• Notification of landowners of the proposed process and progress. • Disturbance to potentially sensitive flora and fauna during site assessments must be avoided.	2	2	1	1	1	0.4	2.8
	Design Alternative 2	• Social anxiety may arise should the landowners not be adequately notified of the proposed activity; and • Potential disturbance to local fauna and flora in the immediate area.	3	3	3	2	1	0.6	7.2	• Notification of landowners of the proposed process and progress. • Disturbance to potentially sensitive flora and fauna during site assessments must be avoided.	2	2	1	1	1	0.4	2.8
CONSTRUCTION PHASE																	
Direct impacts																	
Pollution	**Design Alternative 1 (Preferred)**	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community and possibly the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment may be polluted due to accidental spills of petrochemicals from the vehicles and equipment, or bitumen from surfacing the road; • The construction phase will generate some noise pollution which is not considered significant; • Air pollution related to particulate and dust generation will occur during construction, however, this is not considered to be significant; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.	3	5	3	3	3	0.8	13.6	• All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum; • A Community Liaison Officer could assist in raising any concerns / complaints noted by the landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource; • Any spills on-site are to be immediately dealt with and if large enough, must be reported to the relevant Authority. • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation. • Research and implement alternative energy sources for road lighting where possible.	2	3	1	2	1	0.6	5.4
	Design Alternative 2	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community and possibly the surrounding landowners;	3	5	3	3	3	0.8	13.6	• All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum; • A Community Liaison Officer could assist in raising any concerns / complaints noted by the landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource;	2	3	1	2	1	0.6	5.4

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		• Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment may be polluted due to accidental spills of petrochemicals from the vehicles and equipment, or bitumen from surfacing the road; • The construction phase will generate some noise pollution which is not considered significant; • Air pollution related to particulate and dust generation will occur during construction, however, this is not considered to be significant; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.								• Any spills on-site are to be immediately dealt with and if large enough, must be reported to the relevant Authority. • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation; • Research and implement alternative energy sources for road lighting where possible.							
Stormwater control	**Design Alternative 1 (Preferred)**	• The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion, particularly within agricultural land and erosion adjacent to and within the town of Hluhluwe; • Litter or pollution such as hydrocarbons may wash into the watercourse.	3	5	3	3	3	0.7	11.9	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development.	2	4	1	2	1	0.4	4
	Design Alternative 2	• The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion adjacent to and within the town of Hluhluwe; • Litter or pollution such as hydrocarbons may wash into the watercourse.	3	5	3	3	3	0.7	11.9	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development.	2	4	1	2	1	0.4	4
Erosion	**Design Alternative 1 (Preferred)**	• Physical disturbance of the soil and plant removal may result in soil erosion; • Erosion and potential soil loss from cut and fill activities; • During the construction phase, soils will be cleared for the realignment construction. Potential disturbances include compaction, physical removal and potential pollution by hydrocarbons. Furthermore, if standard storm water control measures are not implemented during the construction phase, soil erosion and sedimentation may occur, both along the alignment and within the watercourse.	3	4	3	3	3	0.7	11.2	• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development; The area surrounding the realignment must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken; • Soil erosion prevention measures must be implemented such as gabions, sandbags etc. whilst energy dissipaters must be constructed at any surface water outflow points. The site should be monitored by the Contractor weekly for any signs of off-site siltation. All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • Various types of drainage structures have been incorporated into the design, all of which are in accordance with the SANRAL typical details, amended to suit where required.	2	3	1	3	1	0.3	3
	Design	• Physical disturbance of the soil and plant removal may result in soil erosion;	3	4	3	3	3	0.7	11.2	• Appropriate stormwater / surface water management measures must be put in place before construction	2	3	1	3	1	0.3	3

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	Alternative 2	• Erosion and potential soil loss from cut and fill activities; • During the construction phase, soils may be cleared for the realignment construction. Potential disturbances include compaction, physical removal and potential pollution by hydrocarbons. Furthermore, if standard storm water control measures are not implemented during the construction phase, soil erosion and sedimentation may occur, both along the alignment and within the watercourse.								commences and maintained throughout the lifetime of the development; The area surrounding the realignment must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken immediately; • Soil erosion prevention measures must be implemented such as gabions, sandbags etc. whilst energy dissipaters must be constructed at any surface water outflow points. The site should be monitored by the Contractor weekly for any signs of off-site siltation. All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • Various types of drainage structures have been incorporated into the design, all of which are accordance with the SANRAL typical details, amended to suit where required.							
Vegetation removal	**Design Alternative 1 (Preferred)**	• Clearing of vegetation during the construction phase will increase surface runoff and therefore adequate stormwater measures will need to be implemented; • Clearing of vegetation on agricultural lands could include the clearing of agricultural crops and a consequent loss of productivity and crops possibly destined for export.	3	4	3	3	3	1	16	• The construction footprint must be limited in its size and be demarcated should any confusion arise as to its extent; • Demarcated vehicle travelling routes must be always adhered to; • Vegetation clearing must be limited to the construction area and care must be taken to avoid the removal of trees if not necessary; • One indigenous tree is to be planted adjacent to the route alignment for every tree that is cut down; • Access to agricultural land must be maintained and the loss of agricultural land must be limited as far as possible.	1	2	1	2	1	0.6	4.2
	Design Alternative 2	• Clearing of vegetation during the construction phase will increase surface runoff and therefore adequate stormwater measures will need to be implemented; and • Clearing of vegetation on agricultural lands could include the clearing of agricultural crops and a consequent loss of productivity and crops possibly destined for export.	3	4	3	3	3	1	16	• The construction footprint must be limited in its size and be demarcated should any confusion arise as to its extent; • Demarcated vehicle travelling routes must be always adhered to; • Vegetation clearing must be limited to the construction area and care must be taken to avoid the removal of trees if not necessary; • One indigenous tree is to be planted adjacent to the route alignment for every tree that is cut down; • Access to agricultural land must be maintained and the loss of agricultural land must be limited as far as possible.	1	2	1	2	1	0.6	4.2
Loss and fragmentation of agricultural land	**Design Alternative 1 (Preferred)**	• The proposed realignment will bisect a portion of agricultural land. The bisection of the land will result in the fragmentation of this land; • The realignment will result in the loss of arable agricultural land; • Clearing of arable lands could include the clearing of agricultural crops and a consequent loss of productivity and crops possibly destined for export.	4	5	7	4	7	1	27	• Access to the fragmented portion of the land has been considered in the design phase of the realignment. • Agricultural land will be lost through the construction of the realignment. However, as the realignment provides important safety benefits and improves travel time due to a more direct route. Cumulatively, the loss of agricultural land is not considered significant in relation to the benefits provided for the greater region.	3	4	3	3	3	0.8	12.8

