

## CHAPTER 10 ASSESSMENT: NDWALANE TO NTAFUFU RIVER

This chapter provides an assessment of the key potential biophysical, socio-economic and cultural/historical heritage impacts, as appropriate, that would result from the construction and operational phases of the proposed works, including physical toll plazas, between Ndwalane and the Ntafufu River (see Figure 10.1). A comparative assessment of the site-specific alternative route alignments and alternative mainline toll plaza locations for the toll section between Mthatha and Ntafufu is provided separately below (see Sections 10.3 and 10.4).

### 10.1 INTRODUCTION

The proposed works between Ndwalane and the Ntafufu River are described in detail in Section 4.2.4, with accompanying illustrations being shown in Figures 4.14 to 4.18. The proposed works along this section of the proposed toll highway would involve the construction of a new “greenfields” road to national road standards between Ndwalane and Ntafufu. A major high-level bridge crossing is proposed over the Mzimvubu River, with interchanges proposed at Ndwalane and Ntafufu.

In summary, the following works are proposed along this section of the proposed toll highway:

- Construction of a new road to national road standards;
- Construction of a new bridge across the Mzimvubu River;
- Construction of new interchanges at Ndwalane and Ntafufu;
- Over- and underpasses, fencing, road signs and guard rails; and
- Construction of a mainline toll plaza at Ndwalane, and ramp plazas at the proposed Ndwalane Interchange.

The Ndwalane Toll Plaza is SANRAL’s preferred mainline toll plaza position for the proposed toll section between Mthatha and Ntafufu - refer to section 3.5.2, Table 3.4 and Figure 4.18. The proposed new road would comprise a two-lane single carriageway highway, with climbing lanes where required and a minimum design speed of 100 to 120 km/h. The width of the road would generally be a minimum of 12.4 m (2x3.7 m lanes and 2x2.5 m paved shoulders) within a road reserve of 80 m.

The proposed Mzimvubu River bridge would be a 40 m span bridge with eight piers, each with four piles in the floodplain and instream areas. Abutments, outside of these areas, would be on cliff tops. The proposed Ntafufu River bridge would consist of three spans supported by two piers and two abutments. Due to unstable soil conditions the north abutment would have a large concrete footing to ensure stability.

A description of the key characteristics of the biophysical, socio-economic and cultural/historical heritage environment along this section of the proposed toll highway is provided in Chapter 6, as appropriate.

As mentioned in Section 5.3, the following “feasible” alternatives have been investigated and assessed along this section of the proposed toll highway:

- Two site-specific alternative route alignments between Ndwalane and the Mzimvubu River – referred to as Alternative 1b and Alternative 1e (i.e. the SANRAL preferred route) – refer to Section 5.3.3 and see Figure 10.2;
- Two site-specific alternative route alignments in the vicinity of Ntafufu village and the Ntafufu River – referred to as Alternative 2a and Alternative 2f (i.e. the SANRAL preferred route) – refer to Section 5.3.4 and see Figure 10.3; and



Figure 10.1: Section of the proposed toll highway between Ndwalane and the Ntafufu River

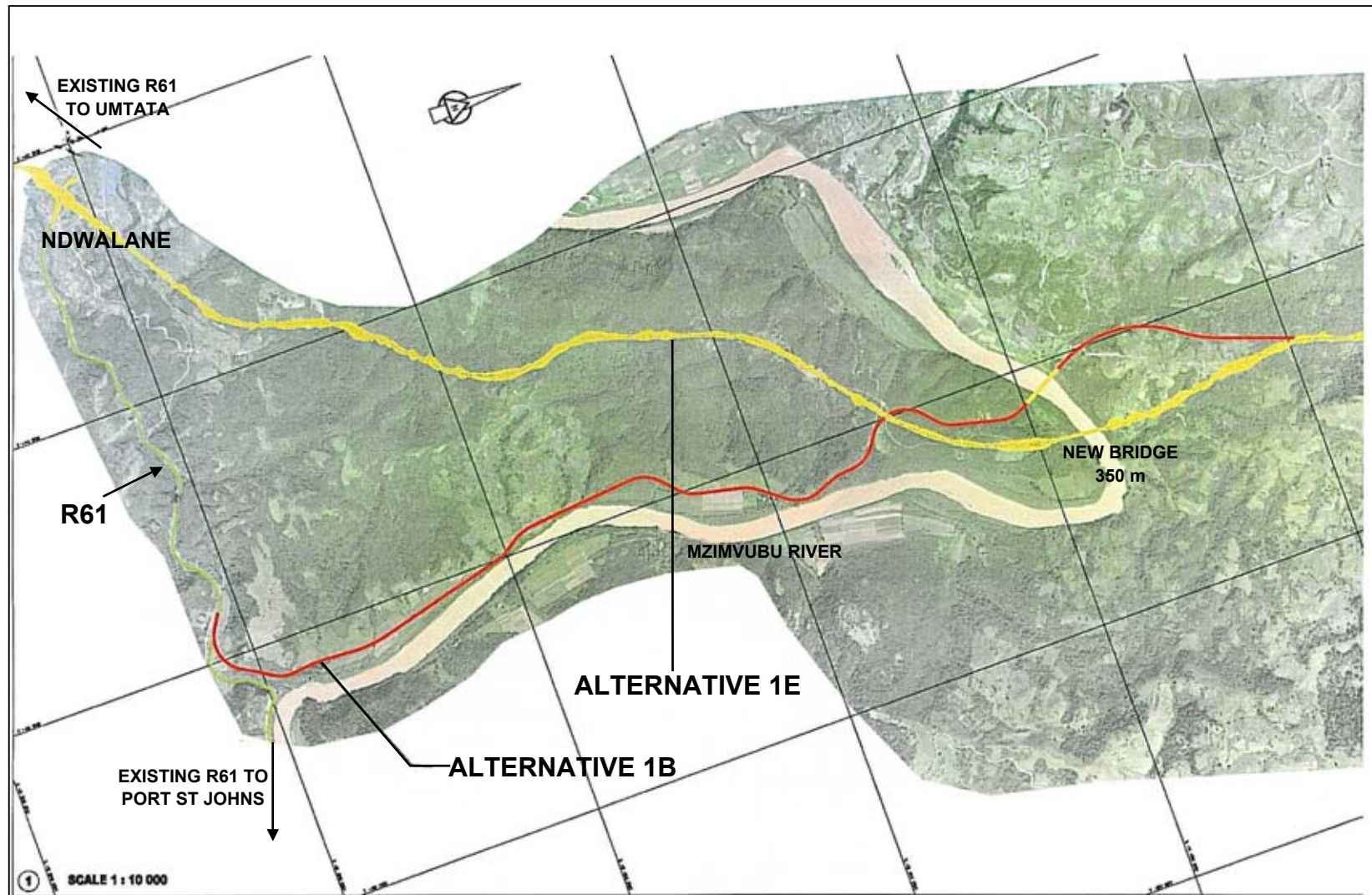


Figure 10.2: SANRAL preferred route (Alternative 1e) and the alternative alignment (Alternative 1b) between Ndwalane and the Mzimvubu River

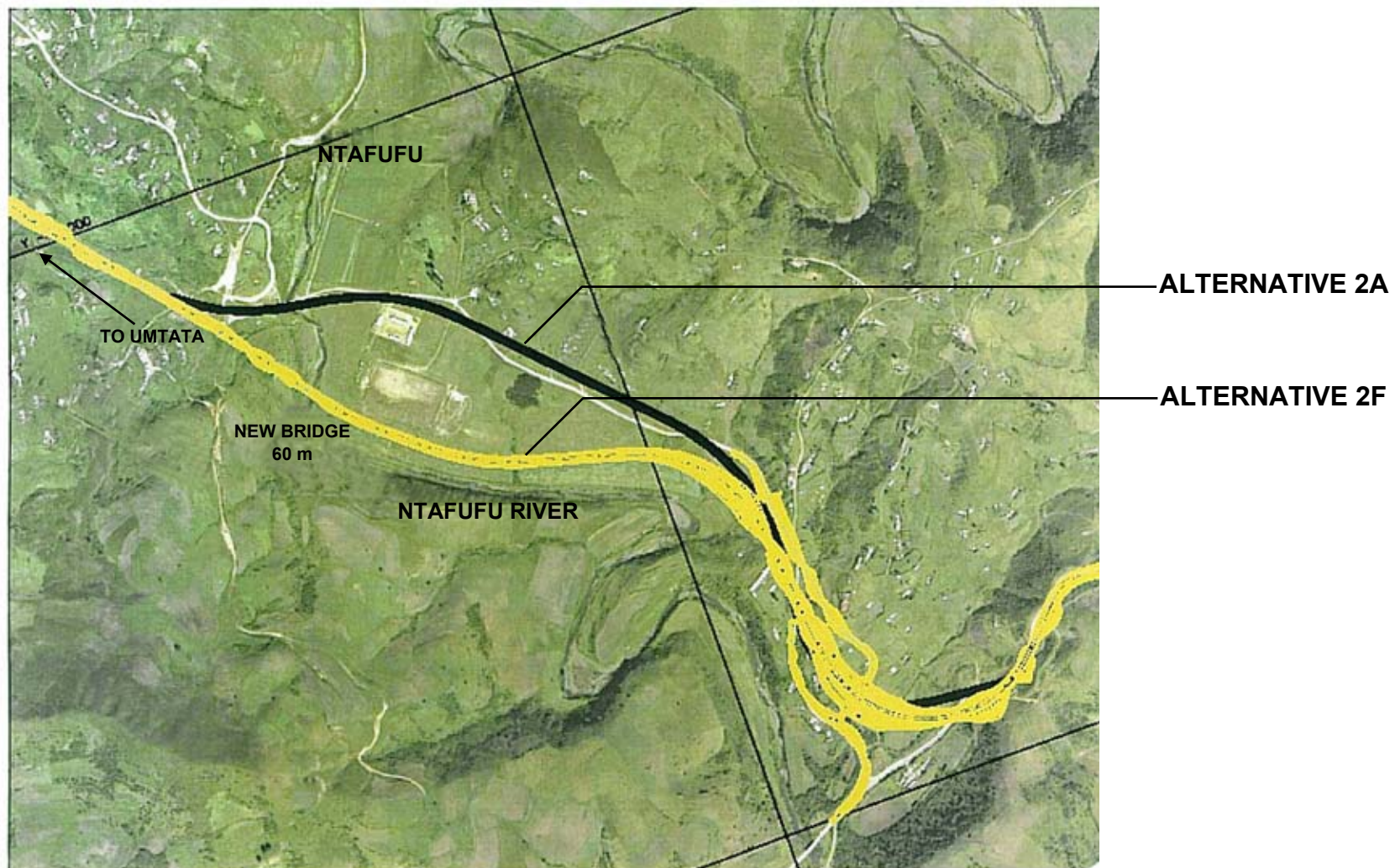


Figure 10.3: SANRAL preferred route (Alternative 2f) and the alternative alignment (Alternative 2a) in the vicinity of the Ntafufu Village and Ntafufu River

- An alternative mainline toll plaza location to SANRAL’s preferred Ndwalane mainline toll plaza (refer to Section 5.3.8, Plate 5.1 and Figure 9.1).

It should be noted that the assessment of the proposed works (provided in Section 10.2 below) incorporates the SANRAL preferred routes – i.e. Alternative 1e between Ndwalane and the Mzimvubu River and Alternative 2f in the vicinity of Ntafufu Village and the Ntafufu River - and preferred Ndwalane mainline toll plaza location mentioned above.

It should also be noted that Sections 10.3 and 10.4 include all potential impacts considered important in undertaking a comparative assessment of the site-specific alternative route alignments and alternative mainline toll plaza locations (in contrast to Section 10.2, which focuses on “key potential impacts” only).

The assessment of potential direct, indirect and cumulative impacts associated with the construction and operational phases of the proposed project are based on the findings of the relevant specialist studies undertaken during the EIA process. The respective specialist reports provide detailed descriptions of the study approach followed, the identified risk sources and the potential impacts – Volumes 2 to 4, Appendices 1 to 13.

