SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED (SANRAL)

STRATEGIC INFRASTRUCTURE PROJECT (SIP2)
PROPOSED CAPACITY UPGRADES TO THE N2 & N3

BASIC ASSESSMENT 1

PROPOSED CAPACITY UPGRADES TO THE N2 (SOLOMON MAHLANGU INTERCHANGE (I/C) TO SOUTH OF UMGENI ROAD I/C), INCLUDING EXPANSION OF THE EB CLOETE AND SOLOMON MAHLANGU INTERCHANGES, AND THE N3 (EB CLOETE TO PARADISE VALLEY) INCLUDING PROVISION OF TEMPORARY ACCESS FOR CONSTRUCTION BELOW WESTVILLE AND PARADISE VALLEY VIADUCTS, ETHEKWINI METROPOLITAN MUNICIPALITY, KWAZULU-NATAL

DRAFT BASIC ASSESSMENT REPORT

DEA REF NO: *TO BE ASSIGNED*

DRAFT BASIC ASSESSMENT REPORT FOR PUBLIC REVIEW

SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED (SANRAL)

STRATEGIC INFRASTRUCTURE PROJECT (SIP2)
PROPOSED CAPACITY UPGRADES TO THE N2 & N3

BASIC ASSESSMENT 1

PROPOSED CAPACITY UPGRADES TO THE N2 (SOLOMON MAHLANGU INTERCHANGE (I/C) TO SOUTH OF UMGENI ROAD I/C), INCLUDING EXPANSION OF THE EB CLOETE AND SOLOMON MAHLANGU INTERCHANGES, AND THE N3 (EB CLOETE TO PARADISE VALLEY) INCLUDING PROVISION OF TEMPORARY ACCESS FOR CONSTRUCTION BELOW WESTVILLE AND PARADISE VALLEY VIADUCTS, ETHEKWINI METROPOLITAN MUNICIPALITY, KWAZULU-NATAL

DRAFT BASIC ASSESSMENT REPORT

DEA REF NO: *TO BE ASSIGNED*

Report prepared for:

SANRAL SOC LIMITED
PO Box 100401
Scottsville
3209

Report prepared by:

ACER (Africa) Environmental Consultants
P O Box 503
Mtunzini
3867

September 2018

DRAFT BASIC ASSESSMENT REPORT FOR PUBLIC REVIEW

This Draft BAR has been placed at the following public places in the project area. It will be available to members of the public from **11 October 2018 – 9 November 2018**.

Area	Venue	Street Address	Telephone Number
Mayville	Cato Crest Library	No. 1 Grammar Road, Mayville, 4091	031 261 1096
Chesterville	Chesterville Public Library	80 Mahlathi Road, Chesterville Zone 1	031 264 0945
Hillary	Hillary Public Library	Shop No. 5, Hillary Centre, Stella Rd, Malvern, Durban, 4094	031 464 4769
Malvern	Malvern Public Library	Rose Park, CNR Coronation Rd and Knightsway Rd, Malvern	031 311 2520
Westville	Westville Civic Centre Library	1 William Leister Drive, Westville, 3613	031 311 6591

YOUR COMMENTS PLEASE

Please submit your comments by 9 November 2018 to:

Mareike Straueli ► P O Box 503, Mtunzini, 3867
► Tel: 035 340 2715 ► Fax: 035 340 2232 ► E-mail: N3batch1@acerafrica.co.za

Please note that, in line with the EIA Regulations, all registered interested and affected parties are required to disclose any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

EXECUTIVE SUMMARY

INTRODUCTION AND LEGAL REQUIREMENTS

The South African National Roads Agency SOC Limited (SANRAL) intends to widen the N2 and N3 national roads between the Port of Durban and Pietermaritzburg, KwaZulu-Natal. The proposed project requires environmental authorisation from the National Department of Environmental Affairs. This report is a Basic Assessment Report (BAR) for a section of the proposed capacity improvements (extending up to Paradise Valley). The BAR has been prepared on behalf of SANRAL by ACER (Africa) Environmental Consultants (ACER), in terms of the requirements of the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended), published under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The Basic Assessment process has included technical investigations and public participation in accordance with GN R. 326. This Draft BAR has been made available for public review and comment during the period **11 October to 9 November 2018.**

Further to the requirement for environmental authorisation, several other environmental laws, policies and guidelines are applicable to this project and are listed in Table 7 of this report.

PROJECT NEED AND DESIRABILITY

The N2 and N3 carry large volumes of traffic, with a high percentage of heavy vehicles carrying freight to and from the Port of Durban, forming the backbone of South Africa's freight network. Sections of these national roads are operating at full capacity. Traffic studies commissioned by SANRAL have projected traffic growth figures and indicate the need to provide additional lanes to alleviate current traffic congestion, accommodate future growth and improve road safety and efficiency. SANRAL (Eastern Region), therefore, proposes to provide additional lanes along a section of the N2 near the Port of Durban and a section of the N3 from the N2/N3 (E.B Cloete) interchange to Pietermaritzburg. The proposed capacity improvements, which are divided into sections and covered ultimately by 17 engineering work packages, will be implemented at different stages according to timing priorities and factors related to funding availability (albeit the reality is that there will be overlapping construction periods between the 17 engineering work packages). The proposed capacity improvements will improve safety, increase mobility and accommodate traffic growth to 2047.

Importantly, the upgrades are planned in line with South Africa's Strategic Infrastructure Projects (SIPs) as described in the National Development Plan, 2011. Specifically, the proposed capacity improvements form the backbone of SIP2, which focuses on strengthening the Durban-Free State-Gauteng logistics and industrial corridor. In line with SIP2 goals, the capacity improvements will improve access to Durban's export and import facilities. National roads are essential infrastructure supporting the economy of the country and, therefore, of benefit to all citizens of South Africa either directly or indirectly. As such, this project has been taken into account by, and is compatible with, national, provincial and municipal development and planning frameworks.

PROJECT LOCATION AND MAIN COMPONENTS

The sections of national roads dealt with in this Basic Assessment are located within the urban core of the eThekwini Metropolitan Municipality, KwaZulu-Natal (see locality figures overleaf). Road sections to undergo widening are:

- N2 from Solomon Mahlangu Interchange (I/C) to south of the Umgeni Road I/C.
- N3 from the EB Cloete I/C to the Paradise Valley I/C.

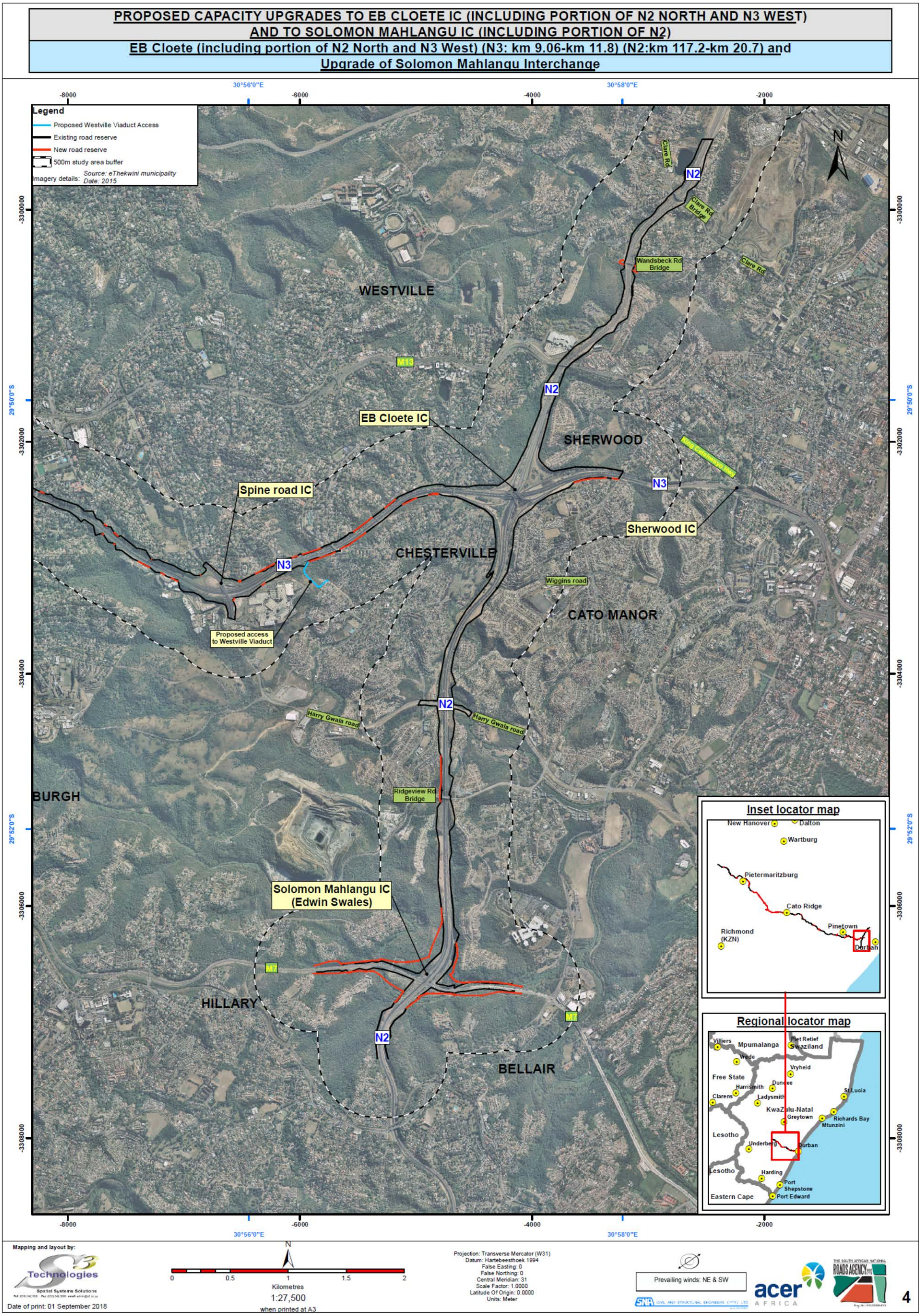


Figure 1 Location of proposed capacity improvements to the EB Cloete I/C (including portion of N2 north and N3 west) and to Solomon Mahlangu I/C (including portion of N2 to south of Umgeni Road I/C)

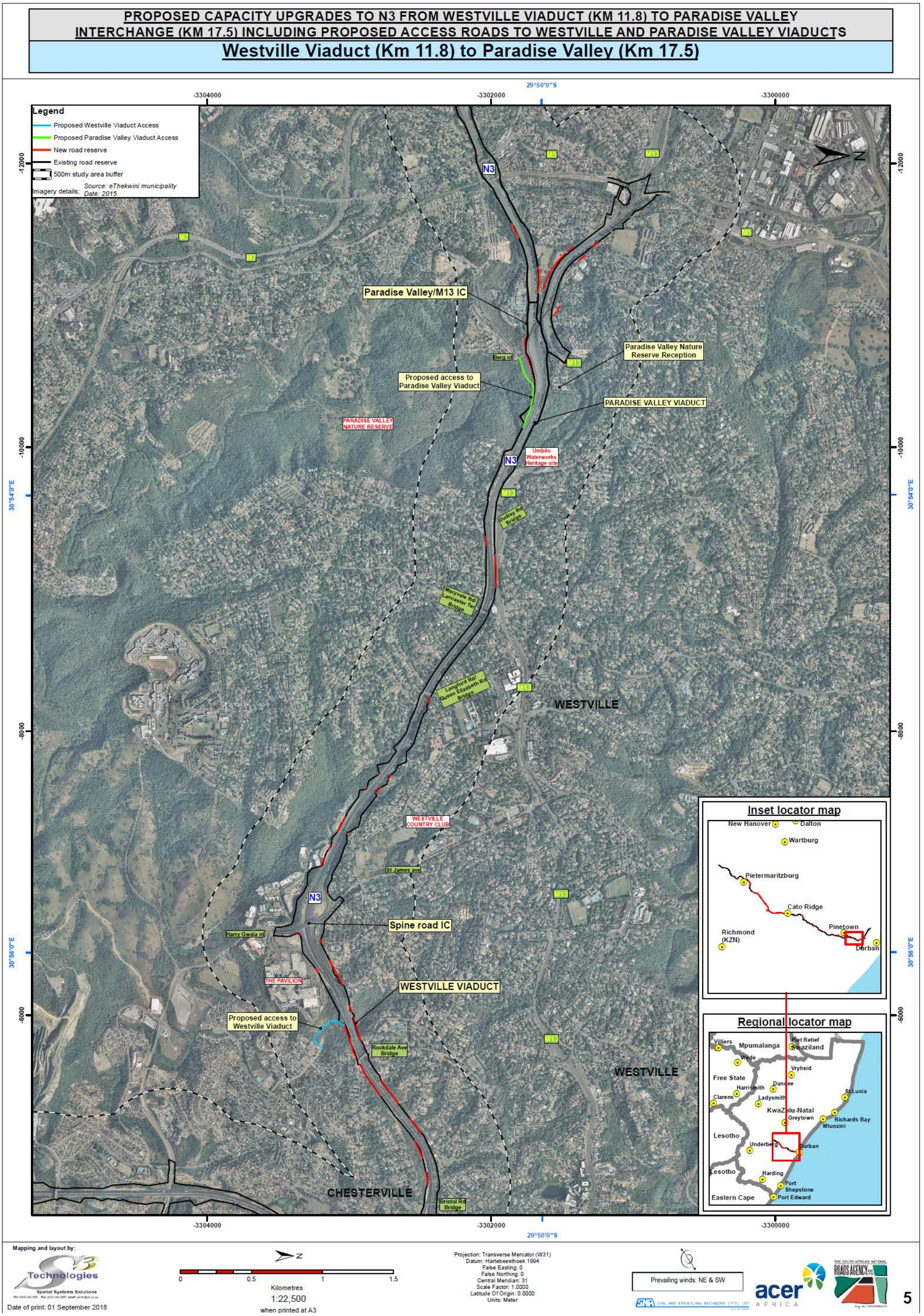


Figure 2 Location of proposed capacity improvements to the N3 from Westville Viaduct to Paradise Valley I/C including proposed access roads to Westville and Paradise Valley Viaducts

Within these sections, the major interchanges to be upgraded are:

- Solomon Mahlangu (N2/M7).
- EB Cloete (N2/N3).
- Westville Spine Road (N3/St James/Harry Gwala).
- Paradise Valley (N3/M13).

In addition, this project requires the construction of two temporary access roads to access the areas beneath the Westville and Paradise Valley Viaducts. These are the:

- Proposed Westville Viaduct access road (sited near the residential area of Chesterville on the south side of the N3).
- Proposed Paradise Valley Viaduct access road (sited within the Paradise Valley Nature Reserve).

Two parallel sections of Transnet Fuel Pipeline, each approximately 500 m in length, will need to be realigned prior to roadworks commencing, to accommodate the capacity upgrades in the vicinity of the N2/M7 (Solomon Mahlangu – previously Edwin Swales) Interchange.

Work on the three road contracts covered by this Basic Assessment (BA) are anticipated to commence towards the end of 2019/beginning of 2020. Relocation of services and construction of temporary viaduct access roads is currently planned to be undertaken prior to this.

PROJECT ALTERNATIVES

In line with the EIA Regulations, several alternatives have been considered for the proposed project. Given that this project entails the upgrade of an existing national road, alternatives investigated by SANRAL have revolved mostly around technical engineering issues (road design, materials, etc.). However, it must be understood that the final project proposal for which environmental authorisation is requested presents only **one feasible overall design alternative** which has been selected based on detailed modelling to best meet traffic demands and road safety standards.

The No-Development alternative (not preferred) provides the baseline against which alternatives are assessed and also demonstrates the consequences of not authorising the development proposal.

THE RECEIVING ENVIRONMENT

The sections of N2 and N3 under consideration are themselves part of a major transport and economic corridor. They pass through an urban environment, with the major adjacent land uses comprising relatively dense residential and commercial areas. Road widening will be restricted mainly to the median and the existing road reserves. However, limited sections of private and state-owned land will need to be acquired by SANRAL where widening cannot be accommodated within SANRAL's own properties. The project also affects natural habitat incorporated into D'MOSS and urban protected areas, including the Paradise Valley Nature Reserve. Due to the hilly nature of the terrain, numerous streams are crossed by the existing national roads and will be affected where road widening requires lengthening/upgrading of existing drainage structures. The Umbilo Waterworks within the Paradise Valley Nature Reserve has been identified as a potentially affected cultural heritage resource.

PUBLIC PARTICIPATION PROCESS

The public participation process was designed and implemented to comply with the requirements of the EIA Regulations and NEMA. A detailed description is provided in Chapter 6 of this report.

ASSESSMENT METHODOLOGY

Issues and potential impacts of the project on the environment (and *vice versa*) were identified by way of field investigations, desktop studies and interaction with Interested and Affected Parties (I&APs). Key issues and impacts requiring further investigation were addressed by specialist studies and/or further detailed input from the environmental and technical team. Input from in-house specialists underwent independent review. Mitigation measures were identified with inputs from I&APs, the specialists, the design engineers and the Environmental Assessment Practitioner (EAP) team. Information was collated, evaluated and integrated, taking into account the specialist findings and recommended mitigation measures. Thereafter, each impact was assessed using the assessment conventions outlined in Table 14 of this report.

Please note that the assessment of potential safety risks associated with the Transnet Fuel Pipeline relocation does not form part of the scope of this Basic Assessment (listed activities triggered are associated only with the removal of vegetation). Safety risks will be assessed by qualified experts as part of the planning and design for the pipeline relocation contract.

SUMMARY OF KEY ISSUES AND POTENTIAL IMPACTS ASSOCIATED WITH THE N2 AND N3 CAPACITY IMPROVEMENTS AND ASSESSMENT OF THE SIGNIFICANCE OF THE IDENTIFIED IMPACTS

The key issues identified and assessed during this Basic Assessment were formulated as eight questions. Associated potential impacts were identified and their significance assessed both before and after mitigation.

What economic and socio-economic benefits will result from the proposed widening/capacity improvements to the N2 and N3, at a local, regional and national scale?

- Employment creation, capacity building (+ve).
- Improved road safety (+ve).
- Reduced travel time (reduced traffic congestion and improved road conditions) (+ve).
- Improved transport corridor (+ve).
- Stimulation of the local, regional and national economy (+ve).

With management, these positive impacts are considered to be of medium and high significance.

What effects will the proposed widening/capacity improvements to the N2 and N3 have on adjacent properties, infrastructure and services, and vice versa?

- Increased interaction with landowners and entry onto private properties by investigative teams (e.g. geotechnical) (-ve).
- Potential loss and disruption due to acquisition or expropriation[1] of properties (-ve).
- Resettlement of formal households and loss of privately owned land (-ve).
- Damage to/disruption of services and infrastructure in and adjacent to the road reserve (-ve).
- Impacts on Paradise Valley Nature Reserve facilities and operations (-ve).
- Unintended damages to private property (-ve).
- Temporary loss and damage to public open space (-ve).
- Expansion of informal settlements into the road reserve (-ve).
- Resettlement of informal settlements (-ve).
- Increased repairs and maintenance to adjoining affected roads (-ve).

[1] It is expressly stated that expropriation discussed in this report is expropriation to be undertaken within the context and provisions of the current laws of the country. Expropriation for purposes of capacity improvements to the N2 and N3 is in no way linked to or to be interpreted within the context of the current debate concerning 'land expropriation without compensation'.

With management, these impacts are considered to be of low and medium significance.

What potential health, safety, security and nuisance impacts may be experienced as a result of the proposed widening/capacity improvements to the N2 and N3 during construction?

- The effect of increased noise on surrounding receivers during construction (-ve).
- Increased likelihood of road traffic accidents (-ve).
- Disruption to vehicle traffic and access (-ve).
- Disruption to pedestrian access in specific localised areas (-ve).
- Health and safety risks to those in proximity to construction activities (-ve).
- Increased dust and vehicle emissions (-ve).
- Increased spread of disease (-ve).
- Increased crime (increased security risk) (-ve).
- Potential protest action by informal settlement communities, business forums and/or disaffected sub-contractors (-ve).
- Direct and indirect effects of the production of large volumes of demolition rubble and inert material (-ve).
- Nuisance impacts e.g. increased dust and degraded aesthetics (-ve).
- Potential safety risks associated with the relocation of a section of Transnet's Fuel Pipeline (impacts are not assessed in this report; this will be done as part of a full risk assessment to be undertaken by qualified experts as part of the relocation project).

With management, these impacts are considered to be of low and medium significance.

What negative impacts will the proposed widening/capacity improvements to the N2 and N3 have on the social environment, during operation?

- Increased safety and security risks to nearby properties and occupants during operation of the widened road (-ve).
- Increased noise where the distance from the road to receptors is reduced (-ve).
- Increased effect of vibrations from heavy vehicles, where the distance from the road to buildings is reduced (-ve).
- Risk of stormwater damage to adjacent properties (-ve).
- Increased proximity to vehicle emissions (-ve).

With management, these impacts are considered to be of low and medium significance.

What effects will the proposed widening/capacity improvements to the N2 and N3 have on cultural heritage resources?

- Potential destruction of part of the Umbilo Waterworks, a provincial landmark (-ve).
- Detraction from landscapes and natural features, viz. Paradise Valley Nature Reserve (-ve).

With management, these impacts are considered to be of low and medium significance.

What effects will the proposed widening/capacity improvements to the N2 and N3 have on the biodiversity of protected areas, D'MOSS and other natural habitat (terrestrial/riparian)?

- Loss of topsoil (-ve).
- Destabilisation of banks, erosion and sedimentation (-ve).
- Loss/degradation of Disturbed Grassland/Shrubland/Thicket Mosaic (-ve).

- Loss/degradation of natural vegetation at Solomon Mahlangu Interchange (including that caused by the relocation of the fuel pipeline) (-ve).
- Loss/degradation of natural vegetation at Westville Viaduct (-ve).
- Loss/degradation of natural vegetation at Roosfontein Nature Reserve (-ve).
- Loss/degradation of natural vegetation at Paradise Valley Nature Reserve (-ve).
- Loss/degradation of riparian and wetland areas[2] (-ve).
- Faunal mortalities and negative effect on local faunal populations due to disturbance, loss of habitat and poaching (-ve).

With management, the impacts are considered to be of low and medium significance.

What potential cumulative impacts can result from the proposed widening/capacity improvements to the N2 and N3?

A cumulative impact is an incremental impact on the environment that results from the impact of a proposed action when added to existing and reasonably foreseeable future actions. Cumulative effects can be both positive and negative. Also, the nature of cumulative impacts can be both temporary (i.e. impacts that are restricted to the construction period) and permanent (i.e. impacts that occur in both the construction and operation phases).

To enhance the positive impacts of the proposed widening/capacity improvements to the N2 and N3 and, thus, enhance positive cumulative effects, the project should be implemented efficiently according to best environmental practice and the infrastructure should be well maintained.

To minimise negative impacts of the proposed widening/capacity improvements to the N2 and N3 and, thus, its negative contributions towards cumulative effects on the environment, the project should be implemented with application of recommended mitigation measures. There will also need to be good co-ordination between contracts running concurrently (which is unavoidable due to restricted timeframes). Alternative routes include the M7, M13 and M19. **In particular, it will be important to consider alternative access to the N2 from the west, when the N3 between Paradise Valley to EB Cloete Interchange is being upgraded.**

What are the impacts of the No Development Alternative (not implementing widening/capacity improvements to the N2 and N3?

- Deferment/avoidance of the negative impacts of construction (social disruption, noise and nuisance, and destruction/disturbance of natural habitat) (+ve).
- Increased traffic congestion and increased commuter time (-ve).
- Decreased road safety (-ve).
- Disadvantages to the local, regional and national economies (-ve).

Apart from the deferment of negative construction impacts, according to the assessment, the predicted impacts of the No Development Alternative are considered to be of high (-ve) significance without mitigation (mitigation would be implementation of the capacity improvements).

ENVIRONMENTAL IMPACT STATEMENT

Effects of the project on the social environment and vice versa

This project is located along approximately 21 km of national road within a highly built-up (urbanised) area of the eThekwini Metropolitan Municipality. Furthermore, the project constitutes major roadworks

[2] Excluding those located in Westville Viaduct, Roosfontein Nature Reserve and Paradise Valley Nature Reserve.

(including widening of bridges and viaducts) to be implemented on national roads carrying high volumes of traffic including heavy vehicles. As such, during the construction period (each contract approximately 4-5 years) there will be numerous negative impacts on the social environment, which will be experienced by both road users and adjacent property owners/occupiers on the affected sections. These will largely be nuisance impacts related to the disruption of traffic flows, road access, increased noise, increased crime risks and general construction related disturbances. The road restrictions will pose higher road safety risks to motorists and pedestrians. Equally, the high traffic volumes and space constraints will make it more difficult for the project team to execute construction efficiently.

Existing services in the current road reserve will have to be relocated and related disruptions may ensue. While all these impacts will be temporary, it can be anticipated with a high level of certainty that they will affect thousands of road users and local residents on a daily basis at varying intensities over a period of several years. Good co-ordination between contracts running concurrently (which is unavoidable due to restricted timeframes for implementation) will therefore be essential to reduce cumulative impacts. Co-ordination has already commenced during the design phase, to ensure a harmonised approach is undertaken on all contracts in terms of traffic accommodation, signage and other aspects during construction, to reduce the delays to motorists. While the majority of the road widening will be contained within the existing road reserve, limited sections will require expropriation of adjacent land and, thus, some property owners will lose land. SANRAL has entered into property acquisition processes with affected property owners and fair compensation will be negotiated in line with legislated procedures.

It should be noted that in the project area, there are localised informal settlements on the boundary of the national road, with some shacks possibly encroaching into the road reserve. If not managed timeously and sensitively by SANRAL and eThekwini, this issue has the potential to cause delays and attendant negative impacts on the project. Similarly, there are cases of structures and buildings located unlawfully in the road reserve, which will need to be dealt with between adjacent property owners and SANRAL. With efficient and proper project management and implementation by SANRAL, as well as the application of the mitigation measures recommended in this report (carried over into the Environmental Management Programme (EMPr), **the negative social impacts during construction, while onerous, will be of medium and low significance, with no negative social impacts of high significance.**

The positive impacts of the project on the social environment during operation will be of high significance. They can be predicted with a high level of certainty to benefit thousands of road users on a daily basis through improved road travelling conditions, including improved road safety and reduced travel times. Negative impacts during operation such as increased traffic noise and exhaust emissions are not a result of the project but rather a result of increasing traffic volumes over time, which will unavoidably affect any occupiers and users of properties adjacent to any national road. In the case of this project, the intensity of impacts will increase where the widened road brings the receivers into closer proximity to traffic. With respect to emissions, the impacts will be variable, depending on the topography and micro-climate of the location. Indeed, some areas where previously there was congestion may improve with respect to emissions, as free flowing traffic is likely to decrease the concentration of exhaust emissions. With respect to operational noise, it is clear that noise levels are already problematic within generally, 300 m from the road and they are predicted eventually (over the next 30 years and in the absence of mitigation) to reach unacceptable levels according to predicted increases in traffic volumes. SANRAL, as the road authority, is tasked with ensuring that the roads can safely and efficiently accommodate traffic growth and to do this, has to widen the road. SANRAL has taken into consideration low noise surfacing in the road design and is in the process of appointing an acoustic specialist to investigate further possible noise control measures over time. Control of the growth of traffic volumes is a broader issue that requires high level

interventions such as improved public transport and migration of freight from road to rail. These issues are being addressed but will take time. Ultimately there must also be an adaptation to prevailing conditions, i.e. a change of land use/receptors adjacent to national roads, towards those which are less sensitive to noise. **With mitigation, the negative impacts on the social environment associated with operation of the widened national roads are anticipated to be of low and medium significance.**

Effect of the project on the economic/socio-economic environment
During the construction period, it is definite that some **positive economic/socio-economic impacts of medium significance will accrue to the local and regional communities** due to the provision of temporary jobs for semi skilled and unskilled workers, the increased opportunities for local contractors and SMMEs and a general increase in spending on a wide range of goods and services both locally and nationally.