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	Design Alternative 2	• The proposed realignment will bisect a portion of agricultural land. The bisection of the land will result in the fragmentation of this land; • The realignment will result in the loss of arable agricultural land; • Clearing of arable lands could include the clearing of agricultural crops and a consequent loss of productivity and crops possibly destined for export.	4	5	7	4	7	1	27	• Access to the fragmented portion of the land has been considered in the design phase for the Preferred Layout, but not Alternative Layout as it is not the preferred route alignment. • Agricultural land will be lost through the construction of the realignment. However, as the realignment provides important safety benefits and improves travel time due to a more direct route. Cumulatively, the loss of agricultural land is not considered significant in relation to the benefits provided for the greater region.	3	4	3	3	3	0.8	12.8
Alien vegetation encroachment	**Design Alternative 1 (Preferred)**	• Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a threat to the agricultural potential of the lands near the development.	3	4	3	4	3	0.8	13.6	• Alien plant encroachment must be addressed in the EMPr; • An Alien Vegetation Control Programme is to be implemented on site. The AVCP is to be provided by the Contractor and submitted to the ECO and Engineer for approval prior to implementation; • Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil and prevent the growth of alien vegetation. Vigorous indigenous grasses are very effective at covering exposed soil. It is important to note, that the any use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into any drainage lines to avoid any possible eutrophication impacts; • Necessary rehabilitation measures, if required, (e.g. burning, seeding, removing alien plants etc.) should be introduced to ensure species composition reverts to a more natural state (with regards to affected areas). Indigenous vegetation with deep set root systems is advisable to limit further soil loss on site. Alternatively, water dissipating mechanisms such as gabions or reno-mattresses may be implemented on-site to help stabilize the surrounding soil and provide a platform for the growth of vegetation; • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilize the soil and prevent the growth of alien vegetation.	1	3	1	3	1	0.6	5.4
	Design Alternative 2	• Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a direct threat to the habitat integrity of the Bonamanzi Reserve near the development. • The proliferation of alien vegetation could replace the forage available for herbivores within the reserve.	3	4	3	4	3	0.8	13.6	• Alien plant encroachment must be addressed in the EMPr; • An Alien Vegetation Control Programme is to be implemented on site. The AVCP is to be provided by the Contractor and submitted to the ECO and Engineer for approval prior to implementation; • Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil and prevent the growth of alien vegetation. Vigorous indigenous grasses are very effective at covering exposed soil. It is important to note, that the any use of fertilisers, must be undertaken with caution and must not be allowed, in any	1	3	1	3	1	0.6	5.4

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										circumstances, to run into any drainage lines to avoid any possible eutrophication impacts; • Necessary rehabilitation measures, if required, (e.g. burning, seeding, removing alien plants etc.) should be introduced to ensure species composition reverts to a more natural state (with regards to affected areas). Indigenous vegetation with deep set root systems is advisable to limit further soil loss on site. Alternatively, water dissipating mechanisms such as gabions or reno-mattresses may be implemented on-site to help stabilize the surrounding soil and provide a platform for the growth of vegetation; • All exposed earth must be rehabilitated promptly with suitable vegetation to stabilize the soil and prevent the growth of alien vegetation.							
Stockpiling	**Design Alternative 1 (Preferred)**	• Incorrect stockpiling may cause the mobilisation of sediments. • Stockpiles may obscure drivers' line of site; • Incorrect stockpiling could result in the contamination of topsoil and the growth of alien vegetation.	2	4	3	3	1	0.7	9.1	• Should temporary stockpiling become necessary, the areas for the stockpiling of excavated / imported material shall be indicated and demarcated on the site plan submitted in writing to the ECO for approval, together with the Contractor's proposed measures for prevention, containment and rehabilitation against environmental damage. • Areas affected by stockpiling shall be reinstated to the satisfaction of the ECO; • The Contractor shall remove topsoil from all areas where topsoil will be impacted on by construction activities, including temporary activities such as storage and stockpiling areas, and detours; • Topsoil stockpiles shall be convex and no more than 2m high so as not to impact microbial functioning. Stockpiles shall be shaped so that no surface water ponding takes place; • Topsoil stockpiles shall be protected from erosion by wind and rain by providing suitable stormwater and cut-off drains (approved by the engineer) and/or the establishment of temporary indigenous vegetation.	1	3	3	2	1	0.4	4
	Design Alternative 2	• Incorrect stockpiling may cause the mobilisation of sediments. • Stockpiles may obscure drivers' line of site; • Incorrect stockpiling could result in the contamination of topsoil and the growth of alien vegetation.	2	4	3	3	1	0.7	9.1	• Should temporary stockpiling become necessary, the areas for the stockpiling of excavated / imported material shall be indicated and demarcated on the site plan submitted in writing to the ECO for approval, together with the Contractor's proposed measures for prevention, containment and rehabilitation against environmental damage. • Areas affected by stockpiling shall be reinstated to the satisfaction of the ECO; • The Contractor shall remove topsoil from all areas where topsoil will be impacted on by construction activities, including temporary activities such as storage and stockpiling areas, and detours;	1	3	3	2	1	0.4	4

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										• Topsoil stockpiles shall be convex and no more than 2m high so as not to impact microbial functioning. Stockpiles shall be shaped so that no surface water ponding takes place; • Topsoil stockpiles shall be protected from erosion by wind and rain by providing suitable stormwater and cut-off drains (approved by the engineer) and/or the establishment of temporary indigenous vegetation.							
Waste generation	**Design Alternative 1 (Preferred)**	• Waste could be generated through the following: – Chemical waste - petrochemicals, resins and paints; – Sewage as may be generated by on site employees; – Construction waste – construction materials, bags, aggregates etc. – General waste. • Impacts to the receiving environment include contamination of the watercourse, contamination of soil, wind-blown litter etc.	4	5	3	3	3	0.6	10.8	• Site personnel (i.e. construction staff) must undergo Environmental Training and be educated on separation and correct disposal of different types of waste; • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported; • All solid wastes should be disposed of at a registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers should be supplied to control solid waste on-site; • The construction site should be inspected for litter daily. Extra care should be taken on windy days. Precautions should be taken to avoid litter from entering any watercourses; • Soil that is contaminated with, e.g. cement, petrochemicals or paint, should be disposed of at a registered waste disposal site and is NOT to be deposited into any watercourses or buried on site; • Drip trays and spill kits are to be made readily available for use should any construction machinery develop a leak; • Chemical waste should be stored in appropriate containers and disposed of at a licensed disposal facility • Any leftover material must be appropriately disposed of (i.e. recycled or issued to the local community for the use); • No storage of waste is to take place outside of the designated waste storage area.	3	4	1	2	1	0.4	4.4
	Design Alternative 2	• Waste could be generated through the following: – Chemical waste - petrochemicals, resins and paints; – Sewage as may be generated by on site employees; – Construction waste – construction materials, bags, aggregates etc. – General waste. • Impacts to the receiving environment include contamination of the watercourse, contamination of soil, wind-blown litter etc.	4	5	3	3	3	0.6	10.8	• Site personnel (i.e. construction staff) must undergo Environmental Training and be educated on separation and correct disposal of different types of waste; • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported; • All solid wastes should be disposed of at a registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers should be supplied to control solid waste on-site; • The construction site should be inspected for litter daily. Extra care should be taken on windy days. Precautions	3	4	1	2	1	0.4	4.4