## **10.2 ASSESSMENT OF POTENTIAL IMPACTS: PROPOSED WORKS**

It is anticipated that the proposed works along this section of the proposed toll highway, including the proposed Ndwalane mainline and ramp toll plazas and Mzimvubu River bridge, would result in key potential impacts relating to the following aspects: vegetation and flora; fauna; aquatic ecosystems; social; tourism; cultural and historical heritage; noise; visual; and planning/development. These are addressed respectively below.

### **10.2.1 VEGETATION AND FLORA**

The proposed new road along the SANRAL preferred route, the Ndwalane mainline and ramp toll plazas, a major new bridge and ancillary works would result in key potential impacts on vegetation and flora in relation to the following, as appropriate: loss of habitat; loss of biodiversity; fragmentation of habitat; loss of species of special concern; increased run-off and drainage, soil erosion, silt loads and sedimentation; invasion by weeds and invasive alien plants; increased accessibility of remote habitats; reduction in resilience/stability of ecosystems; and disruption of the flow of nutrients and materials. A summary of the assessment of the key potential impacts on vegetation and flora is provided in Table 10.1.

#### ***Loss of habitat***

The construction of the proposed greenfields section between Ndwalane and the Ntafufu River would result in the loss of habitat, including habitats associated with Transkei Coastal Belt (Vulnerable) and Scarp Forest (protected nationally) vegetation. Approximately 5.5 km of the proposed new road between Ndwalane and the Mzimvubu River, and some 1.5 km of road on the northern side of the river, would traverse forest areas. Considering a road reserve width of 80 m, approximately 70 ha of forest area could be affected. The anticipated permanent loss of habitat is assessed to be of **high** intensity and significance.

The proposed Ndwalane mainline toll plaza would be located in a previously disturbed and transformed area but would result in some loss of habitat, including habitats associated with Transkei Coastal Belt

(Vulnerable) and a relatively fragmented portion of Scarp Forest (protected nationally) adjacent to cleared areas. It is expected that the associated loss of habitat would be of **medium** intensity and significance.

The proposed major bridge over the Mzimvubu River would probably affect riparian habitats along the river banks. The probable permanent, localised loss of riparian habitat is assessed to be of **medium** intensity and significance.

Minimisation and restriction of site clearing to the area required for construction purposes only, identification of any protected forest species by a botanical expert prior to any site clearing, revegetation of remaining disturbed areas with site indigenous species and limiting disturbance to adjacent undisturbed natural vegetation, as appropriate, would result in residual impacts of **MEDIUM** or **LOW** significance.

#### ***Loss of biodiversity***

The loss of habitat associated with construction of the proposed greenfields section and Ndwalane mainline toll plaza would probably result in loss of biodiversity. The potential impact associated with construction of the proposed new road is assessed to be of **MEDIUM** intensity and significance without and with mitigation while the residual impact associated with the mainline toll plaza is assessed to be of **LOW** significance (i.e. with implementation of mitigation measures as recommended for “loss of habitat” above).

#### ***Fragmentation of habitat***

Construction of the proposed new road section would cut the patch of forest between Ndwalane and the Mzimvubu River approximately in half, thereby creating two almost equal fragments. However, it is considered that at least half of the alignment through the forest area would traverse areas of existing disturbance, including a gravel road, homesteads, previous cultivation and some areas of secondary forest or alien trees. The expected permanent impacts on vegetation and flora associated with fragmentation of habitat, such as impaired gene flow within fragmented populations and creation of edges, is assessed to be of **high** intensity and significance. Implementation of mitigation measures recommended for “loss of habitat” above would result in a residual impact of **MEDIUM** significance.

#### ***Loss of species of special concern***

The loss of habitat and probable loss of biodiversity associated with construction of the proposed greenfields section would probably result in localised loss of species of special concern. The latter may also occur due to increased harvesting in parts of the forest areas that would become more accessible due to the presence of the road. The probable permanent, localised loss of species of special concern is considered to be of **medium** intensity and significance. Implementation of mitigation measures recommended for “loss of habitat” above would result in a residual impact of **LOW** significance.

#### ***Increased run-off and drainage, soil erosion, silt loads and sedimentation***

Site clearing activities and the increased pavement area associated with the proposed new road and Ndwalane mainline and ramp toll plazas would probably result in increased run-off and drainage, soil erosion, silt loads and sedimentation. The probable localised loss or disturbance to vegetation and flora is assessed to be of medium intensity over the long term and is thus considered to be of **medium** significance. Minimisation and restriction of site clearing to areas required for construction purposes only, implementation of erosion and sediment control measures, appropriate location of site offices and ongoing monitoring and maintenance of revegetation works would reduce the significance of the potential impact to **LOW**.

***Invasion by weeds and invasive alien plants***

Invasion by weeds and invasive alien plants would be facilitated by disturbance resulting from construction-related activities, including activities associated with the proposed Mzimvubu River bridge. Alien plants are known to invade forests up to 150 m from the margin adjacent to disturbance, which indicates that approximately 210 ha of additional forest may be altered adjacent to the road over and above the area that would be lost due to road construction. Currently, forests in the study area are already characterised by high levels of invasion of alien plants. Thus it is considered that probable localised, cumulative impacts of high intensity would occur over the long term. The potential impacts associated with invasion by weeds and invasive alien plants are thus deemed to be of **high** significance. It is considered that implementation of an effective weed control programme would reduce the potential impact to **LOW** significance.

***Increased accessibility of remote areas***

The proposed new road through the forested area between Ndwalane and Ntafufu would probably make previously inaccessible areas more accessible, especially for the removal of larger trees, but also for the harvesting of medicinal products from forest species. The probable impact is assessed to be of **MEDIUM** intensity and significance without and with mitigation. It is considered unlikely that mitigation measures would reduce the significance of the potential impact.

***Reduction in resilience/stability of ecosystems***

It is considered that the resilience/stability of the forest ecosystem between Ndwalane and Ntafufu would be impaired, cumulatively, via potential impacts such as direct loss of habitat, fragmentation of habitat, introduction of alien plants and the potential disruption of the flow of nutrients and materials through the landscape. Potential impacts associated with reduction in resilience/stability of the forests, such as change in vegetation structure and loss of productivity, are assessed to be of **MEDIUM** intensity and significance without and with mitigation.

***Disruption of the flow of nutrients and materials***

The proposed Mzimvubu River bridge would probably also result in disruption of the flow of nutrients and materials. The associated potential impact on the ecological functioning of vegetation and flora is assessed to be of local extent, long-term duration and medium intensity, and is thus considered to be of **medium** significance. Probable residual impacts of **LOW** significance would result through minimising potential impacts on riparian areas by way of the design of the bridge widening and associated structures, the revegetation of disturbed areas with site indigenous species and minimisation and restriction of clearing to the area required for construction purposes.

**Table 10.1: Summary assessment of key potential impacts on vegetation and flora – Ndwalane to Ntafufu River**

| ISSUE / IMPACT                     | EXTENT | DURATION  | INTENSITY   | PROBABILITY | SIGNIFICANCE       | CONFIDENCE  |
|------------------------------------|--------|-----------|-------------|-------------|--------------------|-------------|
| Loss of habitat                    |        |           |             |             |                    |             |
| <b>Without mitigation</b>          | Local  | Permanent | Medium/High | Probable    | <b>Medium/High</b> | Medium/High |
| <b>With mitigation</b>             | Local  | Permanent | Low/Medium  | Probable    | <b>LOW/MEDIUM</b>  | Medium/High |
| Loss of biodiversity               |        |           |             |             |                    |             |
| <b>Without mitigation</b>          | Local  | Long term | Medium      | Probable    | <b>Medium</b>      | Medium      |
| <b>With mitigation</b>             | Local  | Long term | Low         | Probable    | <b>LOW</b>         | Medium      |
| Fragmentation of habitat           |        |           |             |             |                    |             |
| <b>Without mitigation</b>          | Local  | Long term | High        | Probable    | <b>High</b>        | High        |
| <b>With mitigation</b>             | Local  | Long term | Medium      | Probable    | <b>MEDIUM</b>      | High        |
| Loss of species of special concern |        |           |             |             |                    |             |
| <b>Without mitigation</b>          | Local  | Permanent | Medium      | Probable    | <b>Medium</b>      | Medium      |
| <b>With mitigation</b>             | Local  | Permanent | Low         | Probable    | <b>LOW</b>         | Medium      |

| ISSUE / IMPACT   | EXTENT | DURATION  | INTENSITY | PROBABILITY | SIGNIFICANCE  | CONFIDENCE |
|--|--------|-----------|-----------|-------------|---------------|------------|
| Impacts associated with increased run-off and drainage, soil erosion, silt loads and sedimentation |        |           |           |             |               |            |
| <b>Without mitigation</b>  | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>   | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |
| Impacts associated with invasion by weeds and invasive alien plants                                |        |           |           |             |               |            |
| <b>Without mitigation</b>  | Local  | Long term | High      | Probable    | <b>High</b>   | Medium     |
| <b>With mitigation</b>   | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |
| Impacts associated with increased accessibility of remote areas                                    |        |           |           |             |               |            |
| <b>Without mitigation</b>  | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>   | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |
| Impacts associated with reduction in resilience/stability of ecosystems                            |        |           |           |             |               |            |
| <b>Without mitigation</b>  | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>   | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |
| Impacts associated with disruption of flow of nutrients and materials                              |        |           |           |             |               |            |
| <b>Without mitigation</b>  | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>   | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |

## 10.2.2 FAUNA

Key potential impacts on fauna are anticipated during the construction and operational phases of the proposed greenfields section between Ndwalane and the Ntafufu River. These would be associated with the following: loss of sensitive faunal habitats; loss of faunal diversity; loss of Species of Special Concern; impacts on the Cape Griffon Vulture; disruption of faunal movement; invasion of alien faunal species; increased fire risk; chemical pollution; noise and light pollution; and ecosystem disruption. A summary of the assessment of the key potential faunal impacts is provided in Table 10.2.

### ***Loss of sensitive faunal habitats***

The habitats which occur between Ndwalane and the Ntafufu River, such as the forests and thicket patches, are considered sensitive faunal habitats due to their isolated and fragmented nature. The proposed toll highway would bisect and thus increase the fragmentation of these habitats. The permanent loss of sensitive faunal habitats is assessed to be of **HIGH** intensity and significance without and with mitigation as it is considered unlikely that the impact can be effectively mitigated. It is, nevertheless, recommended that SANRAL engages the regional conservation authorities to assist in the formal protection of comparable habitats elsewhere in the Pondoland region, particularly in the proposed Pondoland National Park.

### ***Loss of faunal diversity***

This section of the proposed toll highway has been characterised as still retaining high levels of faunal diversity (113 species of amphibians, reptiles and mammals). It is considered that road traffic associated with this greenfields section of the proposed toll highway would result in an increased animal mortality rate when compared to the existing R61 between Ndwalane and the Ntafufu River, i.e. animals being killed or injured whilst crossing the road during normal movements within their home range (e.g. snakes), during annual breeding migrations (e.g. frogs), during seasonal migrations or when attracted to the road either for warmth (e.g. snakes) or for food from previous road kills (e.g. vultures). The highly probable loss of faunal diversity is assessed to be of medium intensity during the operational phase, thus the significance of the anticipated impact is assessed to be **MEDIUM** without and with mitigation. It is considered unlikely that the impact can be effectively mitigated.

### ***Loss of Species of Special Concern***

The section of the proposed toll highway between Ndwalane and the Ntafufu River contains a high number of Species of Special Concern (38 species of butterflies, slugs, cicadas, amphibians, reptiles, birds and mammals). It is considered that construction-phase impacts, such as habitat loss and associated fragmentation (assessed above), and operation of the proposed toll highway (with associated impacts such as increased fire risk, disturbance and road mortality) would, cumulatively, pose a threat to the survival of populations of threatened species. The potential permanent loss of Species of Special Concern is assessed to be of **MEDIUM** intensity and significance without and with mitigation.