There will also be negative economic/socio-economic impacts during the construction period. Economic losses are likely to be incurred indirectly due to poorer access, poorer road safety and travelling conditions, possible damage to infrastructure and services, increased risk of crime, expropriation of properties, resettlement processes, etc. The widening of the Paradise Valley Viaduct will negatively affect the Paradise Valley Nature Reserve and will require closure of some popular areas to the public, during the construction period, with attendant economic losses for the reserve. Excavations and demolition of redundant road structures will result in large volumes of inert material which will require re-use and/or disposal potentially at a high cost. **With mitigation, the negative economic/socio-economic impacts of the project during construction are anticipated to be of low and medium significance.**

Economic impacts during operation will be positive. The project has SIP2 status (and, as such, is a national priority). The primary motivation for implementing this project is to stimulate economic growth through improved transport infrastructure and an improved logistics/transport corridor between Durban and Gauteng. In conjunction with a number of other short-, medium- and long-term strategic government plans and interventions, it is designed to positively impact on the economy of the country. Positive economic benefits will be incurred locally, regionally, provincially and nationally as a result of the improved transport infrastructure. **With sound project management and execution, the positive impacts of this project on the economy will be of high significance. The project will also contribute cumulatively with other SIP projects to significantly benefit the country's economy.**

Effects of the project on cultural heritage resources and vice versa
During construction, the landscapes of the Paradise Valley Nature Reserve will be temporarily affected and visitor access will be restricted. The construction team will likewise be restricted to a minimal footprint of activity. Potential negative impacts on the historical site of the Umbilo Waterworks, which is a provincial landmark and heritage site along the uMbilo River and sited within the Reserve, can be prevented by barricading the site and preventing access to it. **With mitigation, it is anticipated that the potential impacts on cultural heritage resources will be of low and medium significance.**

Effects of the project on the biophysical environment and vice versa
Permanent loss of vegetation will occur within the existing road reserve. While construction will inevitably impact negatively on natural habitat, it should be noted that this project is an upgrade of an existing road, it is located primarily within the existing road reserve and, furthermore, in a highly modified urbanised area. The works will, thus, largely affect previously disturbed habitat. Road widening will entail lengthening of existing drainage structures and existing culverts at stream crossings. There are, however, also some expanded interchanges, some road sections as well as two

required viaduct access roads (each approximately 400 m) and a relocated portion of Transnet's fuel pipeline which will affect terrestrial and riparian areas outside SANRAL's road reserve. The project will also affect eThekwini's D'MOSS, which runs adjacent to the N2 and N3 in some areas, as well as the Paradise Valley Nature Reserve. ACER has worked closely with eThekwini's Environmental and Climate Protection Department to ensure that the areas of most sensitive biodiversity along the affected sections have been identified and suitable mitigation planned (for implementation in both the design and construction phases). Further interaction with eThekwini Parks and Recreation will be required prior to construction, to co-operate and co-ordinate the works within the Paradise Valley Nature Reserve so as to incur the least impact possible on the Reserve as well as its visitors. Once rehabilitation post construction has been completed, the impacts during operation of the road will not be significant. **With mitigation, the negative impacts of construction and operation on the biophysical environment (soils and substrates, terrestrial and riparian habitat, as well as associated fauna) will be of medium and low significance.**

Effects of the No Development Alternative

While the No Development Alternative would defer the negative impacts of construction on the social and biophysical environment, as described above, this would be of short term benefit only. In the longer term, the No Development Alternative will result in increasingly congested, unsafe and inefficient national road infrastructure. The negative consequences of not widening and upgrading the national roads will be severe and will have far reaching impacts on all South Africans and be contrary to the strategic plans of the South African Government.

The negative impacts of the No Development Alternative have been assessed as being of high significance. For this reason, this alternative is not recommended.

RECOMMENDATION OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

It is the opinion of the EAP that the information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of the activity applied for, viz. the proposed capacity upgrades to the N2 (Solomon Mahlangu I/C to south of Umgeni Road I/C), including expansion of the EB Cloete and Solomon Mahlangu Interchanges, and the N3 (EB Cloete to Paradise Valley) including provision of temporary access for construction below the Westville and Paradise Valley Viaducts.

It is recommended that the proposed activity is authorised, based on the findings of the assessment process and conditional on the items listed in Section 11 of this report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ACER	ACER (Africa) Environmental Consultants
BA	Basic Assessment
BAR	Basic Assessment Report
BID	Background Information Document
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs (National)
D'MOSS	Durban Metropolitan Open Space System
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMPr	Environmental Management Programme
EPCPD	(eThekwini) Environmental Planning and Climate Protection Department
GN	Government Notice
ha	hectare
I&APs	Interested and Affected Parties
I/C	Interchange
IDP	Integrated Development Plan
kl	Kilolitre
km	Kilometre
KZN	KwaZulu-Natal Province
KZN DEDTEA	KZN Department of Economic Development, Tourism and Environmental Affairs
m	Meter
m^3	Cubic Meter
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMPAA	National Environmental Management: Protected Areas Act
SANRAL	South African National Roads Agency SOC Limited
SCA	Systematic Conservation Assessment
SIP	Strategic Infrastructure Project
SMME	Small Medium and Micro Enterprises
TOPS	Threatened or Protected Species

DETAILS AND EXPERTISE OF THE SPECIALIST TEAM

Details and CVs of specialists are contained in Appendix D.

ADHERANCE TO REGULATORY REQUIREMENTS

Table 1 Required content of Basic Assessment Report according to GNR 326 (7 April 2017)

			Content of Basic Assessment report according to GNR 326 (7 April 2017)	Reference
1			A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application must include	
	a		Details of	
		i	The EAP who prepared the report and	Appendix G
		ii	The expertise of the EAP, including a curriculum vitae	Appendix G
	b		The location of the activity, including	Section 1.3, Figures 1 & 2
		i	The 21-digit Surveyor General code of each cadastral land parcel	Appendices C2 & C3
		ii	Where available, the physical address and farm name	Appendix C3
		iii	Where the required information in items (i) and (ii)is not available, the coordinates of the boundary of the property or properties	Government Gazette No 40085, Vol. 612, 22 June 2016 & Government Gazette No 8130, 2 April 1982.
	c		A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale, or if it is	Figure 3
		i	A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken, or	Figures 1, 2 & 3. Appendices A1. A2, A3, A4, A5, A6a & A6b.
		ii	On land where the property has not been defined, the coordinates within which the activity is to be undertaken	N/a
	d		A description of the scope of the proposed activity, including	Section 1.3, Chapter 3
		i	All listed and specified activities triggered and being applied for, and	Section 1.4.1, Table 6, Figure 3
		ii	A description of the activities to be undertaken including associated structures and infrastructure	Section 1.4.1, Table 6; Chapter 3
	e		A description of the policy and legislative context within which the development is proposed including	Chapter 2
		i	An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report, and	Chapter 2

		Content of Basic Assessment report according to GNR 326 (7 April 2017)		Reference
		ii	How the proposed activity complies with and responds to the legislation and policy context, plans guidelines, tools frameworks and instruments	Section 1.2
	f		A motivation for the need and desirability for the proposed development including the need and desirability of the captivity in the context of the preferred location	Section 1.2
	g		A motivation for the preferred site, activity and technology alternative	Chapter 4
	h		A full description of the process followed to reach the proposed preferred alternative within the site including	Chapter 4
		i	Details of all the alternatives considered	Chapter 3&4
		ii	Details of the public participation process undertaken in terms of regulation 411 of the Regulations, including copies of the supporting documents and inputs	Chapter 6, Appendix E
		iii	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Section 6.4. Appendix E3
		iv	The environment attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspect.	Chapter 5
		v	The impact and risks identified for each alternative, including the nature significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts	Chapter 8
		aa	Can be reversed	Chapter 9
		bb	May cause irreplaceable loss of resources, and	Chapter 9
		cc	Can be avoided, managed or mitigated	Chapter 8 & 9
		iv	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives,	Chapter 7
		vii	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Chapter 8
		viii	The possible mitigation measures that could be applied and level of residual risk	Chapter 8
		ix	The outcome of the site selection matrix	N/a
		x	If no alternative locations for the activity were investigated, the motivation for not considering such, and	Chapter 4
		xi	A concluding statement indicating the preferred alternatives, including preferred location of the activity	N/a
	i		A full description of the process undertaken to identify assess and rank the impacts the activity will impose on the preferred location through the life of the activity including	Chapter 7
		ii	A description of all environmental issues and risks that were identified during the environmental impact assessment process, and	Chapter 8
		ii	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by	Chapter 9

			Content of Basic Assessment report according to GNR 326 (7 April 2017)	Reference
			the adoption of mitigation	
	j		An assessment of each identified potentially significant impact and risk, including	Chapter 9
		i	Cumulative impacts	Chapter 9
		ii	The nature, significance and consequences of the impacts and risk	Chapter 9
		iii	The extent and duration of the impact and risk	Chapter 9
		iv	The probability of the impact and risk occurring	Chapter 9
		v	The degree to which the impact and risk can be reversed	Chapter 9
		vi	The degree to which the impact and risk may cause irreplaceable loss of resources and	Chapter 9
		vii	The degree which the impact and risk can be avoided, managed or mitigated	Chapter 9
	k		Where applicable, a summary of the findings and impact management measures identified in any specialist's report complying and Appendix 6 to these regulations and an indication as to how these findings and recommendations have been included in the final report	Chapter 8
	l		An environmental impact statement which contains	
		i	A summary of the key findings of the environmental impact assessment	Chapter 10
		ii	A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and	Appendix C4
		iii	A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	Executive Summary, Chapter 10, and Chapter 11
	m		Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed (impact management objectives and the) impact management outcomes for the development for the inclusion in the EMPr	Chapter 8, Appendix F
	n		Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Chapter 11
	o		A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Section 7.2
	p		A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Chapter 11
	q		Where the proposed activity does not include operational aspects, period for which the environment al authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised	N/a to national roads
	r		An undertaking under oath or affirmation by the EAP in relation to	Appendix G3
		i	The correctness of the information provided in the reports	Appendix G3

		Content of Basic Assessment report according to GNR 326 (7 April 2017)		Reference
		ii	The inclusion of comments and inputs from stakeholders and I&APs	Appendix G3
		iii	The inclusion of inputs and recommendations from the specialist reports where relevant, and	Appendix G3
		iv	Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties, and	Appendix G3
	s		Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	N/a
	t		Any specific information that may be required by the competent authority, and	N/a
	u		Any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/a

Table 2 Regulatory requirement for public participation in a Basic Assessment Process according to Chapter 6 of GNR 326 (7 April 2017)

			Public Participation Process (Chapter 6 of GNR 326, 7 April 2017)	Undertaken during the Basic Assessment
41(1)			This regulation only applies in instances where adherence to the provisions of these regulations specifically required.	
2			The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by—	
	a		fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of—	
		i	the site where the activity to which the application or proposed application relates is or is to be undertaken; and	Appendix E1
		ii	any alternative site	Appendix E1
	b		giving written notice, in any of the manners provided for in section 47D of the Act to—	
		i	the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken	Section 6.3; Appendix E1, E2 & E4
		ii	owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;	Section 6.3; Appendix E1, E2 & E4
		iii	the municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;	Section 6.3; Appendix E5
		iv	the municipality which has jurisdiction in the area	Section 6.3; Appendix E5
		v	any organ of state having jurisdiction in respect of any aspect of the activity; and	Section 6.3; Appendix E5
		vi	any other party as required by the competent authority;	Section 6.3
	c		placing an advertisement in—	
		i	one local newspaper; or	Section 6.3; Appendix E1
		ii	any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;	N/a
	d		placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will	Section 6.3; Appendix E1

			Public Participation Process (Chapter 6 of GNR 326, 7 April 2017)	Undertaken during the Basic Assessment
			be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and	
	e		using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to—	
		i	illiteracy;	
		ii	disability; or	
		iii	any other disadvantage.	
3			A notice, notice board or advertisement referred to in subregulations (2) must—	
	a		give details of the application or proposed application which is subjected to public participation; and	Appendix E1
	b		state—	
		i	whether basic assessment or S&EIR procedures are being applied to the application;	Appendix E1
		ii	the nature and location of the activity to which the application relates;	Appendix E1
		iii	where further information on the application or proposed application can be obtained; and	Appendix E1
		iv	the manner in which and the person to whom representations in respect of the application or proposed application may be made	Appendix E1
4			A notice board referred to in subregulation (2) must—	Appendix E1
	a		be of a size of at least 60cm by 42cm; and	Appendix E1
	b		display the required information in lettering and in a format as may be determined by the competent authority.	Appendix E1
5			Where public participation is conducted in terms of this regulation for an application or proposed application, subregulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that—	Noted.
	a		such process has been preceded by a public participation process which included compliance with subregulations (2)(a), (b), (c) and (d); and	N/a
	b		written notice is given to registered interested and affected parties regarding where the—	N/a
		i	revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b);	N/a
		ii	revised environmental impact assessment report or EMPr as contemplated in regulation 23(1)(b); or	N/a
		ii	environmental impact assessment report and EMPr as contemplated in regulation 21(2)(d); may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due.	N/a

			Public Participation Process (Chapter 6 of GNR 326, 7 April 2017)	Undertaken during the Basic Assessment
6			When complying with this regulation, the person conducting the public participation process must ensure that—	
	a		information containing all relevant facts in respect of the application or proposed application is made available to potential interested and affected parties; and	This BAR
	b		participation by potential or registered interested and affected parties is facilitated in such a manner that all potential or registered interested and affected parties are provided with a reasonable opportunity to comment on the application or proposed application.	Section 6.3; Appendix E
7			Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.	Noted.

1. INTRODUCTION

1.1 Background

This report is a Basic Assessment Report (BAR) for part of the South African National Roads Agency SOC Limited's (SANRAL) proposed capacity improvements to existing sections of the N2 and N3 national roads in KwaZulu-Natal. It has been prepared on behalf of SANRAL by ACER (Africa) Environmental Consultants (ACER), in terms of the requirements of the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended), published under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The details of the ACER Environmental Assessment Practitioner (EAP) team are provided in Appendix G.

This assessment, referred to as **Basic Assessment 1**, forms part of a suite of six Basic Assessments being undertaken by ACER for SANRAL's proposed upgrades[3]. They will all ultimately be submitted to the Department of Environmental Affairs (DEA) as part of the requirements of the application for environmental authorisation[4]. (Note that two N3 sections are not included below; Key Ridge to Hammarsdale and Gladys Manzi Road (formerly Murray Road) to New England Road I/C, which are being undertaken by other environmental practitioners).

- **Basic Assessment 1.** Capacity Upgrades to the N2 (Solomon Mahlangu I/C to south of the Umgeni Road I/C), including expansion of the EB Cloete and Solomon Mahlangu Interchanges, and the N3 (EB Cloete to Paradise Valley) including provision of temporary access for construction below Westville and Paradise Valley Viaducts.
- **Basic Assessment 2.** Capacity Upgrades to the N3 (Paradise Valley to Key Ridge), including provision of temporary access for construction below the Umhlatuzana Viaduct.
- **Basic Assessment 3.** Capacity Upgrades to the N3 from Hammarsdale to Cato Ridge.
- **Basic Assessment 4.** Capacity Upgrades to the N3 from Cato Ridge (Km 19.4) to Lynnfield Park (Km 30.6).
- **Basic Assessment 5.** Capacity Upgrades to the N3 from Lynnfield Park (Km 30.6) to Murray Road (Km 6.0).
- **Basic Assessment 6.** Capacity Upgrades to the N3 from New England Road I/C (Km 8.8) to Twickenham Road Underpass (Km 16.5).

This report deals with Basic Assessment 1 (BA1), which includes widening of sections of the N2 (approximately 6 km) and N3 (approximately 14 km), and construction of two temporary viaduct access roads. No tolling is involved, as these road sections are already funded.

BA1 and BA2 are being undertaken in parallel, under a shared public participation process. Please note that BAs 3-6 commenced during early 2018 approximately nine months after the commencement of BAs 1 and 2.

[3] Please note that Basic Assessment 4 is being undertaken by Metamorphosis Environmental Consultants (albeit that the production of the six BARs has been a collaborative effort between the two companies).

[4] DEA, along with their counterparts in the KwaZulu-Natal Department of Economic Development Tourism and Environmental Affairs (DEDTEA) will review the BAR for the purposes of adjudicating the application for environmental authorisation.

1.2 Project purpose, need and desirability

SANRAL is responsible for improving, managing and maintaining the network of national roads which act as the "economic arteries" of South Africa. The N2 and N3 carry large volumes of traffic, with a high percentage of heavy vehicles carrying freight to and from the Port of Durban, forming the backbone of South Africa's freight network. Sections of these national roads are operating at full capacity. Traffic studies commissioned by SANRAL have projected traffic growth figures and indicate the need to provide additional lanes to alleviate current traffic congestion, accommodate future growth and improve road safety and efficiency. SANRAL (Eastern Region), therefore, proposes to provide additional lanes along a section of the N2 near the Port of Durban and a section of the N3 from the N2/N3 (E.B Cloete) Interchange (I/C) onto Pietermaritzburg. The proposed capacity improvements, which are divided into several sections and covered ultimately by 15 engineering work packages, will be implemented at different stages according to timing priorities and factors related to funding availability (albeit the reality is that there will be overlapping construction periods between the work packages). The proposed capacity improvements will improve safety and accommodate traffic growth to 2047.

Importantly, the upgrades are planned in line with South Africa's Strategic Infrastructure Projects (SIPs) as described in the National Development Plan, 2011. Specifically, the proposed capacity improvements form part of SIP2, which focuses on strengthening the Durban-Free State-Gauteng logistics and industrial corridor. In line with SIP2 goals, the capacity improvements will improve access to Durban's export and import facilities. National roads are essential infrastructure supporting the economy of the country and, therefore, the project will benefit all citizens of South Africa either directly or indirectly. As such, this project has been taken into account by, and is compatible with, national, provincial and municipal development and planning frameworks.

1.3 Location and scope of proposed capacity upgrades (for Basic Assessment 1)

The study area falls within the urban core of the eThekwini Metropolitan Municipality, KwaZulu-Natal, affecting various wards (Table 3). This assessment deals with upgrades of the national road between the Port of Durban and the Westville/Pinetown area (See Figures 1 and 2 in the Executive Summary). Road widening is primarily restricted to the existing road reserve (indicated by the black lines in Figures 1 and 2) but will require additional land in limited areas (indicated by the red lines in Figures 1 and 2). The basic scope of the project is outlined below. GPS co-ordinates of the various components are provided in Tables 4 and 5[5]. Different sections will be dealt with under different construction contracts. A detailed description of proposed improvements and construction activities associated with the various engineering contracts is provided in Section 3.1. Details of affected properties are provided in Section 5.2.

Road sections to undergo construction (Appendices A1 & A2) are:

- N2 from Solomon Mahlangu I/C to south of the Umgeni Road I/C.
- N3 from the EB Cloete I/C to Paradise Valley I/C.

[5] GPS co-ordinates of the linear sections of existing road to be improved, the proposed viaduct access roads and main interchanges are provided in Tables 4 and 5. Please note that there is only one site (route) alternative as this is an *in situ* upgrade of an existing national road. For the proposed viaduct access roads, the only feasible access to beneath the Paradise Valley Viaduct will follow the route of the original track that was used when the national road was first built in the 1970s. The access to the Westville Viaduct similarly has only one feasible alternative.

Table 3 Municipalities and wards affected by the project

Province	KwaZulu-Natal
District Municipality	eThekwini Metropolitan Municipality
Local Municipality	eThekwini Metropolitan Municipality: North Central, South Central, Inner West and Outer West planning areas
Ward Number(s)	N2 from Solomon Mahlangu I/C to just south of Umgeni Road I/C: Wards 25, 30, 29, 65 Section of N3 from EB Cloete I/C to the Paradise Valley Viaduct: Wards 30, 24, 18 Westville Viaduct Access Road: Wards 30, 24 Paradise Valley Viaduct Access Road: Wards 24, 18

Table 4 Geographical co-ordinates of the existing and proposed linear road sections affected by the project

	Latitude (S)	Longitude (E)
N2 from Solomon Mahlangu I/C to just south of Umgeni Road I/C (approx 6.45 km)		
Starting point of the activity	29° 53' 09.98"	30º 56' 45.40"
Middle/additional point of the activity	29° 50' 33.06"	30° 57' 23.45"
End point of the activity	29° 48' 49.90"	30° 58' 26.40"
N3 from EB Cloete I/C to the Paradise Valley Viaduct (approx. 14.32 km)		
Starting point of the activity	29° 50' 23.44"	30° 58' 30.02"
Middle/additional point of the activity	29° 50' 53.50"	30° 55' 54.01"
End point of the activity	29° 50' 02.01"	30° 53' 10.51"
Proposed Westville Viaduct Access Road (Chesterville) (approx. 0.4 km)		
Starting point of the activity	29° 50'50.70"	30° 56' 25.78"
Middle/additional point of the activity	29° 50'52.07"	30° 56' 22.11"
End point of the activity	29° 50'45.25"	30° 56' 19.19"
Proposed Paradise Valley Viaduct Access Road (Paradise Valley Nature Reserve) (approx. 0.46 km)		
Starting point of the activity	29° 50' 5.20"	30° 53' 24.21"
Middle/additional point of the activity	29° 50' 2.64"	30° 53' 31.03"
End point of the activity	29° 50' 3.92"	30° 53' 41.51"

Table 5 Geographical co-ordinates of the existing interchanges to undergo improvements

Interchanges	Latitude (S)	Longitude (E)
N2/N3 EB Cloete Interchange	29° 50' 26.69"	30° 57' 26.27"
N2/M7 Solomon Mahlangu I/C	29°52' 42.81"	30° 57' 17.93"
N3 Spine Road I/C	29° 50' 52.84"	30° 55' 52.55"
N3 Paradise Valley/M13 I/C	29° 50' 00.43"	30° 53' 13.74"

Within these sections, the major interchanges to be upgraded (Appendix A3, A4, A5, A6a & A6b) are

- Solomon Mahlangu (N2/M7).
- EB Cloete (N2/N3).
- Westville Spine Road (N3/St James/Harry Gwala).
- Paradise Valley (N3/M13).

In addition, this project requires the construction of two temporary access roads to get to the areas beneath the Westville and Paradise Valley Viaducts.

- Proposed Westville Viaduct access road (sited near the residential area of Chesterville on the south side of the N3).
- Proposed Paradise Valley Viaduct access road (sited within the Paradise Valley Nature Reserve).

This project also requires the relocation of a section of Transnet's Fuel Pipeline in the vicinity of the N2/M7 Solomon Mahlangu Interchange:

- Proposed relocation of two parallel sections of pipeline, each approximately 500m in length, to accommodate the widened road.
- Provision of additional protection to existing portions of the pipeline crossing the N2.

1.4 Environmental authorisation requirements and listed activities triggered by the project

In terms of the 2014 EIA Regulations (as amended April 2017) published in Government Notices R.324, R.325, R.326 and R.327 under Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), the proposed project triggers activities that may significantly affect the environment. Therefore, SANRAL requires environmental authorisation from the competent authority, viz. the National Department of Environmental Affairs (DEA)[6].

1.4.1 Listed activities triggered by the project

Activities from Listing Notice 1 (GN R.327) and Listing Notice 3 (GN. R. 324) are triggered by the project and are detailed in Table 6. Figure 3 is a map showing the locality of these triggered listed activities.

[6] In cases where an applicant is an organ of state or a parastatal, DEA is the lead competent authority, considering the application in close consultation with its provincial counterparts, in this case the KZN Department of Economic Development, Tourism and Environmental Affairs.

Table 6 Listed activities in terms of which SANRAL is seeking environmental authorisation for the proposed N2 and N3 capacity improvements

No	**Listed activity as described in GN R.327, GN R.325 and GN R.324 (EIA Regulations 2014, as amended)**	**Description of project activity that may trigger the listed activity**
1	Listing Notice 1 (Government Notice, No. R. 327, 7 Apr 2017) Item 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Contractors may store and use fuel and other hazardous substances at their site camps, in containers that have a combined capacity of 80 cubic metres or more, but not exceeding 500 cubic metres.
2	Listing Notice 1 (Government Notice, No. R. 327, 7 Apr 2017) Item 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from **a watercourse.**	Construction will affect watercourses as road and bridge widening will require existing culverts and bridges at watercourses to be extended or replaced. The construction of new culverts will be required in places where interchanges are to be expanded, for example, at Solomon Mahlangu I/C. At the Westville and Paradise Valley Viaducts, additional and/or expanded bridge piers will be constructed, some of which are in the watercourse. The viaduct access roads will also require drainage to be installed at stream crossings. The project, therefore, will involve excavation, removal, infilling and/or depositing of material of more than 10 m^3, in watercourses.
3	Listing Notice 1 (Government Notice, No. R. 327, 7 Apr 2017) Item 31: The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (iii) any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or (iv) any activity regardless the time the activity was commenced with, where such activity: (a) is similarly listed to an activity in (i) or (ii) above; and (b) is still in operation or development is still in progress;	The widening of the national road sections will require the replacement of bridges. In some cases, it will entail demolition of existing bridges and the rebuilding of an expanded bridge in the same position. In some instances, it will require the building of new bridge(s) adjacent to existing bridge(s), after which the redundant bridge(s) will be demolished. Bridges will be replaced where existing bridges cannot accommodate the widened carriageway and cannot be extended, and/or where they do not have sufficient clearance (resurfacing of the carriageway will reduce clearances). In some cases, upgraded interchanges will render part of the existing structure redundant, and these structures will be demolished once the new interchange is in place. Thames Drive Footbridge will be demolished and not replaced. The access roads to Paradise Valley and Westville Viaducts are temporary structures and will be removed and rehabilitated once they are no longer required for construction purposes.

No	**Listed activity as described in GN R.327, GN R.325 and GN R.324 (EIA Regulations 2014, as amended)**	**Description of project activity that may trigger the listed activity**
4	Listing Notice 3 (Government Notice, No. R. 324, 7 Apr 2017) Item 4 (d) (iv) (vi) (viii) (x) (xiii aa) (xiii cc) The development of a road wider than 4 metres with a reserve less than 13.5 metres. (d) In KwaZulu-Natal: vi A protected area identified in terms of NEMPAA; viii Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; x Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; xiii Inside urban areas: (cc). Within urban protected areas.	The project requires an 8 m wide temporary access road (wider than 4 m with a reserve less than 13.5 m) to be constructed, for construction plant to gain access beneath the Paradise Valley Viaduct. It will follow an existing track for some of its length. However, this track will require widening and upgrading. The Paradise Valley Viaduct is within Paradise Valley Nature Reserve, which is a declared protected area. It is also demarcated in Ezemvelo KZN Wildlife's (EKZNW) MINSET data as a critical biodiversity area. Moreover, the reserve is part of the Durban Metropolitan Open Space System (D'MOSS). It is an urban protected area and designated for conservation use in the eThekwini SDF. The project requires an 8 m wide temporary access road (wider than 4 m with a reserve less than 13.5 m) to be constructed for construction plant to gain access beneath the Westville Viaduct. This proposed road traverses an area which is identified as a Critical Biodiversity Area in terms of EKZNW's C-Plan. It also falls into D'MOSS. The valley that this proposed temporary access road will traverse is not set aside for conservation purposes and harbours a high concentration of alien vegetation.
5	Listing Notice 3 (Government Notice, No. R. 324, 7 Apr 2017) Item 10 (d) (iv) (vii) (xi) (xiii aa, cc) (xiv aa) The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. d) In KwaZulu-Natal: iv Biodiversity Stewardship Programme Biodiversity Agreement areas; vii A protected area identified in terms of NEMPAA, excluding conservancies; xi Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; Xiv In urban areas: (aa) Areas zoned for use as public open space;	Contractors may store fuel and other hazardous substances at their site camps, in containers that have a combined capacity of 80 cubic metres or more, but not exceeding 500 cubic metres. Site camp locations are not known as yet and will be identified by the contractors. The site camp for viaduct construction may be set up within the Nature Reserve at Paradise Valley, if authorised by reserve management. Paradise Valley Nature Reserve is a protected area identified in terms of NEMPAA and designated for conservation use. It falls within the urban area of eThekwini Metro.