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										should be taken to avoid litter from entering any watercourses; • Soil that is contaminated with, e.g. cement, petrochemicals or paint, should be disposed of at a registered waste disposal site and is NOT to be deposited into any watercourses or buried on site; • Drip trays and spill kits are to be made readily available for use should any construction machinery develop a leak; • Chemical waste should be stored in appropriate containers and disposed of at a licensed disposal facility • Any leftover material must be appropriately disposed of (i.e. recycled or issued to the local community for their use); • No storage of waste is to take place outside of the designated waste storage area.						
Contamination of surface and groundwater	**Design Alternative 1 (Preferred)**	• Hazardous (diesel, oils, cement) waste will be generated during the construction phase and if spilled can cause contamination of the surrounding environment. • Waste generated during the construction phase may enter the environment through surface water runoff.	5	6	7	5	7	0.7	21	• All hazardous contaminants are to be stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination); • Any contaminated water associated with construction activities must be contained in separate areas or receptacles such as Jo-Jo tanks or water-proof drums, and must not be allowed to enter natural drainage systems; • Any spills on-site must be reported to the relevant Authority. • Ensure all contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded adequately (i.e. 110% of total capacity contained within the bund) to prevent the bio-physical contamination of the environment; • Routine checks must be done on all machinery on site, and these must be kept in good working order. No washing of machinery or vehicles may take place on site and container washing must take place in a designated, bunded washing areas.	3	4	3	3	1	0.3	4.2
	Design Alternative 2	• Hazardous (diesel, oils, cement) waste will be generated during the construction phase and if spilled can cause contamination of the surrounding environment. • Waste generated during the construction phase may enter the environment through surface water runoff.	5	6	7	5	7	0.7	21	• All hazardous contaminants are to be stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination); • Any contaminated water associated with construction activities must be contained in separate areas or receptacles such as Jo-Jo tanks or water-proof drums, and must not be allowed to enter natural drainage systems; • Any spills on-site must be reported to the relevant Authority.	3	4	3	3	1	0.3	4.2

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										• Ensure all contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded adequately (i.e. 110% of total capacity contained within the bund) to prevent the bio-physical contamination of the environment; • Routine checks must be done on all machinery on site, and these must be kept in good working order. No washing of machinery or vehicles may take place on site and container washing must take place in a designated, bunded washing areas. • All efforts are to be made to ensure that contamination of surface and / or groundwater does not take place.							
Health and Safety	**Design Alternative 1 (Preferred)**	• Incorrect road traffic control measures may result in serious injury to road users, as well as to employees working on the construction of the realignment; • Slow-moving construction vehicles on the surrounding roads may cause congestion and / or accidents; • If not properly maintained, the increased activity on the existing infrastructure by construction personnel may cause damage; • Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users and local residents; • There is potential for construction labour to use the surrounding vegetation and farm lands for ablutions; • Disruption to residents through increased activity and noise in the area; and • If not properly managed, there may be damage to landowners fencing, crops etc.	2	2	1	1	1	0.3	2.1	• Relevant road traffic signage is to be erected and visible at all times to control traffic activities and to provide a safe environment for all; • Personnel must not be allowed to trespass onto neighbouring properties and poaching or harvesting of indigenous flora / fauna is strictly forbidden; • Appropriate temporary traffic control and warning signage must be erected and implemented on all affected roads in the vicinity; • Construction worker's / construction vehicles must take heed of normal road safety regulations; thus all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • Construction worker's / construction vehicles should take heed of normal road safety regulations; thus all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • No-go areas must be demarcated; • An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the construction phase. These must be maintained in a satisfactory condition and a minimum of 100m away from any watercourses.	1	1	0	0	0	0.1	0.2
	Design Alternative 2	• Incorrect road traffic control measures may result in serious injury to road users, as well as to employees working on the construction of the realignment; • Slow-moving construction vehicles on the surrounding roads may cause congestion and / or accidents; • If not properly maintained, the increased activity on the existing infrastructure by construction personnel may cause damage; • Construction personnel / construction vehicles – movement of construction personnel and vehicles	2	2	1	1	1	0.3	2.1	• Relevant road traffic signage is to be erected and visible at all times to control traffic activities and to provide a safe environment for all; • Personnel must not be allowed to trespass onto neighbouring properties and poaching or harvesting of indigenous flora / fauna is strictly forbidden; • Appropriate temporary traffic control and warning signage must be erected and implemented on all affected roads in the vicinity; • Construction worker's / construction vehicles must take heed of normal road safety regulations; thus all personnel must obey and respect the law of the road. A courteous	1	1	0	0	0	0.1	0.2

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		may pose a potential health and safety risk to road users and local residents; • There is potential for construction labour to use the surrounding vegetation and farm lands for ablutions; • Disruption to residents through increased activity and noise in the area; and • If not properly managed, there may be damage to landowners fencing, crops etc.								and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • Construction worker's / construction vehicles should take heed of normal road safety regulations; thus all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; • No-go areas must be demarcated; • An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the construction phase. These must be maintained in a satisfactory condition and a minimum of 100m away from any watercourses.							
Employment	**Design Alternative 1 (Preferred)**	• Increased temporary employment and skills development for local community members; • There is potential for community members to hamper construction; • Possible economic benefits to suppliers of building materials in the Hluhluwe area or further airfield as goods and services may be purchased from these entities during the construction phase.	4	3	3	1	1	1	12	• Increased temporary employment and skills development for local community members; • Wherever possible, local suppliers are to be used for the sourcing of material.	4	3	3	1	1	1	12
	Design Alternative 2	• Increased temporary employment and skills development for local community members; • There is potential for community members to hamper construction; • Possible economic benefits to suppliers of building materials in the Hluhluwe area or further airfield as goods and services may be purchased from these entities during the construction phase.	4	3	3	1	1	1	12	• Increased temporary employment and skills development for local community members; • Wherever possible, local suppliers are to be used for the sourcing of material.	4	3	3	1	1	1	12
Alignment with IDP and LSDI	**Design Alternative 1 (Preferred)**	• The IDP notes that future development within Hluhluwe town is planned to the south and the west of the existing town. For this reason, the Preferred Layout alignment is best as it does not limit future development and does not conflict with the LAP or IDP. • The proposed realignment falls within the extent of the LSDI and will form an integral economic and social connector between the surrounding regions.	5	6	7	7	7	1	32 (positive)	• Sufficient communication is required with the Local Big 5 Hlabisa Local Municipality to ensure that the proposed development remains in line with the local IDP.	5	6	7	7	7	1	32 (positive)
	Design Alternative 2	• The IDP notes that future development within Hluhluwe town is planned to the south and the west of the existing town. Alternative Layout 1 also does not limit future development and does not conflict with the LAP or IDP. • The proposed realignment falls within the extent of the LSDI and will form an integral economic and social connector between the surrounding regions.	5	6	7	7	7	1	32 (positive)	• Sufficient communication is required with the Local Big 5 Hlabisa Local Municipality to ensure that the proposed development remains in line with the local IDP.	5	6	7	7	7	1	32 (positive)