### ***Impacts on the Cape Griffon Vulture***

The survival of the Cape Griffon Vulture in the Transkei region depends not just on protecting important breeding sites on cliffs in river gorges, but also in maintaining a suitable foraging environment with sufficient healthy carcasses for food. The main mortality factors for Cape Griffon Vultures have been ranked as loss of carrion (food), inadvertent poisoning and electrocution on electric transmission lines. The proposed greenfields section between Ndwalane and the Ntafufu River would result in probable impacts of **medium** intensity and significance on the Cape Griffon Vulture. Ensuring that all cables across the major bridge across the Mzimvubu River are installed with suitable bird diverters to prevent vulture mortalities would reduce the probable residual impact to **LOW** significance.

### ***Disruption of faunal movement***

Since the proposed greenfields section between Ndwalane and the Ntafufu River would bisect and thus increase the fragmentation of sensitive forest and thicket habitats, it is anticipated that disruption to faunal movements would also occur. Impacts would arise directly, via increased mortalities from road traffic, as well as indirectly from disturbance and behavioural reluctance to cross alien habitat. The potential localised disruption to faunal movements is assessed to be of medium intensity over the long term and is thus considered of **MEDIUM** significance without and with mitigation. It is considered unlikely that the intensity and significance of the potential impact could be reduced.

### ***Invasion of alien faunal species***

The probable passive translocation of alien faunal species associated with the proposed greenfields section (leading to possible declines in indigenous faunal populations) is assessed to be of medium intensity over the long term and is thus deemed to be of **medium** significance. Active culling programmes of problem animals would reduce the significance of the probable residual impact to **LOW**.

### ***Increased fire risk***

The operational phase of the greenfields section of the proposed toll highway would probably result in a risk of accidental fires extending into the sensitive habitats occurring between Ndwalane and the Ntafufu River, thereby causing localised loss of faunal habitats and diversity. The permanent long-term loss of fauna is assessed to be of **MEDIUM** intensity and significance without and with mitigation since it is considered unlikely that the potential impact could be effectively mitigated. However, it should be ensured that vegetation in the road reserve is kept low so that it serves as an effective fire break and that rest stops and other similar infrastructure are not situated adjacent to sensitive habitats.

### ***Chemical pollution***

It is considered that chemical pollution from exhaust fumes, oil spillage and accumulation of rubber compounds from tyre wear during the operational phase of the proposed toll highway would result in potential impacts of **MEDIUM** intensity and significance without and with mitigation. This would be of particular importance at the proposed interchanges and Ndwalane mainline toll plaza location. It is considered unlikely that the intensity and significance of the potential impact could be reduced. However, it should be ensured that the use of herbicides in the road reserve and at the toll plaza is

restricted and controlled, that impacts on sensitive habitats are minimised and that stormwater outlets, particularly from the toll plaza, do not drain into natural wetlands.

### **Noise and light pollution**

The operation of the proposed toll highway in the greenfields section would result in noise from vehicle traffic and at night would also involve considerable light pollution from vehicle headlights. Cumulatively these factors could depress local faunal populations. For example, ponds adjacent to and illuminated by road traffic or elevated lighting associated with road interchanges and toll plazas (or service facilities) have been shown to have reduced amphibian populations. The potential faunal impact associated with noise and light pollution is assessed to be of **MEDIUM** intensity and significance without and with mitigation since it is considered unlikely that the intensity and significance of the potential impact could be reduced.

### **Ecosystem disruption**

It is expected that the potential direct, indirect and cumulative impacts of the construction and operation of the proposed greenfields section between Ndwalane and the Ntafufu River would, overall, probably result in disruption of biological interactions which, in turn, may lead to a resultant loss or change of ecosystem function (e.g. nutrient cycling) or interruption of ecological processes. This potential localised, long-term impact is assessed to be of **medium** intensity and significance. Implementation of mitigation measures such as: the avoidance of sensitive habitats; maintaining natural drainage; maintaining road reserves as natural fire breaks; minimising silt loads into rivers, streams and wetlands; and ensuring that underpasses are large enough to allow the maintenance of water flow and soil hydrodynamics (and also to serve as migratory paths for small animals) would ensure that ecosystem functioning is maintained. The residual impact of the proposed toll highway between Ndwalane and the Ntafufu River with regard to ecosystem disruption is assessed to be of **LOW** significance.

**Table 10.2: Summary assessment of key potential impacts on fauna – Ndwalane to Ntafufu River**

| ISSUE / IMPACT                                  | EXTENT | DURATION  | INTENSITY | PROBABILITY | SIGNIFICANCE  | CONFIDENCE |
|---|--------|-----------|-----------|-------------|---------------|------------|
| Loss of sensitive faunal habitats               |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Permanent | High      | Definite    | <b>High</b>   | High       |
| <b>With mitigation</b>                          | Local  | Permanent | High      | Definite    | <b>HIGH</b>   | High       |
| Loss of faunal diversity                        |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |
| Loss of Species of Special Concern              |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |
| Impacts on the Cape Griffon Vulture             |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |
| Disruption of faunal movement                   |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |
| Impacts associated with invasion of alien fauna |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |
| Impacts associated with increased fire risk     |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |
| Impacts associated with chemical pollution      |        |           |           |             |               |            |
| <b>Without mitigation</b>                       | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                          | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |

| ISSUE / IMPACT                                    | EXTENT | DURATION  | INTENSITY | PROBABILITY | SIGNIFICANCE  | CONFIDENCE |
|---|--------|-----------|-----------|-------------|---------------|------------|
| Impacts associated with noise and light pollution |        |           |           |             |               |            |
| <b>Without mitigation</b>                         | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                            | Local  | Long term | Medium    | Probable    | <b>MEDIUM</b> | Medium     |
| Ecosystem disruption                              |        |           |           |             |               |            |
| <b>Without mitigation</b>                         | Local  | Long term | Medium    | Probable    | <b>Medium</b> | Medium     |
| <b>With mitigation</b>                            | Local  | Long term | Low       | Probable    | <b>LOW</b>    | Medium     |

### 10.2.3 AQUATIC ECOSYSTEMS

The following aspects relating to aquatic ecosystems are addressed separately below; riparian and instream vegetation; rivers; wetlands; and estuaries.

#### *Riparian and instream vegetation*

Key potential impacts on riparian and instream vegetation are anticipated during the construction and operational phases of the proposed greenfields section of the proposed toll highway. These would be associated with the following: destruction of riparian vegetation and loss of sensitive habitats; increased surface run-off; surface and groundwater pollution; reduction in permeable surfaces ; diversion of flow by hard surfaces; and change in vegetation community type. A summary of the assessment of the key potential impacts on riparian and instream vegetation is provided in Table 10.3.

#### *Destruction of riparian vegetation and loss of sensitive habitats*

The proposed greenfields section of the proposed toll highway between Ndwalane and the Ntafufu River would result in destruction of riparian vegetation and loss of sensitive habitat. The expected permanent impact is assessed to be of medium intensity at a local level and is assigned a **high** significance rating due to the nature of the riparian vegetation and the important role it plays within the riverine ecosystems. Clearing of vegetation during the drier winter months, limiting clearing to areas immediately needed for construction, undertaking vegetation stripping in parallel with road construction and avoiding large stands of Palmiet would reduce the significance of the potential impact to **LOW**.

#### *Increased surface run-off*

Site clearing activities and the increased pavement area associated with the proposed greenfields section would result in increased surface run-off and increased risk of erosion. Vegetation attenuates surface water flow which, consequently, encourages permeation of the soils and contributes to maintaining water table levels. The anticipated permanent impact on riparian and instream vegetation during the construction and operational phases is assessed to be of **medium** intensity and significance. Potential residual impacts of **LOW** significance are expected with implementation of a surface stormwater drainage system and the use of swales during construction (which should then be grassed for the operational phase).

#### *Surface water and groundwater pollution*

Construction activities would probably result in sediment loads entering the freshwater ecosystems in this section of the proposed toll highway, leading to increased turbidities and sedimentation risks in downstream areas. Diesel, oils and other chemical substances conveyed along the road during the operational phase would pose a threat to the continued functioning of the instream and adjacent areas, if by chance these are dispersed via surface run-off, or permeate into the groundwater. Changes to water quality (surface and groundwater) affect the functioning of plants and other instream biota. The potential impact on riparian and instream vegetation is assessed to be permanent and of medium intensity at a local level. The significance of the potential impact is thus rated as **medium**. Formulation and implementation of erosion and sediment control measures, proper storage of construction materials

(including fuels and oils), emergency plans, construction camp management procedures and appropriate location (i.e. well removed from aquatic systems) of stockpiles, site offices, etc. would reduce the potential impact to **LOW** significance.

#### *Reduction in permeable surfaces*

The hard surfaces associated with the proposed greenfields section of the proposed toll highway would reduce the amount of permeable surfaces for water to penetrate the soils and maintain the local groundwater systems. The potential indirect impact on riparian and instream vegetation due to changes in soil moisture status is assessed to be permanent and of medium intensity at a local level. This potential impact is thus rated of **medium** significance. Revegetation of all remaining disturbed areas with appropriate plant species would reduce the potential impact to **LOW** significance.

#### *Diversion of flow by hard surfaces*

The construction of hard surfaces associated with the proposed greenfields section would probably divert flow away from water bodies, as well as increase flow velocities of run-off and increase the risk of pollution if the stormwater contains any spilled oils, fuels or coolants from passing traffic. This would especially be the case at the proposed Ndwalane toll plaza, where large quantities of oils may leak from vehicles while idling. This potential permanent impact on riparian and instream vegetation is assessed to be of **medium** intensity and significance. Residual potential impacts of **LOW** significance would result by way of the design and use of stormwater retention swales and oil traps to prevent contamination of downstream areas.

#### *Change in vegetation community type*

Disturbance of the natural vegetation caused by the construction activities would lead to the potential introduction of exotic plant species. The potential localised change to the indigenous riparian and instream vegetation is assessed to be of permanent duration and **medium** intensity and significance. Implementation of an appropriate rehabilitation and weed control programme would result in a potential residual impact of **LOW** significance.

**Table 10.3: Summary assessment of key potential impacts on riparian and instream vegetation – Ndwalane to Ntafufu River**

| ISSUE / IMPACT  | EXTENT | DURATION  | INTENSITY | PROBABILITY | SIGNIFICANCE  | CONFIDENCE |
|---|--------|-----------|-----------|-------------|---------------|------------|
| Destruction of riparian vegetation and loss of sensitive habitats |        |           |           |             |               |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium    | Definite    | <b>High</b>   | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low       | Definite    | <b>LOW</b>    | High       |
| Impacts associated with increased surface run-off                 |        |           |           |             |               |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium    | Definite    | <b>Medium</b> | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low       | Definite    | <b>LOW</b>    | High       |
| Impacts associated with surface and groundwater pollution         |        |           |           |             |               |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium    | Definite    | <b>Medium</b> | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low       | Definite    | <b>LOW</b>    | High       |
| Impacts associated with reduction in permeable surfaces           |        |           |           |             |               |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium    | Definite    | <b>Medium</b> | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low       | Definite    | <b>LOW</b>    | High       |
| Impacts associated with diversion of flow by hard surfaces        |        |           |           |             |               |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium    | Definite    | <b>Medium</b> | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low       | Definite    | <b>LOW</b>    | High       |
| Change in vegetation community type                               |        |           |           |             |               |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium    | Definite    | <b>Medium</b> | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low       | Definite    | <b>LOW</b>    | High       |

## **Rivers**

The construction and operational phases of the proposed bridges would result in key potential impacts associated with the following riverine aspects: change in channel structure and loss of instream habitat; risk of surface and groundwater pollution; and changes in ecosystem structure and function, and loss of biodiversity. It should be noted that the specialist study elevated the significance of most of the potential impacts beyond the ratings that would have been assigned in terms of the “convention for assigning significance ratings to potential impacts” (refer to Section 2.2.2 and Table 2.3) due to the potential cumulative impacts on already impacted systems. A summary of the assessment of the key potential impacts on rivers is provided in Table 10.4.