No	**Listed activity as described in GN R.327, GN R.325 and GN R.324 (EIA Regulations 2014, as amended)**	**Description of project activity that may trigger the listed activity**
6	Listing Notice 3 (Government Notice, No. R. 324, 7 Apr 2017) Item 12d (iii), (xi) The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. In KZN: iv Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA. xi Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;	The upgrading of the N2 and N3 carriageways, as well as the construction of the viaduct access roads, will require the clearance of vegetation exceeding 300 m^2. Vegetation clearance will occur all along the road reserve, part of which will be within Paradise Valley Nature Reserve, which is a protected area (for conservation). The proposed Paradise Valley Viaduct Access Road also will fall within this reserve and will require some vegetation clearance. The footprint of the N3 and the viaduct access roads traverses Durban Metropole North Coast Grassland (KZN 2) which is Critically Endangered. It must be noted, however, that because it is (mainly) an existing road in a very built up urban area, the extent of current transformation of this ecosystem, where unprotected, is very high.
7	Listing Notice 3 (Government Notice, No. R. 324, 7 Apr 2017) Item 14 (ii)a&c, d(iv), d(vii) and d((xi)(bb)) The development of Ii infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— a) within a watercourse; c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; <u>d) In KwaZulu-Natal:</u> iii Biodiversity Stewardship Programme Biodiversity Agreement Areas iv A protected area identified in terms of NEMPAA, excluding conservancies vii Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; xi Inside urban areas: aa) Areas zoned for use as public open space; bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose;	The proposed temporary viaduct access road to gain access beneath the Paradise Valley Viaduct will be constructed within the Paradise Valley Nature Reserve and will encroach within 32 m of the water course (uMbilo River). The widening of the Paradise Valley Viaduct itself will take place in and near the river. The Paradise Valley Nature Reserve is a protected area identified in terms of NEMPAA. It is designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose. It falls within a Critical Biodiversity area and is part of D'MOSS. It is also used by the public for picnics, trails, etc. The proposed temporary Westville Viaduct Access Road will also trigger this activity as it falls within a Critical Biodiversity area and is part of D'MOSS. This listed activity will also be triggered at interchanges where new ramps are being built, and where they fall into D'MOSS as well as Critical Biodiversity Areas in terms of EKZNW's C-Plan. These include the N2 Solomon Mahlangu I/C, EB Cloete I/C and N3/M13 Paradise Valley I/C.
8	Listing Notice 3 (Government Notice, No. R. 324, 7 Apr 2017) Item 18d (iii), (vi), (viii), (x), (xii aa), (xiii aa and cc) The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	The N3 carriageway will be widened at the Paradise Valley Viaduct, by more than 4 m, although the widening will take place within SANRAL's current road reserve. The viaduct passes directly over (through) the Paradise Valley Nature Reserve. The access road to gain access

No	**Listed activity as described in GN R.327, GN R.325 and GN R.324 (EIA Regulations 2014, as amended)**	**Description of project activity that may trigger the listed activity**
	In KZN: iii Biodiversity Stewardship Programme Biodiversity Agreement Areas vi A protected area identified in terms of NEMPAA; viii Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; x Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; xiii In urban areas: aa Areas zoned for use as public open space; Cc Within urban protected areas.	beneath the viaduct will be developed along an old existing track but will need to be widened by more than 4 m. The Paradise Valley Nature Reserve is a protected area identified in terms of NEMPAA. It falls within a designated Critical Biodiversity Area. It is designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose. It falls within an urban area. It is also used by the public for picnics, trails, etc. The Westville Viaduct and proposed access road also occur within EKZNW's identified Critical Biodiversity areas and, thus, would trigger this activity. This activity is also likely to be triggered where new ramps are involved in the upgraded interchanges, and the interchanges fall within EKZNW's identified Critical Biodiversity areas. This applies to the N2 Solomon Mahlangu I/C, EB Cloete I/C and N3/M13 Paradise Valley I/C.
9	Listing Notice 3 (Government Notice, No. R. 324, 7 Apr 2017) Item 23(ii) a and c: d(ii), d(iv), d(vii), d(x aa) and d(xi aa and bb) The expansion of— ii infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— a) within a watercourse; c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; d In KwaZulu-Natal iv A protected area identified in terms of NEMPAA, excluding conservancies; vii Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; Xi In urban areas: aa) Areas zoned for use as public open space; bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose	The N2 and N3 carriageways and possibly parts of existing tracks for the viaduct access roads (Westville and Paradise) will entail widening. The roads cross numerous drainage lines, streams and rivers. Bridges and drainage structures in or near watercourses will need to be expanded to accommodate the expanded roads. Parts of these sections fall within or within 5 km of, protected areas. Parts of these sections may also fall within D'MOSS areas as well as Critical Biodiversity Areas in terms of EKZNW's conservation plan. The Paradise Valley Viaduct traverses the Paradise Valley Nature Reserve. The Paradise Valley Nature Reserve is a protected area identified in terms of NEMPAA. It falls within a designated Critical Biodiversity Area and is designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose. It also falls within an urban area and is also used by the public for picnics, trails, etc.
*For clarity, please note that the following listed activities are **not triggered** because the whole study area of BA1 is **within an urban area**: Listing Notice 1 (Government Notice, No. R. 327, 7 Apr 2017) Items 12; 24; 48(i, ii, iii, vi), 49(v) and 56.*		

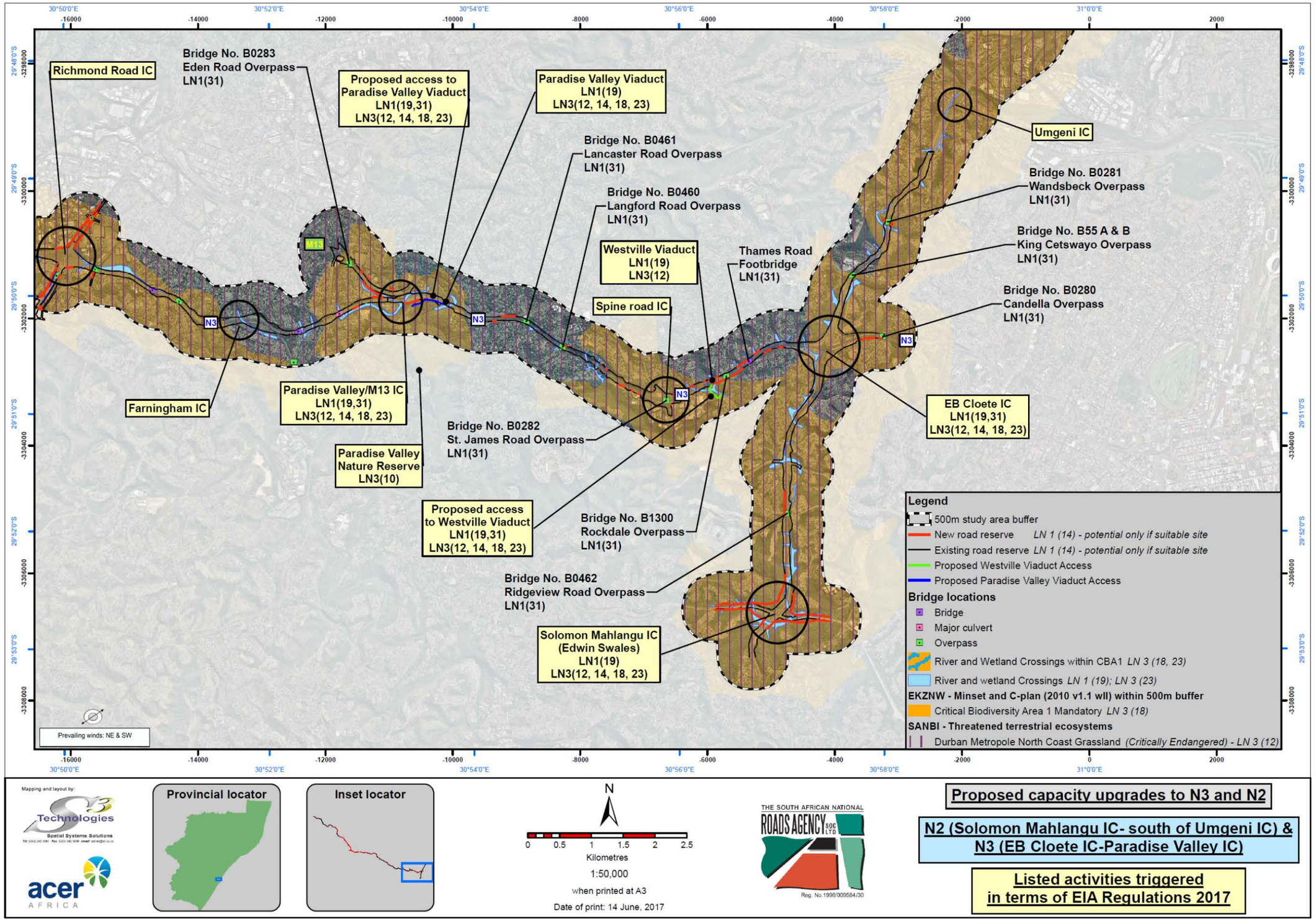
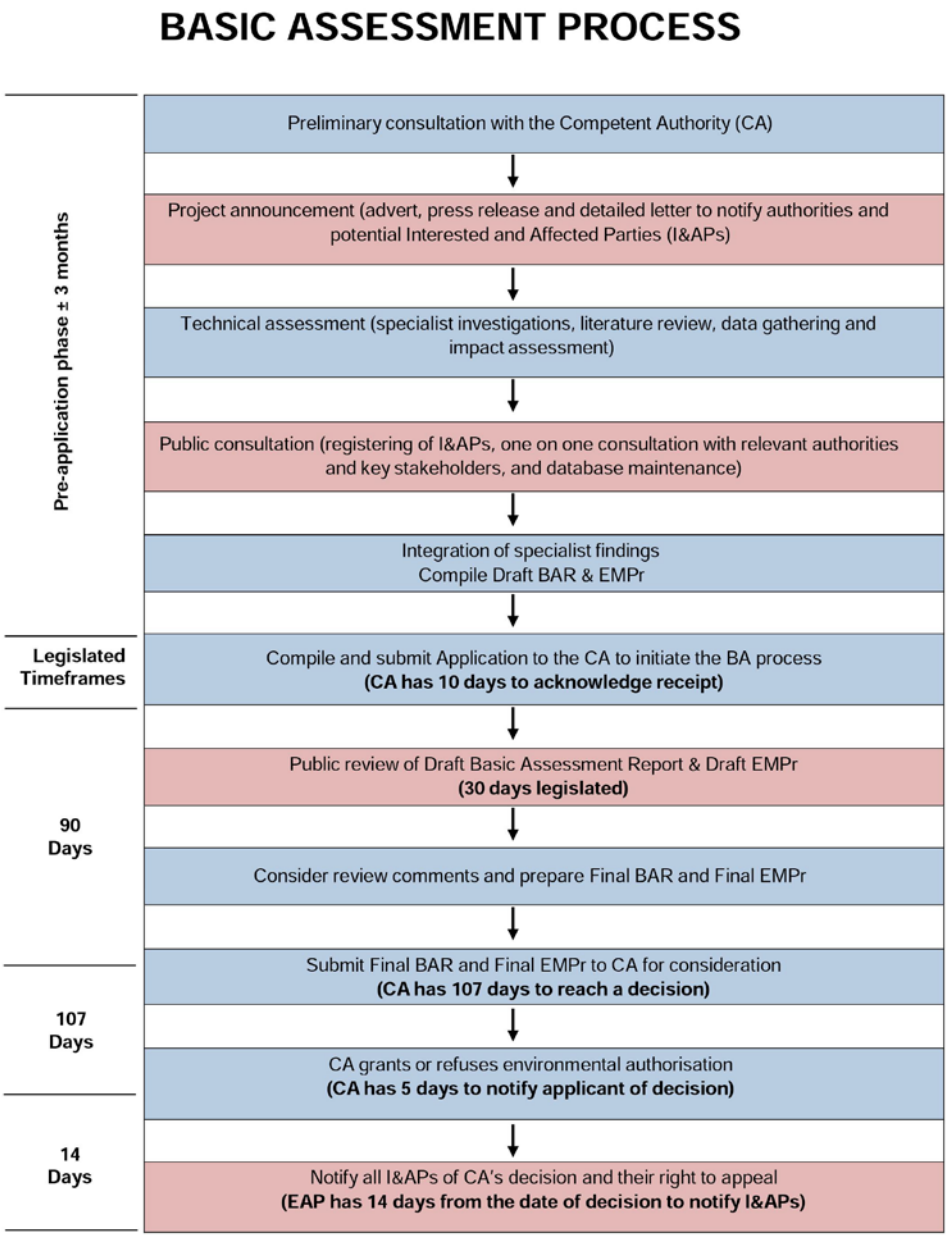


Figure 3 Location of listed activities triggered in terms of the EIA Regulations (2014, as amended in 2017)

1.4.2 Basic assessment process and requirements

The application for environmental authorisation requires a Basic Assessment to be undertaken in accordance with regulations 19 and 20 of GN No. 326 (07 April 2017) as shown below.



1.4.3 Contents of a Basic Assessment Report (BAR)

A BAR must contain the information set out in Appendix 1 of GN No. 326. Table 1 indicates where in this BAR this has been covered.

1.4.4 Public participation process during the Basic Assessment

Public participation is to be undertaken in accordance with Chapter 6 of GN No. 326 (refer to Table 2). A detailed description of public participation undertaken for this project is provided in Chapter 6 of this BAR.

2. LEGISLATIVE FRAMEWORK

Further to the regulatory process for environmental authorisation outlined in Section 1.4, the environmental legislation applicable to this project includes but is not limited to that indicated in Table 7. Given that these are national roads and part of planned SIP2 projects, the proposed capacity improvements to the national roads have been taken into account by, and are in line with, national, provincial and municipal development goals and planning frameworks.

Table 7 Applicable legislation, policies and guidelines

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) (as amended)	The Environmental Clause, Access to Information, Fair Administrative Action, Enforcement of Rights and Administrative Review	Government of South Africa	1996
National Environmental Management Act, 1998 (Act No. 107 of 1998)	Management of activities that may have a significant impact on the environment. Principles include: ❒ The sustainability principle. ❒ The life-cycle, cradle-to-grave principle. ❒ The 'polluter pays' principle. ❒ The precautionary principle. ❒ The duty of care principle. ❒ Fair and transparent public consultation.	Department of Environmental Affairs	1998
National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)	The conservation of natural habitats, fauna and flora. Permits required to remove or relocate protected plant species.	Department of Environmental Affairs	2004
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003)	To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. Permission to construct a road within a protected area will be required by SANRAL from the management authority.	Department of Environmental Affairs	2003

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management: Waste Act, 2008 (Act No.59 of 2008)	Management of activities that generate waste.	KZN Department of Economic Development, Tourism and Environmental Affairs	2008
KwaZulu-Natal Nature Conservation Management Act, 1997 (Act 9 of 1997)	The Act provides for the management of nature conservation within KZN and protected areas. Permits required to remove or relocate protected plant species.	Ezemvelo KZN Wildlife	1997
KwaZulu-Natal Nature Conservation Management Act, 1997 (Act 9 of 1997)	The Act provides for the management of nature conservation within KZN and protected areas. Permits required to remove or relocate protected plant species.	Ezemvelo KZN Wildlife	1997
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	The conservation of agricultural resources. Protection of soils.	Department of Agriculture, Forestry and Fisheries	1983
National Forests Act, 1998 (Act No. 84 of 1998)	The conservation of natural forests. Permits required to remove or cut protected tree species.	Department of Agriculture, Forestry and Fisheries	1998
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	The protection of cultural heritage resources and the management of activities that may have a significant impact on cultural heritage resources.	South African Heritage Resources Agency	1999
KwaZulu-Natal Heritage Act, 2008 (Act No. 4 of 2008)	The protection of cultural heritage resources and the management of activities that may have a significant impact on cultural heritage resources (specifically within KZN).	Amafa aKwaZulu-Natali	1997
Environment Conservation Act, 1989 (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992).	Department of Environmental Affairs	1989
National Water Act, 1998 (Act No 36 of 1998)	Legislation regulating and protecting water resources in South Africa which includes non-consumptive water uses such as the impeding or diverting of water in a water course or altering of beds, banks or characteristics of a watercourse. Also regulates abstraction of large volumes of water from natural water bodies.	Department of Water and Sanitation Provincial Office of Water and Sanitation	1998
National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004)	Measures in respect to air quality.	District Municipalities	2004
National Roads Traffic Act, 1996 (Act No 93 of 1996)	Measures in respect to road use in South Africa.	South African National Roads Agency Limited (national roads);	1996

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
		Provincial Department of Transport	
Promotion of Access to Information Act, 2000 (Act No 2 of 2000)	All requests for access to information held by the state or private bodies are provided for in the Act under Section 11.	Department of Justice and Constitutional Development	2000
Promotion of Administration Justice Act, 2000 (Act No 3 of 2000)	In terms of Section 3, the Government is required to act lawfully and take procedurally fair, reasonable, and rational decisions. Interested and affected parties have a right to be heard.	Department of Justice and Constitutional Development	2000
Infrastructure Development Act, 2014 (Act No. 23 of 2014)	To provide for the facilitation and co-ordination of public infrastructure development which is of significant economic or social importance to the Republic.	Department of Economic Affairs Presidential Infrastructure Coordinating Commission	2014
Public Participation Guideline in Terms of the National Environmental Management Act, 1998 and Environmental Impact Assessment Regulations	The guideline provides information and guidance for proponents or applicants, I&APs, competent authorities and Environmental Assessment Practitioners on the public participation requirements of the Act. It further provides information on the characteristics of a rigorous and inclusive public participation process.	Department of Environmental Affairs	2017
Guideline Series 5: Companion to the Environmental Impact Assessment Regulations of 2010 Guideline Series 7: Public Participation in the Environmental Impact Assessment Process Guideline Series 9: Need and Desirability in terms of the Environmental Impact Assessment Regulations of 2010 (Draft) DEA Alternatives Guideline 5 DEA Guidelines for EMPs	These guidelines provide information and guidance on the requirements of the EIA Regulations and various associated aspects of the environmental impact assessment process.	Department of Environmental Affairs	2010

3. DESCRIPTION OF THE PROPOSED ACTIVITY

3.1 Proposed capacity improvements

BA1 deals with proposed road upgrades covered by three different detailed design engineering contracts. A description of the proposed works for each contract is outlined below. Further information and technical drawings are provided in Appendix A (A1-A6).

3.1.1 Upgrade of the EB Cloete I/C (including portion of N2 North and N3 West) (approximately 8.08 km)

- The N2 portion (4.72 km) is from km 16.0 (south of the Wiggins Road underpass) in the south to km 20.72 (south of Umgeni Rd I/C) in the north. The N3 portion (3.36 km) is from km 8.44 (Sherwood I/C) in the east to km 11.8 (eastern abutment of the Westville Viaduct) in the west.
- Within the EB Cloete I/C, both the N2 and N3 will have four lanes in each direction. The portions of the N2 and N3 will have 6-7 lanes in each direction.
- Nearly all cuts and fills will be restrained by retaining walls. Cut retaining walls will consist of soil nails and reinforced gunite with a precast concrete cladding. A concrete ("New Jersey-type") barrier will be constructed at the base of each wall. Fill retaining walls will be either mechanically stabilised earth walls ("reinforced earth type walls") or conventional reinforced concrete walls. All walls will be topped with a concrete parapet.
- All sections of the N2 and N3, and interchange ramps within the project area will be provided with overhead street lighting (masts in the median, and, on 7-lane sections of road, on the outside edge as well).
- All road signage will be replaced with new signs to accommodate the additional lanes. All signs will be mounted on overhead sign gantries.
- The use of Armco barriers will be limited, as nearly all cuts will have New Jersey-type (concrete) barriers at the base of the cut retaining wall and nearly all fills will have concrete parapets on the top of the fill retaining walls. Armco barriers will, however, be used where circumstances dictate and where concrete walls/parapets are not already provided.
- On the N2 north, a pedestrian walkway will be provided adjacent to the northbound carriageway between King Cetshwayo Highway (M13) and Wandsbeck Road. A concrete barrier 800 mm high will separate this walkway from the N2.
- A similar walkway will be provided on the N3 between Rockdale Avenue and the Westville Viaduct (and eventually on to the Pavilion Shopping Mall) adjacent to the westbound carriageway.
- The following work will be carried out on the crossroads:
  - ***Wiggins Road underpass***: Wiggins Road will be re-graded (lowered) over a length of approximately 200 m on its existing alignment. This is necessary to obtain correct vertical clearance under the bridge.
  - ***King Cetshwayo Highway (M13***): two new longer bridges will be constructed in the position of the existing bridges (existing to be demolished). This is necessary to accommodate the additional lanes on the N2.
  - ***Wandsbeck Road*** will be re-aligned onto a new bridge (overpass) approximately 40 m south of its existing position (to accommodate eThekwini's future road planning). The existing bridge will be demolished.
  - ***Candella Road***: a new longer bridge will be constructed parallel to and immediately west of the existing bridge, and once the crossroad has been diverted onto the new bridge, the existing bridge will be demolished.

- At the ***Sherwood Interchange*** both west-facing ramps will be widened to two lanes.
- ***Bristol Road*** will be re-graded (raised) on its existing position (to create vertical clearance).
- ***Thames Road Footbridge*** (currently not in use) will be demolished and not replaced.
- ***Rockdale Avenue***: a new, longer bridge will be constructed in the existing position after the existing bridge has been demolished. This is necessary to accommodate the additional lanes on the N3.

The **estimated construction period on this contract** is five years and is anticipated to commence before the end of 2019.

3.1.2 Upgrade of the Solomon Mahlangu I/C on the N2 including a portion of the N2 and M7 (approximately 6.45 km)

- The upgrade to the Solomon Mahlangu I/C includes 4.2 km of the N2 from south of Edwin Swales/Solomon Mahlangu I/C (km 11.8) in the south to Wiggins Road (km 16.0) in the north. It includes 2.25 km of the M7 (km 11.3 in the west to km 13.5 east of the N2). The N2 northbound and N2 southbound will have 7 and 6 lanes, respectively. The M7 will have 3 lanes in each direction and 4 lanes in each direction within the I/C. Most ramps within the I/C will be 2 lanes wide. Outside lane widths will be 3.7 m and inside lane widths, 3.5 m.
- Where necessary, cut and fill retaining walls similar to those for the EB Cloete I/C will be provided.
- The interchange layout has been selected to provide free-flow for all directions of traffic movement. With the constraints of the site (residential area, topography, uMbilo River), no practical alternatives were found.
- Both the N2 and the M7 will be provided with street lighting on masts in the median. In addition, the 7-lane section of the N2 will have lighting provided on the outside edge as well. All ramps will be lit.
- All road signs will be replaced with new signs to accommodate the new layout and additional lanes. On the N2 all signage will be on overhead gantries.
- Armco barriers will be provided where retaining walls/parapets are not provided and conditions dictate their necessity.
- No pedestrian facilities will be provided on the N2 except for a short section of the N2 between Ridgeview Road overpass and Wiggins Road where a pedestrian walkway is provided adjacent to the northbound carriageway. A concrete barrier 800 mm high will separate this walkway from the N2.
- The following work will be carried out on crossroads:
  - ***Ridgeview Road Overpass:*** A new longer bridge will be constructed in the existing position after the existing bridge has been demolished.
  - ***Harry Gwala Road (Booth Road) Underpass***: The existing bridge will be widened on both the median and outside edges to accommodate the additional lanes on the N2. A restricted roadway width on Harry Gwala Road will be required during construction.

Prior to construction, two approx. 500m sections of parallel Transnet fuel pipelines will need to be moved out of the road reserve to accommodate widening. New pipeline sections will be constructed and tied into the existing ends, and the redundant section will be closed off. The construction of the new section of pipeline will be undertaken by relevant pipeline specialists appointed by SANRAL. Transnet Fuel Pipelines will be responsible for closing off the old sections, tying into the new sections and ensuring that all technical and safety standards are met.

The **estimated construction period for this contract** is four years, commencing mid 2020.

3.1.3 Upgrade of the N3 from Westville Viaduct to Paradise Valley I/C including 1.5 km of the M13 (approximately 6.24 km)

- This upgrade includes 5.74 km of the N3, extending from Westville Viaduct (km 11.8) to Paradise Valley I/C (km 17.54, immediately west of the I/C). It also includes the upgrade of 1.5 km of the M13 in the vicinity of the I/C.
- The N3 will have 6 lanes per direction (7 in some places).
- The M13 will remain 2 lanes per direction. Lane widths will be 3.5 m (inside lanes) and 3.7 m (outside lanes).
- The Paradise Valley I/C will be remodelled so that the existing ramps will link the N3 to the M13 only, with no link to Stapleton Road. Two new ramps will be provided to link the N3 to Stapleton Road. In addition, east facing ramps will be provided between the M13 and Stapleton Road.
- Spine Road IC: all ramps will be upgraded/widened in their existing positions.
- Retaining walls: due to the requirement to contain earthworks within the existing road reserve wherever possible, nearly all cuts and fills are restrained by retaining walls. The only exceptions are a few shallow cuts and low fills.
- Cut retaining walls will consist of soil nails and reinforced gunite with a precast concrete cladding. A concrete (“New Jersey-type”) barrier will be constructed at the base of each wall.
- Fill retaining walls will be either mechanically stabilised earth walls (“reinforced earth type walls”) or conventional reinforced concrete walls. All walls will be topped with a concrete parapet.
- The Paradise Valley I/C layout is as per the existing layout. No alternative layouts were considered as the upgrade was considered only as an upgrade (addition of lanes) of the existing layout.
- All sections of the N3 and interchange ramps will be provided with overhead street lighting (masts in the median, and, on 7-lane sections of road, on the outside edge as well).
- All road signage will be replaced with new signs to accommodate the additional lanes. All signs will be mounted on overhead sign gantries.
- As nearly all cuts will have New Jersey-type barriers at the base of the cut retaining wall and nearly all fills will have concrete parapets on the top of the fill retaining walls, the use of Armco barriers is limited, but they will be used wherever circumstances dictate and concrete walls/parapets are not already provided.
- Pedestrian facilities: a pedestrian walkway is provided adjacent to the westbound carriageway between the Westville Viaduct (Rockdale Avenue) and the Pavilion (km 12.3). A concrete barrier 800 mm high will separate this walkway from the N3.
- A taxi lay-by will be provided at the eastbound on ramp to the N3 at the Spine Road I/C, in the position of the existing lay-by.
- The following work will be carried out on the crossroads:

- ***Spine Road/St. James Avenue***: a new, longer bridge will be constructed in the position of the existing bridge, but also wider than the existing bridge. It will accommodate four lanes of traffic in each direction and sidewalks on both sides. The old bridge will be demolished.
- ***Langford Road***: a new, longer bridge in the existing position is planned. The old bridge will be demolished.
- ***Lancaster Road***: a new, longer bridge in the existing position is planned. The old bridge will be demolished.
- ***Dudley Road***: there will be no major work on Dudley Road. Widening the N3 may require reduced clearances during construction. The N3 eastbound carriageway will be re-graded to provide the specified clearance of 5.2 m.
- ***Eden Road:*** minor realignments to accommodate the off-ramps from the N3 and the M13.
- ***Sanderson Road/Drake Road***: minor realignments to accommodate the on-ramps from Stapleton Road to the N3 and M13.
- ***M13 between Paradise Valley I/C and Stapleton Road***: there will be a reduction in the width of the median.