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Indirect impacts																	
Social anxiety	**Design Alternative 1 (Preferred)**	• Loss of agricultural land along which the realignment falls; • If surrounding landowners are not adequately informed of the process and the related construction activities, social anxiety may arise.	4	4	3	3	1	1	15	• Compensation/buying of land from landowners on which the realignment falls; • All IAPs should be contacted to inform them of the starting date of construction and the proposed duration; • All IAPs should be notified of the construction process and the manner to which it should be implemented via public notices; and • All IAPs should be given the correct correspondence information should they wish to contact the Contractor during the construction phase.	3	3	1	1	1	0.5	4.5
	Design Alternative 2	• Loss of agricultural land along which the realignment falls; • If surrounding landowners are not adequately informed of the process and the related construction activities, social anxiety may arise.	4	4	3	3	1	1	15	• Compensation/buying of land from landowners on which the realignment falls; • All IAPs should be contacted to inform them of the starting date of construction and the proposed duration; • All IAPs should be notified of the construction process and the manner to which it should be implemented via public notices; and • All IAPs should be given the correct correspondence information should they wish to contact the Contractor during the construction phase.	3	3	1	1	1	0.5	4.5
Alien vegetation encroachment	**Design Alternative 1 (Preferred)**	• Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel; • Soil disturbance and plant removal – increased competition from alien plant species; • Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control.	3	4	3	4	3	0.8	13.6	• A monitoring programme must be implemented to enforce the continual eradication of alien and invasive species during the construction phase.	1	3	1	3	1	0.6	5.4
	Design Alternative 2	• Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel; • Soil disturbance and plant removal – increased competition from alien plant species; • Disturbance of the site may lead to encroachment of alien plant species onto the site. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control.	3	4	3	4	3	0.8	13.6	• A monitoring programme must be implemented to enforce the continual eradication of alien and invasive species during the construction phase.	1	3	1	3	1	0.6	5.4
Pollution	**Design Alternative 1 (Preferred)**	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local	4	5	3	3	3	0.6	10.8	• A Liaison Officer could assist in raising any concerns / complaints noted by the reserve / landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource;	3	4	1	2	1	0.4	4.4

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		community, wildlife and the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment may be polluted due to accidental spillages of petrochemicals from the vehicles and equipment, or bitumen from the constructing the road; • Air pollution related to particulate and dust generation will occur during construction; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.									• Any spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation, local Department of Economic Development, Tourism and Environmental Affairs., etc.); • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation. • Research and implement alternative energy sources for road lighting where possible.							
	Design Alternative 2	• There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil and cement spills, litter from personnel on-site, sewage from ablutions etc.); • Dust and noise will be created during the construction phase, which may impact on the local community, wildlife and the surrounding landowners; • Removal of vegetation and anticipated soil disturbance could result in increased dust levels in the area; • The receiving environment may be polluted due to accidental spillages of petrochemicals from the vehicles and equipment, or bitumen from the constructing the road; • Air pollution related to particulate and dust generation will occur during construction; • Planning of alternative energy sources (solar panels for lighting and solar studs for road marking) to reduce reliability on the national grid.	4	5	3	3	3	0.6	10.8	• A Liaison Officer could assist in raising any concerns / complaints noted by the reserve / landowners or surrounding community to the construction team; • Road dampening measures must be undertaken to prevent excessive dust during construction. Note, measures such as soil binders, are preferred over the use of water as it is a scarce resource; • Any spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation, local Department of Economic Development, Tourism and Environmental Affairs., Bonamanzi Reserve etc.); • All vehicles and equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation. • Research and implement alternative energy sources for road lighting where possible.	3	4	1	2	1	0.4	4.4
Health and safety	**Design Alternative 1 (Preferred)**	• The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; • Faunal disturbance may occur potentially from the additional noise from increased vehicular movement at the construction site; and • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs. • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel;	2	2	1	1	1	0.3	2.1	• Hours of work should be limited to between 7am and 5pm on weekdays and Saturdays; • No work is to be permitted on Sundays or Public Holidays; • Construction personnel should be made aware of the need to prevent unnecessary noise such as hooting and shouting; • A designated speed limit should be set by the developer to limit possible road strikes.	2	2	1	1	1	0.3	2.1

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	Design Alternative 2	• The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; • Faunal disturbance may occur potentially from the additional noise from increased vehicular movement at the construction site; and • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs. • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel;	2	2	1	1	1	0.3	2.1	• Hours of work should be limited to between 7am and 5pm on weekdays and Saturdays; • No work is to be permitted on Sundays or Public Holidays; • Construction personnel should be made aware of the need to prevent unnecessary noise such as hooting and shouting; • A designated speed limit should be set by the developer to limit possible road strikes.	2	2	1	1	1	0.3	2.1
Aesthetics	**Design Alternative 1 (Preferred)**	• The surrounding landowners, road users, tourists etc. may be exposed to an aesthetically unpleasant environment during the construction phase.	2	2	1	1	1	0.8	5.6	• If possible, the Construction Camp should be positioned on previously disturbed areas; • The Construction Camp must be contained so as to prevent any visual intrusion and be kept in a clean and orderly state at all times. This will also deter rodents and other fauna from entering the camp; • The roofing of the proposed construction camp should be neutral shades and constructed with non-reflective materials; Housekeeping is to be maintained for the duration of the construction and rehabilitation phases.	1	1	0	0	0	0.4	0.8
	Design Alternative 2	• The surrounding landowners, road users, tourists etc. may be exposed to an aesthetically unpleasant environment during the construction phase.	2	2	1	1	1	0.8	5.6	• If possible, the Construction Camp should be positioned on previously disturbed areas; • The Construction Camp must be contained so as to prevent any visual intrusion and be kept in a clean and orderly state at all times. This will also deter rodents and other fauna from entering the camp; • The roofing of the proposed construction camp should be neutral shades and constructed with non-reflective materials; Housekeeping is to be maintained for the duration of the construction and rehabilitation phases.	1	1	0	0	0	0.4	0.8
Poaching of local fauna and flora	**Design Alternative 1 (Preferred)**	• Due to the species rich region in which the construction site is found, poaching of fauna and flora by employees may take place.	2	4	3	2	3	0.2	2.8	• No hunting is permitted on-site or in the surrounding areas; • No animals required for hunting e.g. dogs, under the supervision of construction workers, should be allowed into the area; • All construction personnel should be informed of this ruling; and • Any construction personnel found to be poaching in the area should be subjected to a disciplinary hearing.	1	1	1	1	1	0.1	0.5
	Design Alternative 2	• Due to the species rich region in which the construction site is found, poaching of fauna and flora by employees may take place.	3	5	3	3	3	0.2	3.4	• No hunting is permitted on-site or in the surrounding areas; • No animals required for hunting e.g. dogs, under the supervision of construction workers, should be allowed into the area;	2	2	1	2	1	0.1	0.8