### *Change in channel structure and loss of instream habitat*

It is considered that the placing of the Mzimvubu and Ntafufu River bridge structures in the river beds would cause immense damage to the structure of the river banks or beds, and therefore the channel in which the rivers flow. The physical channel forms the template for instream habitat, and is essential for maintaining habitat quality. Any changes in channel condition and structure would have a cumulative effect, and is sufficiently extreme, may result in a shift in population structure and possibly biodiversity at the sites. Macroinvertebrates are particularly dependent on instream habitat availability, and due to their short life-spans and localised habitats, are very vulnerable to changes in channel structure and resultant changes in instream habitat.

The significance of the probable change in channel structure and loss of instream habitat associated with the construction of the proposed Mzimvubu and Ntafufu River bridges is assessed to be **medium** and **high**, respectively. The potential impact of the proposed Ntafufu River bridge is rated of higher significance due to the type of instream habitat (cobble / riffle) that would be affected – these are important for instream biota, especially in the upper catchments of river systems. Probable residual impacts of **LOW** significance would result with effective implementation of mitigation measures. The latter include the following: designing the bridges to span the entire width of the channel and floodplain so as to avoid disturbance to the riparian zones of the rivers (where possible); ensuring pillars, columns or bridge buttresses are not placed in instream or riparian zones (where possible); minimising disturbance of instream channels and riparian zones during bridge construction; and minimising the number and width of pillars, vertical columns and buttresses placed within the river channel and floodplain.

### *Risk of surface and groundwater pollution*

The construction of the proposed greenfields section would be associated with the reduction of vegetated plant cover and work taking place within or close to wetlands, resulting in increased sediments in the systems. During the operation of the greenfields section of the proposed toll highway diesel and oils (and other chemical substances conveyed along the road) would pose a threat to the continued functioning of the instream and adjacent areas, if by chance these are dispersed via surface run-off, or permeate into the groundwater. Changes to water quality (surface and groundwater) affect the functioning of plants and other instream biota.

The significance of probable surface and groundwater pollution, including turbidity loads due to sedimentation and other pollutants, associated with the construction and operational phases of the proposed Mzimvubu and Ntafufu River bridges is assessed to be **medium**. It is recommended that pillars, vertical columns and buttresses should not be placed within river channels if at all possible. If this is necessary, all precautions should be taken to avoid excessive disturbance of the bank and increased sedimentation into the river channels. Formulation and implementation of erosion and sediment control measures (e.g. coffer dams and silt traps), proper storage of construction materials (including fuels and

oils) and emergency plans during the construction and operational phases would reduce the extent and intensity of the potential impact, resulting in a residual potential impact of **LOW** significance.

#### *Changes in ecosystem structure and function, and loss of biodiversity*

Impacts on aquatic systems that result in changes in habitat, flow pattern or hydrodynamics and water quality (assessed above) have the potential, cumulatively, to cause changes in ecosystem structure and function. If the proposed development is undertaken without appropriate caution and effective mitigation, loss of biodiversity and replacement of certain organisms (e.g. indigenous fish species) with other organisms (e.g. alien fish species) may occur. This is of particular relevance in the areas where Red Data book species are found, where fish populations have not yet been surveyed and where disturbances may occur in the river channel.

Probable changes in ecosystem structure and function, and loss of biodiversity are assessed to be of **medium** intensity and significance. Implementation of mitigation measures such as ensuring base flows, reducing the potential for sedimentation and erosion, limiting large construction footprints (e.g. bridge piers) as far as possible and reducing the clearing of any vegetation to a minimum would result in a residual improbable impact of **LOW** (Mzimvubu River bridge) and **LOW-MEDIUM** (Ntafufu River bridge) significance.

**Table 10.4: Summary assessment of key potential impacts on rivers – Ndwalane to Ntafufu River**

| ISSUE / IMPACT  | EXTENT         | DURATION   | INTENSITY   | PROBABILITY         | SIGNIFICANCE          | CONFIDENCE |
|---|----------------|------------|-------------|---------------------|-----------------------|------------|
| Change in channel structure and loss of instream habitat              |                |            |             |                     |                       |            |
| <b>Without mitigation</b>   | Regional       | Short term | Medium/High | Probable            | <b>Medium/High</b>    | Medium     |
| <b>With mitigation</b>  | Local          | Short term | Low         | Probable/Improbable | <b>LOW</b>            | Medium     |
| Risk of surface and groundwater pollution                             |                |            |             |                     |                       |            |
| <b>Without mitigation</b>   | Regional/Local | Short term | Medium      | Probable            | <b>Medium</b>         | Medium     |
| <b>With mitigation</b>  | Local          | Short term | Low         | Probable/Improbable | <b>LOW</b>            | Medium     |
| Changes in ecosystem structure and function, and loss of biodiversity |                |            |             |                     |                       |            |
| <b>Without mitigation</b>   | Local/Regional | Short term | Medium      | Probable            | <b>Medium</b>         | Medium     |
| <b>With mitigation</b>  | Local          | Short term | Low         | Improbable          | <b>LOW/LOW-MEDIUM</b> | Medium     |

#### **Wetlands**

The construction and operational phases of the proposed greenfields section would result in key potential impacts on wetlands in terms of the following aspects: risk of surface and groundwater pollution; reduction in permeable surfaces; diversion of flow by hard surfaces; change in vegetation community type; and physical change to wetland areas. A summary of the assessment of the key potential impacts on wetlands is provided in Table 10.5.

#### *Risk of surface and groundwater pollution*

The construction of the proposed greenfields section would be associated with the reduction of plant cover, resulting in increased sediments in wetland systems. During the operation of the greenfields section of the proposed toll highway diesel and oils (and other chemical substances conveyed along the road) would pose a threat to the continued functioning of the adjacent wetland areas, if by chance these are dispersed via surface run-off, or permeate into the groundwater. Changes to water quality (surface and groundwater) affect the functioning of plants and other wetland biota.

The significance of probable surface and groundwater pollution associated with the construction and operational phases of the proposed greenfields section is assessed to be **high** and **medium**, respectively. Formulation and implementation of erosion and sediment control measures (e.g. coffer dams and silt traps), proper storage of construction materials (including fuels and oils) and emergency

plans during the construction and operational phases would reduce the extent and intensity of the potential impact, resulting in a residual potential impact of **LOW** significance.

#### *Reduction in permeable surfaces*

The hard surfaces associated with the proposed greenfields section would reduce the amount of permeable surfaces for water to penetrate the soils and maintain the local groundwater systems. The potential impact on wetlands due to changes in soil moisture status is assessed to be permanent and of medium intensity at a local level. This potential impact is thus rated of **medium** significance. Reduction of surface flow velocities by way of suitable stormwater run-off areas would allow time for the stormwater to permeate the local soils and groundwater systems and would maintain localised flows to sustain the surrounding wetlands and/or vegetation. The significance of the potential residual impact is deemed to be **LOW**.

#### *Diversion of flow by hard surfaces*

The increased area of hard surfaces would probably divert flow away from water bodies, as well as increase flow velocities of run-off and increase the risk of pollution if the stormwater contains any spilled oils, fuels or coolants from passing traffic. This would especially be the case at the proposed Ndwalane mainline toll plaza, where large quantities of oils may leak from vehicles while idling. The potential permanent impact on wetlands is assessed to be of **medium** intensity and significance. Discharge of stormwater into retention swales before being allowed to flow into wetlands and use of oil traps to prevent contamination of downstream areas would reduce the potential impact to **LOW** significance.

#### *Change in vegetation community type*

Disturbance of the natural vegetation caused by the construction activities would lead to the potential introduction of exotic plant species. The potential localised change to the indigenous wetland vegetation is assessed to be of permanent duration and **medium** and **high** intensity and significance during the construction phase, and **medium** intensity and significance during the operational phase. Implementation of an appropriate rehabilitation and weed control programme would result in a potential residual impact of **LOW** significance.

#### *Physical change to wetland areas*

The proposed greenfields section between Ndwalane and the Ntafufu River would result in physical change to wetland areas both directly and due to changes to the wetland plant communities and diversion of flows. The potential permanent, localised reduction in wetland functioning is assessed to be of **medium** intensity and significance. The potential impact would be reduced to **LOW** significance by ensuring that the location of construction infrastructure, materials and camps avoid wetlands as far as possible, and implementation of the recommended mitigation measures stipulated above.

**Table 10.5: Summary assessment of key potential impacts on wetlands – Ndwalane to Ntafufu River**

| ISSUE / IMPACT  | EXTENT | DURATION  | INTENSITY   | PROBABILITY | SIGNIFICANCE       | CONFIDENCE |
|---|--------|-----------|-------------|-------------|--------------------|------------|
| Impacts associated with risk of surface and groundwater pollution |        |           |             |             |                    |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium/High | Definite    | <b>Medium/High</b> | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low         | Definite    | <b>LOW</b>         | High       |
| Impacts associated with reduction in permeable surfaces           |        |           |             |             |                    |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium      | Definite    | <b>Medium</b>      | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low         | Definite    | <b>LOW</b>         | High       |
| Impacts associated with diversion of flow by hard surfaces        |        |           |             |             |                    |            |
| <b>Without mitigation</b>   | Local  | Permanent | Medium      | Definite    | <b>Medium</b>      | High       |
| <b>With mitigation</b>  | Local  | Permanent | Low         | Definite    | <b>LOW</b>         | High       |

| ISSUE / IMPACT                      | EXTENT | DURATION  | INTENSITY   | PROBABILITY | SIGNIFICANCE       | CONFIDENCE |
|-------------------------------------|--------|-----------|-------------|-------------|--------------------|------------|
| Change in vegetation community type |        |           |             |             |                    |            |
| <b>Without mitigation</b>           | Local  | Permanent | Medium/High | Definite    | <b>Medium/High</b> | High       |
| <b>With mitigation</b>              | Local  | Permanent | Low         | Definite    | <b>LOW</b>         | High       |
| Physical change to wetland areas    |        |           |             |             |                    |            |
| <b>Without mitigation</b>           | Local  | Permanent | Medium      | Definite    | <b>Medium</b>      | High       |
| <b>With mitigation</b>              | Local  | Permanent | Low         | Definite    | <b>LOW</b>         | High       |

### **Estuaries**

The construction and operational phases of the proposed toll highway would result in key potential impacts on estuaries as a result of the following: sedimentation; water quality changes; and improved access. A summary of the assessment of the key potential impacts is provided in Table 10.6.

#### *Sedimentation*

Sediments, deposited into the two river catchments that would be crossed by the proposed new road construction in the greenfields section, would ultimately be conveyed into estuaries at which the ichthyofaunal, water quality and aesthetic status are described as “moderate-good”, “fair-good” and “moderate-good”, respectively. The Mzimvubu estuary currently suffers from excess siltation while the Ntafufu estuary is considered to be an important estuary due to the diverse range of habitats available to estuarine biota, i.e. both systems are sensitive to sedimentation impacts.

It is predicted that highly probable impacts of high intensity in the short term would occur at a regional level due to the extent of the area covered and the importance of the estuaries in terms of diversity and fish breeding and nursery grounds. The impact is thus considered to be of **medium** significance. Implementation of mitigation measures applicable to “riparian and instream vegetation”, as stipulated above, would result in a probable impact of **LOW** significance.

#### *Water quality changes*

Water quality changes in the estuaries are expected as a result of potential oil, grease and fuel spillages in the river catchments during both the construction and operational phases.

The potential impact on the currently “fair-good” water quality status of the estuaries in the region is assessed to be of high intensity during construction, and medium intensity during the operational phase. The potential impact is thus assessed to be of **medium** significance during both the construction and operational phases. Implementation of construction-related mitigation measures applicable to “riparian and instream vegetation”, as stipulated above, would reduce the potential impact to **LOW** significance during the construction phase. It is considered, however, that potential impacts associated with the operational phase, such as spillages and sheet-wash off the road into the river catchments (which would ultimately discharge into the estuaries) would be more difficult to mitigate. The significance of the potential residual impact on water quality changes in estuaries during the operational phase is thus considered to remain **MEDIUM**.