The **estimated construction period for this contract** is four years and is anticipated to commence during mid 2020.

Prior to construction commencing under the viaducts, viaduct access roads will need to be constructed, as described below.

Westville Viaduct Access Road
A construction access road, approximately 8 m wide and 420 m long will be required to gain access beneath the Westville Viaduct (Figure 1). This will essentially form a short extension of Molife Road in Chesterville. The road will be required to be in place before widening of the viaduct bridge can commence, so that heavy machinery and plant can bring in materials and position themselves to work beneath the viaduct. The road will be surfaced with gravel and drainage will be provided in the form of temporary pipe culverts with attenuation at their outlets where necessary. The intention is that the road will be temporary and will be removed and rehabilitated after use. This will entail the removal of temporary drainage structures and the temporary gravel wearing course, scarifying, topsoiling and planting of vegetation as required. It is estimated that the access road will be required for 18 months.

Paradise Valley Viaduct Access Road
A construction access road, approximately 8 m wide and 560 m long, will be required to gain access beneath the Paradise Valley Viaduct (Figure 2). This will extend from Entabeni Road/Berg Road through the Paradise Valley Nature Reserve. It follows the route of the original track used for construction of the N3 during the 1970s. The construction and eventual removal of the road will be as described above for the Westville Viaduct access road. It is estimated that the access road will be required for 24 months.

3.2 Construction phase activities

3.2.1 Access to construction sites

With the exception of the proposed viaduct access roads, all other access for construction will be via existing roads (national, provincial and municipal roads).

3.2.2 Relocation of services including the Transnet fuel pipeline

Several services will need to be relocated out of the road reserve, where required to accommodate road widening. This includes water pipelines, telecommunications and electrical infrastructure. Co-ordination between the affected service providers and SANRAL's appointed engineers and contractors will be undertaken to achieve the seamless relocation of services.

.

As shown in Figure 4, there are two parallel sections of Transnet Fuel Pipelines that will need to be deviated to accommodate road widening. The proposed relocation of the parallel pipelines will require a 500 m long and 6 m wide access road to be cleared (3,000 m^2) near the M7 in the south-east quadrant of the interchange. The two parallel trenches will each be 500 m long, 1.2 m wide and 1.75 m deep. The 400 mm pipes will be buried to a depth of 1 m. The abandoned pipes will likely remain *in situ.* However, where they will be directly impacted by the works, will they be removed. In the north-west quadrant of the interchange, existing pipelines will require a length of 200 m of service culverts or protection, and in the north-east quadrant, extension of sleeves or protection may be required (approximately 50 m). The pipeline design and construction will be done according to strict standards and with hazardous installation risk assessments undertaken as required by the industry. Once the new pipe sections and the tie-ins are in place, they will be tested to ensure all the required technical standards are met. Transnet Fuel Pipelines will then resume responsibility for closing off and draining the redundant sections of pipe, tying the main line into the relocated sections and ensuring that all the required safety standards are met.

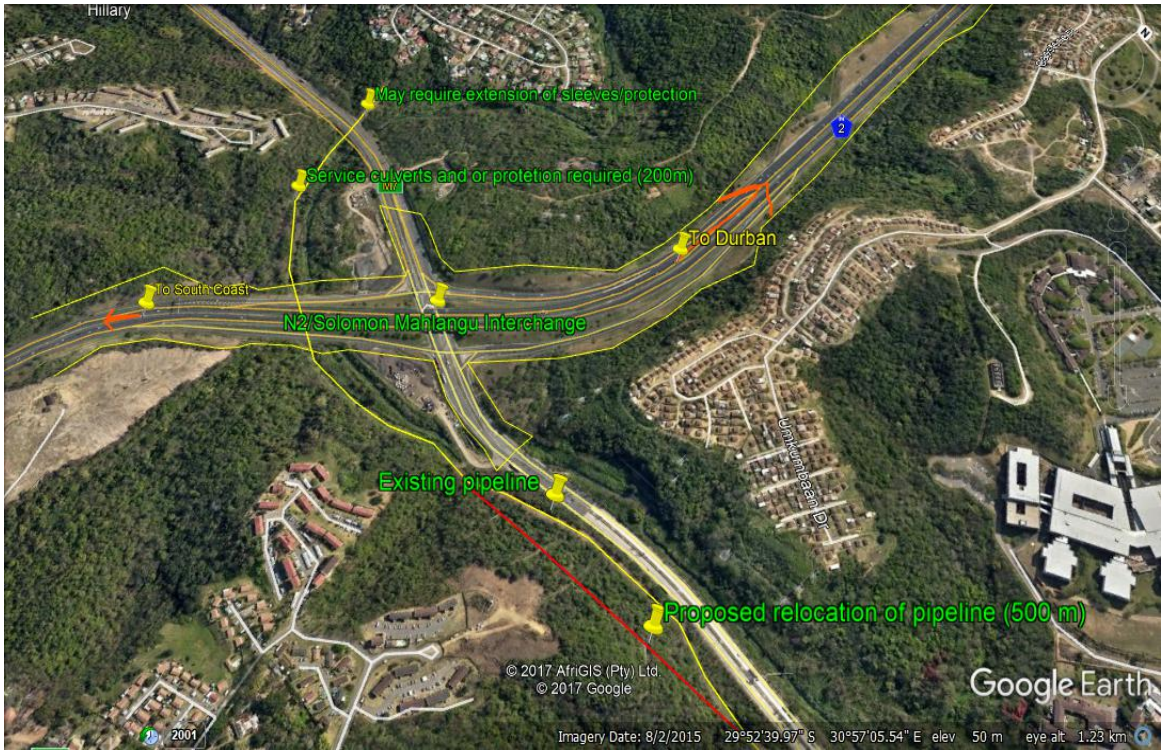


Figure 4 Google Earth image showing the position of the existing Transnet Fuel Pipeline and the section to be relocated at Solomon Mahlangu Interchange (N2/M7)

3.2.3 Contractors' site offices and stockpile areas

Contractors' site offices and stockpile areas will be located either within the road reserve or on nearby properties as negotiated and agreed with property owners. The exact sites will be identified by the contractor who is awarded the tender for the work. Siting and establishment will be guided by specifications in the Environmental Management Programme (EMPr). No staff (except security) will be accommodated overnight at site offices/stockpile sites, although the facilities may be used during possible night work.

3.2.4 Waste management

Solid waste
Solid waste will be produced during construction. However, there will be no waste management activities requiring a permit in terms of the Waste Regulations under the National Environmental Management: Waste Act.

The project will generate large volumes of demolition rubble consisting of reinforced concrete, when bridges, parapets and concrete-lined side drains are demolished. The removal, where necessary, of concrete islands, concrete barriers, signage, etc. will also result in large volumes of rubble/solid waste. The inert waste will be used as fill and excess sold to outside contractors (for similar purposes) and/or disposed at licensed landfill sites. Monthly quantities are unknown at present. However, over the duration of the project (3 contracts each taking 4-5 years to complete) an estimated 50,000 m^3 of rubble will be produced from the demolition of structures.

Waste tar resulting from removal of pavements will be generated as well as other general waste such as cement bags, packaging, plastic and used metal canisters. It is intended that general waste, including any excess inert waste, will be disposed at the nearest licensed municipal landfill site (likely the Bisasar Road Landfill Site).

The project will also generate a large surplus of cut material from earthworks, estimated at approximately 270,000 to 280,000 m^3 (roughly 410,000 tons). However, this will not be waste as it is SANRAL's intention to use this on other sections of the N3 to be upgraded as part of capacity improvements between Durban and Pietermaritzburg. It will be stockpiled on SANRAL's own land.

Liquid effluent/waste water
The project will not produce effluent other than normal sewage, which will be disposed. Rented portable chemical toilets to be serviced by the contractor's appointed service provider will be used for workers at the work sites.

There will be no waste water generated by the project that can be recycled. Batching plants will not be on site. It is envisaged that concrete as well as asphalt will be obtained from commercial sources.

Emissions
There will be no emissions other than exhaust and dust emissions.

3.2.5 Borrow pits and quarries

No new borrow pits or quarries will be established as materials will be sourced from commercial sources.

3.2.6 Batching plants

No batching plants will be established on site.

3.2.7 Water use

The estimated average volume of water required during construction is a maximum of 250 kl (m^3) per day. Water will be obtained from a municipal supply and/or will be abstracted from rivers near to site. The Department of Water and Sanitation (DWS) has been consulted regarding the water use registrations (General Authorisations) that will be required.

3.2.8 Energy use

During construction, conventional sources of energy will be used (e.g. municipal electrical supply, generators, and conventional fuels and oils). Alternative energy sources will not apply.

3.2.9 Demolition

The N2/N3 will be closed temporarily during the initial stages of demolition. Demolition will take place at the following sites:

- N2 Ridgeview Road Overpass.
- N2 King Cetshwayo Highway (M13) Overpass.
- N2 Wandsbeck Road Bridge.
- N3 Candella Road Bridge.
- Bridge over N3 on King Cetshwayo Highway (M13).
- N3 Thames Road Footbridge (note this will be demolished and not replaced as it is already redundant).
- N3 Rockdale Avenue Bridge.
- N3 Spine Road I/C Bridge (St James Ave/M32).
- N3 Langford Road Bridge.
- N3 Lancaster Road Bridge.
- Eden Road Overpass (M13).
- There will also be minor demolition work (existing parapets) at the N2 Solomon Mahlangu I/C bridges, the N2/N3 E B Cloete I/C bridges (including the two top ramps), N2 Wiggins Road, N3/M13 Dudley Road, the N3 Paradise Valley ramp bridges, the N3 Westville Viaduct and N3 Paradise Valley Viaduct.

Demolition rubble is anticipated to reach a volume of approximately 50,000 m^3 and will consist mainly of broken up concrete and reinforcing steel rods. The material will be broken into smaller, more uniform pieces using mechanical breakers. The steel will be removed and sold to recycling contractors. The concrete rubble will be re-used in new construction as far as possible. Excess demolished material will be disposed at licensed landfill sites. The demolition site will be restored to a safe and neat condition.

3.2.10 Generation of noise

During construction, construction activities will elevate existing noise levels over and above those already generated by traffic on the N3. The existing noise generated by traffic exceeds

65 dB (A)[7] within (generally) 300 m from the road. Project construction activities will add to the existing noise levels. Although this will be temporary and confined mostly to daylight hours, there will, however, be some need to work at night, due to the heavy traffic volumes and the need to reduce the duration of construction.

If blasting occurs, this will generate temporary and short lived loud noises. Blasting will be undertaken in accordance with relevant legislation and with prior notice to affected neighbours.

3.2.11 Accommodation of traffic during construction

The upgrade of the N2 between Solomon Mahlangu and uMgeni Interchanges and the N3 between EB Cloete Interchange and Key Ridge will result in substantial delays being experienced by the travelling public. These portions of the N2 and N3 carry very large volumes of traffic; the busiest section being on the N2 between uMgeni and EB Cloete Interchanges which carries more than 160,000 vehicles per day. Traffic in general will travel on a reduced number of lanes while construction takes place under traffic on each of the carriageways on both the N2 and N3. Motorists will be encouraged to consider various alternative routes during construction, including the M4, M7, M13 and M19. SANRAL is in discussion with both KwaZulu Natal Department of Transport and the eThekwini Municipality to ensure that their plans for any road upgrades do not occur during the same period as the N2/N3 upgrade projects.

Traffic will be managed according to a Traffic and Road Safety Management Plan. The contractor will be required to submit the final traffic management and road safety plan for approval by the engineer prior to construction commencing.

3.2.12 General construction activities

The main construction activities for the capacity upgrades are presented hereunder.

Site preparation

- Establishment of site camps and stockpile areas.
- Provision for on site waste management – sewage, waste water, solid waste, general waste, etc.
- Provision for storage/handling/disposal of hazardous substances (e.g. cement, asphalt, fuels and oils). A bunded area will be provided for storage. Storage volumes may exceed 50 m^3.
- Clearance of vegetation.
- Removal and stockpiling of topsoil and subsoil.
- Construction of temporary access roads to Westville and Paradise Valley Viaducts.

Road and bridge widening

- Accommodation of traffic.
- Demolition of structures (where required).
- Blasting (where required). Blasting is expected to be required on some areas of the Natal Group Sandstone (visible in a number of the cuttings on the N3 and probably also for foundations for structures). Some demolition of existing structures could also be done by controlled blasting.
- Excavation with heavy plant.

[7] The Draft Noise Control Regulations (NCR) GNR 154 of January 1992 and Application of Noise Control Regulations, CNR 155 10 January 1992 framed under the Environmental Conservation Act 1989 (Act 73 of 1989) identify a level of 65 dB (A), equivalent noise level (L_{Reqd}) cut off for road noise impact.

- Stockpiling of spoil for building and levelling on site or other parts of the proposed N2 & N3 upgrades.
- Stockpiling of demolition rubble for building and levelling on site or other parts of the proposed N2 & N3 upgrades.
- Disposal of excess spoil/rubble to licensed landfill sites.
- Provision of drainage structures where crossing drainage lines and watercourses.
- Haulage and placement of materials with heavy plant.
- Water abstraction from local streams.
- Water spraying.
- Rolling and compaction with heavy plant.
- Bridge jacking.
- Retaining walls/other stabilisation/erosion control structures (as required).
- Erection of lighting, Armco or concrete barriers, road signs, and road lane markings.
- Relocation of existing traffic management infrastructure (cameras, etc).

Re-instatement and rehabilitation

- Reinstatement of slopes.
- Reinstatement of topsoil.
- Revegetation.
- Erosion control.
- Alien plant control.

Rehabilitation of the viaduct access roads

The gravelled viaduct access roads will be decommissioned and rehabilitated once no longer required for construction purposes. This will entail:

- Removal of gravelled surface.
- Removal of temporary drainage structures.
- Removal of rubble to a licensed waste site or for use as fill.
- Loosening of soil.
- Application of topsoil.
- Replanting with indigenous vegetation.
- Erosion control.
- Alien plant control.

3.2.13 Employment opportunities

Contractors, with their skilled labour, will be appointed in accordance with the procurement policies of SANRAL. Unskilled labour will be sourced by the contractors involved in the work. At present, it is unclear exactly how many jobs will be created as a result of the proposed project. However, based on previous projects, it is anticipated that, per contract, the most people employed on site at any one time will not exceed 550. Of these, approximately 250 jobs will be semi-skilled and unskilled labour. It is anticipated that contractors may use their own skilled personal and, thus, direct employment opportunities for people from the surrounding communities may be predominantly for unskilled and semi-skilled jobs. The number of job opportunities will, however, vary on a month to month basis and will be dependent on the stage in the construction process.

3.2.14 Communication with land owners and stakeholders

This is a linear development with several affected land owners over and above the applicant (SANRAL). Consultation with directly affected property owners has been initiated by the land

acquisition team as part of the land acquisition process. The design engineers have notified organisations and institutions with respect to the relocation of services and utilities in the road reserve. All key stakeholders including as many as possible of the adjacent property owners have been notified and given an opportunity to consult with the project team as part of the public participation process conducted for this application for environmental authorisation. During construction, SANRAL and its appointed contractor(s) will be responsible for keeping road users and adjacent landowners informed of relevant planned construction activities (e.g. blasting, road closures, deviations, etc).

3.3 Operation phase activities

3.3.1 Vehicle traffic

The main activity of the N2 and N3 during operation is obviously the carrying of the nation's vehicle traffic, which comes with noise related impacts and safety hazards. These are largely controlled by road design (including the road reserve which acts as a buffer between the road and surrounding land), speed restrictions, signage, monitoring by camera, traffic policing and emergency services as needed.

3.3.2 Road maintenance

During operation, SANRAL conducts routine maintenance activities which include:

- Maintenance of vegetation in the road reserve, e.g. trimming of grass and shrubs, weed removal and control of alien invasive plants.
- Erosion control in the road reserve.
- Clean-up of litter from the carriageway and road reserve.
- Keeping drains and culverts free of vegetation and litter.
- Checking and maintaining the travelled road surface as required.
- Checking and repair of road related infrastructure as required (barriers, guard rails, signage, etc).
- Operation of speed cameras, variable messaging system, etc.

SANRAL appoints a Routine Maintenance Engineer for each section of road to advise on the physical maintenance that is required on the travelled road surface, so that tenders and contracts for the work can be set up as required. Contracts for road reserve maintenance (mowing etc) are longer term. All maintenance activities will remain in place during construction.

3.3.3 Waste generation

During operation, the national roads *per se* will not generate solid waste. However, road users do throw out litter from their vehicles and this accumulates on the roadsides. The road reserves are also maintained and this produces grass cuttings and other vegetation. This waste is collected on a regular basis by SANRAL's routine road maintenance contractors and disposed at the closest licensed municipal landfill sites.

3.3.4 Energy use

Lighting of the interchanges and road sections is provided by a conventional electrical connection. A performance based approach is used for the procurement of the luminaires (street lighting) on the N3 corridor. This means that as technology evolves after the procurement phase, the latest technology will be made available to this project. LED street

lights with high efficiency and low energy consumption are being specified. In addition to the luminaires, a Lighting Management System will also be implemented which allows the dimming of the lights as required, thus extending the life spans of the luminaires.

Generally, the capacity upgrades should facilitate smooth traffic flow, thus improving energy efficiency. Where the Partial Clover (Parclo) configuration is used for interchanges, it allows for free movement of traffic, which is more fuel efficient for vehicles.

3.3.5 Generation of noise

During operation, noise will continue to be generated from the traffic using the N2 and N3, as is already the case. Currently, noise levels exceed the 65 dB limit within generally, 300 m of the edge of the highway. With increasing growth in traffic volumes, noise levels will increase. It must be noted that an increase in traffic volumes will occur, regardless of whether the proposed upgrade proceeds or not. Thus, the project itself will not result in more noise; it is the increase in traffic volumes which will result in increased noise. However, where road widening encroaches closer to receivers, the source of the noise will be closer to recipient residences, businesses and other community facilities.

4. PROJECT ALTERNATIVES

Given that this project entails the upgrade of existing national roads, alternatives investigated by SANRAL have revolved mostly around technical engineering issues (road design, materials, etc.). Alternatives that have been considered during the course of SANRAL's planning are discussed below. It must, however, be understood that the final project proposal put forward for consideration by DEA consists only of one feasible alternative.

No additional feasible alternatives have been put forward by SANRAL as the final design selected has been based on detailed traffic modelling to best meet traffic demands and road safety standards.

4.1 Macro alternatives: use of road versus rail

The South African government recognises the need to introduce an efficient rail freight service to reduce truck traffic on national routes in the long term, ease traffic burden on road networks and at the same time enhance the longevity and quality of roads. A migration from road to rail will improve road safety and decrease road maintenance costs. However, given the major role that road plays in South Africa, being able to migrate from road to rail is a long term venture and dependency on road transport will still continue even after required rail upgrades take place. Thus, the use of rail cannot be considered as an alternative to the proposed project.

Of the 643 million tons (Mtons) of freight moving through South Africa annually, only 22.5% is moved by rail and the rest by road. Within the Gauteng to Durban corridor, general freight moved by road is 46 Mtons and a mere 6.4 Mtons via rail[8]. Of the 2.7 million containers moving over Durban's wharf per annum, 70% are spread around Durban and only 30% are sent to Gauteng. There is a high dependence on the movement of freight) in rural corridors via road (255 Mtons) versus rail (39 Mtons), with a similar trend for metro corridors[9]. This highlights a need for road freight movement through these corridors and a particular need for freight movement via road for short, local hauls and rail for longer hauls. Given the high density of rural and metro areas in South Africa, freight movement via road is essential. There is also a requirement for the migration of more freight from road to rail and rail upgrades are needed to enable this[10].

SIP 2 included the Durban–Free State -Gauteng logistics corridor, is expected to create 135 000 jobs, strengthen the movement of freight and transport corridors between major industrial hubs in the country, improve the access to the port and increase efficiency. The programme includes the construction of a new railway line between Gauteng and Durban. The Durban to Gauteng corridor is one of the most important corridors in the country and is expecting massive increases in freight volumes (Havenga et al, undated). With freight forecasts considered, it is expected that during the next 25 to 30 years, containers moved from the port of Durban to Gauteng will grow almost eightfold. This cannot be done without a new rail line, as the expected increases in freight will result in a heavy increase in freight trucks travelling within this corridor. The existing rail lines need upgrades to be dedicated to carry freight. However in the absence of rail line upgrades and new line construction, the need for road upgrades are essential and are regarded as high importance. Without back up for freight movement at the

8 https://www.environment.gov.za/sites/default/files/docs/publications/freightshift_roadtorail.pdf

9 https://roadtransportnews.co.za/wp-content/uploads/2017/01/Havenga.pdf

10http://www.transport.gov.za/documents/11623/39906/7_FreightTransport2017.pdf/a3f7cb55-8d77-4eea-b665-4c896c95a0d8

moment, it is essential that road upgrades are made to manage the increase in freight movement, particularly between the Durban to Gauteng corridor, which is the busiest road freight corridor in South Africa. .

4.2 Property/location/route alternatives

Early in the planning process, SANRAL's decision was to make use of the national road median so as to contain the extra lanes as far as possible within SANRAL's existing road reserve, rather than having to expand on the outer edges of the road, which may require the acquisition of much more additional adjacent land than is currently proposed. The red lines in Figures 1 and 2 indicate where additional land must be acquired.

As this is an upgrade of an existing national road in a built up area, route alternatives were not considered for the N2 and N3 sections. Route alternatives were, however, considered for the two proposed viaduct access roads.

For the **Westville Viaduct,** access from the northern side is not practical due to limited road access and prevailing topography. However, access from the southern side of the viaduct has an existing main road network approaching relatively close to the viaduct, as well as more suitable (less steep) topography. The southern approach also has less impact on the Westville Trail. The proposed route is also supported by eThekwini's Environmental Planning and Climate Protection Department (EPCPD). Thus, only the proposed access from the Chesterville (southern) side (Figure 1) was taken forward for detailed assessment in this BA.

For the **Paradise Valley Viaduct**, three potential routes to get underneath the viaduct were considered. Access from the north-eastern side of the N3 (between the M13 and the N3) was excluded because of very steep slopes down the bank of the river. Access from the north-western side of the N3 (near the reception area of the nature reserve) was not viable due to the unacceptable impact it would have on the hiking trails, the forest vegetation and the public amenities of the nature reserve. The only feasible route identified follows the old track used originally for construction of the Paradise Valley Viaduct, which gains access from the south-western side of the N3 from Berg Road. This access route was proposed and is supported by the reserve management and EPCPD. This access has the advantage of following previously disturbed areas and has less impact on parts of the reserve that are used by the public for hiking. Thus, only the proposed access from Berg Road (Figure 2) was taken forward for detailed assessment in this BA.

4.3 Design/layout alternatives

This project has undergone a preliminary engineering design phase undertaken by SNA, which resulted in proposals for the widening of sections of the N2 and N3 (see drawings in Appendix A). The proposals were based on numerous engineering factors and models, taking into account the results of Traffic Analyses, forecasts of future traffic loads based on predicted developments and land uses changes, the existing and required road standards, road gradients, geological conditions and other factors. Based on this information, the optimal number of lanes and lane configurations, and corresponding interchange layouts were proposed. Subsequently, the preliminary design proposals have been reviewed as part of a detailed design process undertaken by the detailed design engineers (SNA). Preliminary designs have been refined and/or changed where necessary.

This project has involved a technical and iterative design process which has entailed modelling and testing of various alternative layouts to arrive at financially feasible designs that meet the

required safety standards and traffic carrying capacity to 2047. It is beyond the scope of this environmental report to provide detailed engineering motivation for each iteration that has played out during the design process, or to assess these alternatives. However, it can be said that the various interchanges have been designed (within the individual confines and restrictions of the surrounding physical environment) for optimal traffic flow of forecast traffic on approach and exit lanes, and to accommodate the number of additional lanes on the main carriageway. The feasibility of phased upgrades has also been considered, i.e. to design for maximum carrying capacity but to construct initially to provide an intermediate carrying capacity (the design would allow for provision of additional ramps at a later stage, should development in the area call for maximum carrying capacity).

For this project, the existing interchange layouts have not been modified in most cases, but additional lanes have been added to the existing ramps and cross roads. Alternative layouts were considered for the Solomon Mahlangu I/C, viz. the provision of an additional directional ramp (on another long bridge) for the traffic from the west on the M7 to the south on the N2. The design has been done in this way so that this directional ramp can be provided at some time in the future, if traffic volumes warrant it and the current loop ramp provided for this traffic is over capacity. The current traffic predictions show that this is not expected to be the case before 2047, but the uncertainty surrounding the development of the dig-out port on the old airport site has resulted in this option being left open. In addition, the difficulties in widening the currently proposed two long bridges for the two directional ramps (N2 south bound to the M7 westbound and the M7 westbound to the N2 northbound) has resulted in the proposal that these two bridges be constructed now to be wide enough to accommodate three lanes of traffic, but they will be marked for only two lanes with wide shoulders at this stage. Again, current traffic predictions indicate that the two lanes will be sufficient to 2047.

Taking into consideration the above, it must be noted that SANRAL has put forward one final recommended layout proposal for environmental authorisation. For a project of this scale and nature, which constitutes an *in situ* upgrade, it would be impractical to assess any other alternative for authorisation that is not recommended by SANRAL and cannot be implemented.

4.4 Technology alternatives

Aspects such as pavement structure, retaining structures, lighting, signage, barriers, etc. have also been subjected to a process whereby various design proposals have been investigated and the optimal design selected based on technical engineering, road safety and cost criteria.

A key operational aspect taken into account has been noise management/reduction. Investigations are currently been undertaken for the best possible noise reduction mitigating measures. At this stage, a decision has been made to use ultra-thin friction course (UTFC) surfacing over the Asphalt (Flexible pavement) sections. This type of asphalt surfacing has been proven to be quieter than conventional asphalt surfacing and could also be used to overlay road sections where SANRAL is proposing to construct a concrete (Rigid) pavement. SANRAL is also considering Diamond Grinding of concrete sections. This method has been adopted internationally and reduces road noise on concrete pavements.

It should be noted that SANRAL has commenced the process of sourcing an acoustic specialist to investigate further feasible and cost effective noise mitigation measures which can be implemented to reduce noise levels adjacent to the N3.

4.5 The no-go alternative

The No-Go (no development) alternative implies that the *status quo* remains and no widening of the national road and upgrading of interchanges occur. If no widening occurs, no listed activities will be triggered, for example, the clearance of indigenous vegetation or construction within or near wetlands and riparian channels. The resultant impacts of construction on vegetation, riparian areas and wetlands along the N2 and N3 sections of interest will, thus, be avoided. The nuisance impacts and disruption to traffic which will result from road widening construction activities will also be avoided. As no access roads will be required to gain access under the Westville and Paradise Valley Viaducts, negative impacts on these areas (especially the Paradise Valley Nature Reserve) and the residential areas through which construction vehicles need to gain access, will also be avoided.