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										• All construction personnel should be informed of this ruling; and • Any construction personnel found to be poaching in the area should be subjected to a disciplinary hearing.							
Cumulative Impacts																	
General	**Design Alternative 1 (Preferred)**	• Environmental degradation; • Additive disturbance to IAPs during the construction phase; • Increased runoff and water turbidity from run-off and construction activities; • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents; • Increased temporary employment and skills development for local community members; • Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel; • Soil erosion, disturbance and plant removal – increased competition from alien plant seeds; • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel; • Construction personnel may illegally poach local fauna; • The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs; • Increased runoff and water turbidity from run-off and construction activities.	4	5	7	7	3	0.9	23.4	• Ensure that original mitigatory impacts regarding soil erosion, flora, fauna disturbance and social anxiety are enforced and adhered to in the construction phase; and • All mitigation measures as detailed above will be included in the EMPr.	4	5	7	3	1	0.6	12
	Design Alternative 2	• Environmental degradation; • Fragmentation of a larger portion of agricultural land than the Preferred Layout; • Additive disturbance to IAPs during the construction phase; • Increased runoff and water turbidity from run-off and construction activities; • Construction personnel/ construction vehicles – movement of construction personnel and vehicles pose a potential health and safety risk to road users and local residents; • Increased temporary employment and skills development for local community members; • Alien plant infestation – seed dispersal via building material and equipment imports, vehicles and personnel;	4	5	7	7	3	0.9	23.4	• Ensure that original mitigatory impacts regarding soil erosion, flora, fauna disturbance and social anxiety are enforced and adhered to in the construction phase; and • All mitigation measures as detailed above will be included in the EMPr.	4	5	7	3	1	0.6	12

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		• Soil erosion, disturbance and plant removal – increased competition from alien plant seeds; • Noise impacts generated from construction activity i.e. vehicles, equipment and personnel; • Construction personnel may illegally poach local fauna; • The development may result in concern and confusion amongst IAPs should they not be aware of the project prior to construction commencing; • Increase in road strikes of birds and wildlife, especially slow-moving organisms such as frogs.															
OPERATIONAL PHASE																	
Direct impacts																	
Road safety	**Design Alternative 1 (Preferred)**	• Regular maintenance of built infrastructure; • Improved road safety for pedestrians and road users in Hluhluwe town.	4	6	7	7	7	1	31 (Positive Impact)	• Appropriate traffic signage must be installed to alert road users of speed limits; • Road safety measures such as rumble strips and speed bumps may be installed to prevent speeding; • Safety features such as guardrails, fencing and appropriate road signs should be erected where necessary to assist in addressing safety measures on the road.	4	6	7	7	7	1	31 (Positive Impact)
	Design Alternative 2	• Regular maintenance of built infrastructure; • Improved road safety for pedestrians and road users in Hluhluwe town.	4	6	7	7	7	1	31 (Positive Impact)	• Appropriate traffic signage must be installed to alert road users of speed limits; • Road safety measures such as rumble strips and speed bumps may be installed to prevent speeding; • Safety features such as guardrails, fencing and appropriate road signs should be erected where necessary to assist in addressing safety measures on the road.	4	6	7	7	7	1	31 (Positive Impact)
Improved efficiency of travel	**Design Alternative 1 (Preferred)**	• The realigned route will allow for faster, safer and more direct travel for commuters.	4	6	7	7	7	1	31 (Positive Impact)	• Mitigation measures required include the relevant safety signage and standards along the realigned route.	4	6	7	7	7	1	31 (Positive Impact)
	Design Alternative 2	• This corridor also has an increased risk of vehicular collisions with wildlife.	4	6	7	5	7	1	29	• Mitigation measures required include the relevant safety signage and standards along the realigned route.	4	6	7	5	7	1	29
Loss and fragmentation of agricultural land	**Design Alternative 1 (Preferred)**	• The construction footprint will result in the loss of agricultural land, which will continue to be experienced during the operational phase. • Arable land will remain fragmented during the operational phase.	3	4	7	5	7	1	26	• It is anticipated that SANRAL will compensate the landowner for any loss of agricultural land and consequent earnings. This is however being dealt with as a separate process to this assessment.	1	3	3	4	7	1	18
	Design Alternative 2	• The construction footprint will result in the loss of agricultural land, which will continue to be experienced during the operational phase. • Arable land will remain fragmented during the operational phase.	3	4	7	5	7	1	26	• It is anticipated that SANRAL will compensate the landowner for any loss of agricultural land and consequent earnings. This is however being dealt with as a separate process to this assessment.	1	3	3	4	7	1	18
Alignment with IDP and LSDI	**Design**	• The various objectives listed in the IDP and LSDI, in relation to the realignment of the R22, will be realised once the Preferred Layout is constructed	5	7	7	5	7	1	31 (Positive Impact)	• No mitigation measures required.	5	7	7	4	7	1	30 (Positive Impact)