#### *Improved access*

It is anticipated that increased recreational and development-related pressures would be exerted on important and sensitive estuaries in this region as a result of the improved access to the region.

The highly probable impacts on the ecological functioning and aesthetics of the estuaries would be of high intensity over the long term and are thus considered of **very high** significance. Implementation of applicable legislation promulgated for the protection of estuaries (see section 4.2.3 of the aquatic ecosystems specialist report – Volume 2, Appendix 3), enforcement of bag limits to protect estuarine resources such as fish and shell-fish (historically, however, this has proven difficult to manage) and the

control of development in the floodplains of the estuaries would reduce the indirect impacts on estuaries to a probable residual impact of **HIGH** significance.

**Table 10.6: Summary assessment of key potential impacts on estuaries – Ndwalane to Ntafufu River**

| ISSUE / IMPACT                                | EXTENT   | DURATION          | INTENSITY   | PROBABILITY     | SIGNIFICANCE      | CONFIDENCE |
|---|----------|-------------------|-------------|-----------------|-------------------|------------|
| Impacts associated with sedimentation         |          |                   |             |                 |                   |            |
| <b>Without mitigation</b>                     | Regional | Short term        | High        | Highly probable | <b>Medium</b>     | Medium     |
| <b>With mitigation</b>                        | Regional | Short term        | Medium      | Probable        | <b>LOW</b>        | Medium     |
| Impacts associated with water quality changes |          |                   |             |                 |                   |            |
| <b>Without mitigation</b>                     | Regional | Short/Medium term | Medium/High | Probable        | <b>Medium</b>     | Medium     |
| <b>With mitigation</b>                        | Regional | Short/Medium term | Medium      | Probable        | <b>LOW/MEDIUM</b> | Medium     |
| Impacts associated with improved access       |          |                   |             |                 |                   |            |
| <b>Without mitigation</b>                     | Regional | Long term         | High        | Highly Probable | <b>Very high</b>  | Medium     |
| <b>With mitigation</b>                        | Regional | Long term         | Medium      | Probable        | <b>HIGH</b>       | Medium     |

#### 10.2.4 SOCIAL

The proposed new road construction in the greenfields section between Ndwalane and the Ntafufu River would result in key potential social impacts relating to the following: increased employment opportunities; improved safety for vehicle road users; increased safety hazards for pedestrians and traffic; increased HIV/AIDS and STD risks; increased crime; increased taxi-related tension and violence; improved livestock safety; loss of use of the existing road reserve; rural severance effects; uncontrolled secondary development; improvement in transport provision; and negative influences on existing family networks and social structures. A summary of the assessment of the key potential impacts is provided in Table 10.7.

##### ***Increased employment opportunities***

The anticipated positive social impact associated with increased employment opportunities (unemployment in the municipal area is estimated at 48 % and in the Ntafufu area – Ward 1 at 80 %) is assessed to be of high intensity during construction and medium intensity during the operational phase. The significance of the impact is thus rated to be **positive high** (during construction) and **positive medium** (during the operational phase). Optimisation measures such as establishment of a “labour and employment desk”, use of labour-intensive methods where possible, use of local labour as far as possible and remuneration beyond the minimum wage rate would increase the significance of the potential positive impact to **POSITIVE HIGH** significance.

##### ***Improved safety for vehicle road users***

The probable improved safety for vehicle road users (compared to poor and dangerous existing road conditions both locally and on the existing R61) is considered a positive impact of high intensity over the long term and is thus rated to be of **POSITIVE HIGH** significance. Ensuring close cooperation and effective communication between all relevant traffic authorities, effective traffic control mechanisms and carefully positioned under- and overpasses would not result in any further improvement in traffic safety risks, but would further enhance the probability of improved safety for vehicle road users.

##### ***Increased safety hazards for pedestrians and traffic***

Construction sites and associated activities, and expected traffic during the operational phase, would lead to increased safety hazards for pedestrians and traffic, particularly where introduced into relatively remote rural areas such as between Ndwalane and the Ntafufu River. The potential impact is assessed to be of

**medium** (during construction) and **high** (during the operational phase) intensity and significance. Regular inspection and maintenance of fencing, erection of appropriate warning signs and implementation of community risk awareness programmes would reduce the intensity and significance of the potential impact to **LOW** and **MEDIUM** during the construction and operational phases, respectively.

#### ***Increased risk of HIV/AIDS and STDs***

The anticipated influx of construction workers during construction, and the anticipated increased long-distance truck traffic on the proposed toll highway, would probably result in an increased risk of HIV/AIDS and STDs. The potential impact is assessed to be of **medium** intensity and significance. Mitigation measures aimed at reducing the spread of HIV/AIDS and STDs, such as the design and implementation of appropriate HIV/AIDS and STD awareness and prevention campaigns, maximisation of job opportunities to local people who do not need to be housed in construction accommodation, and availability of an adequate supply of free condoms for workers would reduce the risk of the spread of HIV/AIDS and STDs to **LOW-MEDIUM** significance during the construction and operational phases.

#### ***Increased crime***

Potential increase in criminal activity, due to an influx of workers during construction and the greater accessibility of the area, has been raised as a serious concern in this section of the proposed toll highway. Due to the relative isolation of the area and its rugged topography a number of car theft syndicates are currently operating in the area. Potential easier access during the operational phase of the proposed toll highway may also assist police in their efforts to combat these syndicates. The probable impact is assessed of **medium** intensity and significance during the construction and operational phases. Liaison with the local police to monitor changes during construction and operation, provision of additional security if required and assistance with establishment of Community Policing Forums where they do not exist would reduce the significance of the potential impact to **LOW**.

#### ***Increased taxi-related tension and violence***

It is anticipated that the proposed toll highway would result in potential increased internal taxi-related tension and violence associated with the profitability of certain routes. This potential impact is considered to be of **medium** intensity and significance over the long term. The intensity, and hence significance, of this potential impact would be reduced to **LOW** through consultation with the relevant taxi industries, in particular regarding the implementation of tolling and potential discounts.

#### ***Improved livestock safety***

The operation of the proposed new road, with adequate and well maintained fencing, would probably result in improved livestock safety when compared to the corresponding R61 section between Ndwalane and the Ntafufu River, which is characterised by significant safety hazards associated with the presence of livestock on the road. In addition to posing a safety hazard, the loss of livestock due to traffic collisions may lead to impoverishment of the families who owned them. The probable improved livestock safety is considered of high intensity over the long term and is thus rated to be of **POSITIVE HIGH** significance. The assessment is, however, made with a low level of confidence since it is uncertain to what extent it would be possible to keep fencing intact and thus preventing livestock from being present on the road. Close cooperation and effective communication between all relevant authorities, the introduction of active and efficient control mechanisms and carefully positioned under- and overpasses would likely increase the probability of this potential positive impact.

#### ***Loss of use of the existing road reserve***

Much of the greenfields section, especially the section between the Mzimvubu and the Ntafufu rivers, is used for subsistence maize cultivation. The soils, land use and agriculture study estimate that about 5 ha of irrigation land would be lost to the proposed new road while about 20 ha of cultivated rain-fed crop land

would be lost. The probable, localised loss of use of the existing road reserve of the proposed toll highway is assessed to be of **MEDIUM** intensity and significance without and with mitigation.

#### ***Rural severance effects***

Concerns were raised that the proposed new road in the greenfields section between Ndwalane and the Ntafufu River would cut communities off from their grazing lands and fields, facilities such as a dip tank, educational facilities (and playing fields) and water sources such as the Ntafufu River. The potential effects on the livelihoods and well-being of local communities are assessed to be of medium intensity at a local level during construction, and high intensity at a local level during the operational phase. The potential rural severance effects are thus rated to be of **medium** (construction) and **high** (operational phase) significance. Implementation of effective mitigation measures, such as the appropriate location of crossing points (over- and underpasses), ensuring that central service nodes (such as schools, clinics, water points, etc.) remain easily and safely accessible and that crossing points are adequate for people and livestock, as appropriate, would reduce the significance of the potential impact during the construction and operational phases to **LOW** and **MEDIUM**, respectively.

#### ***Uncontrolled secondary development***

The proposed new road between Ndwalane and the Ntafufu River would probably lead to the creation of unplanned nodes, for example around the proposed Ndwalane Interchange and Ndwalane mainline toll plaza. Concern has also been expressed that, due to the generally weak capacity of the local authorities along this section of the proposed toll highway, the potential unplanned developments would not be controlled. This is considered to result in potential negative, localised social impacts of **medium-high** intensity and significance. Active engagement between the Proponent and the relevant local, provincial and national authorities, aimed at ensuring that no unplanned secondary developments occur, would reduce the significance of the probable residual impact to **LOW**.

#### ***Improvement in transport provision to the area***

It is anticipated that the proposed new road would enhance existing patterns of local and regional travel and transport and service delivery, although limited long distance travel from the area takes place. The latter may, however, be an indication of the difficulties that long distance travellers face. Significant time and cost savings are anticipated in terms of journeying to and from key centres, better access to ambulance services, etc. The potential positive impact is considered of **POSITIVE MEDIUM** significance without and with mitigation.

#### ***Negative influences on existing family networks and social structures***

The construction and operation of the proposed toll highway would probably result in localised negative influences on existing family networks and social structures, such as increased prostitution, unplanned and unwanted pregnancies, pressure on local services and competition for available jobs and resources as a result of an influx of workers and job seekers. The potential negative influences on existing family networks and social structures are assessed to be of **medium-high** significance. A probable residual impact of **MEDIUM** significance would result through implementation of mitigation measures such as the maximisation of job opportunities to local people, establishing and maintaining communication channels with local community structures, ensuring condoms are readily accessible to workers and provision of adequate on-site temporary accommodation and amenities for non-local workers.

**Table 10.7: Summary assessment of key potential social impacts – Ndwalane to Ntafufu River**

| ISSUE / IMPACT   | EXTENT         | DURATION        | INTENSITY   | PROBABILITY | SIGNIFICANCE         | CONFIDENCE |
|--|----------------|-----------------|-------------|-------------|----------------------|------------|
| Impacts associated with increased employment opportunities |                |                 |             |             |                      |            |
| <b>Without mitigation</b>                                  | Local-Regional | Short/Long term | Medium/High | Definite    | <b>Medium+/High+</b> | High       |
| <b>With mitigation</b>                                     | Local-Regional | Short/Long term | High        | Definite    | <b>HIGH+</b>         | High       |

| ISSUE / IMPACT  | EXTENT         | DURATION        | INTENSITY   | PROBABILITY | SIGNIFICANCE       | CONFIDENCE |
|---|----------------|-----------------|-------------|-------------|--------------------|------------|
| Impacts associated with improved safety for vehicle road users                                |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Regional       | Long term       | High        | Probable    | <b>High+</b>       | Medium     |
| <b>With mitigation</b>  | Regional       | Long term       | High        | Probable    | <b>HIGH+</b>       | Medium     |
| Increased safety hazards for pedestrians and traffic  |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local-Regional | Short/Permanent | Medium/High | Definite    | <b>Medium/High</b> | Medium     |
| <b>With mitigation</b>  | Local-Regional | Short/Permanent | Low/Medium  | Definite    | <b>LOW/MEDIUM</b>  | Medium     |
| Impacts associated with increased risk of HIV/AIDS and STDs                                   |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Permanent       | Medium      | Probable    | <b>Medium</b>      | Medium     |
| <b>With mitigation</b>  | Local          | Permanent       | Low         | Probable    | <b>LOW-MEDIUM</b>  | Medium     |
| Increased crime   |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Permanent       | Medium      | Probable    | <b>Medium</b>      | Medium     |
| <b>With mitigation</b>  | Local          | Permanent       | Low         | Probable    | <b>LOW</b>         | Medium     |
| Increased taxi-related tension and violence   |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Long term       | Medium      | Probable    | <b>Medium</b>      | Medium     |
| <b>With mitigation</b>  | Local          | Long term       | Low         | Probable    | <b>LOW</b>         | Medium     |
| Impacts associated with improved livestock safety   |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Regional       | Long term       | High        | Probable    | <b>High+</b>       | Low        |
| <b>With mitigation</b>  | Regional       | Long term       | High        | Probable    | <b>HIGH+</b>       | Low        |
| Impacts associated with loss of use of the existing road reserve                              |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Permanent       | Medium      | Definite    | <b>Medium</b>      | Medium     |
| <b>With mitigation</b>  | Local          | Permanent       | Medium      | Definite    | <b>MEDIUM</b>      | Medium     |
| Impacts associated with rural severance effects   |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Permanent       | Medium/High | Probable    | <b>Medium/High</b> | High       |
| <b>With mitigation</b>  | Local          | Permanent       | Low/Medium  | Probable    | <b>LOW/MEDIUM</b>  | High       |
| Impacts associated with uncontrolled secondary development                                    |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Permanent       | Medium      | Probable    | <b>Medium-high</b> | Medium     |
| <b>With mitigation</b>  | Local          | Permanent       | Low         | Probable    | <b>LOW</b>         | Medium     |
| Impacts associated with improvement in transport provision                                    |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local-Regional | Permanent       | Medium      | Definite    | <b>Medium+</b>     | Medium     |
| <b>With mitigation</b>  | Local-Regional | Permanent       | Medium      | Definite    | <b>MEDIUM+</b>     | Medium     |
| Impacts associated with negative influences on existing family networks and social structures |                |                 |             |             |                    |            |
| <b>Without mitigation</b>   | Local          | Short/Long term | Medium-high | Probable    | <b>Medium-high</b> | Medium     |
| <b>With mitigation</b>  | Local          | Short/Long term | Medium      | Probable    | <b>MEDIUM</b>      | Medium     |