However, the fact that this proposed project is one of South Africa's Strategic Infrastructure Projects (SIP2 status) is an indication of its importance and priority. The project will assist in strengthening the logistics and transport corridor between South Africa's main industrial hubs, improve access to Durban's export and import facilities, and raise efficiency along the corridor. Currently, the N3 carries between 40,000 and 120,000 vehicles per day and in excess of 75 million tons of freight per annum. The section of the N2 between Mgeni Interchange and EB Cloete Interchange is the busiest in KwaZulu-Natal and carries in excess of 150,000 vehicles per day. The EB Cloete Interchange is a key access point in providing access for the public from the west travelling to the north including the King Shaka International Airport and Dube Tradeport Facility. The sections of N2 and N3 under consideration are operating at full capacity with ongoing safety related incidents. The failure to widen and upgrade these sections will lead to increasing congestion as traffic volumes continue to increase with substantial costs to the economy in lost time. This, in turn, will lead to increased safety risks and accidents. It will also result in more road maintenance requirements, causing further congestion during maintenance and much road user frustration and dissatisfaction. The ongoing decrease in the efficiency of transport of people and goods, due to increasing traffic congestion, will result in widespread negative effects on the social and economic environment. The No-Go Alternative is, therefore, not considered to be a feasible alternative.

While the no development option is not preferred, it forms the baseline against which all other options are assessed.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

A description of aspects of the receiving environment relevant to the assessment is provided below. Refer to Appendix B for photographs.

5.1 Current land use and zoning

The section of road under assessment falls within the urban core of eThekwini and well within the urban development line. Figures 1 and 2 provide an indication of land use in the study area. Refer to Appendix C1 for a town planning/zonation map.

The section of N2 which falls within the study area is bordered predominantly by formal (low and middle income) residential areas on both the northern and southern side of the EB Cloete Interchange. A few informal settlements have also been established in the vicinity of these residential areas, often close to or potentially within the existing road reserve. The section of N3 being reviewed in this report borders predominantly middle income residential and business areas, some of which are close to the existing road reserve. This section of N3 also crosses two viaducts, Westville (a conservancy) and Paradise Valley (a nature reserve protected under NEM: Protected Areas Act). The N3 in the Westville area also runs adjacent to part of Roosfontein Nature Reserve, which is also proclaimed as a national protected area.

Throughout the study area, the environment is largely transformed and characterised by high levels of noise due to road traffic, which is likely to be heard by people residing in residential properties or working in office blocks adjacent to the road.

The proposed capacity improvements to the national roads are in line with national, provincial and municipal development goals and planning frameworks. The national routes (N2 and N3) are mapped as national routes on all mapping. Refer to Appendix C1 for land use zoning adjacent to the national routes. Where land is to be expropriated for widening, it will be gazetted as part of the national road network road reserve, which will result in a change of land use.

5.2 Land ownership and affected properties

5.2.1 Land ownership

This is a linear development located primarily within the proclaimed N2 and N3 road reserves belonging to SANRAL, as use will be made of the median and existing road reserve to accommodate widening. However, additional (private) property will need to be acquired adjacent to the N2 and N3 in some areas where expansion beyond the existing road reserve is required. These areas are indicated by the red lines in Figures 1 and 2 and include private and institutionally owned properties. SANRAL undertakes a land acquisition process whereby negotiations are entered into with property owners to purchase the land at market based values. In the rare circumstances where agreement cannot be reached, SANRAL is compelled to embark on legal proceedings to expropriate[11] the land. The newly acquired land will be proclaimed as road reserve.

[11] It is expressly stated that expropriation discussed in this report is expropriation to be undertaken within the context and provisions of the current laws of the country. Expropriation for purposes of capacity improvements to the N2 and N3 is in no way linked to or to be interpreted within the context of the current debate concerning 'land expropriation without compensation'.

5.2.2 Property names and numbers

This approximately 21 km linear project through a densely populated area involves thousands of property subdivisions, mostly within SANRAL's proclaimed road reserve. The property diagrams and property numbers in the proclaimed N3 road reserve are published in Government Gazette No 40085, Vol. 612, 22 June 2016 and the N2 road reserve diagrams and property numbers are published in Government Gazette No 8130, 2 April 1982. The relevant property information in these gazettes is in excess of 100 pages of information and for practical purposes (amount of electronic data as well as paper for hard copies) is not appended to this document. The gazettes can be downloaded from the government website: http://www.gov.za/sites/www.gov.za/files/40085_gon733.pdf

The property numbers of all properties within 50 m of the national road sections to be widened are included in Appendix C2. Property names and numbers for properties to be acquired by SANRAL for the new road reserve are in Appendix C3.

5.2.3 Wayleaves/servitudes

Several services (e.g. pipelines, fibre optic cables, electricity infrastructure, etc) are located within the road reserve, with SANRALs permission. These are governed by wayleave agreements between SANRAL and the utility provider which will also determine who carries the cost for relocations. When services need to be relocated due to road works, this is co-ordinated (allowing for required lead times) between SANRAL's engineers and the utility provider.

SANRAL will not be responsible for costs of moving utilities and infrastructure that are not legally in the road reserve.

5.3 The social/socio-economic environment

A summary of the socio-economic character of the receiving environment is provided below. More detailed information is provided in the Social Impact Assessment Specialist Report (Appendix D1).

5.3.1 Demographics

eThekwini covers an area of approximately 2,297 km² with approximately 3.5 million people residing in the municipality, the majority of whom (89.9%) reside in urban areas (Stats SA, 2012). The population is characterised by a high proportion of people under the age of 34 with 70% of the population aged between 15 and 34 years, and 25.2% below the age of 15 (StatsSA, 2012). Unemployment in the municipality is reported to be 30% which equates to almost one in three people of working age being unemployed; albeit still below the unemployment level for KwaZulu-Natal which is 33% (Stats SA, 2012). High levels of unemployment have been cited as a key development challenge throughout eThekwini, with high levels of economic inactivity among the economically active portion of the population resulting in high levels of dependency, both of which contribute to eThekwini having the highest number of people living on less than US $ 2/day amongst all the leading metros in South Africa (eThekwini IDP, 2011/2012).

As would be expected of the major urban centre in KwaZulu-Natal, 80% of households reside in formal dwellings with only 4.2% residing in traditional dwellings, which is significantly lower than the provincial average of 19% (StatsSA, 2012). Of significance is that the proportion of

households reported to reside in informal dwellings (15.8%) in the municipality is above the provincial average (8.3%) (StatsSA, 2012). This trend is typical of urban centres in South Africa where informal settlements develop on vacant land adjacent to the urban periphery and are often occupied by people migrating to the city in search of opportunities.

As noted previously, there are pockets of informal settlements within the project area, some of which appear to have encroached on the current road reserve. These settlements, which are typically characterised by high unemployment, crime and poor services, are of significant sensitivity and if not dealt with correctly may impact the proposed project negatively.

5.3.2 Economic sectors

As the economic hub of KwaZulu-Natal, eThekwini contributes 64.1% of the total provincial GDP and 10.1% of the South African GDP. The tertiary sector, including wholesale and retail trade, transport, storage and communication, financial and business services, and community services, are the largest contributors to the local economy. It should also be noted that manufacturing, particularly, the production of food and beverages, and fuel, petroleum, and chemical and rubber products, contributed 22.8% of total economic activity (eThekwini IDP, 2011/2012). The economy of eThekwini is to a large degree reliant on the N3 corridor linking the Port of Durban with Gauteng, currently the busiest road freight corridor in South Africa. The corridor is of vital importance to ensuring transport efficiencies and lower logistics costs thereby aiding economic growth and ensuring that the country remains competitive.

5.3.3 Noise receptors adjacent to the N2 and N3

Being a densely built up urban area, a large percentage of the national road of relevance to this study has commercial and residential properties directly adjacent to the road (this can be seen in Figures 1 and 2). The most sensitive noise receptors are generally within 300 m of the edge of the N2 and N3, particularly those situated above the level of the road and within direct line of sight (i.e. with no intervening structures or natural barriers between the receptor and the national road).

Residents of Chesterville and Paradise valley in the vicinity of the proposed construction access roads to Westville and Paradise Valley viaducts will also experience noise during the construction period while the access roads are being constructed and then while they are being used during construction at the viaducts.

5.4 Cultural heritage resources

eThembeni Cultural Heritage Consultants undertook a specialist study to assess impacts of the project on heritage resources within the study area. Study findings indicate the following cultural heritage resources in the project area (refer to Appendix C4 for localities of these cultural sites and to Appendix D2 for the Cultural Heritage Specialist Report).

5.4.1 Places, buildings, structures and equipment

The N3 national route in KwaZulu-Natal has been constructed over the past approximately 40 years. Accordingly, no infrastructure associated with the road, such as bridges, is older than sixty years and, therefore, generally protected in terms of the NHRA. However, the widening of the N3 Paradise Valley Viaduct has the potential to impact upon a provincial landmark, viz. the Umbilo Waterworks.

Umbilo Waterworks
Umbilo Waterworks is a Provincial Landmark in terms of Section 39 of the KZNHA, which is equivalent to a Grade II Provincial Heritage Site in terms of Section 27 of the NHRA. It is located on the uMbilo River within the Paradise Valley Nature Reserve, and some components of the waterworks are close to the footprint of the proposed works on the N3 Paradise Valley Viaduct. The widening of the viaduct has the potential to impact upon part of the Umbilo Waterworks. However, engineers have indicated that the site will be fenced off with barricades during construction and in this way, avoid damage.

5.4.2 Landscapes and natural features

Paradise Valley Nature Reserve
Paradise Valley Nature Reserve is formally protected and managed by eThekwini Metropolitan Municipality. It has heritage significance for its aesthetic, scientific, social and historical values. The Paradise Valley Viaduct on the N3 spans a section of the Paradise Valley Nature Reserve. In addition, the temporary access track which needs to be constructed to reach the viaduct will pass though a short section of the reserve (along the route of the original track used when the N3 was constructed).

5.5 The biophysical environment

5.5.1 Site gradient

This is a linear development that traverses KwaZulu-Natal's typically hilly terrain encountered between the coast and the hinterland. The roads traverse a variety of gradients that do not exceed 1:19. The N2 and N3 carriageways do not exceed 1:20 and 1:19 respectively at their steepest points. The Westville Viaduct Access road is 1:12.5 at its steepest and the Paradise Valley Viaduct Access Road is 1:12 at its steepest. Banks in the road reserve adjacent to the road are steep in places and reinforced where needed.

5.5.2 Geological conditions along the route

Table 8 provides a summary of geological conditions along the route. Soft, medium and hard rock is encountered and blasting will be required in places. Where slope stability is unstable, soil nails, bolts and/or reinforced gunite will be required to reinforce cut slopes. Although soil erosion has not been identified as a major risk, it will need prevention and management particularly at river and wetland crossings. The route has been investigated by the geotechnical team and specific recommendations have been made regarding matters of slope stabilisation, bridge piling, foundations, etc. (refer to the specialist geotechnical report in Appendix D3 for further detail).

Table 8 Summary of geological conditions along the route

Lithology	Comment
Shales and mudrocks	Major rock type along the N2
Mainly tillite	Encountered along the N2 and at the EB Cloete I/C
Sandstone	Major rock type along the N3

5.5.3 Rivers and wetlands

The study area falls within the Pongola-Mtamvuna Water Management Area. The N2 and N3 sections of national road, along with the two viaduct access roads, traverse approximately 21 km through a very hilly area on KZN's coastal belt in the uMngeni and uMbilo river catchments with an abundance of streams, drainage lines and wetlands. Major rivers all drain in a predominantly easterly direction eventually discharging into the South Indian Ocean off the east coast.

There are numerous watercourses within 500 m of the proposed road upgrade. Most of these have been heavily impacted by the road and associated drainage structures, by canalisation and by urban development. Vegetation is largely degraded and heavily invaded by alien species. Approximately 27 crossings (Figure 5) identified as providing wetland/riparian habitat (three being wetlands and the remainder rivers/streams/drainage lines) were assessed by Ground Truth (Appendix D4a & D4b). It must be noted that because these are existing road crossings, the watercourses are already modified at the crossing points. They include:

- The uMbilo River in the vicinity of the Solomon Mahlangu I/C on the N2/M7, described as a modified channel infested with invasive alien plants, with an assigned Health Score of "Fair".
- The uMbilo River running beneath the N3 Paradise Valley Viaduct within the Paradise Valley Nature Reserve with good indigenous vegetation cover and a Health Score of "Good".
- Tributary to the uMbilo River near the M13/N3 I/C with a Health Score of "Good" despite invasion by exotic plants.
- Several modified small riparian channels along the N2 and N3, many fed by runoff from the highway and infested with invasive alien plants and, in many cases, litter. They have assigned Health Scores varying from "Poor" to "Fair" to "Seriously Modified". In some cases, these channels are canalised where they run adjacent to the national road.
- Three valley bottom wetlands with channels on the N2 north of EB Cloete I/C, two with Health Scores of "Critically Modified" and one with a Health Score of "Seriously Modified".

Further detailed information is provided in the riparian specialist report (Appendix D4a and D4b).

5.5.4 Natural habitat affected by the project

Land use in the study area is urban in nature and dominated by residential settlement, commercial developments and road infrastructure. Due to high levels of development, most of the vegetation remaining within the road reserve, including proposed extensions, is very disturbed. Most of the riparian zones and wetlands are similarly highly disturbed and modified due to development. Nevertheless, limited pockets of better quality natural vegetation are encountered where the road intersects or runs adjacent to some of the steeper valleys and municipal nature reserves. Areas that are important in this regard are Westville Viaduct, Paradise Valley Viaduct, pockets at the Solomon Mahlangu Interchange, and Roosfontein Nature Reserve (to a lesser degree) (Figures 5, 6a, 6b and 7). Please refer to the specialist vegetation report in Appendix D5 for detailed information and mapping.

Table 9 provides a general indication of the habitat condition and levels of transformation on project affected areas.

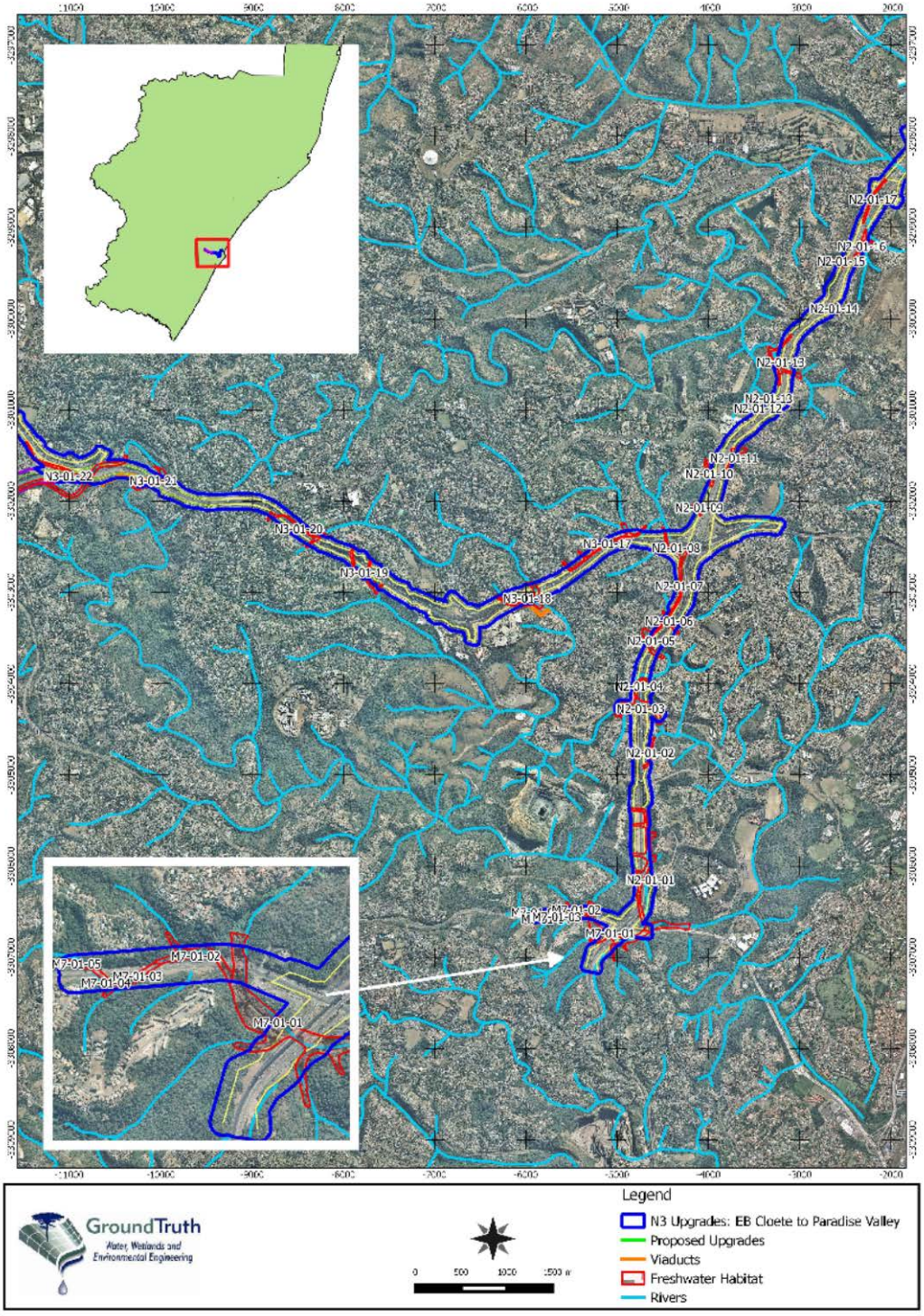


Figure 5 Watercourses crossed in the study area

LEGEND FOR SENSITIVE VEGETATION (FIGURES 6a, 6b AND 7)

	Existing road reserve
	Proposed extension of road reserve
	Temporary access routes below Westville and Paradise Valley Viaducts during construction
	Key area of concern
	Westville Viaduct wetland and associated stream

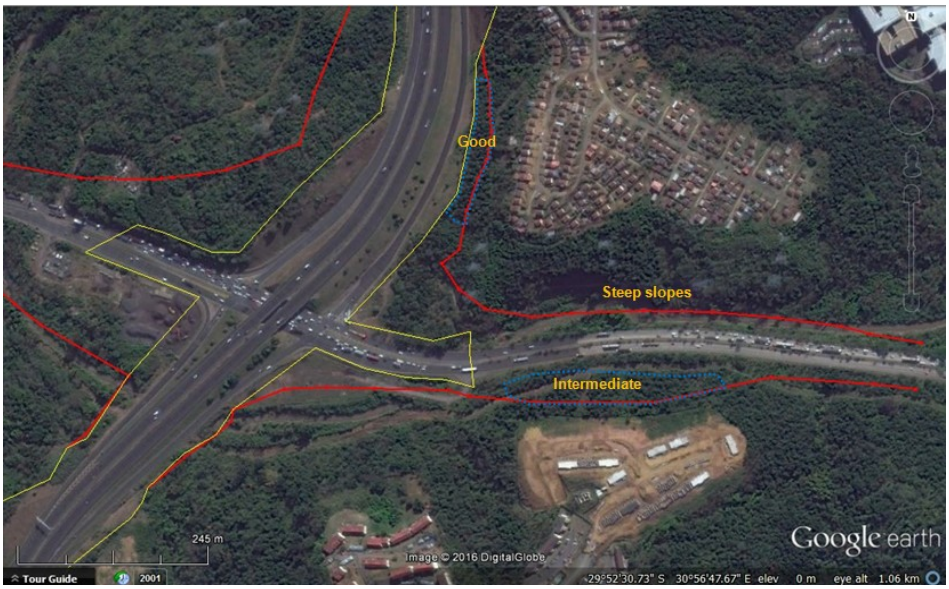


Figure 6a Solomon Mahlangu Interchange (east section) sensitive areas

Figure 6b Solomon Mahlangu Interchange (west section) sensitive areas

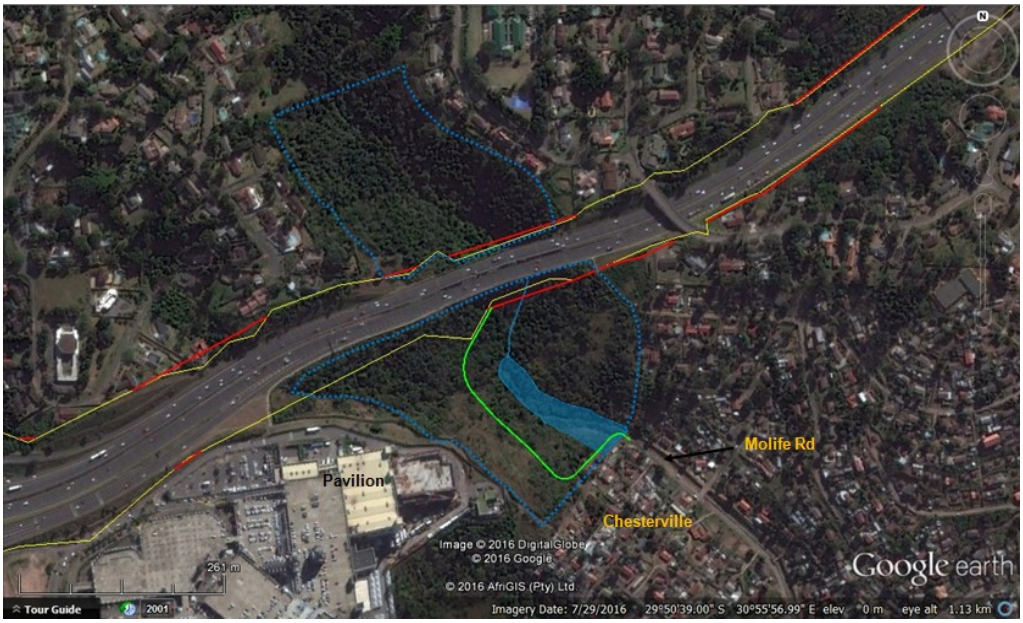


Figure 7 Westville Viaduct sensitive areas

Table 9 Summary of habitat condition on site

Habitat Condition	% of Habitat Condition Class	Description and Additional Comments and Observations
Natural	0.2%	There is a stand of good quality Eastern Scarp Forest remaining within the north-eastern quadrant of the Solomon Mahlangu I/C. The interior is dominated by indigenous species and is characterised by stands of forest growing on shallow soils with a well-developed canopy and understory of trees.
Near Natural (includes areas with low to moderate level of alien invasive plants)	2.2%	There are stands of intermediate quality forest remaining within the footprint of the Solomon Mahlangu I/C. These occupy the steeper slopes around the interchange which remain largely untouched by works associated with urban infrastructure and where access for residents is more difficult for the extraction of natural resources, cultivation or erection of informal housing. The species composition is similar to that of the good quality stands; however, the cover of alien invasive species is higher, although these are not as dense as found within sections of degraded vegetation. There are also near natural stands of vegetation within the footprint at Paradise Valley Nature Reserve.
Degraded (includes areas heavily invaded by alien plants)	45.6%	Degraded areas within the study area are comprised of a patchy mosaic of secondary grassland, shrubland and thicket. The original natural vegetation has become degraded through road construction, residential, industrial and commercial development, earthworks, footpaths, illegal dumping, borrow pits and sand winning activities. Mowed grass verges and vegetable gardens also occur.
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	52%	The majority of the footprint comprises transformed land in the form of the existing tarred highway, bridges and on/off ramps.

5.5.5 Vegetation types

The following vegetation types are affected by the proposed upgrade, based on Mucina and Rutherford's (2006) national vegetation map showing the extent prior to transformation/degradation. Please refer to the specialist vegetation report (Appendix D5 - Figures 3 and 4) for more detailed information and mapping.

- KwaZulu-Natal Coastal Belt (CB 3).
- Northern Coastal Forest (FOz 7).
- Scarp Forest (FOz 5).
- Subtropical Alluvial Vegetation (AZa 7).

The provincial vegetation types coverage completed by EKZNW (Scott-Shaw & Escott, 2011) shows a similar coverage of vegetation type polygons; however, the nomenclature has been refined further, as follows:

- KwaZulu-Natal Coastal Belt Grassland (Critically Endangered).
- KwaZulu-Natal Coastal Forests: Southern Mesic Coastal Lowlands Forest (Critically Endangered).
- Eastern Scarp Forests: Southern Coastal Scarp Forest (Least Threatened).
- Alluvial Wetlands: Subtropical Alluvial Vegetation (Endangered).

The widening of the N3 will affect several D'MOSS areas and the following eThekwini Municipal Area vegetation types[12]:

- Eastern Scarp Forest (below the 450 m contour): comprising sections in Good and Intermediate ecological condition.
- Transitional Forest: comprising sections in Intermediate and Degraded ecological condition.
- Transitional Thicket: comprising sections in Degraded ecological condition.
- Transitional Woodland: comprising sections in Intermediate and Degraded ecological condition.
- Wetland: comprising sections in Intermediate and Degraded ecological condition.

5.5.6 Threatened terrestrial ecosystems

The National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004) provides a listing of ecosystems that are threatened and in need of protection. The section of the N3 investigated in this study intersects with Durban Metropole North Coast Grassland (KZN 2). Please refer to the specialist vegetation report (Appendix D5 - Figure 7).

The conservation status of Durban Metropole North Coast Grassland is Critically Endangered and it is required that impacts should be avoided, minimised, mitigated and/or offset as appropriate. Critically endangered ecosystems are defined as ecosystems that have undergone severe degradation of ecological structure, function or composition because of human intervention and are subject to an extremely high risk of irreversible transformation.

[12] A small section of KwaZulu-Natal Sandstone Sourveld (CE) (below the 450 m contour) in Intermediate ecological condition is located close to the proposed N3 upgrade just east of the EB Cloete interchange (adjacent to 45th Avenue). Due to the disturbed nature of the vegetation occupying the road reserve, this is not directly affected by the upgrade; however, it is recommended that caution is exercised during construction to ensure that the adjacent section of sourveld is not disturbed.

5.5.7 D'MOSS and protected areas

The eThekwini Environmental Planning and Climate Protection Department (EPCPD) has recently undertaken a Systematic Conservation Assessment (SCA) of the eThekwini Municipal Area (EMA) to identify and prioritise areas for the conservation of biodiversity and the ecosystem services, biodiversity provides to the citizens of Durban. A primary objective of the SCA was to inform the production of an updated version of the Durban Metropolitan Open Space System (D'MOSS) last updated and adopted by the eThekwini Council in December 2010. The D'MOSS is a system of open spaces that incorporates areas of high biodiversity value linked together in a network of open spaces. The D'MOSS has been adopted as a layer within the various town planning schemes formulated under various legislation found throughout the city[13]. The practical effect of this, is that in the case of any land affected by D'MOSS, prior to developing, excavating, levelling, removing any natural vegetation, erecting any structure, dumping or carrying out any work on a site, the prior approval of the Council must be obtained. The section of the N3 investigated in this study passes through or is adjacent to various green areas of eThekwini which are included in D'MOSS:

- Roosfontein Nature Reserve (eThekwini Municipality). Roosfontein Nature Reserve (Figure 1, Appendix C4) is situated on the southern side of the N3 near the Pavilion and has recently been declared a protected nature reserve area under the National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003).
- Paradise Valley Nature Reserve (eThekwini Municipality). Paradise Valley Nature Reserve (Figure 2, Appendix C4) is also protected under the Protected Areas Act, 2003. It is located between Westville and Pinetown and administered by eThekwini Municipality Parks and Recreation. It is a 100+ ha nature reserve through which the uMbilo River runs and contains good quality, mature coastal forest, scarp forest and riverine forest. The reserve also contains a spectacular waterfall and the uMbilo Water Works (1887-1905), which is a national monument.
- Westville Trail (eThekwini Municipality).
- Various vegetated open spaces corridors adjacent to the N3 (not formal reserves).

Please refer to the specialist vegetation report (Appendix D5 - Figure 5) for detailed mapping.

5.5.8 Critical Biodiversity Areas

EKZNW's MINSET data for the area of interest (Appendix D5 - Figure 1) indicates that the national roads intersect in places with Critical Biodiversity Areas. MINSET is a guide using planning units to indicate optimal site selection to meet conservation targets and does not reflect the level of transformation within each planning unit. According to the data, the most important planning units (Critical Biodiversity Area 1) occur:

- Along the N2 north of EB Cloete Interchange.
- Around the EB Cloete Interchange.
- Between the EB Cloete and Solomon Mahlangu Interchanges.
- Around the Solomon Mahlangu Interchange.
- In the Westville area.
- In the Paradise Valley area.