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	Alternative 1 (Preferred)	and in operation.															
	Design Alternative 2	• The IDP notes that future development within Hluhluwe town is planned to the south and the west of the existing town. For this reason, any development to the south of the town limits any township development and recreates issues which are presently experienced within the town. The Southern Corridor is therefore considered to conflict with the LAP and IDP. • The proposed realignment falls within the extent of the LSDI and will form an integral economic and social connector between the surrounding regions.	5	7	7	5	7	1	31 (Positive Impact)	• No mitigation measures required.	5	7	7	4	7	1	30 (Positive Impact)
	Design Alternative 1 (Preferred)	• Potential fears on the part of local proprietors and businesses regarding the scope of the business revenues, the value of their properties, and the impact of the road on land uses. Petrol stations, quick stop service stations and fast-food restaurants are assumed to cater largely for through traffic and are the most likely to be impacted by the diversion of traffic due to the realignment, although all layout alternatives provide easy access to the CBD. • Loss of income for farmers relating to loss of arable agricultural land.	4	5	7	5	7	0.8	22.4	• As per the Traffic Study undertaken the bypass will not have a big impact on local business. In addition, if commuters are wanting to enter Hluhluwe town for business reasons, they can do so via the entry / exit points. • It is anticipated that SANRAL will compensate the landowner for any loss of agricultural land and consequent earnings. This is however being dealt with as a separate process to this assessment.	3	4	7	5	7	0.6	15.6
	Design Alternative 2	• The value of the farmer's land may decrease because of the bisected agricultural land. • Possible decrease in the value of houses at the northern extent of Hluhluwe town relating to the proximity of the houses to the realignment.	2	5	7	4	7	0.5	12.5	• This is an indirect impact which cannot be mitigated against should the development go ahead. • The loss of agricultural land and consequent land value is being addressed by SANRAL as a separate process.	2	4	7	4	7	0.3	7.2
Stormwater control	**Design Alternative 1 (Preferred)**	• Stormwater run-off from the hardened surface of the road may create erosion; • Additional vehicles travelling to and from the site will increase traffic on the surrounding roads; • The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion adjacent to and within the town of Hluhluwe.	2	4	3	3	3	0.5	7.5	• Velocity dissipating measures with regards to stormwater management should be installed; • The site, and surrounding areas, must be monitored for signs of erosion, excess construction material, waste etc. Should any signs be noted, the erosion mitigation measures, as will be noted in the relevant EMPr, must be implemented; • Appropriate stormwater / surface water management measures must be maintained throughout the lifetime of the development.	1	3	2	2	1	0.2	1.8
	Design Alternative 2	• Stormwater run-off from the hardened surface of the road may create erosion; • Additional vehicles travelling to and from the site will increase traffic on the surrounding roads; • The additional hardened surfaces created during	2	4	3	3	3	0.5	7.5	• Velocity dissipating measures with regards to stormwater management should be installed; • The site, and surrounding areas, must be monitored for signs of erosion, excess construction material, waste etc. Should any signs be noted, the erosion mitigation	1	3	2	2	1	0.2	1.8

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		construction will increase the amount of stormwater runoff, which has the potential to cause erosion adjacent to and within the town of Hluhluwe.								measures, as will be noted in the relevant EMPr, must be implemented; • Appropriate stormwater / surface water management measures must be maintained throughout the lifetime of the development.							
Alien vegetation	**Design Alternative 1 (Preferred)**	• Alien plants may invade the site if not monitored and removed on an on-going basis. Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control.	3	3	3	3	3	0.7	10.5	• Alien plant encroachment must be monitored and prevented as will be outlined in the EMPr. • An Alien Vegetation Control Programme, as produced by the Contractor, and submitted to the ECO and Engineer for approval prior to implementation, is to be implemented on site.	2	2	1	2	1	0.2	1.6
	Design Alternative 2	• Alien plants may invade the site if not monitored and removed on an on-going basis. • Alien vegetation may encroach onto the surrounding lands due to poor on site alien vegetation control. This poses a direct threat to the habitat integrity of the Bonamanzi Reserve near the development. • The proliferation of alien vegetation could replace the forage available for herbivores within the reserve.	3	3	3	3	3	0.7	10.5	• Alien plant encroachment must be monitored and prevented as will be outlined in the EMPr. • An Alien Vegetation Control Programme, as produced by the Contractor, and submitted to the ECO and Engineer for approval prior to implementation, is to be implemented on site.	2	2	1	2	1	0.2	1.6
Cumulative impacts																	
Traffic	**Design Alternative 1 (Preferred)**	• Decrease in traffic volumes in Hluhluwe town; • Increase in pedestrian safety in Hluhluwe town due to decreased traffic volumes and interactions with vehicles; • Change in traffic patterns / increased traffic volumes could result in increased noise levels and an increase in 'roadkill' accidents along the road (fauna); • Safety impacts during the construction phase relating to construction vehicles exiting and entering the exiting R22.	3	5	7	1	7	1	23	• Increase in traffic volumes is difficult to mitigate against as the purpose of the realignment is to transfer road traffic from Hluhluwe, out of town. • Traffic Safety Management Plan is to be drawn up by the Applicant / the Applicants suitably qualified representatives for implementation during the construction phase. This is to encompass traffic control measures, flagmen, access points etc.	3	5	7	1	7	1	23
	Design Alternative 2	• Decrease in traffic volumes in Hluhluwe town; • Increase in pedestrian safety in Hluhluwe town due to decreased traffic volumes; • Change in traffic patterns / increased traffic volumes could result in increased noise levels and an increase in 'roadkill' accidents along the road (fauna); • Safety impacts during the construction phase relating to construction vehicles exiting and entering the exiting R22.	3	5	7	1	7	1	23	• Increase in traffic volumes is difficult to mitigate against as the purpose of the realignment is to transfer road traffic from Hluhluwe, out of town. • Traffic Safety Management Plan is to be drawn up by the Applicant / the Applicants suitably qualified representatives for implementation during the construction phase. This is to encompass traffic control measures, flagmen, access points etc.	3	5	7	1	7	1	23
Aerodromes, flight procedure designs & Communication, Navigation and	Design Alternative 1 (Preferred)	• An Aviation Obstacle Impact Assessment was conducted on the proposed SANRAL R22 Hluhluwe Road Bridge development.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• The proposed development's proximity to any airport's OLS should be continuously monitored to ensure ongoing compliance with safety standards.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Nature of Impact		Impact summary	Without Mitigation						Significance rating (before mitigation)	Proposed mitigation	With Mitigation						Significance rating (after mitigation)
			SE	S / I / M	D	RL	R	P			SE	S / I / M	D	RL	R	P	
			SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, RL = Resource Loss, R = Reversibility, P = Probability								SE = Spatial Extent, S/I/M = Severity / Intensity / Magnitude, D = Duration, R L= Resource Loss, R = Reversibility, P = Probability						
Surveillance (CNS) equipment	Design Alternative 2	• The assessment confirmed that the proposed development poses no adverse effects / impacts on existing published Flight Procedures, Minimum Vectoring Altitudes and the operational integrity of CNS systems.								• Regular reviews of CNS facilities and operational procedures should be maintained to pre-emptively address any future concerns.							
ACTIVITY: DECOMMISSIONING AND CLOSURE PHASE																	
It is not anticipated that the site location and consequent realigned route will be decommissioned or closed at any point as it ties in directly with other planned future expansions within the greater area namely the expansion of the railway line and the Lubombo Spatial Development Initiative. As such it is not envisaged that the realigned route will ever be decommissioned or closed.																	
ACTIVITY: NO-GO OPTION																	
The purpose of the proposed realignment is to provide a safe more direct commute for passengers using the R22 and surrounds, to improve the safety of pedestrians within Hluhluwe town, to comply with national standards regarding regional routes passing through towns, and also for the R22 to tie in directly with the authorised realignment. If the no-go option is followed, the safety of road users and pedestrians within Hluhluwe town will continue to be compromised. In addition, this will compromise the development of the realignment, which are integral motivating factors in this application, as the road-over-rail bridge forms an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique. As such it is not recommended that the No-Go alternative is pursued.																