### 10.2.5 TOURISM

The proposed toll highway would result in the following key potential impacts relating to tourism: increase in the number of tourism products; increase in growth in transit tourists on a KwaZulu-Natal/Eastern Cape/Western Cape route; and increased access to environmentally sensitive areas. A summary of the assessment of the key potential impacts is provided in Table 10.8.

#### ***Increase in the number of tourism products***

As described in Section 7.2.5, the proposed toll highway would definitely result in an increase in the number of tourism products due to an expected increase in growth in overnight tourists and associated increase in the rate of growth of tourism products. The potential impact is rated to be of **positive medium** significance. Implementation of optimisation measures such as tourism promotion and product development would most probably increase the intensity of the potential impact, resulting in an impact of **POSITIVE HIGH** significance.

**Increase in growth in transit tourists on a KwaZulu-Natal/Eastern Cape/Western Cape route**

As described in Section 7.2.5, it is anticipated that an increased growth in transit tourists on a KZN/Eastern Cape/Western Cape route would be of **positive medium** significance. Tourism promotion and development would increase the significance of the potential impact to **POSITIVE MEDIUM-HIGH**. However, there is a risk that this could be inhibited by various factors (availability of well-maintained feeder roads, ownership of land, alignment with municipal policies, etc.), therefore the assessment of the potential impact with mitigation is undertaken at a medium level of confidence.

**Increased access to environmentally sensitive areas**

A number of indirect ecological impacts associated with increased access to the study area have been predicted (e.g., refer to section 10.2.1 above). Since the biophysical environment of the study area is an important tourism resource it is considered probable that negative ecological impacts would have an impact on the sustainability of eco-tourism ventures as many of these businesses currently trade on the availability of a relatively undisturbed biophysical environment in the study area. The probable impact on the sustainability of eco-tourism ventures associated with increased access to environmentally sensitive areas is assessed to be of **MEDIUM** intensity and significance without and with mitigation (measures as applicable to potential impacts on vegetation and flora, fauna and aquatic ecosystems).

**Table 10.8: Summary assessment of key potential tourism impacts – Ndwalane to Ntafufu River**

| ISSUE / IMPACT  | EXTENT   | DURATION    | INTENSITY   | PROBABILITY | SIGNIFICANCE        | CONFIDENCE |
|---|----------|-------------|-------------|-------------|---------------------|------------|
| Impacts associated with increase in the number of tourism products                                      |          |             |             |             |                     |            |
| <b>Without mitigation</b>   | Regional | Long term   | Low         | Definite    | <b>Medium+</b>      | High       |
| <b>With mitigation</b>  | Regional | Long term   | Medium      | Definite    | <b>HIGH+</b>        | Medium     |
| Impacts associated with increase in growth in transit tourists on a KZN/Eastern Cape/Western Cape route |          |             |             |             |                     |            |
| <b>Without mitigation</b>   | Regional | Medium term | Medium      | Probable    | <b>Medium+</b>      | Medium     |
| <b>With mitigation</b>  | Regional | Medium term | Medium-high | Probable    | <b>MEDIUM-HIGH+</b> | Medium     |
| Impacts associated with increased access to environmentally sensitive areas                             |          |             |             |             |                     |            |
| <b>Without mitigation</b>   | Regional | Long term   | Medium      | Probable    | <b>Medium</b>       | Medium     |
| <b>With mitigation</b>  | Regional | Long term   | Medium      | Probable    | <b>MEDIUM</b>       | Medium     |

**10.2.6 CULTURAL AND HISTORICAL HERITAGE**

The construction and operation of the proposed new road in the greenfields section between Ndwalane and the Ntafufu River would result in the following key potential impacts relating to cultural and historical heritage: graves; and archaeological sites. A summary of the assessment of the key potential impacts is provided in Table 10.9.

**Graves**

The proposed greenfields route would result in the need to relocate graves in the Mampube village and Ntafufu areas. Since all human remains have high heritage significance for their social value, the potential permanent, localised impact is assessed to be of **high** intensity and significance. It is considered that implementation of all applicable legislative requirements, guidelines and regulations applicable to the removal of human remains (as part of the recommended resettlement action plan), such as notification of the impending removals, consultation with individuals or communities related or known to the deceased, observation of rituals or ceremonies required by the families, etc. would reduce the significance of the potential impact to **MEDIUM**.

### Archaeological sites

It is considered highly probable that the proposed new road would result in the alteration or destruction of the Late Iron Age archaeological sites in the vicinity of the Mzimvubu River (refer to section 6.4). The significance of the impact on the archaeological sites is deemed **medium-high** since the permanent impact would be of medium intensity at a local-regional level. Implementation of appropriate mitigation measures, such as the presence of an heritage practitioner at the onset of earthworks for the Mzimvubu River crossing in order to identify any archaeological sites which may be affected, and obtaining a permit from SAHRA for the alteration or destruction of any affected archaeological sites would reduce the significance of the impact to **LOW-MEDIUM**.

**Table 10.9: Summary assessment of key potential heritage impacts – Ndwalane to Ntafufu River**

| ISSUE / IMPACT            | EXTENT         | DURATION  | INTENSITY  | PROBABILITY     | SIGNIFICANCE       | CONFIDENCE  |
|---------------------------|----------------|-----------|------------|-----------------|--------------------|-------------|
| Graves                    |                |           |            |                 |                    |             |
| <b>Without mitigation</b> | Local          | Permanent | High       | Highly probable | <b>High</b>        | Medium      |
| <b>With mitigation</b>    | Local          | Permanent | Low-medium | Highly probable | <b>MEDIUM</b>      | Medium      |
| Archaeological sites      |                |           |            |                 |                    |             |
| <b>Without mitigation</b> | Local-Regional | Permanent | Medium     | Highly probable | <b>Medium-high</b> | Medium-high |
| <b>With mitigation</b>    | Local-Regional | Permanent | Low        | Highly probable | <b>LOW-MEDIUM</b>  | Medium-high |

### 10.2.7 NOISE

The proposed new road between Ndwalane and the Ntafufu River, including the proposed Ndwalane mainline and ramp toll plazas, would result in key potential noise impacts. A summary of the assessment of this key potential impact is provided in Table 10.10.

#### **Proposed new road**

The proposed new road would be located between 10 m and 250 m from numerous dwellings in this section of the proposed toll highway. The predicted intensity and significance of the highly probable noise impact would range from **very high** for the nearest residences (which would be exposed to a noise rating level in excess of 65 dBA), to **medium** for the more distant residences (which would be exposed to a noise rating level in excess of 55 dBA). A noise barrier would have little effect due to the residences generally being at a higher elevation than the proposed new route. The only effective noise mitigation measure would be the application of a low-noise road surface. It is predicted that a two-layer, low-noise road surface would reduce the respective impacts to **HIGH** intensity and significance at the nearest residences (a noise rating level equal to 60 dBA would be in compliance with the Noise Control Regulations but would be 15 dB in excess of the acceptable South African National Standard – SANS - noise rating level of 45 dBA) and **LOW** intensity and significance at the furthest residences (a noise rating level equal to 50 dBA would be in compliance with the Noise Control Regulations but would be 5 dB in excess of the acceptable SANS noise rating level).

#### **Ndwalane mainline and ramp toll plazas**

A farm residence would be located within 240 m of the proposed toll plaza, within full line-of-sight and at a higher elevation than the proposed mainline toll plaza while numerous dwellings would be located close to the proposed Ndwalane Interchange ramp toll plazas. It is predicted that noise from the toll plazas would be distinctly audible at the dwellings, particularly at night. The highly probable noise impact is assessed to be of medium-high intensity over the long term. This potential impact is thus rated to be of **medium** significance. Locating the mainline toll plaza at least 950 m (northward) from the farm buildings would reduce the intensity of the impact to **NO EFFECT**. Alternatively, construction of a noise barrier at the mainline toll plaza (of at least 3m in height and extending 100 m beyond each side of the toll booths)

would result in a residual noise impact of **LOW** significance. It is probable that 2 m high noise barriers extending approximately 20 m on either side of the ramp toll plazas would be required – this would need to be confirmed at detailed design stage of the proposed Ndwalane Interchange.

**Table 10.10: Summary assessment of key potential noise impacts – Ndwalane to Ntafufu River**

| ISSUE / IMPACT  | EXTENT | DURATION  | INTENSITY        | PROBABILITY     | SIGNIFICANCE               | CONFIDENCE |
|---|--------|-----------|------------------|-----------------|----------------------------|------------|
| Impacts associated with the proposed new road                               |        |           |                  |                 |                            |            |
| <b>Without mitigation</b>   | Local  | Long term | Medium/Very high | Highly probable | <b>Medium to Very high</b> | Medium     |
| <b>With mitigation</b>  | Local  | Long term | Low/High         | Highly probable | <b>LOW TO HIGH</b>         | Medium     |
| Impacts associated with the proposed Ndwalane mainline and ramp toll plazas |        |           |                  |                 |                            |            |
| <b>Without mitigation</b>   | Local  | Long term | Medium-high      | Highly probable | <b>Medium</b>              | Medium     |
| <b>With mitigation</b>  | Local  | Long term | Negligible/Low   | Highly probable | <b>NONE/LOW</b>            | Medium     |

### 10.2.8 VISUAL

Key potential visual impacts identified along this section of the proposed toll highway relates to the following: Ndwalane mainline toll plaza; and Mzimvubu and Ntafufu River bridges. A summary of the assessment of the key potential impacts is provided in Table 10.11.

#### ***Ndwalane mainline toll plaza***

The Ndwalane mainline toll plaza would be situated in a narrow and fairly scenic valley. It would be overlooked by small communities from the south and south-west. It is considered that the valley has a medium to high visual absorption capacity and during the day would assist in blending the proposed structure with the landscape (see Figure 10.4). At night the structure would be highly visible due to the intensive night lighting. However, the night lighting would be contained by the valley and would limit the affect to 2.5 km. The Ndwalane mainline toll plaza would result in a highly probable, permanent visual impact of high intensity at the local level. The impact is thus assessed to be of **medium** significance. Implementation of mitigation measures such as the use of colour variations, building form, lighting, landscaping and screening in order to reduce scale, avoiding reflection or deflection of sunlight or artificial light and avoiding light spillage would result in a residual visual impact of **LOW-MEDIUM** significance.