[13] It should be noted that any future changes to the D'MOSS footprint will be undertaken in terms of the Planning and Development Act, 2008 (Act No 6 of 2008).

5.5.9 Vegetation on site

The vegetation on site is described below, with an emphasis on sensitive areas. Detailed species lists are provided in the specialist report (Appendix D5). Alien species are denoted with an asterisk (*).

Disturbed Grassland/Shrubland/Thicket Mosaic
This is the most widespread community within the study area and comprises a patchy mosaic of secondary grassland approximately 1 m tall, shrubland between 2 and 3 m tall and thicket between 3 and 5 m tall. The original natural vegetation has become degraded through road construction, residential, industrial and commercial development, earthworks, footpaths, illegal dumping, borrow pits and sand winning activities (from rivers). Mowed grass verges and vegetable gardens are included. A range of generalist, ruderal[14] and alien invasive grasses, forbs and shrubs, and trees are common. Species of particular note include:

- *Freesia laxa* subsp. *laxa, Gladiolus dalenii* and members of Iridaceae which are designated as specially protected under the Natal Nature Conservation Ordinance (15 of 1974).
- The geophyte *Hypoxis hemerocallidea* which has a status of declining (species of conservation concern) in the National Red List of South African Plants.
- *Pittosporum viridiflorum* which is protected under the National Forests Act, 1998 (individuals found in degraded vegetation associated with the Solomon Mahlangu I/C).

Riparian and Wetland Areas
Due to the intense disturbance often experienced by wetland and riparian communities, natural environmental gradients have been obscured and vegetation often resembles that of the Disturbed Grassland/Shrubland/Thicket Mosaic described above, with an association of aliens and generalist species which prefer wetter conditions. There are numerous stream and drainage line crossings, and levels of disturbance are generally high, resulting in disturbed thicket or riverine woodland colonising banks. The species composition is typically early successional and alien invasive trees and shrubs with gaps in the canopy occupied by a variety of reeds, sedges and other hydrophytes.

Solomon Mahlangu I/C
While the majority of the vegetation falling within the footprint of the proposed Solomon Mahlangu Interchange is degraded, there are stands of good and intermediate quality Eastern Scarp Forest remaining within the footprint (Figures 6a & 6b). Remaining patches of Eastern Scarp Forest mostly occupy the steeper slopes around the interchange which remain largely untouched by works associated with urban infrastructure and where access for residents is more difficult for the extraction of natural resources, cultivation or erection of informal housing.

A good quality stand located on the north-eastern quadrant of the interchange is fringed by *Melia azedarach*, Berkheya bipinnatifida, Lantana camara** and *Pavonia burchelli* where historical disturbance on the edge of the steep road cutting has provided a foothold for aliens and generalists. However, the interior is dominated by indigenous species with a relatively low cover of alien invasive species. It is characterised by stands of forest growing on shallow soils with a well-developed canopy and understory of trees (8–10 m tall) and shrubs, together with a relatively sparse herb layer.

[14] A plant that is associated with human dwellings or agriculture, or one that colonises waste ground. Ruderals are often weeds, which have high demands for nutrients and/or are intolerant of competition.

Intermediate quality stands of Eastern Scarp Forest occur on the south-eastern, south-western and north-western quadrants of the interchange. The species composition is similar to that of the good quality stands; however, the cover of alien invasive species is higher, although these are not as dense as found within sections of degraded vegetation. Typical invasive species include *Chromolaena odorata*, Litsea sebifera*, Melia azedarach*, Lantana camara** and *Eugenia uniflora**, amongst others.

Where the uMbilo River flows through the south-western quadrant of the interchange, and then through the north-eastern quadrant along the east-bound carriageway, the associated riverine woodland is degraded. The uMbilo River in this area has been canalised and the more open alluvial deposits along the channel support a mosaic of reedbed and shrubland.

The proposed upgrade will result in the destruction of sections of the uMbilo River channel[15] within the interchange footprint, and while the vegetation within the footprint is largely degraded, caution should be exercised where construction activities come close to the steeper slopes just outside of the footprint along the east-bound carriageway, east of the interchange. Here, stands of better quality scarp forest and cliff communities occupy the steeper slopes.

Notable species found include:

- *Freesia laxa* subsp. *laxa* and *Dioscorea cotinifolia* which are designated as specially protected under the Natal Nature Conservation Ordinance (15 of 1974).
- The geophyte *Hypoxis hemerocallidea* which has a status of Declining (species of conservation concern) in the National Red List of South African Plants.
- *Pittosporum viridiflorum* which is protected under the National Forests Act, 1998.
- *Anastrabe integerrima* and *Brachylaena uniflora* which are South African endemics.

Westville Viaduct

Widening of the Westville Viaduct will have an impact on the valley below, not only within the road reserve but also beyond that, due to the viaduct access road (Figure 7). This steep-sided valley is dominated by disturbed coastal and scarp forest with a mosaic of grassland and thicket towards the crests of the valley sides, particularly below the Pavilion Shopping Centre. With the proximity of Chesterville, it is likely that extraction of wood, medicinal plants and building materials (e.g. sand) contributes to on-going disturbance of the natural vegetation in the area. The forest canopy supports a diversity of alien invasive and indigenous species. *Litsea sebifera** is a conspicuous component of the canopy. A range of early successional and alien invasive shrubs and climbers are present.

As with the coastal and scarp forest, the riparian zone associated with the river at the bottom of the valley is similarly disturbed, with *Litsea sebifera** being a common component of the canopy, together with a range of other early successional and alien invasive species. Although the species composition is modified, the riparian zone does play an important role in stream bank stabilisation, amelioration of floods, trapping sediments and nutrients, and maintenance of natural water temperatures for aquatic species.

Other nearby plant communities include a mosaic of grassland and thicket towards the crests of the valley sides which have been disturbed by construction of the adjacent Pavilion Shopping Centre and ongoing pedestrian traffic between Chesterville and the Pavilion. It is likely that the original grassland has been encroached by woody species due to alteration of natural fire

15 A specialist investigation on rivers and wetlands has been undertaken by GroundTruth, and, therefore, detailed wetland and riparian assessments were not undertaken for the vegetation assessment. Also, the water use licence requirements are not elaborated here.

regimes, resulting in the present mosaic of structural classes and the presence of alien invasive trees and shrubs. A small, disturbed wetland dominated by alien species is located immediately north-west of Chesterville.

Roosfontein Nature Reserve
Widening of the south side of the N3 may result in the removal of a small section of the Disturbed Grassland/Shrubland/Thicket Mosaic within the existing road reserve, adjacent to Roosfontein.

Paradise Valley Nature Reserve
Paradise Valley Nature Reserve supports a dense cover of forest with a particularly high diversity relative to the species composition of the majority of the area of interest (Figure 8). Coastal forest occupies the lower lower-lying parts of the reserve and comprises a canopy of trees between 8 and 12 m in height. It is characterised by several strata made up of a wide diversity of indigenous trees, shrubs, forbs, grasses, ferns and climbers. The canopy comprises a diverse mix of indigenous trees. A range of smaller trees and shrubs populate the understory and a range of forbs, geophytes, ferns, grasses and sedges occur as groundcover. The presence of a wide range of climbers is characteristic of coastal forest, and it is also likely that a range of epiphytic orchids are present.

Towards the uMbilo River, the riverine forest in the riparian zone is characterised by taller trees such as *Macaranga capensis* and *Syzygium cordatum,* together with *Bridelia micrantha, Ficus natalensis* and *Tabernaemontana ventricosa.* Due to the high light conditions, the open alluvial terraces along the uMbilo River support a dense cover of herbaceous plants, climbers, shrubs, early successional trees and hydrophytes. On-going disturbance through natural flooding has resulted in a range of alien invasive species.

Scarp forest occupies the steeper valley sides and the eastern slope of the uMbilo valley supports the largest stand likely to be affected by the upgrade of the viaduct. It is characterized by shorter stands of forest growing on shallow soils with a well-developed canopy and understory of trees and shrubs, together with a relatively sparse herb layer. Species better adapted to drier conditions occur here, including *Acacia sieberiana, Aloe arborescens, Apodytes dimidiata, Dalbergia obovata, Euclea natalensis, Obetia tenax* and *Searsia pentheri.*
Notable species at Paradise Valley include:

- *Millettia grandis, Crocosmia aurea, Haemanthus albiflos, Dioscorea cotinifolia, Dioscorea dregeana* and *Aloe arborescens* which are designated as specially protected under the Natal Nature Conservation Ordinance (15 of 1974).
- *Podocarpus falcatus* and *Podocarpus latifolius* which are protected under the National Forests Act, 1998.
- *Cassipourea gummiflua* which has a status of Vulnerable in the National Red List of South African Plants.
- *Curtisia dentata* which has a status of Near Threatened in the National Red List of South African Plants.
- *Adenia gummifera* and *Loxostylis alata* which have a status of Declining in the National Red List of South African Plants.
- *Anastrabe integerrima* and *Brachylaena uniflora* which are South African endemics.

LEGEND FOR SENSITIVE VEGETATION (FIGURE 8)

	Existing road reserve
	Proposed extension of road reserve
	Temporary access routes below Westville and Paradise Valley Viaducts during construction
	Key area of concern
	Westville Viaduct wetland and associated stream

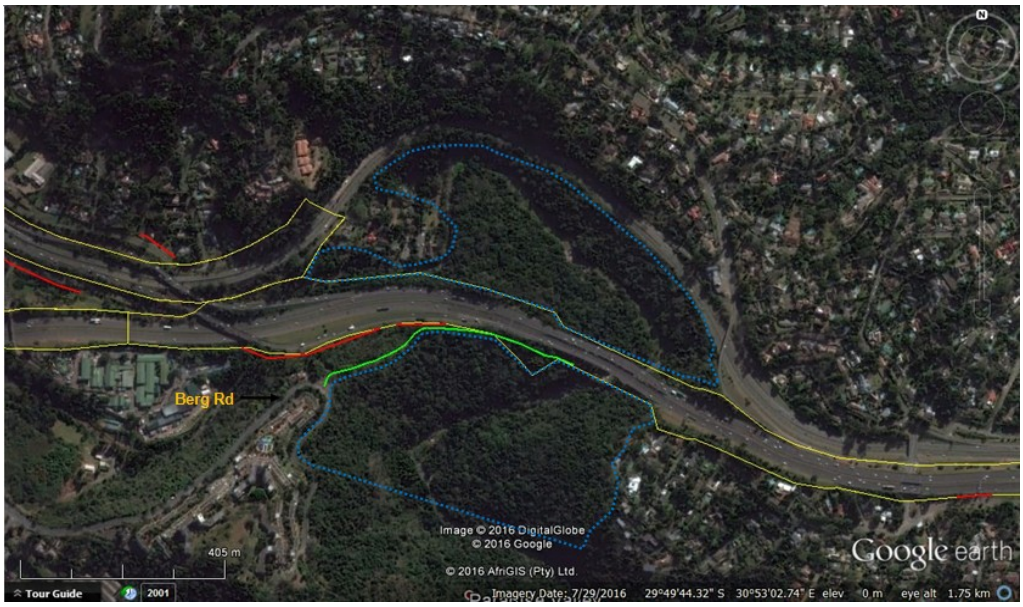


Figure 8 Paradise Valley sensitive areas

Proposed Paradise Valley Viaduct Access Road within the Paradise Valley Nature Reserve

The proposed route for this access road has been used previously by surveyors and geotechnical teams and is aligned along a series of terraces closer to the river which were installed when the viaduct was originally constructed (Figure 8). The route has, thus, been disturbed in the past and this, together with the area under the existing viaduct, comprises forest which is regenerating from the initial disturbance experienced during initial bridge construction. The forest is approximately 8 m tall and is characterised by a mix of indigenous and alien invasive trees and shrubs, common climbers, forbs and grasses. A number of *Podocarpus* spp. (yellowwood trees) are growing along the route (most likely planted) and some of these are likely to be removed and/or pruned for the operation of the temporary access route.

5.5.10 Fauna and avifauna

Due to the high urban population density and consequent transformation of natural habitat, animal biodiversity and populations are limited in eThekwini. However, a high diversity of naturally occurring species is protected in the nature reserves, which provide habitat for a large variety of amphibians, reptiles, mammals, birds and invertebrates. Mammals include various small antelope, jackal, bush pig, porcupine, genet, caracal, mongeese, dassies and vervet monkeys as well as a variety of rodents.

There are also numerous species of birds around eThekwini and the nature reserves are popular for bird watching. Crowned Eagles in the highway region are of particular interest to this project and discussed further below.

Crowned Eagles
The Crowned Eagle *Stephanoaetus coronatus* is globally Near Threatened and Vulnerable within South Africa and, therefore, fully protected (McPherson, 2016). A pair of crowned eagles has been nesting for a decade in the Paradise Valley Nature Reserve, not far from the N3 Viaduct. Two nesting sites in blue gum trees have been used, one upstream of the viaduct (further away) and more recently, one downstream (closer to the proposed viaduct access road). These blue gum trees have, however, been ring-barked and have a limited future as nest sites.

According to a raptor ecologist who has been studying and monitoring the Crowned Eagles in the highway area for many years (McPherson, 2016), Crowned Eagles are generally long-lived (16-30 years) and are year-round residents with small home ranges. The breeding cycle is long and most pairs breed biennially as the juvenile requires extended post-fledging food provisioning by the adults. Annual breeding is known in the more seasonal latitudes of South Africa. In KwaZulu-Natal, early nest building and courtship may start in May. Peak egg laying occurs in August. Nestlings fledge from December with late nestlings leaving the nest in March. Juveniles have an extended post-fledging dependency on their parents for food and will continue to be fed for at least five months. Some juveniles receive intermittent food from their parents until up to 10 months. Nest sites are typically in emergent riverine trees and pairs typically are very faithful to a site, with optimal nest sites being used for decades and generations of Crowned Eagles. In some cases, especially in the D'MOSS study area, some pairs will tend more than one nest, breeding annually but in each nest in alternate years. Blue gum is a frequently used nest tree in Durban. The nest is built of large branches and lined with leafy sprigs, and is built upon every breeding cycle, becoming tens of kilograms in weight. Nest collapses occur infrequently and if a nest collapses, the pair is likely to rebuild on the same location in subsequent years.

5.5.11 Site sensitivity map

Please refer to Appendix C4 for a map showing overall cultural and environmental sensitivities. In addition, refer to the mapping provided in the relevant specialist reports in Appendix D.

6. PUBLIC PARTICIPATION PROCESS

6.1 Objectives

The public participation process for the proposed project was designed to comply with the requirements of the EIA Regulations and NEMA (Table 2). The objectives of public participation are to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

- Identify issues of concern, and provide suggestions for enhanced benefits and alternatives.
- Contribute local knowledge and experience.
- Verify that their issues have been considered.
- Comment on the findings of the assessment, including the measures that have been proposed to enhance positive impacts and reduce or avoid negative ones.

6.2 Stakeholder/I&AP profile

Table 10 lists the profile of stakeholders registered on the database (Appendix E2) and Table 11 lists the organs of state that have been identified as key stakeholders. Note that as the public participation processes were run for BA1 and BA2 simultaneously, the database contains individuals and groups associated with the N2 and N3 sections for both projects.

Table 10 Sectors of society represented by I&APs on the direct mailing list

Government (National, Provincial and Local)
State owned companies (Telkom, Transnet)
Transport sector (taxis, buses)
Non-Governmental Organisations/Community Based Organisations
Private and institutional adjacent landowners
Local residents and businesses
Conservation Authorities
Business and Industry

Table 11 Authorities and organs of state identified as key stakeholders

Authority/Organ of State	Contact person	Tel No	Fax No	e-mail	Postal address
South African National Roads Agency Limited (SANRAL)	Mr Ravi Ronny	033392 8100	033 386 3365	ronnyr@nra.co.za	58 Van Eck Place, Mkondeni, Pietermaritzburg, KwaZulu-Natal
Department of Water and Sanitation (Licensing)	Ms Zama Hadebe	031 336 2767 /082 895 8445	086 505 6477	Hadebezdws.gov.za	Office 1237 Southern Life Building, 88 Joe Slovo Street, Durban
Department of Water and Sanitation	Mr. Siyabonga Buthelezi	031 336 2846 /081 036 8761		ButheleziS2@dws.gov.za	14th floor Southern Life Building, 88 Joe Slovo Street, Durban
KZN Department of Transport	Mrs Judy Reddy	033 355 8600	033 342 3962	Judy.Reddy@kzntransport.gov.za	224 Prince Alfred Street Private Bag X9043 Pietermaritzburg, 3200
KZN Department of Economic Development, Tourism and Environmental Affairs	Ms Yugeshni Govender	031 366 7319	031 302 2824	yugeshni.govender@kznedtea.gov.za	Private Bag X54321 Durban, 4000
DAFF- KZN Forestry Regulations & Support	Miss Karen Moodley	0333927741	033 3428783	KarenM@daff.gov.za	Private Bag X9029 Pietermaritzburg, 3200
AMAFA Heritage KwaZulu Natal	Ms Bernadette Pawandiwa	033 394 6543	033 394 6552	bernadetp@amafapmb.co.za	P.O. Box 2685 Pietermaritzburg 3201
Ezemvelo KZN Wildlife	Ms Dineshree Thambu	033 845 1999	033 845 1499	thambud@kznwildlife.com	P O Box 13053, Pietermaritzburg, 3232
Dept. of Transport, Community Safety & Liaison	Mr Sibusiso Gumbi	033 355 8808	033 355 8021	sbusiso.gumbi@kzntransport.gov.za	Private Bag X9043, Pietermaritzburg, 3200
eThekwini Metropolitan	Mrs Diane van	031 311 7136	031 311 7859	Diane.VanRensburg@durban.gov.za	PO Box 680, Durban, 4000

Authority/Organ of State	Contact person	Tel No	Fax No	e-mail	Postal address
Municipality (Engages with all Municipality departments)	Rensburg				
Transnet Ltd	Mr Willy Joubert	035 906 7487		willie.joubert@transnet.net	
Transnet Pipelines	Mrs Khosi Zondi	031 361 1347	031 361 1346	khosi.zondi@transnet.net	PO Box 3113, Durban, 4001
uMgeni Water	Ms Lyn Archer	033 341 1345	033 341 1349	lyn.archer@umgeni.co.za	310 Burger Street, Pietermaritzburg, 3201
Dept Co-operative Governance & Traditional Affairs	Ms Hlengiwe Phewa	033 355 6472	033 355 6424	hlengiwe.phewa@kzncogta.gov.za	Private Bag X9123, Pietermaritzburg, 3200
Department Of Public Works	Mr T.L. Mchunu	033 897 1421/1422	033 897 1399	PA.RegionalManager@kznworks.gov.za / Thobiyisi.mchunu@kznworks.gov.za	10 Prince Alfred Street, Pietermaritzburg, 3201
Department of Rural Development and Land Reform	Ms Thembeka Ndlovu	033 355 4388		Thembeka.Ndlovu@drdlr.gov.za	200 Church St, Pietermaritzburg, 3201
Department of Human Settlements KZN	Mr Lindani Khoza	031 336 5316		Lindani.khoza@kzndhs.gov.za or Sli.zwane@kzndhs.gov.za	Legal Wise building,, 199 Pietermaritz St, Pietermaritzburg, 3201

6.3 Project notification and invitation to participate

Notification of the project and the opportunity to participate in the Basic Assessment process was announced during July and August of 2016. Notifications to I&APs were made available in two local languages, English and isiZulu. The process undertaken is described below and summarised in Table 12. All relevant documentation associated with the public participation is contained in Appendix E. (Note that the public participation process was undertaken for BA1 and BA2 together).

- Direct personal notification of **directly affected property owners** (where they have been contactable) has been undertaken to date by the responsible engineers along the relevant sections of roads. This refers to the owners of properties which SANRAL needs to acquire, where expansion to the existing road reserve is necessary and where the owner will be required to sell a portion of land to SANRAL. Wherever these property owners were contactable, these property owners were also sent information regarding the Basic Assessment process (see further below and Appendices E1 & E2 & E3). Please note that contact details for some property owners have not been available and the search for property owner details is ongoing.
- **Landowners adjacent to the site** – a deeds search was done to identify owners of thousands of properties adjacent to the affected sections of the N2 and N3, and all reasonable attempts were made to obtain current contact details. Many property owners own multiple properties and are in the form of Companies or Trusts, and several properties belong to the State or Municipality. Some are individuals. A letter, Background Information Document (BID) and comment sheet were posted to the identified addresses of owners and in the letter, the I&APs were requested to update their details for the database. Where addresses were not available or invalid (returned to sender) an sms was sent to the property owner (where cell numbers were available) (Appendix E4 provides proof of postage/bulk sms).
- Compilation of a **database of I&APs** (Appendix E2) identified as being potentially interested and/or affected, including authorities, municipalities, organs of state, councillors, conservation bodies, non-government organisations, landowners, local residents, etc. The registered I&APs from databases used for other recent projects (e.g. upgrade of the N3 Hammarsdale I/C) were also included in the database, as relevant.
- It should be noted that due to the municipal elections held during August 2016, new **ward councillors** were appointed in the place of the previous councillors who were originally registered on the project database. The details of the new councillors were obtained as soon as they were made publicly available and they were added to the database. The new councillors for the affected wards were sent the project information and invited to comment, as were other **authorities** (e.g. municipalities, and provincial and national government departments) (Appendix E5 provides proof of written notice to authorities).
- **Personalised letters and electronic mail, including a Background Information Document** (Appendix E1) containing relevant details of the project and environmental application process were sent out to all I&APs on this database. A comment sheet was provided for I&APs to update their contact details, register themselves on the database, to record issues and to send back by fax or email. Contact telephone numbers of the project public participation office were provided to enable direct telephonic liaison with the project team, if required.
- **Advertisements** (Appendix E1) were placed on 27 July 2016 in local, provincial and national newspapers (Table 12) providing project details and contact details of where to register and obtain further information:
  - The Highway Mail (English).
  - The Mercury (English).

- The Natal Witness (English).
- The Ilanga (Zulu).
- Citizen (English).

- **Public notices** (A3 posters) (Appendix E2) were posted at the nearest public facilities such as public libraries, nature reserves and larger site notices were placed in selected areas adjacent to the N2/N3. SANRAL does not allow notices to be placed directly along the side of their national roads as they can cause a safety hazard (distraction to motorists), thus, it was not possible to place notices directly on the site. This limitation was raised and discussed with DEA during the pre-application meeting.
- A **project website** containing relevant documentation was set up on www.acerafrica.co.za.
- SANRAL was provided with relevant information to place on the **SANRAL website and Facebook page**.
- The project announcement was placed on the **Upper Highway Community Forum,** a social media forum on Facebook that alerts the public to projects and issues pertinent to residents of the eThekwini upper highway area (including Kloof, Hillcrest, Gillits, Winston Park, etc).
- During the latter half of 2015 and during the course of 2016, one on one meetings were held with certain **key authorities** such as the eThekwini Environmental Planning Department, eThekwini Human Settlements Department, eThekwini Framework Planning and the regional Department of Water and Sanitation (Appendix E6). Importantly, the routes for the viaduct access roads were identified in the field during site visits held with representatives of eThekwini Parks and eThekwini Environmental Planning Departments (Appendix E6f). The technical engineering teams have held direct meetings with the KZN Department of Transport and eThekwini Transport.
- A **Public Open Day** was held at the Westville Country Club on 16 August 2016. The date of the Open Day was advertised in the media adverts and invitation reminders circulated to all I&APs on the database.
- A **press release and further round of adverts was placed by SANRAL** on 23 September 2016 (Table 12) in the following newspapers:
  - The Daily News (English).
  - The Mercury (English).
  - Isolezwe (Zulu).
- In December 2016, a letter, BID and comment sheet were sent out to adjacent landowners identified through deeds searches. Where postal addresses failed, a bulk sms was sent out during February and March 2017, where cell phone numbers were available.
- A project update letter was sent out to the database during on 11 December 2017.
- A flyer was dropped at residences in the vicinity of the proposed Transnet Fuel Pipeline realignment (Solomon Mahlangu I/C- BA1) on 20 June 2018.
- Another update letter was sent out on 25 July 2018, notifying I&APs about the proposed realignment of the Transnet Fuel Pipeline near the N2/Solomon Mahlangu I/C (BA1), as well as design changes to Richmond Road and Farningham Ridge (BA2).
- On 30 July 2018, a flyer was distributed at businesses and residences in the vicinity of the proposed N3/Richmond Road I/C and N3/Farningham I/C (BA2).
- Receipt of comments from I&APs and acknowledgement of comments has been ongoing since project announcement in July 2016. Responses to these comments are in the **Comments and Responses Report** (Appendix E3).

6.4 Summary of Issues Raised by I&APs

Table 13 provides a summary of issues raised by I&APs and the responses provided by the EAP. A full Comments and Responses Report is provided in Appendix E3.

6.5 Circulation of draft BAR for public review (BA1 and BA2)

- Stakeholders on the project database (registered stakeholders) were notified of the availability of the draft BAR & EMPr for comment, for a period of 30 days (all I&APs including authorities). Notification was done by post and email to registered I&APs and advertisements in newspapers.
- The documents were made available on ACER's website.
- Hard copies of the draft BAR and EMPr were made available at the following public libraries: Hillcrest, Pinetown, Westville, Cato Manor, Chesterville, Hilary and Malvern.
- Hard copies and/or CDs of the draft BAR & EMPr were provided to key municipalities and organs of state (eThekwini Metropolitan Municipality, Amafa, KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs, KZN Department of Transport, Department of Agriculture, Fisheries and Forestry (Forestry Department), and the Department of Water and Sanitation).
- CDs were made available to key stakeholders affected by the project such as ward councillors, management of Giba Gorge Mountain Bike Park, management of Paradise Valley Nature Reserve and other landowners on request.