13 ENVIRONMENTAL IMPACT STATEMENT

13.1 SUMMARY OF KEY FINDINGS

The findings of the detailed impact assessment and scoring noted that of the two Site Alternatives provided, namely the Northern and Southern Corridor. The Northern Corridor (Site alternative 1) is the preferred Site Alternative, as it complies with local planning documents, does not negatively impact on the surrounding biodiversity and provides a shorter realignment route (and consequently reduced construction costs). In contrast, the Southern Corridor (Site alternative 2) is in direct conflict with local planning documentation, will pass directly through Bonamanzi Game Reserve and follows a longer and more expensive route alignment.

As such Site alternative 1 is considered the only feasible and reasonable alternative.

Within the Northern Corridor, two Layout Alternatives were provided, namely the Design Alternative 1 (preferred) and Design Alternative 2. Of these, the Preferred Layout was deemed the only suitable layout which achieved the mandate of the road realignment. This was achieved as the Preferred Layout does not infringe on local future planning documentation and has a smaller cumulative loss of agricultural land associated with the road and the road reserve**.**

As such the Design Alternative 1 is considered the only feasible and reasonable alternative.

13.2 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS IDENTIFIED

13.2.1 Alternatives

Site Alternatives

Site Alternative 1 **(Preferred Alternative)**

During the initial route location process for the Western and Eastern Phases of the development, two corridors were identified for the potential realignment of the R22. These were a Southern Corridor located to the south of the existing R22 passing through the southern portion of Hluhluwe and a Northern Corridor passing through mainly agricultural land. The Northern Corridor (**Figure 6-2**) was considered the favourable option for the following reasons:

- The Northern alignment corridor is shorter, thus reducing road construction costs, the amount of land required and the impact on the receiving environment.
- The Northern Corridor does not bisect the town of Hluhluwe and there is little or no impact on the LAP of Hluhluwe.
- The Northern Corridor alignment does not impact on the future expansion of Hluhluwe town.
- The Northern Corridor is bound by the Ngweni River to the north requiring only one potential water course crossing within this corridor.
- The alignment of the Northern Corridor passes through agricultural land which is completely transformed.

The Northern Corridor has a smaller development footprint, a reduced impact on the receiving environment, and does not negatively affect the LAP of Hluhluwe town. It would also tie into the already authorised realignment which is already under construction.

As such it is considered the Northern Corridor is the preferred site and the only feasible alternative. As such, this assessment report only refers to the Northern Corridor.

Site Alternative 2

An alternative site to the south of Hluhluwe Town was initially considered during the site selection process. This site, referred to as the Southern Corridor, had two layout options namely an alignment between the Hluhluwe River and Hluhluwe Town, or an alignment to the south of the Hluhluwe River. Both of these options were considered unsuitable for the following reasons:

- Extending the corridor to the south of the Hluhluwe River increases the length of the realignment substantially. This would require the acquisition of substantially more land.
- The increased alignment footprint would increase construction costs, as well as the impact on the receiving environment which, although disturbed, has not been completely transformed.
- In terms of the Big 5 False Bay Local Municipality Local Area Plan (LAP), any road located to the south of the existing R22 and north of the Hluhluwe River will effectively bisect the township developments within Hluhluwe. A route located here would create a similar situation with respect to uncontrolled access, vehicular and pedestrian movements that currently exist within Hluhluwe. These factors are undesirable for a National Route.
- The Southern Corridor has a number of smaller feeder tributaries which would require several structures to accommodate these streams.
- The development planning for the town of Hluhluwe will be severely curtailed should the realignment of the R22 pass along the Southern Corridor, which is directly through the primary development node as identified by the LAP.
- The Southern Corridor extends through the Bonamanzi Game Reserve and any road here would bisect the reserve and negatively impact on the habitat of the wildlife and operations of the reserve. This corridor also has an increased risk of vehicular collisions with wildlife.

The Southern Corridor is an undesirable option in terms of a site alternative, and as such the Northern Corridor is considered the only feasible option.

Activity Alternatives

Alternative 1 **(Preferred Alternative)**

The primary reason for the construction of a dedicated road-over-rail-bridge and approach alignment at the intersection of Route R22 is the elimination of the at-grade railway crossing. The at-grade crossing compromises the safety of road users, whereas the road-over-rail bridge will enhance the safety of all road users in the Hluhluwe area (local and visitor traffic). Benefits to the town include improved safety of pedestrians within town as the bypass removes all through traffic (except those wishing to stop in town). The development will also improve the safety of all road users at the railway crossing as they will no longer have to cross directly over the railway line but will pass over the railway line on the bridge structure, thus directly removing the threat of a collision with trains. Improvement of road safety along the section of the MR453 that passes through the town centre, especially for pedestrians due to the reduction of vehicular and pedestrian conflict in the town area. Heavy vehicles which are not destined for the town centre will no longer pass through the town centre. The bypass will provide an alternative route for these vehicles, removing most of them from the town centre. This will increase the lifespan of the pavement of the MR453. Other reasons include:

- Noise and pollutant emission reduction in town area.
- Travel time saving for through traffic.
- Opportunity for local construction contractors and associated local community enterprises to gain economic benefits from the construction phase.
- Additional opportunities for skills transfer and education/training of local communities will be created.
- Potential positive socio-economic impacts likely to result from the project, such as increased local spending and the creation of local employment opportunities.
- The proposed development will assist in the upgrading of transport routes which link tourism centres.
- The project will complement the R22 Lubombo Spatial Development Initiative (LSDI) Corridor which links Hluhluwe to Mozambique.

Alternative 1 is the preferred activity option and would infer that the proposed construction of a Dedicated Road-Over-Rail Bridge and Approach Alignment at the Mbazwana/Sodwana Intersection of Route R22, Hluhluwe Town, Big 5 False Local Municipality, KwaZulu-Natal will be undertaken.

Alternative 2

Activity alternative two is the "no-go" option. In the case that the "no-go" alternative is exercised, the safety of road users crossing the railway line will continue to be compromised. In addition, this will also compromise the development of the Western Phase, which is an integral motivating factor in this application, as the Western and Eastern Phases form an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique. As such it is not recommended that the No-Go alternative is pursued.

Design Alternatives

Alternative 1 (Preferred Alternative)

The proposed layout follows the R22 alignment from the east, passes directly through where Gazebo Lodge is currently situated, and then rises above the railway line by way of a road-over-rail-bridge. The alignment extends past the north of the town and ties into the R22 west of the town. A desirable design speed of 100km/h will be able to be maintained with this layout alternative.

The alignment passes to the North of the Hluhluwe Airfield (Runway 21) at chainage 2540. A Quarterlink junction at chainage 2706 provides access from the realigned R22 to Hluhluwe town.

The route will be connected to the existing R22 via a bidirectional Quarterlink road. The alignment of the Quarterlink will be parallel to the airfield in a north/south direction for approximately 400m.

From a geometric perspective Alternative 1 is the preferred alignment as it has the most favourable horizontal geometry particularly in the proximity of the airfield and new road over rail bridge. Alternative 1 also provides the most acceptable sight distances along the route for the desired design speed. Based on the outcome of the traffic analysis Alternative 1 is recommended as the preferred alignment.