#### ***Mzimvubu and Ntafufu River bridges***

It is predicted that the visual impact of these bridges would be generally confined to the river valley with views extending up and down the valley for up to 2.5 km, occasionally extending to 5 km (see Figure 10.5). Although the Visual Absorption Capacity within these valleys is considered medium to high, the bridges would be exposed. The visual quality of the rivers is considered high. Although the intensity of the visual impact is assessed to be high, it is considered that the significance of the visual impact would be **MEDIUM** since the extent of the visual impact would be limited. In order to contain the extent of the visual impact it is recommended that the disturbance footprint is limited to the absolute minimum across the valley bottom and that the remaining disturbed areas be rehabilitated immediately.

**Table 10.11: Summary assessment of key potential visual impacts – Ndwalane to Natufu River**

| ISSUE / IMPACT  | EXTENT | DURATION        | INTENSITY | PROBABILITY     | SIGNIFICANCE      | CONFIDENCE |
|---|--------|-----------------|-----------|-----------------|-------------------|------------|
| Impacts associated with the proposed Ndwalane mainline toll plaza       |        |                 |           |                 |                   |            |
| <b>Without mitigation</b>   | Local  | Permanent       | High      | Highly probable | <b>Medium</b>     | Medium     |
| <b>With mitigation</b>  | Local  | Permanent       | Medium    | Highly probable | <b>LOW-MEDIUM</b> | Medium     |
| Impacts associated with the proposed Mzimvubu and Ntafufu River bridges |        |                 |           |                 |                   |            |
| <b>Without mitigation</b>   | Local  | Short/Permanent | High      | Highly probable | <b>Medium</b>     | Medium     |
| <b>With mitigation</b>  | Local  | Short/Permanent | High      | Highly probable | <b>MEDIUM</b>     | Medium     |

### 10.2.9 PLANNING/DEVELOPMENT

The proposed toll highway would result in key potential planning/development impacts relating to the Ntafufu node. A summary of the assessment of the key potential impact is provided in Table 10.12.

Although not as well developed as the Thombo area, the SDF of the Port St Johns LM also identifies the Ntafufu area as having the potential to develop into an administrative node within the municipal area. The SDF argues that the development of this node has the potential to provide a broad sector of the community with a range of administrative and institutional services. The conceptualisation of proposed uses around the node, as depicted in the SDF of the Port St Johns LM, has considered the route of the proposed greenfields section of the proposed toll highway through Ntafufu and the proposed Ntafufu Interchange. The proposed toll highway could result in uncontrolled growth around this node. The potential planning impact is rated to be of **MEDIUM** significance. Proper management of the node would change the status of the impact to neutral.

**Table 10.12: Summary assessment of key potential planning/development impacts – Ndwalane to Ntafufu River**

| ISSUE / IMPACT                    | EXTENT | DURATION  | INTENSITY | PROBABILITY | SIGNIFICANCE            | CONFIDENCE |
|-----------------------------------|--------|-----------|-----------|-------------|-------------------------|------------|
| Implications for the Ntafufu area |        |           |           |             |                         |            |
| <b>Without mitigation</b>         | Local  | Long term | Medium    | Probable    | <b>Medium</b>           | High       |
| <b>With mitigation</b>            | Local  | Long term | Medium    | Probable    | <b>MEDIUM (Neutral)</b> | High       |

## 10.3 ASSESSMENT OF POTENTIAL IMPACTS: SITE-SPECIFIC ALTERNATIVE ROUTES

It should be noted that the assessment of Alternative 1b (between Ndwalane and the Mzimvubu River) and Alternative 2a (in the vicinity of the Ntafufu village and river) is given relative to the assessment of potential impacts associated with the comparable sections of the SANRAL preferred routes (i.e. Alternatives 1e and 2f), as provided above.

### 10.3.1 COMPARATIVE ASSESSMENT OF ALTERNATIVE 1B VERSUS THE SANRAL PREFERRED ROUTE BETWEEN NDWALANE AND THE MZIMVUBU RIVER

As mentioned in Section 5.3.3, Alternative 1b would involve a deviation from the R61 in the vicinity of the Mzimvubu River floodplain and tributary whereas the SANRAL preferred route (Alternative 1e) would exit from the existing R61 closer to Ndwalane, on higher-lying ground in the vicinity of Mampube village (refer to Figure 10.2).

A summary of potential residual impacts of Alternative 1b versus the SANRAL preferred route (Alternative 1e) is provided in Table 10.13. Relevant potential impacts are discussed separately below.

#### ***Vegetation and flora***

Alternative 1b would affect good quality (true) forests at the location (interchange) where the route would divert from the existing R61, rather than a degraded and transformed area at the location for the proposed Ndwalane Interchange (see Figure 10.6). In addition, a sensitive floodplain with small streams entering the Mzimvubu River would be affected at this location. Generally, however, Alternative 1b would result in less overall impact on botanical habitats and diversity over the length of the route between

Ndwalane and the Mzimvubu River. From a botanical perspective neither alignment is considered more favourable.

### ***Fauna***

Alternative 1b has the significant advantage of avoiding the large areas of intact forest/thicket faunal habitats that would be significantly impacted upon by the SANRAL preferred route. Thus, Alternative 1b offers significant advantage in reducing potential impacts on sensitive faunal habitats over the SANRAL preferred route. In terms of potential faunal impacts, Alternative 1b is thus favoured over the SANRAL preferred route.

### ***Aquatic ecosystems***

The aquatic ecosystems specialist report indicates that Alternative 1b and the SANRAL preferred route would result in similar potential impacts on aquatic ecosystems. Thus, neither alignment is considered more favourable from an aquatic ecosystems perspective.

### ***Soils, land use and agriculture***

Alternative 1b would impact significantly on agriculture occupying almost 5 ha of prime riparian irrigation land (but effectively sterilising a bigger area of land). The loss of this land would be of **HIGH** significance without and with mitigation. In terms of soils, land use and agriculture the SANRAL preferred alignment is therefore favoured over Alternative 1b.

### ***Social***

Consultations regarding the two site-specific alternative alignments revealed no particular preferences for either of the two alignments. However, the directly affected communities expressed the need for proper compensation and relocation, and over- and underpasses, as appropriate. The need was also expressed for consultation regarding continued access to the Fort Harrison road and access to the proposed new road to facilitate the movement of labour, services, and produce to markets. It is predicted that both alternatives would, overall, result in **MEDIUM** significance residual impacts in terms of household relocation, loss of arable land and access. Neither alignment is thus considered more favourable from a social perspective.

### ***Cultural and historical heritage***

It is considered that Alternative 1b would present no advantage in reducing potential cultural and historical impacts over the SANRAL preferred route between Ndwalane and the Mzimvubu River. Neither alignment is thus considered more favourable from a cultural and historical heritage point of view.

### ***Noise***

Some residences, located within 40 m of the route of Alternative 1b, would be exposed to a noise rating level approaching 70 dBA with an associated noise impact of **very high** intensity and significance. Residences which would be located between 150 m and 180 m from the route of Alternative 1b would be exposed to a noise rating level approaching 60 dBA. The intensity and significance of the associated noise impact is assessed to be **high**. A 3 m high noise berm, extending at least 200 m beyond each side of the residences, would reduce the noise rating level to less than 55 dBA with an associated noise impact of **LOW** intensity and significance at the nearest residences. Alternative 1b is thus favoured from a noise perspective since fewer residences would be affected and noise mitigation would have a greater effect on all affected land.

### ***Discussion***

The above comparative assessment indicates that Alternative 1b would present major advantages over the SANRAL preferred route in terms of limiting potential impacts on sensitive faunal habitats and

potential noise impacts to nearest residences. However, this route would result in significant impacts on prime riparian irrigation land and good quality (true) forests at the location (interchange) where the route would divert from the existing R61. Thus, consideration of the overall environmental implications of the two site-specific alternative routes does not reveal a clearly favoured route option. It is anticipated that both routes would, however, result in residual indirect impacts of **HIGH** significance due to increased recreational and development-related pressures which would be exerted on sensitive estuaries in the region due to improved access. Thus, consideration of the overall environmental implications of the two site-specific alternative routes does not reveal a clearly favoured route option. SANRAL has indicated that the construction of a major road in the floodplain of a river would not be preferable from a practical, strategic and technical perspective since the road would have to be raised to clear the 1:100 year flood line.

**Table 10.13: Summary comparative assessment of potential residual impacts of the site-specific alternative routes between Ndwalane and the Mzimvubu River**

| ISSUE / IMPACT  | SIGNIFICANCE OF POTENTIAL RESIDUAL IMPACTS |                   |
|---|--|-------------------|
|   | SANRAL PREFERRED ROUTE                     | ALTERNATIVE 1B    |
| <b>VEGETATION AND FLORA</b>   |  |                   |
| Overall impacts on vegetation and flora as a result of disruption of the flow of nutrients and materials, loss of habitat, loss of biodiversity, reduction in resilience/stability of ecosystems, etc.) | LOW TO MEDIUM                              | MEDIUM            |
| <b>FAUNA</b>  |  |                   |
| Loss of sensitive faunal habitat  | HIGH                                       | MEDIUM            |
| <b>AQUATIC ECOSYSTEMS</b>   |  |                   |
| Overall impacts on riparian and instream vegetation   | LOW  | LOW               |
| Overall impacts on rivers and wetlands  | LOW TO LOW-MEDIUM                          | LOW TO LOW-MEDIUM |
| Overall impacts on estuaries  | LOW TO HIGH                                | LOW TO HIGH       |
| <b>SOILS, LAND USE AND AGRICULTURE</b>  |  |                   |
| Overall impacts on soils, land use and agriculture  | LOW  | HIGH              |
| <b>SOCIAL</b>   |  |                   |
| Overall social impacts (severance effects, loss of arable land etc.)  | MEDIUM                                     | MEDIUM            |
| <b>CULTURAL AND HISTORICAL HERITAGE</b>   |  |                   |
| Overall cultural and historical heritage impacts (graves, archaeological sites etc.)  | LOW TO MEDIUM                              | LOW TO MEDIUM     |
| <b>NOISE</b>  |  |                   |
| Noise impacts   | LOW / HIGH                                 | LOW               |

### 10.3.2 COMPARATIVE ASSESSMENT OF ALTERNATIVE 2A VERSUS THE SANRAL PREFERRED ROUTE IN THE VICINITY OF NTAUFUFU VILLAGE AND THE NTAUFUFU RIVER

As mentioned in Section 5.3.3, Alternative 2a would cross the Ntafufu River at the existing crossing site and largely follow the existing gravel access road to join the existing R61 between Port St Johns and Lusikisiki whereas the SANRAL preferred route (Alternative 2f) would cross the Ntafufu River at a point slightly downstream of the existing crossing site (refer to Figure 10.3).

A summary of the potential residual impacts of Alternative 2a versus the SANRAL preferred route (Alternative 2f) is provided in Table 10.14. Relevant potential impacts are discussed separately below.

#### **Vegetation and flora**

It is considered that Alternative 2a would not result in loss of habitat, as no natural vegetation would be traversed. The bridge crossing may, however, result in potential impacts on ecological processes associated with the riparian/wetland habitat. The SANRAL preferred route would result in a small amount

of habitat loss associated with a degraded area close to the existing village. Thus, from a botanical perspective, neither alternative route is considered more favourable.

### ***Fauna***

It is considered that Alternative 2a would present no advantage in reducing potential faunal impacts over the SANRAL preferred route in the vicinity of Ntafufu village and the Ntafufu River. In light of the predicted potential faunal impacts, neither alternative route is considered more favourable.

### ***Aquatic ecosystems***

Alternative 2a and the SANRAL preferred route (Alternative 2f) would result in similar potential impacts on aquatic ecosystems. From an aquatic ecosystems perspective, neither alternative route is thus considered more favourable.

### ***Soils, land use and agriculture***

Alternative 2a would avoid cultivated fields belonging to the Ntafufu Senior Secondary School. About 5 ha is under irrigation for the production of vegetables. Thus, from an agricultural perspective, Alternative 2a would be preferred over the SANRAL preferred route.