Table 12 Summary of adverts and project notifications to the public and key stakeholders

Publication/event	Type	Placement date 2016
Highway Mail	English Advert	25 July 2016
The Mercury	English Advert	25 July 2016
Ilanga	Zulu Advert	25 July 2016
Citizen	English Advert	25 July 2016
A2 On Site Notices	4 (English)	27 July & 10 August 2016
A3 posters	25 English 25 Zulu	27 July 2016
Email and post to database	Letter (English and Zulu), Background Information Document (English) and comment sheet (English and Zulu)	Posted and Emailed 21-22 July 2016
BID, Comment Sheet and Letter	ACER Project Website	25 July 2016 (Ongoing)
Public Open Day	Westville Country Club	16-August 2016
Daily News	English Advert	23 September 2016
Isolezwe	Zulu Advert	23 September 2016
The Mercury	English Advert	23 September 2016
Email and post to adjacent landowners identified through deed searches (793 names, includes owners of multiple properties)	Letter, Background Information Document and comment sheet	02 December 2016
Bulk sms to adjacent landowners with cell numbers but no addresses, as well as those where letters were returned to sender	Bulk sms project notification	24 Feb 2017 09 Mar 2017
Project update letter notifying that information would be forthcoming of anticipated changes around Richmond Road (BA2) and Farningham Ridge (BA2)	Emailed and posted to database	11 Dec 2017
Flyer regarding Transnet Fuel Pipeline was distributed to nearest properties (knock and drop)	Flyer	20 June 2018
Letter detailing Transnet Fuel Pipeline Relocation (BA1) and detailed planning for Richmond Road and Farningham Interchanges (BA2) including an invitation to an Open Day (BA2)	Emailed and posted to database	25 July 2018
Flyer notifying I&APs of proposed plans for Richmond Road and Farningham Interchanges including an invitation to an Open Day (BA2)	Flyer placed in residences post boxes / handed to management or security at affected complexes and businesses.	30 July 2018

Table 13 Summary of issues raised by interested and affected parties

Summary of main issues raised by I&APs	Summary of response from EAP
Increased noise during construction.	Construction activities will involve the use of heavy plant and equipment which will generate noise, adding to the noise levels already generated by the N2 and N3. Construction noise will vary in intensity, depending on the equipment being used at the time. Generally, noise levels will have the greatest negative impact on receivers up to 300 m distance from the highway. Where viaduct access roads are to be constructed, residents will be affected by the noise of haulage vehicles passing through residential areas to gain access to the work areas (Chesterville and areas near Paradise Valley). Construction noise cannot be avoided and will negatively affect people situated in proximity to the source. Some sections of the proposed road upgrades will require night construction work. Construction noise will be managed by the contractor, with the aim of keeping noise nuisance to a minimum. Specifications are provided in a Noise Management Plan and include various control measures, including liaison with affected parties, limiting work hours, managing vehicles/equipment and noise monitoring.
Increased noise during operation.	The noise generated by traffic on the national roads is already high and over time, with the predicted increase in traffic volumes, noise levels will increase. Noise levels will differ according to the topographical position of the receiver (whether above or below the road) and depending on whether any physical barriers to sound are located between the road and receiver (walls, other houses, vegetation, banks, etc). Steep sections of road may generate more noise, due to heavy vehicles having to engage lower gears and/or air brakes. Generally, however, according to the noise specialist report (Appendix D6), noise levels are most problematic to receivers located within 300 m of the road. Within this distance, the noise levels are generally above the standards set in the Noise Control Regulations. It is not possible to eliminate noise next to a national road and owners who have chosen to purchase properties adjacent to the N2 and N3 have done so being aware of the existing noise levels and the potential for these noise levels to increase over time (due to growth in traffic volumes and decreased distance from properties when necessary expansion of roads is undertaken to accommodate this growth). However, there are various measures that can be implemented to help reduce noise levels. These include using low noise road surfaces and the construction of barrier walls. SANRAL will be using ultra thin friction wearing course on the proposed road upgrades, which is a low-noise surface. The effectiveness of barrier walls is, however, very dependent on the location, height and distance between the noise source and the receiver. Noise barriers are effective in reducing the level of noise received on severely impacted locations close to the road, provided

Summary of main issues raised by I&APs	Summary of response from EAP
	the barrier screens the receivers' (ground floor and upper floors) windows from the noise source. Their effectiveness is good near the source and decreases with increasing distance. The engineers responsible for detailed design will be investigating, in conjunction with acoustic design specialists, the feasibility of constructing barrier walls in certain areas, to mitigate noise in particularly problematic areas. Home and business owners may be able to reduce noise levels on their own properties by erecting walls around their properties and using double glazing on windows. An evaluation of the noise source should be undertaken first so that optimum measures can be put in place. According to the noise specialist, the use of hedges and vegetation generally provides little noise reduction.
Increased dust during construction.	The contractor will implement dust control measures during construction, in accordance with the specifications of the EMPr.
Vibrations on windows and doors from heavy vehicles passing, during operation.	The widening of the road may result in the source of vibrations passing closer to the residences. However, the improved road surface will reduce vibrations as it is usually a rough or uneven road surface which can cause vibration. Regular maintenance and ensuring that uneven surfaces are repaired will help reduce vibrations.
Damage to windows and structures as a result of blasting.	If blasting is required, all potentially affected parties will be informed prior to any blasting taking place. Improved blasting techniques allow for more controlled blasts, with impacts being confined to small targeted areas. Controlled blasting will be done in accordance with relevant legislation and due regard for the proximity of structures that may be vulnerable to vibrations from the blast. Photo reports pre- and post-blasting can be requested for infrastructure in very close proximity to the blast area.
Increased health and safety risks during construction, where there is proximity of construction to houses and properties.	Property boundary fences will remain in place during construction to provide a barrier between properties and construction activities. Where boundary fences have to be moved, they will be reinstated prior to the commencement of construction. Health and safety risks during construction will be managed by the contractor and will include various measures required in terms of the Construction Regulations under the Occupational Health and Safety Act,1993 (Act 85 of 1993) as well as relevant specifications in the EMPr. An important component of safety during construction will be the management of traffic. A Traffic Management Plan is appended to the EMPr. However, when the contract is awarded, the contractor is to submit a detailed and finalised Traffic Management Plan to the Engineer for approval.
Safety risks to properties and houses due to proximity to freeway during operation.	Boundary fences will be retained between the road reserve and neighbouring properties. In certain places, the edge of the road will be within 3 m of the property boundary. Guardrails or concrete parapets will be constructed as protection, where required.
Increased security risks/crime during construction including at	It is possible that security risks will increase during construction, due to an influx of workers and potential increased opportunity for criminals. Crime is more likely to occur where properties are located

Summary of main issues raised by I&APs	Summary of response from EAP
properties located near site camps.	in proximity to construction activities and where existing fencing is required to be removed and replaced in closer proximity to residences or business premises. The Contractor shall be responsible for the security of the site during the construction stage. During construction, measures will be put in place by the Contractor to help minimise the security risk. This will include strict control of staff, identification of staff and maintenance of boundary fencing (including provision of temporary fencing if required). No staff (except security) will be accommodated overnight at site offices/stockpile sites. These measures are stipulated in the EMPr.
Notification of the public regarding construction activities, prior to and during construction.	SANRAL will notify the public of construction activities by placement of media releases, both written and verbal. During construction, contract boards are posted on either end of the road section under construction, listing the details of the project, the start and end dates as well as the relevant contact numbers for the Traffic Safety Officer. Should there be specific closures, demolition, blasting or other activities, these will be communicated via media advertisements as well as additional construction information boards.
Effect on property values.	The effect on property values will differ according to each individual circumstance and can be influenced by multiple factors. Generally, properties increase in value over time but the rate at which they increase will be influenced by the nature of the area and trend in surrounding and uses. Where an owner has purchased property adjacent to an existing national road, this is presumably done in awareness of noise as well as the current and future disadvantages of such a location (such as increase in noise levels and encroachment due to road widening). Properties adjacent to national roads are, for these reasons, generally lower in value and less expensive to purchase. However, depending on the nature of the property and its use, and proximity and access to the national road, the location may be advantageous and a widened national road may not devalue the property. For example, easy access to a national road often adds value to business and institutional premises. Where land is to be acquired, SANRAL will negotiate with each land owner as part of the land acquisition process. The valuator takes into account individual circumstances and potential financial losses caused by acquisition. SANRAL will compensate land owners at a fair market value for the land they purchase and may compensate for financial losses in line with applicable legislation, viz. The Constitution, Section 25 (3) and Expropriation Act (Act 63 of 1975). In terms of the Expropriation Act, compensation is not payable for the perceived or real devaluation of properties.
Compensation for properties to be acquired by SANRAL and compensation for opportunity costs/expenses associated with having to move.	Where land is to be acquired to accommodate widening, SANRAL negotiates with each land owner as part of land acquisition and takes into account their individual circumstances and potential financial losses caused by expropriation. SANRAL will compensate land owners at fair market value for the land they purchase and may compensate for financial losses in line with applicable legislation, viz. The Constitution, Section 25 (3) and the Expropriation Act.

Summary of main issues raised by I&APs	Summary of response from EAP
SANRAL needs to find alternative accommodation for those forced to move.	SANRAL will compensate property owners as negotiated and agreed through the land acquisition process. However, SANRAL is not responsible for finding alternative accommodation for those who have to move.
Impact of project on boundary walls, fences and banks of adjacent properties.	Existing fences between the N3 and neighbouring properties will be protected. Where land is being acquired due to expansion of the road reserve and existing fences need to be removed, SANRAL will provide a new fence to the minimum standard of the current fence, as part of the works contract, at SANRAL's cost. (SANRAL will always provide a boundary fence along its road reserve, providing some form of safety). Any affected banks in the road reserve will be stabilised to the required standard.
Protection of watercourses and sustaining the ecological function by ensuring stormwater neutrality (measures to reinstate the pre-development ecological, environmental and hydrological conditions).	Section D1 of the BAR deals with the potential impacts of construction on stormwater runoff and on watercourses, and the mitigation thereof. Specifications for protection and rehabilitation of watercourses are also provided in the EMPr C1012 (1a, 4r, 5c and Appendix B). Control of stormwater during operation forms a key part of the road design. According to the design engineers, the total catchment areas feeding all the cross-drainage structures will not increase. The runoff, however, will increase by a very small margin due to the relatively high runoff on the additional road surface width. In comparison to the total stormwater runoff, this is minimal and the culverts crossing the road will be operating at very similar runoffs as in the past. All the stormwater which runs off the road surface is accommodated in lined stormwater channels adjacent to the road surface. The concentration of stormwater from the concrete side drains is mitigated by the construction of energy dissipaters which ease the flow of water into the natural streams. The engineers will assess the existing inlet and outlet structures and review the need for additional erosion measures where these outlets are located. This forms part of the detailed design phase (which is in progress).
Potential damage to/ relocation of public services/utilities in the road reserve.	The engineers have all the encroachment consent agreements with SANRAL for services in their road reserve, and these will be protected. The relevant institutions and departments have been notified by the design engineers of the proposed widening. Other (illegal) services will only be located if they are uncovered/damaged during construction, and then the owner will be responsible for their relocation. SANRAL does not compensate for service relocations if it is within SANRAL's current road reserve. For any service within SANRAL's current road reserve, a wayleave agreement must be in place which stipulates that the service owner is responsible for relocation of the service. Only where a service is outside the current road reserve and

Summary of main issues raised by I&APs	Summary of response from EAP
	will be affected by the upgrading i.e. falls within additional land to be acquired, then SANRAL considers cost for the relocations.
Impacts on D'MOSS areas and Municipal Nature Reserves.	There has been close correspondence and liaison with eThekwini's Environmental Planning Department as well as Parks and Leisure, to identify sensitive areas and ensure that sufficient protection measures for soils, vegetation and riparian areas are put in place to minimise impacts on biodiversity and to ensure that nature reserves are disrupted as little as possible. The mitigation measures are wide ranging and are detailed in section D1 of this report as well as in the relevant sections of the EMPr (Appendix G).
Pedestrian safety during construction.	During construction, as part of the Occupational Health and Safety Act requirements, the contractor will need to either ensure pedestrian safety or close the area to pedestrians completely (the latter will be necessary in places at times.) Signage will be one of the measures employed in this regard.
Disruption of access for emergency vehicles.	A minimum of two lanes shall be open to traffic in each direction at all times. As part of the traffic accommodation plans, provision will be made to allow easier access to emergency vehicles.
Geotechnical investigations will be required where widening affects slope stability. New bridges will also require suitable founding conditions.	This is a key engineering consideration and geotechnical investigations have been undertaken to inform detailed design.
Impacts on air quality (dust and emissions).	Measures for dust control during construction are provided in the EMPr (Appendix G). When the road is widened, vehicle emissions (carbon dioxide and nitrous oxide) will occur closer to residences (by a few meters) than previously and will cumulatively contribute to existing air pollution levels. However, pollution levels vary in place and time due to numerous climatic and topographical factors. If there are serious concerns about areas experiencing persistent high levels of air pollution, these should be reported to eThekwini's Department of Health for further investigation and monitoring.
Hazardous waste removed from the site must be documented, handled, transported and disposed in compliance with National Environmental Management: Waste Act of 2008.	Contractors are required to deal with hazardous waste in accordance with legal requirements. Specifications for waste handing are also provided in the EMPr (Appendix G).
Numerous individual queries from property owners as to whether the road widening will affect their properties adjacent to the N2 and N3.	The EAP has responded to all individual queries with information and maps to indicate the footprint of construction in relation to individual properties. Where requested, further information has been provided by the engineers involved.

Summary of main issues raised by I&APs	Summary of response from EAP
Concern/confusion about the land acquisition process - some property owners felt that although they had been engaged by the land acquisition team, they did not sufficiently understand the process and, thus, desired more information.	In cases where the EAP was unable to provide the required information, the queries were forwarded to the engineers to provide responses to the property owners.
Occupation of properties by informal settlers.	There are three main areas of informal settlements close to or encroaching into the road reserve. SANRAL will fence off the road reserve area as soon as possible to prevent expansion of informal settlements into the road reserve. eThekwini's Human Settlements Department deals with informal settlement in the Metro. SANRAL will be involved only with settlement within its own road reserve. Should any removal of informal dwellings from the road reserve and possible resettlement of squatters be required, the process will be dealt with jointly by SANRAL and the Human Settlements Department at eThekwini in accordance with the correct channels and procedures.
Overgrown vegetation in some sections of the road reserve harbours criminals and makes it difficult to control rampant crime.	SANRAL is responsible for maintenance of the road reserve, including the control of vegetation. Areas of concern should be reported to SANRAL, Eastern Region, RRM Division (033 392 8100).
Consideration of upgrades of adjacent municipal roads that are affected by the project.	SANRAL will be responsible for replacing sections of municipal roads that they affect, with new sections of road to the same standard. Any drainage problems in the affected sections would be taken into account by the engineers when reconstructing. Any services that are affected will also be relocated as necessary. However, should any widening or upgrades to municipal roads and/or services (e.g. sewer facilities) be required, these matters are the responsibility of the eThekwini Municipality unless there is an agreement in place between the municipality and SANRAL that SANRAL undertakes the work.
Traffic volumes on, and poor condition of, Entabeni Road and Berg Road, which will need to be used by construction vehicles to get to the proposed Westville Viaduct access road through Paradise Valley Nature Reserve.	It is possible to restrict the contractor to avoid peak hours and use the road in off-peak hours. The maintenance of the roads (in the condition they are in at the time of start of construction) can also be made the contractor's responsibility for the duration of the period they are in use, but their current condition is the responsibility of the municipality.
Provision of street lights and barriers on affected section of M13.	The M13, which is a provincial road, will be provided with street lights, where affected by this (SANRAL) project. There will also be a concrete barrier in the median (to separate counter flow) but only over a very short section where it is planned to move the two carriageways closer together. It is the EAP's understanding that the

Summary of main issues raised by I&APs	Summary of response from EAP
	M13 is being upgraded under a KZN Department of Transport contract, westwards to Hillcrest and will tie in to the end of the section that SANRAL will be working on. It is the EAP's understanding that lighting and barriers in the median will also be provided under that contract.
Drainage problems on adjacent properties.	Stormwater management is an important component of design and SANRAL will ensure that drainage off the N2 and N3 is adequately dealt with so as not to cause damage to adjacent properties.
The EAP's notification letter was received after the due date stated for submission of comments.	In some cases, the contact details of adjacent landowners, as acquired from property deed searches, were incorrect and in some cases, letters were sent on to forwarding addresses. This resulted in delayed receipt of the project notification letter. However, the EAP has continued to receive and process all comments up until circulation of this draft Basic Assessment Report (BAR) for public review. I&APs are now afforded another opportunity for comment during this public review period.

7. ASSESSMENT METHODOLOGY

7.1 Identification and assessment of significance of key issues and impacts

Issues and potential impacts of the project on the environment (and *vice versa*) were identified by way of field investigations, desktop studies and interaction with I&APs. Key issues and impacts requiring further investigation were addressed by specialist studies[16] (Appendix D) and/or further detailed input from the environmental and technical teams. Specialist studies were guided by Terms of Reference[17] (Appendix D7) to ensure that issues and associated impacts were correctly identified, understood and addressed, thereby enabling an integrated assessment of the development proposal. Mitigation measures were identified with inputs from I&APs, the specialists, the design engineers and the EAP team. Information was collated, evaluated and integrated. Thereafter, the significance of each impact was assessed using the assessment conventions outlined in Table 14 (in line with the requirements of the EIA Regulations). It should be noted that the significance of an impact is a function of all the attributes outlined in Table 14, and the relationships between them. The assessment conventions are applied qualitatively by the EAP, based on an understanding of the receiving environment, the proposed project components and activities, and the information gathered from different sources, including specialists and the public.

7.2 Assumptions, limitations and gaps in knowledge

7.2.1 General assumptions, limitations and gaps in knowledge

- It is assumed that technical data supplied by the applicant and its appointed engineers were correct and valid at the time of compilation of the BAR.
- It is assumed that data supplied by external institutions (for example, eThekwini Environmental Planning and Climate Protection Department) were correct and valid at the time of compilation of the specialist reports and the BAR.
- While every effort was made to directly contact all affected landowners and adjacent landowners, there were cases where current contact details could not be obtained. However, it is assumed that the widespread advertising and public notices would serve to notify the public at large.

7.2.2 Specialist assumptions, limitations and gaps in knowledge

The assumptions, limitations and gaps in knowledge stated in the specialist reports are listed below.

Social Impact Assessment

- The information, including maps, provided by SANRAL and engineering teams is accurate.
- It is not the purpose of this SIA and report to quantify the resettlement impacts. If necessary, resettlement planning will take place following detailed design.
- The project will not undergo decommissioning and, as such, potential social impacts during decommissioning have not been considered.
- The information provided herein will be adequate for effective decision-making in the environmental authorisation process.
- Safety regulations specify that parking vehicles and walking on the N3 are not permitted. Further, the minimum speed allowed on the N3 is 60 km/h. Therefore, it was not possible

16 Note that ACER's in-house specialist reports were subject to independent review.

17 Terms of Reference for each specialist are contained in their relevant reports. Terms of reference for updating each of these studies are provided in Appendix D7.

to access and assess all potentially affected areas, thereby limiting the ability of the specialist to undertake a complete SIA.

- The number of households that will require resettlement, particularly within the informal settlements has not been determined yet.
- The exact number of jobs that will be created has not been confirmed as yet. An estimation based on projects of a similar nature has, therefore, been used.
- The impact assessment conventions (Table 14) are more applicable to the biophysical environment. Therefore, for social/socio-economic impacts, the SIA practitioner has applied professional judgement to the conventions to arrive at the assessment of impact significance.

Cultural Heritage Resources Impact Assessment

- The description of the proposed project, provided by the client, is accurate.
- The public consultation process undertaken as part of the Basic Assessment is sufficient and adequate and does not require repetition as part of the heritage impact assessment.
- Soil surface visibility varied from good to non-existent. Heritage resources might be present below the surface or in areas of dense vegetation and we remind the client that the NHRA requires that a developer cease all work immediately and observe the protocol in Section 7 of the specialist report, should any heritage resources, as defined in the Act, be discovered during the course of development activities.
- No subsurface investigations (including excavations or sampling) were undertaken, since a permit from Amafa is required to disturb a heritage resource.
- Stopping or parking of vehicles and walking are not allowed on the N3 and the minimum speed allowed on the N3 is 60 kilometres per hour. This affected observations made from the N3, particularly in instances where alternative access to road sections was difficult or impossible due to the nature of the terrain.
- A key concept in the management of heritage resources is that of non-renewability: damage to or destruction of most resources, including that caused by *bona fide* research endeavours, cannot be reversed or undone. Accordingly, management recommendations for heritage resources in the context of development are as conservative as possible.
- Human sciences are necessarily both subjective and objective in nature. eThembeni staff members strive to manage heritage resources to the highest standards in accordance with national and international best practice, but recognise that their opinions might differ from those of other heritage practitioners.
- Staff members involved in this project have no vested interest in it; are qualified to undertake the tasks as described in the terms of reference; and comply at all times with the Codes of Ethics and Conduct of the Association of Southern African Professional Archaeologists.

Vegetation Ecology Impact Assessment

The following assumptions have been made regarding affected areas and associated impacts on vegetation, and assumes a worst-case scenario:

- All vegetation within the existing road reserve will be cleared during construction.
- All areas within proposed extensions to the road reserve will be cleared during construction.
- Habitat degradation is likely to occur directly adjacent to cleared areas, due to edge effects that will manifest over time once construction activities have commenced.
- It is important to note that different sections of the proposed upgrade were visited on three different occasions:
  - The field survey for the majority of the project was undertaken in late summer 2013.

- Site inspection of road routes to gain access to the area below the Westville and Paradise Valley Viaducts was undertaken during December 2015.
- Further site visits were undertaken during August 2016 to assess the latest changes to the proposed upgrade.
- Although different sections of the site were visited on different occasions, the full spectrum of flowering times was not covered with the result that some herbaceous and geophytic plants may not have been visible or identifiable at the time. However, all effort was made to identify Red Data, specially protected and other important species, and surrounding land use and condition of natural vegetation were surveyed to identify levels of disturbance and potential biodiversity issues.

Wetland and Riparian Impact Assessment

- The reference benchmark vegetation of the wetlands and riparian areas onsite are considered to be KwaZulu-Natal Coastal Belt (CB3) (Mucina and Rutherford, 2006), within the Indian Ocean Coastal Belt Group 2.
- The final development layout will remain within the indicated proposed development footprint.
- The development footprint provided was accurate.
- The original assessments were done in Summer of 2012, and the 2016 update assessments were done in winter 2016 during drought conditions.
- Riparian and wetland areas were only assessed within the 50 m buffer of the footprint area as per the original Terms of Reference.

Noise Assessment

- The original noise measurements were performed in 2012 (29 to 31 October 2012). The updated assessment during 2016 identified that the original noise measurements and predictions are valid.
- The measurements were only performed where the ambient climatic conditions had no influence on the results. The SANS Code of Practice stipulates the conditions under which noise measurements can be performed. This was complied with in both the 2012 and 2016 evaluations.
- During the 2012 noise impact assessment, the equipment was calibrated to 109.9 dB(A) before and after use. In 2016, the equipment was calibrated at 114 dB(A) 1000 Hz. This change had no effect or influence on the results or their validity.

Table 14 Conventions applied to the impact assessment

Criteria	Rating Scales	Definition
Nature	Positive	This is an evaluation of the overall impact of the construction, operation and management that the proposed N2/N3 upgrades would have on the affected environment (social, biophysical and economic)
	Negative	
	Neutral	
Spatial extent	Low	Site-specific, affects only the development footprint
	Medium	Local (< 2 km from site)
	High	Regional (within 30 km of site) to national
Duration	Very low	Temporary (less than 1 year)
	Low	Short term (1-4 years, i.e. duration of construction)
	Medium	Medium term (5-10 years)
	High	Long term (impact will only cease after the operational life of the activity) to permanent
Intensity	Low	Negligible alteration of natural systems, patterns or processes
	Medium	Noticeable alteration of natural systems, patterns or processes
	High	Severe alteration of natural systems, patterns or processes
Irreplaceability of resource caused by impacts	Low	No irreplaceable resources will be impacted (the affected resource is easy to replace/rehabilitate)
	Medium	Resources that will be impacted can be replaced, with effort
	High	Project will destroy unique resources that cannot be replaced
Reversibility of impacts	Low	Low reversibility to non-reversible
	Medium	Moderate reversibility of impacts
	High	High reversibility of impacts
Consequence (a combination of spatial extent, duration, intensity and irreplaceability of impact on resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low - Intensity is low and up to two of the other criteria are rated medium - Intensity is medium and all three other criteria are rated low
	Medium	Intensity is medium and at least two of the other criteria are rated medium
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration Intensity is rated high, with all of the other criteria being rated medium or high
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or there is a less than 50% chance that an impact will occur
	Medium	It is between 50 and 75% certain that the impact will occur
	High	It is more than 75% certain that the impact will occur or it is definite that the impact will occur
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability Low consequence and medium probability Low consequence and high probability
	Medium	Medium consequence and low probability Medium consequence and medium probability Medium consequence and high probability High consequence and low probability
	High	High consequence and medium probability High consequence and high probability

8. INTEGRATED DESCRIPTION OF ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

The key issues identified and assessed during this Basic Assessment were formulated as eight questions:

- What economic and socio-economic benefits will result from the proposed widening/capacity improvements to the N2 and N3, at a local, regional and national scale?
- What effects will the proposed widening/capacity improvements to the N2 and N3 have on adjacent properties, infrastructure and services, and *vice versa*?
- What potential health, safety, security and nuisance impacts may be experienced as a result of the proposed widening/capacity improvements to the N2 and N3 during construction?
- What negative impacts will the proposed widening/capacity improvements to the N2 and N3 have on the social environment during operation?
- What effects will the proposed widening/capacity improvements to the N2 and N3 have on cultural heritage resources?
- What effects will the proposed widening/capacity improvements to the N2 and N3 have on the biodiversity of protected areas, D'MOSS and other natural habitat (terrestrial/riparian)?
- What potential cumulative impacts can result from the proposed widening/capacity improvements to the N2 and N3?
- What are the impacts of the No Development Alternative (not implementing widening/capacity improvements to the N2 and N3)?

Potentially significant impacts associated with each of the above issues (including cumulative impacts) are discussed in the sections below. The assignment of significance ratings to impacts (where applicable), according to the assessment conventions (Table 14), is provided in Chapter 9 (Tables 15 - 21).

8.1 What economic and socio-economic benefits will result from the proposed widening/capacity improvements to the N2 and N3, at a local, regional and national scale?

A summary of impacts (incorporating a summary of specialist findings as applicable) is provided below, including recommended measures for management/mitigation of impacts. For further detail, please refer to the Social Impact Assessment specialist report (Appendix D1). According to the assessment, these positive impacts are considered to be of low and medium significance, without management. With management, the impacts are considered to be of medium and high significance (Table 15 in Chapter 9).

8.1.1 Employment creation and capacity building

During the planning, design and construction phases, economic and socio-economic benefits will accrue locally, regionally and nationally through project spend on these contracts, estimated to be in the region of R 6,4 billion (excluding VAT). There will be increased opportunities for temporary employment and capacity building for individuals, local contractors, SMMEs, service providers and retailers.

8.1.2 Improved road network, stimulation of the economy and achieving SIP2 goals

An efficient and effective road network is critical to sustain economic growth and development. As such, regular maintenance is essential and upgrading is also essential to accommodate growth in traffic volumes. There are numerous positive and wide reaching social and socio-economic effects that provision of a high quality and safe road network have on the economy and the daily lives of people in general, as it generally allows people to conduct their business more quickly, safely, efficiently and cost effectively. As indicated in Section 1.2 of this report, this project forms part of national infrastructure (National Infrastructure Plan - Strategic Infrastructure Project 2[18]) to strengthen the logistics and transport corridor between SA's main industrial hubs and improve access to Durban's export and import facilities. The successful implementation of the project will, therefore, have numerous cumulative wide-ranging economic and socio-economic benefits as a result of *inter alia*:

- Improved road safety.
- Reduced travel time (reduced traffic congestion and improved road).
- Improved transport corridor.
- Stimulation of the local, regional and national economy.
- Enhanced aesthetics of tourist gateway (planting of attractive, appropriate species of indigenous vegetation in the road reserve will positively impact on the tourism industry).

8.1.3 Potential positive economic and socio-economic impacts and recommended measures for management (enhancement)

Pre-construction and construction

- Increased employment creation/opportunities for local contractors and SMMEs (all project phases):
  - Ensure that, wherever possible, labour is sourced locally.
  - Sub-contractors, SMMEs and service providers should be sourced locally where the requisite skills exist.
  - Conduct procurement in accordance with the Preferential Procurement Policy Framework Act, specifically Section 10, pre-qualification criteria for preferential procurement, which stipulates that a required value of the contract must go to Exempted Micro Enterprises and Qualifying Small Business Enterprises which, as a minimum, are Black owned. These criteria are likely to enhance the potential positive impacts for local contractors and SMMEs. This will be addressed via the Contract Participation Goals in the contract documents which assist the Targeted Enterprises.

Operation

- Improved transport corridor and road conditions:
  - Provide budget to beautify the road reserve with appropriate (aesthetic but low maintenance) indigenous plant species.
  - In conjunction with the eThekwini Municipality, develop a database of all locally based service providers.
  - Ensure budget is provided for regular road and road reserve maintenance, and that this is implemented timeously in a cost effective manner.