Alternative 2

The proposed layout follows the R22 alignment from the east, has a series of right and left curves to avoid the Gazebo Lodge and then rises above the railway line by way of a road-over-rail-bridge. The alignment extends past the north of the town and ties into the R22 west of the town.

The alignment passes to the North of the Hluhluwe Airfield (Runway 21) at chainage 2540. The road at this position is approximately 1m in fill i.e. has risen 1m above ground level and is within the approach requirements of the South Africa Civil Aviation Authority. A Quarterlink junction provides access from the realigned R22 to Hluhluwe town. The alignment at this point has a series of right and left curves to avoid the Gazebo Lodge. From here the alignment ties in with the existing R22 in the East.

The alignment of the Quarterlink will be parallel to the airfield in a north/south direction for approximately 400m and will then curve to the left with a radius of 130m. The link will tie in with a T-junction on the existing R22.

Technology Alternatives

Technology alternatives are limited to the illumination of the road-over-rail-bridge. Two separate illumination alternatives are available for the lighting of the bridge. These are solar energy powered lights, or lights that draw energy from the electricity mains. As per a Case Study established by SANRAL in the Cape Town region, the establishment of renewable energy sources at point forms along a road alignment is a viable solution to electricity lines. The case study notes that if the distance from the nearest electricity supply exceeded 1km, then the establishment of renewable energy sources is advised. "The total installation cost of the renewal equipment per camera location or VMS installation amounts to approximately R40 000 (US$6 000) which is comparable to the cost of laying an electrical cable, encasing it in concrete for 1 km and connecting it to the mains supply. In many locations along the route, the provision of renewable energy resulted in significant savings to the project.

The illumination source type for the lighting of the bridge will be finalised at a later stage during the construction phase.

Operational Aspects

The preferred and only operational aspects of the activity involve the maintenance of infrastructure. No alternatives to the operation aspect of the proposed development have been considered.

"No-Go" Alternative

The no-go alternative must be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The no-go alternative assumes that the proposed project will not go ahead i.e., the proposed development will not occur and therefore the site will remain as

The purpose of the proposed road-over-rail-bridge and approach alignment is to provide a safe crossing point for vehicles, over the railway line. This is in light of the proposed application for the Western Phase Application (which will tie into the Eastern phase Application), and the future expansion of the railway line. If the no-go option is followed, the safety of road users crossing the railway line will continue to be compromised. In addition, this will compromise the development of the Western Phase, which is an integral motivating factor in this application, as the Western and Eastern Phases form an integral part of the Lubombo Spatial Development Initiative, which links the N2 with Sodwana, Kosi Bay and Mozambique.

13.2.2 Final Proposed Alternative

As has been assessed in this report, **The Northern Corridor is the preferred site alternative (Site alternative 1)**. Within the Northern Corridor, **Design Layout 1 is considered the only feasible and reasonable alternative,** with the greatest positive impacts and the least negative impacts.

It is therefore recommended that should the DFFE grant Environmental Authorisation, the Preferred Layout (which incorporates both Site Alternative 1 & Design Layout 1) be authorised.

13.2.3 EIA Phase

Open lines of communication with the Competent Authority will continue. Following the commencement of the legislated EIA Phase PPP timeframes, the DFFE will be notified of the availability of the DEIA, as well as being supplied with the electronic copies of the reports for review and commenting purposes.

The Public Participation Process will continue in the EIA Phase. The register of IAPs from the Scoping Phase has been carried over and expanded. Communication with the Assessing Officer, Government Authorities, Municipal Departments, landowners and conservation bodies such as EKZNW will continue via written and electronic means.

Simultaneously, the EIA and EMPr will be made available to all I&APs for review and comment for a period of 30 days. Stakeholder and I&AP's will be notified of the pending closure of timeframes of the commenting periods, approximately a week prior to the closure. Following the completion of the DEIA Phase PPP timeframes, the report will be amended and finalised based on I&AP and stakeholder comment and the relevant impact assessment. The DEIA commenting period will close on 18 October 2025. The Final EIA document will be submitted to the DFFE for review and decision.

Public participation will continue to be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the NEMA (Act 107 of 1998) EIA Regulations of 2014 (as amended).

14 CONDITIONS OF AUTHORISATION / RECOMMENDATIONS OF THE EAP

The proposed development will not result in impacts on the natural or social environment that are highly detrimental, nor result in undue risks to the natural environment, should all standards be adhered to and mitigation measures and specialist recommendations be implemented during the pre-construction and construction phases of the project.

The nature and types of negative impacts do not outweigh the potential benefits of this project, provided that the localised impacts of the construction phase are adequately mitigated and managed appropriately. In this regard, an EMPr has been compiled and is attached to this report (see **Appendix E**).

It is recommended that external EMPr monitoring is undertaken by an independent Environmental Control Officer (ECO) during the construction phase of the project to ensure that the requirements of the EMPr are being correctly implemented, thus ensuring the protection of the surrounding environment

IT IS THE RECOMMENDATION OF THE EAP THAT THE FOLLOWING MANAGEMENT AND MITIGATION MEASURES BE INCORPORATED INTO ANY PROJECT APPROVALS WHICH MAY BE ISSUED:

1. All recommendations noted in the specialists' assessments undertaken are to be implemented as stated in the EMPr.
2. Environmental Monitoring:
   - An independent, external ECO must audit the construction site during the construction phase of the development on at least a monthly basis, unless otherwise specified by the DFFE;
   - A monthly construction Environmental Audit Report is to be drafted by the ECO and submitted to the DFFE; and
   - During operation, SANRAL is responsible for monitoring the realignment and implementing maintenance and rehabilitation, in line with their standard EMP.
3. General measures:
   - An agreement is to be established between the Contractor and the Local Municipality with regards to the provision of services (sewerage, electricity etc.) for the duration of the construction period.
   - Should the provision of water services by the Local Municipality, for the contractor, not be feasible, the Contactor will be responsible for obtaining the relevant licences for the abstraction of water, prior to the commencement of the construction phase.
   - A Traffic Safety & Accommodation Management Plan is to be drawn up by the Contractor (for approval by the SANRAL Project Team) for implementation during the construction phase. This is to encompass traffic control measures, flagmen, access points etc.
   - No construction on the bridge can commence prior to receiving approval from SACAA.

It is requested that the Environmental Authorisation, if issued by the Competent Authority, be valid for a period of ten (10) years from the date of signature.

15 ASSUMPTIONS / UNCERTANTIES AND GAPS IN KNOWLEDGE

The information provided in this report is based on relevant planning documentation, input from the appointed engineering firm, professional judgement, past experience and site work. The requirements proposed in the PoS accepted by the DFFE have been implemented and assessed in the EIA. No deviations from the methodology included in the PoS were required.