### ***Social***

Alternative 2a would require the relocation of both the Ntafufu Junior and Senior Secondary Schools, which were built entirely out of community contributions and are deemed locally to be exceptional facilities and local landmarks. Consultations with members of the community and teachers clearly indicated that the community achievements should ideally not be destroyed or relocated. The SANRAL preferred route (Alternative 2f) would also require the relocation of the Ntafufu Junior Secondary School but would affect the two soccer and rugby fields of the Senior Secondary School only. The latter impacts are deemed, locally, to be easily mitigatable through the allocation of other land for these purposes adjacent to the schools. In the event of construction, the local community has advised that the contracting companies could assist in this regard by levelling some sloping ground. From a social perspective, Alternative 2f (SANRAL preferred route) is considered more favourable, due solely to the additional threat Alternative 2a would pose to the Ntafufu Senior Secondary School.

### ***Cultural and historical heritage***

It is considered that Alternative 2a would present no advantage in reducing potential cultural and historical impacts over the SANRAL preferred route in the vicinity of Ntafufu village and the Ntafufu River. Neither alignment is thus considered more favourable from a cultural and historical heritage point of view.

### ***Noise***

Alternative 2a, in the vicinity of Ntafufu village and the Ntafufu River, would be situated closer to residences than the SANRAL preferred route. Thus, from a noise perspective, it is considered that the SANRAL preferred route would be more favourable.

### ***Discussion***

Overall, and with adequate compensation/replacement of the affected irrigation scheme and school playing fields adjacent to the river, it is considered that the key factor to be considered in determining a preferred route would be the potential impacts on the two local Ntafufu schools. In this regard, the SANRAL preferred route (Alternative 2f) is considered more favourable, due solely to the additional threat Alternative 2a would pose to the Ntafufu Senior Secondary School.

**Table 10.14: Summary comparative assessment of potential residual impacts of the site-specific alternative alignments in the vicinity of Ntafufu Village and the Ntafufu River**

| ISSUE / IMPACT   | SIGNIFICANCE OF POTENTIAL RESIDUAL IMPACTS |                   |
|--|--|-------------------|
|  | SANRAL PREFERRED ROUTE                     | ALTERNATIVE 2A    |
| VEGETATION AND FLORA   |  |                   |
| Overall impacts on vegetation and flora (as a result of loss of habitat, increased run-off and drainage, soil erosion, silt loads and sedimentation, etc.) | NEGLECTIBLE TO LOW                         | NONE TO LOW       |
| FAUNA  |  |                   |
| Overall impacts on fauna (habitats, ecosystems etc.)   | LOW TO MEDIUM                              | LOW TO MEDIUM     |
| AQUATIC ECOSYSTEMS   |  |                   |
| Overall impacts on riparian and instream vegetation  | LOW  | LOW               |
| Overall impacts on rivers and wetlands   | LOW TO LOW-MEDIUM                          | LOW TO LOW-MEDIUM |
| Overall impacts on estuaries   | LOW TO HIGH                                | LOW TO HIGH       |
| SOILS, LAND USE AND AGRICULTURE  |  |                   |
| Overall impacts on soils, land use and agriculture   | LOW  | NONE              |
| SOCIAL   |  |                   |
| Overall social impacts (severance effects, loss of arable land etc.)   | LOW  | MEDIUM            |
| CULTURAL AND HISTORICAL HERITAGE   |  |                   |
| Overall cultural and historical heritage impacts (graves, archaeological sites, etc.)  | LOW TO MEDIUM                              | LOW TO MEDIUM     |
| NOISE  |  |                   |
| Noise impacts  | MEDIUM                                     | MEDIUM            |

#### 10.4 ASSESSMENT OF POTENTIAL IMPACTS: ALTERNATIVE MAINLINE TOLL PLAZA LOCATIONS

Potential impacts relevant to a comparative assessment of the alternative locations for the proposed Ndwalane Toll Plaza are discussed separately below.

SANRAL's preferred location for the Ndwalane mainline toll plaza is described and illustrated in Section 4.2.4 and Figure 4.18. The alternative location for this mainline toll plaza, in the vicinity of the Ntlaza Mission, near the Tutor Ndamase Pass, is described and illustrated in Sections 4.2.3 and 5.3.8, Figure 4.12 and Plate 5.1).

A summary of potential residual impacts, where applicable, of the Alternative Ndwalane mainline toll plaza versus SANRAL's preferred Ndwalane mainline toll plaza location is provided in Table 10.15. Relevant potential impacts are discussed separately below.

##### **Vegetation and flora**

The Alternative Ndwalane mainline toll plaza would offer a major advantage over SANRAL's preferred location in terms of minimising potential loss of habitat, fragmentation of habitat and loss of species of special concern. The proposed Ndwalane mainline toll plaza would, in addition to affecting habitats associated with Transkei Coastal Belt (Vulnerable), also affect some natural forest area adjacent to existing disturbed areas. From a botanical perspective the Alternative Ndwalane mainline toll plaza location is thus considered more favourable.

##### **Fauna**

Potential residual faunal impacts associated with the two alternative locations for the Ndwalane mainline toll plaza are considered to be similar and of **LOW** significance. Anticipated faunal impacts relate to

increased pollution (chemical, light and noise) and fire risk, which would occur over the operational lifetime of the proposed toll highway (effectively permanent). Neither location is thus considered more favourable from a faunal perspective.

### **Aquatic ecosystems**

The Alternative Ndwalane mainline toll plaza would be situated further from drainage lines as compared to SANRAL's preferred location. Although residual impacts are considered to be **LOW**, the Alternative Ndwalane mainline toll plaza is preferred from an aquatic ecosystems perspective since it would avoid any potential impacts.

### **Social**

It is considered that the alternative mainline plaza locations would result in similar effects in terms of possible creation of unplanned nodes. Thus, neither alternative is considered more favourable than the other.

### **Noise**

There would be no significant difference between the alternative mainline toll plaza locations with regard to their proximity to settlements. It is thus anticipated that the two plaza locations would result in similar noise impacts. From a noise perspective, neither location is thus considered more favourable than the other.

### **Visual**

It is anticipated that the Alternative Ndwalane mainline toll plaza would result in a lower potential residual visual impact (**LOW**) than SANRAL's preferred Ndwalane location. Thus, the Alternative Ndwalane mainline toll plaza location is considered more favourable.

### **Discussion**

The above comparative assessment (and Table 10.15) indicates that Alternative Ndwalane mainline toll plaza would, overall, be more favourable than SANRAL's preferred Ndwalane mainline toll plaza location in terms of potential impacts relating to vegetation and flora, aquatic ecosystems and visual aspects. Moreover, the SANRAL preferred location would result in key potential residual impacts associated with potential loss of habitat.

**Table 10.15: Summary comparative assessment of potential residual impacts, where applicable, of the Alternative Ndwalane Toll Plaza versus SANRAL's proposed Ndwalane Toll Plaza**

| ISSUE / IMPACT  | SIGNIFICANCE OF POTENTIAL RESIDUAL IMPACTS |                                 |
|---|--|---------------------------------|
|   | PROPOSED NDWALANE TOLL PLAZA               | ALTERNATIVE NDWALANE TOLL PLAZA |
| VEGETATION AND FLORA  |  |                                 |
| Loss of habitat   | MEDIUM                                     | LOW                             |
| Fragmentation of habitat; loss of species of special concern  | LOW  | -                               |
| Loss of biodiversity; increased runoff and drainage, soils erosion, silt loads and sedimentation; invasion by weeds and invasive alien plants | LOW  | LOW                             |
| Pollution at construction camps and increased risk of veld fires  | VERY LOW                                   | VERY LOW                        |
| FAUNA   |  |                                 |
| Overall faunal impacts  | LOW  | LOW                             |
| AQUATIC ECOSYSTEMS  |  |                                 |
| Overall impacts on aquatic ecosystems   | LOW  | LOW                             |
| SOCIAL  |  |                                 |
| Uncontrolled secondary development  | LOW  | LOW                             |

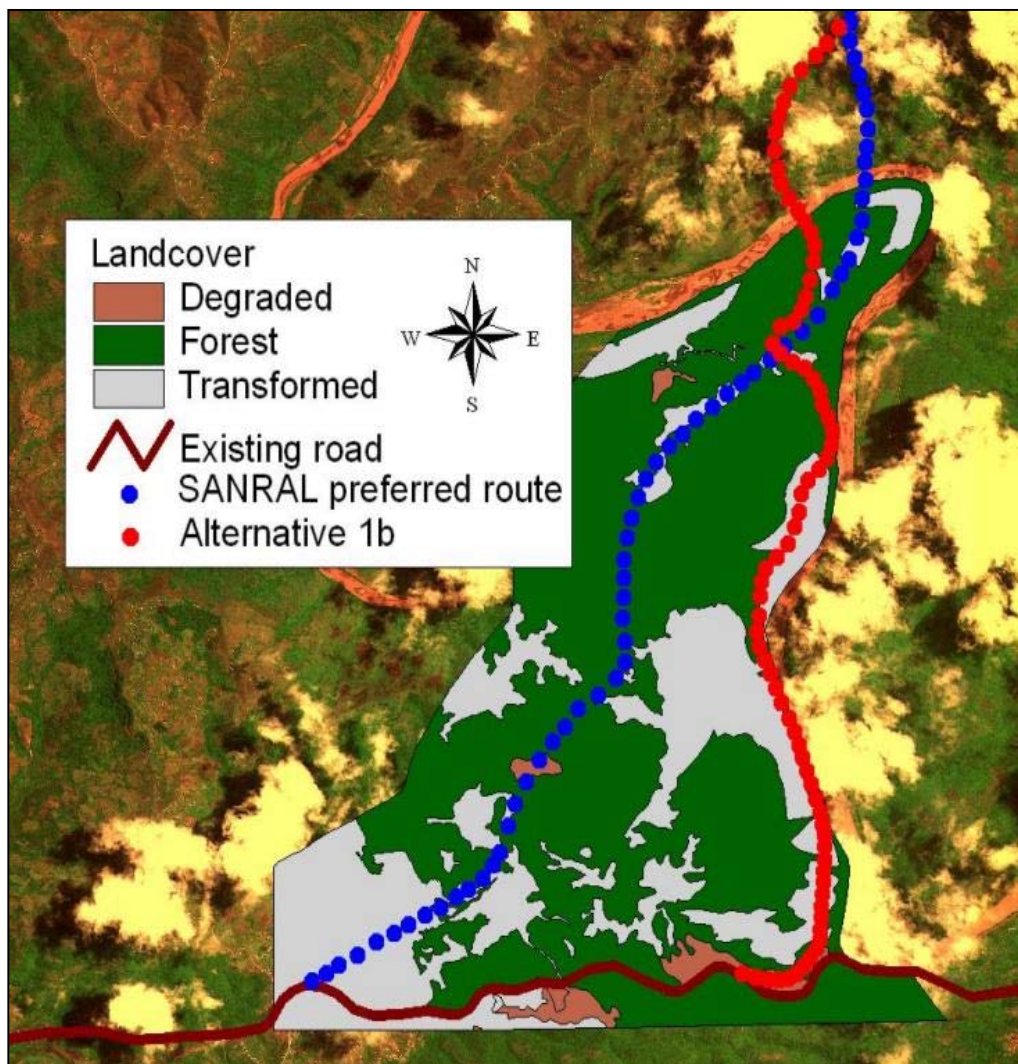
| ISSUE / IMPACT | SIGNIFICANCE OF POTENTIAL RESIDUAL IMPACTS |                                 |
|----------------|--|---------------------------------|
|                | PROPOSED NDWALANE TOLL PLAZA               | ALTERNATIVE NDWALANE TOLL PLAZA |
| NOISE          |  |                                 |
| Noise impacts  | NONE/LOW                                   | NEGLIGIBLE/LOW                  |
| VISUAL         |  |                                 |
| Visual impacts | LOW-MEDIUM                                 | LOW                             |



Figure 10.4: Ndwalane mainline toll plaza viewshed analysis



Figure 10.5: Mzimvubu River bridge viewshed analysis



**Figure 10.6: Affected habitats along the SANRAL preferred route and Alternative 1b between Ndwalane and the Mzimvubu River**