[18] **SIP 2: Durban-Free State-Gauteng Logistics and Industrial Corridor**
Strengthen the logistics and transport corridor between SA's main industrial hubs; improve access to Durban's export and import facilities; integrate Free State Industrial Strategy activities into the corridor; new port in Durban; Aerotropolis around OR Tambo International Airport.

8.2 What effects will the proposed widening/capacity improvements to the N2 and N3 have on adjacent properties, infrastructure and services and *vice versa*?

A summary of impacts (incorporating a summary of specialist findings as applicable) is provided below, including recommended measures for management/mitigation of impacts. For further detail, please refer to the Social Impact Assessment specialist report (Appendix D1). According to the assessment, the impacts on adjacent properties, infrastructure and services are of low, medium and high significance, without management. With management, the impacts are considered to be of low and medium significance (Table 16 in Chapter 9).

8.2.1 Increased interaction with owners and residents of adjacent properties

During the planning phase, adjacent landowners (depending on the location of their properties) may be contacted and required to interact with engineers, land acquisition teams and/or other investigative teams (e.g. geotechnical) who may require access to properties.

Where adjacent properties are required by SANRAL for road widening, SANRAL's land acquisition team will enter into negotiations with landowners.

8.2.2 Property loss, compensation, resettlement, effect on property values

The project will result in the permanent loss of portions of some adjacent, privately owned properties, and encroachment of the busy road closer to existing residences, which may reduce property values. Some residents may be required to move if SANRAL needs to procure a large proportion of the property. Where SANRAL needs to acquire the entire property, property owners will be bought out and will need to relocate.

Where formal property owners have unlawfully encroached into the road reserve either with buildings or fences, they may lose these structures without compensation.

8.2.3 Damage to/disruption of services and infrastructure in and adjacent to the road reserve

During construction, there is the potential for incurring damage to boundary fences/walls and banks of adjacent properties. Similarly, unintended damage may occur on adjacent land which is public open space. Where adjacent roads are affected by construction works (or gaining access to construction works), damage may be incurred. Existing services and infrastructure below and on the surface of the road reserve may need to be excavated/removed, disconnected and relocated, which may cause temporary disruptions to services (e.g. water/electricity/telecommunications). This will be dealt with by SANRAL's appointed engineers and the relevant authorities, and landowners will be kept informed.

Note that the required relocation of a section of fuel pipeline (refer to Section 3.2.2) will be undertaken in such a way that the existing pipeline will not have to cease operation, except for a short period of disconnection and reconnection.

8.2.4 Impacts on Paradise Valley Nature Reserve Facilities and Operations

The Paradise Valley Nature Reserve will be negatively impacted in several ways due to the construction of the access road to the Paradise Valley Viaduct and due to construction (widening) of the Viaduct itself. Apart from impacts on the biodiversity of the reserve (discussed in Section 8.6), the project will have other implications for reserve management.

The viaduct works will directly cut off visitor access to the waterfall on the uMbilo River. The reserve will lose revenue as a result of closure of portions of the reserve to the public during the construction period.

When the boundary fence between the N3 and the reserve is taken down during construction, the reserve will be vulnerable to land invasion, increased crime and poaching.

Closure of the construction site to the public could disrupt access for the reserve's staff and interfere with management tasks.

8.2.5 Temporary loss of access to public open space

During construction, there may be temporary loss of access to areas of public open space, e.g. Westville Trail.

8.2.6 Informal settlements

There are three informal settlements along the N2, where informal dwellings have encroached next to or possibly into the road reserve. Removal and relocation may be required. Illegal occupants pose a safety risk to the travelling public as well as to themselves. Illegal occupation of the road reserve could impact negatively on the project in that it may cause delays to construction while relocations are managed. It will also result in additional costs.

8.2.7 Increased repairs and maintenance to adjoining affected roads

Where construction vehicles are required to use provincial or municipal side roads for access, these roads may deteriorate and will be maintained and repaired by the contractor on a more regular basis. This will create extra nuisance for residents/business owners who use these roads on a daily basis.

8.2.8 Potential impacts to adjacent properties, infrastructure and services, and recommended measures for mitigation/ management

Planning and design

- Increased interaction with landowners and entry onto private property.
  - Maintain good communication with affected landowners throughout the project lifecycle.
  - Ensure that any investigative activities on private properties are undertaken with due consideration and respect for people and property.
  - Conduct land acquisition negotiations timeously and professionally.
- Geotechnical investigations.
  - Geotechnical team to comply with relevant industry standards.
- Property loss, compensation, resettlement and affect on property values.
  - All affected land owners should be consulted on an individual basis.
  - Fair and equitable compensation should be paid in line with SANRAL's policies and according to the country's legal framework (The Constitution Section 25 (3) and the Expropriation Act (Act 63 of 1975)).
- Loss of revenue for Paradise Valley Nature Reserve.

- Compensation for loss of revenue is a matter to be taken up directly between eThekwini Parks and SANRAL, and a mutually satisfactory agreement will need to be reached.

- Co-operation with Paradise Nature Reserve Management.
  - A meeting must be held between SANRAL, SANRAL's detailed design engineers and Reserve Management along with eThekwini Parks and Leisure to ensure that all issues are dealt with prior to construction commencing.
- Potential delays to project due to informal settlements.
  - SANRAL should fence off the road reserve area as soon as possible to prevent expansion of informal settlements into the road reserve.
  - Should resettlement be required, the process will need to be undertaken with great care and in accordance with international norms and standards to prevent potential disruptions to the project and manipulation of the situation by opportunistic groups for political gain. SANRAL and the Human Settlements Department at eThekwini must formulate a plan of action that ensures the correct channels and procedures are followed.
- Risks associated with illegal infrastructure in road reserve.
  - SANRAL has dedicated route managers on its routes to identify immediately when illegal occupants/infrastructure occupy the road reserve.[19]
- Increased need for repairs and maintenance to associated roads
  - Budget will be made available for this, as part of the works contract.

Pre-construction and construction

- Risks to property fencing/walls.
  - Existing fences/walls between the N2 or N3 and neighbouring properties will be protected. In cases where land is being acquired due to expansion of the road reserve, requiring existing fences to be removed, SANRAL will provide a new fence/wall to the standard of the current fence/wall, as part of the works contract, at SANRAL's cost.
- Relocation of services.
  - The design engineers must ensure that all encroachment consents are identified and the service providers timeously notified so that services can be relocated timeously and preceded by sound forward planning.
  - The relocation costs will be borne by SANRAL should there be a need to relocate services in the road reserve. Importantly, however, SANRAL will bear the costs only for services that are legally in the road reserve (covered by existing encroachment consents/wayleaves).
- Illegal structures in the road reserve.
  - It will be necessary to remove existing unlawful structures in the road reserve where widening is to take place. Property owners will not be compensated for the loss of unlawful buildings or structures in the road reserve. The owner will be responsible for the cost of demolition or removal of these structures. It is recommended that adjacent property owners finding themselves in this situation contact Mr I Ramklown (033 392 8100) at SANRAL Eastern Region offices as soon as possible.
- Risks to the integrity of Paradise Nature Reserve Boundary.
  - It is essential for the Reserve Management to maintain an intact boundary fence due to issues of land invasion, crime and poaching. Thus, it will be necessary to erect and maintain a boundary fence during the entire construction period. If it is a

19 This is made more difficult where fences are stolen.

temporary fence, then a permanent one would need to be put in place post construction.
    - SANRAL must take the above into account when putting the contract out to tender. All works need to be done in consultation with the management of the Nature Reserve.
- Disruptions to access for Paradise Nature Reserve Management staff (preconstruction and construction).
    - Access for reserve staff must be maintained.
    - All reserve staff are to be put through the safety induction course should they need to pass through any of the construction sites or along any access roads used by construction vehicles
    - The contractor must maintain regular communication with the Reserve Manager or his appointed officer so they are appraised at all times of construction activities, timeframes and any relevant issues that arise for the attention of Reserve Management.
- Increased need for repairs and maintenance to associated roads
    - Contractors are to maintain roads/repair damages caused by construction vehicles. This must be budgeted for in the contract documents.

8.3 What potential health, safety, security and nuisance impacts may be experienced as a result of the proposed widening/capacity improvements to the N2 and N3 during construction?

A summary of impacts (incorporating a summary of specialist findings as applicable) is provided below, including recommended measures for management/mitigation of impacts. For further detail, please refer to the Social Impact Assessment and Noise Impact Assessment specialist reports (Appendix D1 and Appendix D6). According to the assessment, the potential health, safety, security and nuisance impacts on adjacent properties, infrastructure and services are of medium and high significance, without management. With management, the impacts are considered to be of low and medium significance (see Table 17 in Chapter 9).

8.3.1 Disruption of traffic and increased road safety risks

The construction phase of the upgrade will have a negative impact on all road users in that lanes will be reduced, traffic will be slowed down, delays will be experienced and road conditions may not be as safe due to the constricted motorways. Road closures may be required over certain periods, for example, when blasting or demolishing. Conditions will be worst at interchanges and during peak hours, as well as at the start and end of holiday periods when traffic volumes are very high. The disruption to traffic will also impact on the ability of emergency vehicles to move freely on the road.

The road conditions during the construction period may well cause significant frustration to drivers, contributing to incidences of road rage and flouting of road rules. Road safety may be compromised by restricted access and increased traffic congestion during construction. This may result in increased vehicle and pedestrian accidents and injuries.

Motorists will be encouraged to consider various alternative routes during construction, including the M4, M7, M13 and M19. SANRAL is in discussion with both KwaZulu Natal Department of Transport and the eThekwini Municipality to ensure that their plans for any road upgrades do not occur during the same period as the N2/N3 upgrades.

8.3.2 Disruption to pedestrian access

Road works may disrupt pedestrian access to other roads and properties. An example is the pedestrian pavement along the Westville Viaduct Bridge, which is used by many pedestrians from the Chesterville area and which will have to be closed off during widening. These disruptions may result in delays and possible safety risks if pedestrians use more risky alternatives. Contractors will be obliged to ensure that there is safe alternative access, where formal access is closed off for construction.

8.3.3 Increased noise from construction activities

Construction activities will involve the use of heavy plant and equipment which will generate noise, adding to the noise levels already generated by the N2 and N3. Construction noise will vary in intensity, depending on the equipment being used at the time. Generally, noise levels will have the greatest negative impact on receivers up to 300 m distance from the highway.

Construction noise cannot be avoided and will negatively affect people situated in proximity to the source. Some sections of the proposed road upgrades will require night construction work. Although noise from construction will be a variable and temporary impact, construction will occur over several months and will negatively impact at variable times on receptors within an area of up to 500 m from the road.

Where viaduct access roads are to be constructed (residential areas near Chesterville and Paradise Valley), residents will be affected by the noise of haulage vehicles passing through residential areas to gain access to the work area The frequency and number of road construction vehicles in the residential areas at any time without control can be high and noise levels above 80 dB(A) could occur. The Contractor will need to manage /restrict the time(s) of construction vehicles into and out of these residential areas between sunset and sunrise, the number of vehicles at any one time in residential areas, the type of vehicle, its speed and the use of reversing warning devices. Banning of vehicles with reversing audible alarms in or near residential areas is recommended as well as no haulage or construction vehicle in or on residential roads before 08h00 and after 17h00.

Construction noise will be managed by the contractor, with the aim of keeping noise nuisance to a minimum.

8.3.4 Health and safety risks to those in proximity to construction activities

Construction activities in proximity may expose nearby residents and properties to danger and injury, especially if boundary fences and access (driveways) are compromised.

8.3.5 Increased crime and security risks to those in proximity to construction activities

The presence of construction teams, site camps, etc increases the risk for opportunistic crime and, thus, may increase security risks to nearby residents, especially if boundary fences are compromised.

Contractors should be aware that areas of open space around Solomon Mahlangu are occupied by many vagrants and incidences of muggings are known to occur.

8.3.6 Potential protest action

It is becoming increasingly common for large construction projects to be delayed as a result of protest action, often concerning the lack of employment opportunities provided for members of local communities as well business forums. In addition, protest by disaffected contractors (usually smaller and emerging contractors) is an eventuality arising from mistrust in procurement processes. In the event of protests occurring, there may be costly project delays due to lost days, as well as potential for violent confrontation, destruction of project and non-project related infrastructure and equipment, and ultimately injuries and/or fatalities. In addition, protest action is likely to result in road closures which will compound disruptions to traffic and the associated impacts such as increased commuter time. The informal settlements adjacent to the N2 are of particular concern as, if not dealt with correctly, there could be significant opposition raised by these communities which is likely to result in project delays. The potential for protest action and how it may affect construction contracts, is an issue which needs to be considered very carefully in SANRAL's planning.

8.3.7 Increased spread of disease

Health and social well-being may be negatively affected due to increased spread of disease. Any development which causes the migration of people has the potential to lead to the spread of disease. In the case of South Africa, the spread of HIV/AIDS as a result of project induced migration is particularly pertinent.

8.3.8 Disposal of large amounts of demolition rubble and management of inert material

Over the duration of the project (three contracts each taking 4-5 years to complete) an estimated 50,000 m^3 of rubble will be produced from demolition of structures. It is intended that as much as possible of this will be crushed and re-used for the road building. The project will also generate a large surplus of cut material from earthworks, estimated at approximately 270,000 to 280,000 m^3 (roughly 410,000 tons). It is SANRAL's intention to use this on other sections of the N3 (which are part of the capacity upgrades between Durban and Pietermaritzburg), and to stockpile on SANRAL's own land, adjacent to interchanges.

These may cause temporary stockpiles of massive proportions and will cost large amounts in haulage for disposal. Without good forward planning as to disposal and stockpiling procedures, it may become difficult to deal with such large volumes which may accumulate in unwanted stockpiles and/or not be accepted by authorised landfill sites.

8.3.9 Other temporary nuisance impacts

Construction activities may result in increased dust particularly in the drier months and during windy periods.

Construction equipment, materials and activities and exposed soils will detract from the aesthetics of the area.

8.3.10 Potential risks to adjacent properties and infrastructure, due to the relocation of sections of Transnet's Fuel Pipeline

The fuel pipeline is situated on low lying land with the closest residences being located higher upslope on steep adjacent hills. The relocation will bring the pipeline about 30 m closer to the

foot of the slope. The closest portion of the existing pipeline to the M7 in this vicinity is approximately 20 m. Relocating the pipeline will move this approximately 50 m further away from the road (M7). There are sand winning activities taking place within 40 m from the existing pipeline. Before any works can be undertaken, the proposed activity requires that qualified experts undertake a complete hazardous installation Risk Analysis and compile a full Risk Management Plan, including a full Blast Analysis, to identify, assess and manage risks related to possible explosions and potential effects on nearby residential property and infrastructure.

8.3.11 Potential health, safety, security and nuisance impacts and recommended measures for mitigation/management

Planning and Design

- Management of demolition rubble and other inert waste.
  - SANRAL must ensure that the construction contracts that go out to tender are clear about re-use and/or disposal of material. Should the material need to be stored prior to use on other sections of the road, sites must be identified upfront and any necessary authorisations /permits obtained, should they be required.
  - Landfill sites should be contacted prior to construction, to ensure that anticipated volumes can be accepted.
- Risks associated with the fuel pipeline relocation.
  - The contract for the pipeline relocation must include the engagement of qualified experts to undertake a complete hazardous installation Risk Analysis and compile a full Risk Management Plan, including a full Blast Analysis, to assess and manage the impact of possible pipeline explosions.

Pre-construction and construction

- Increased need for public liaison.
  - Key to management of all traffic, health, safety and other impacts will be timeous and regular communication by SANRAL, SANRAL's appointed engineers and contractors, with affected road users, pedestrians and residents over the entire duration of the construction period.
  - Budget for communication with the public must be taken into consideration in the tender process.
- Disruptions to traffic and increased road safety risks.
  - The Traffic Management Plan must be adhered to, as contained in the EMPr (Appendix F). When the contract is awarded, the contractor is to submit a detailed and finalised Road Traffic and Safety Management Plan to the Engineer for approval.
  - It is imperative that measures are put in place to ensure that emergency vehicles have easy access to and through the sections of road where upgrades are taking place, especially during peak traffic periods.
  - Ensure there is suitable signage informing road users of construction activities, anticipated closures and potential delays.
  - Where possible, separate fast moving and slow moving traffic into specific lanes.
  - Encourage road users to avoid the affected section of road during peak periods.
  - Provide information on planned road closures (especially for demolition and blasting activities). Information should be provided through signage on the affected section of road as well as through local media, such as newspapers and local radio stations. SANRAL can also make use of the Variable Message System (electronic boards on the side of national roads). SANRAL must encourage road users (through national campaigns if necessary) to use alternative routes, especially in holiday periods.

- Signage for pedestrians must be erected, where applicable.
- All staff and visitors on site are to undergo road safety induction.
- All staff and visitors on site are to wear applicable PPE at all times.
- Suitable signage warning road users of construction activities is to be erected.
- Safe pedestrian access and appropriate signage must be provided where applicable.
- Implement measures to reduce traffic speed, including rumble strips and speed cameras.

❒ Disruption to vehicle and pedestrian access.
- Any closure or disruption of authorised access to either pedestrians or vehicles during the construction period must be managed and alternatives provided, with sufficient signage and communication with directly affected parties as required.
- The contractor must ensure that provision is made for access by emergency vehicles.

❒ Temporary loss of access to public open space.
- Inform the public through on-site notices and social media platforms of limited access to any areas of public open space (e.g. Westville Trail).
- Ensure that all areas closed to the public are clearly marked.

❒ Increased noise during construction.
- In areas where construction will be taking place in proximity to residential and/or business property, make use of noise reduction techniques as applicable and as indicated in a Noise Management Plan (Appendix F).
- Where viaduct access roads are to be constructed, residents will be affected by the noise of haulage vehicles passing through residential areas to gain access to the work area (Chesterville and areas near Paradise Valley). The Contractor will need to manage very carefully the frequency of trips and restrict the time(s) of construction vehicles into and out of these residential areas, the number of vehicles at any one time in residential areas, the type of vehicle, its speed and the use of reversing warning devices. Banning of vehicles with reversing audible alarms in or near residential areas is recommended as well as no haulage or construction vehicle in or on residential roads before 08h00 and after 17h00. The Contractor is to submit a finalised Noise Management Plan for these residential areas to the Engineer for approval.
- Avoid undertaking construction activities after daylight hours. In instances when this is not possible, ensure that potentially affected parties are informed timeously in advance.
- If blasting is required, ensure that potentially affected parties are informed prior to any blasting taking place. Blasting is to be done in accordance with relevant legislation and due regard for the proximity of structures that may be vulnerable to vibrations from the blast. Pre and post blasting surveys will be undertaken as necessary.
- Management of noise during construction is the responsibility of the contractor, who will be obliged to adhere to the Noise Management Plan appended to the EMPr.

❒ Health and safety risks on and adjacent to site.
- Property boundary fences are to remain in place during construction and, thus, provide a barrier between properties and construction activities.
- Where boundary fences have to be moved, they must be reinstated in the new location prior to the commencement of construction.
- Health and safety risks during construction are to be managed by the contractor in accordance with the Construction Regulations under the Occupational Health and

Safety Act,1993 (Act 85 of 1993) as well as relevant specifications in the EMPr (Appendix F).
- Erect barriers around the construction areas where excavations and localised machinery movements will be considered a danger to the public.
- The contractor is to implement and abide by the specifications of the Traffic Management Plan, which is appended to the EMPr (noting that the contractor submits a final plan for SANRAL's approval).

❒ Increased crime and security risks on and adjacent to site.
- Construction teams should be clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on the body.
- Dismiss and prosecute any staff caught in criminal activities of any kind.
- Inform local law enforcement agencies of the possibilities of increased criminal activity in the area.
- Urban reserves are conduits for crime and contractors will need to be mindful of security on site at all times. Paradise Valley affords easy escape for criminals onto the N3, if fences are cut.
- Boundary fences must be maintained. Where there is a need to remove them, they must be replaced immediately in the new location, or temporary fencing (or other contingency measures e.g. guards) arranged until the permanent structure can be put in place.
- Continual vigilance for one's own person and property is key to avoiding incidences of crime.

❒ Potential protest action.
- As far as possible, employ labour locally.
- Employ a community liaison representative to ensure the free flow of information between the project team and local communities.
- Open and transparent procurement in accordance with procurement policies, and to encourage appointed contractors to make use of local sub contractors (or elsewhere in the country, if the requisite skills are not available locally).
- Ensure informal settlements are dealt with in accordance with an agreed plan of action between SANRAL and the Human Settlements Department at eThekwini.

❒ Increased spread of disease.
- The contractor is to ensure that all construction staff go through an HIV and AIDS education awareness programme as part of induction.
- The contractor must make education material regarding general hygiene, HIV & AIDS and sexually transmitted diseases readily available to staff.
- Condoms should be made readily available to staff.

❒ Increased dust.
- Suitable dust suppression techniques should be implemented, such as the use of water carts and shade cloth screens in areas where activities are taking place which will generate excessive dust.
- Conduct regular monitoring to ensure that dust levels remain at an acceptable level.

❒ Negative visual/aesthetic impacts.
- Ensure that 'good housekeeping' is practised on the construction site at all times.

8.4 What negative impacts will the proposed widening/capacity improvements to the N2 and N3 have on the social environment during operation?

A summary of impacts (incorporating a summary of specialist findings as applicable) is provided below, including recommended measures for management/mitigation of impacts. For further detail, please refer to the Social Impact Assessment and Noise Impact specialist reports

(Appendices D1 and D7). According to the assessment, the potential negative impacts on the social and socio-economic environment during operation are of medium significance, without management. With management, the impacts are considered to be of low significance (see Table 18 in Chapter 9).

`8.4.1 Increased safety and security risks due to closer proximity of the widened road to adjacent properties

Residents are concerned about safety risks during operation. Where houses and structures have been brought into closer proximity to the widened road, they may be at increased risk of damage due to vehicle collisions, spillages, fires, etc. In certain places, the edge of the road is within 3 m of a property boundary. Guardrails/concrete parapets will be constructed as protection where required adjacent to banks.

There are instances where sections of road reserve are overgrown with vegetation near residential areas and these areas are used by criminals to hide and aid them in their criminal activities. Where houses and structures have been brought into closer proximity to the widened road, the security risks could increase if the road reserve is not kept clear of thick vegetation. Alternatively, however, where the road reserve has substantially narrowed, it is likely there will be less space for thick vegetation and less opportunity for criminals to hide.

The assessment of potential safety risks associated with the Transnet Fuel Pipeline relocation does not form part of the scope of this Basic Assessment (listed activities are associated only with the removal of vegetation for this pipeline). Safety risks will be assessed by qualified experts as part of the planning and design for the pipeline relocation contract. Refer to Section 8.3.10.

8.4.2 Increased noise during operation of the widened road

The predicted increase in traffic over time will be accompanied by an increase in noise levels adjacent to the national roads. In addition, due to the widening of the N3, the edge of the road will be closer to residential and business properties. The noise generated by traffic on the national roads is already high. Noise levels will differ according to the topographical position of the receiver (whether above or below the road) and depending on whether any physical barriers to sound are located between the road and receiver (walls, other houses, vegetation, banks, etc.). Steep sections of road may generate more noise than flatter sections, due to heavy vehicles having to engage lower gears and/or air brakes. Generally, however, according to the noise specialist report (Appendix D6), noise levels are most problematic to receivers located within 300 m of the road. Within this distance, the noise levels are generally above the standards set in the Noise Control Regulations. Operational noise will increase over time due to the increase in traffic. Vehicle volumes are estimated to double from 2010 to 2047. This translates to a 3 - 5 decibel (dB) increase. The decibel is a logarithmic unit and therefore if the sound increases by 3 dB, the noise level has doubled.

It is not possible to eliminate noise next to a national road. Owners who have chosen to purchase properties adjacent to the N2 and N3 have done so being aware of the existing noise levels and the potential for these noise levels to increase over time (due to growth in traffic volumes and decreased distance from properties when necessary expansion of roads is undertaken to accommodate this growth). However, there are various measures that can be implemented to help reduce noise levels. These include using low noise road surfacing and, potentially (if feasible) the construction of barrier walls.

SANRAL will apply low noise surfacing to all sections of roads that pass residential areas. Barrier walls, however, need to be location specific and may have very limited effect, depending on the location of the receptor in relation to the road. Barrier walls are generally extremely costly and come with their own set of negative impacts, particularly negative visual impacts. The noise they deflect from one receptor may potentially become a problem for another receptor. SANRAL has commissioned an acoustic design specialist to investigate if there are feasible and affordable options that may be incorporated into the design, or implemented over time, post construction, for particular noise hotspots. These would then need to be assessed for *in situ* impacts.

Ultimately, however, it should be understood that it is the increase in traffic that causes an increase in noise and not road widening. SANRAL, as the road authority, is tasked with ensuring that the roads can safely and efficiently accommodate traffic volumes. Control of the growth of traffic volumes is a broader planning exercise that would include interventions from various government departments, such as better public transport and increased movement of freight by rail. Ultimately there must also be an adaptation to prevailing conditions i.e. a change of land use/receptors adjacent to national roads, towards those which are less sensitive to noise.

8.4.3 Possible stormwater damage to neighbouring properties during operation of the widened road

SANRAL has received a few complaints regarding the damaging effect of stormwater on adjacent properties being attributed to runoff from the national road. According to the design engineers, the total catchment areas feeding all the cross-drainage structures will not increase. The runoff, however, will increase by a very small margin due to the relatively high runoff on the additional road surface width. The risk of storm water damage should be low as proper cognisance for drainage was undertaken during design.

8.4.4 Increased effect of vibrations during operation of the widened road

Some residents living adjacent to the national road complain of vibrations when heavy vehicles go past. The vibrations rattle windows and are a source of disturbance. The widening of the road may result in the source of vibrations passing closer to the residences thereby increasing the disturbance. However, the improved road surface may well reduce vibrations as it is usually a rough or uneven road surface which causes vibrations.

8.4.5 Increased proximity/exposure to air emissions during operation of the widened road

When the road is widened, the source of vehicle emissions (carbon dioxide and nitrous oxide) will encroach closer to residences than previously and will cumulatively contribute to existing air pollution levels. However, the concentrations/dilution of emissions and other air pollutants at different positions along the N2 and N3 will vary depending on topography, prevailing winds and weather conditions.

8.4.6 Potential negative social impacts during operation and recommended measures for mitigation/management

Planning and design

- Safety risks to adjacent properties.
  - Retain boundary fences between the road reserve and neighbouring properties.
  - Construct guardrails/concrete parapets as protection, where required.

- Risk of damage from stormwater runoff.
  - Ensure drainage design prevents damaging stormwater runoff on adjacent properties.
- Increased noise.
  - Ultra thin friction wearing course will be used, which is a low noise surface. It may also be used over sections of concrete pavement. It must be regularly maintained.
  - The engineers responsible for detailed design must investigate, in conjunction with acoustic design specialists, the feasibility of constructing barrier walls to mitigate noise, particularly in problem areas. The effectiveness of walls is, however, very dependent on the location, height and distance between the noise source and the receiver. Noise barriers are effective in reducing the level of noise received on severely impacted locations close to the road provided the barrier screens the receivers' (ground floor and upper floors) windows from the noise source. Their effectiveness is good near the source and decreases with increasing distance.

Operation and maintenance

- Increased noise.
  - Home and business owners may be able to reduce noise levels on their own properties by erecting walls around their properties and using double glazing on windows. An evaluation of the noise source should be undertaken first, however, so that optimum measures can be put in place. According to the noise specialist, the use of hedges and vegetation generally provides little noise reduction.
  - Ensure regular maintenance of the noise reducing road surfacing.
  - SANRAL has commissioned an acoustic design specialist to investigate if there are feasible and affordable options that may be incorporated into the design, or implemented over time, post construction, for particular noise hotspots. These would then need to be assessed for *in situ* impacts.
- Increased vibrations.
  - Maintain the road surface regularly and ensure uneven surfaces are repaired.
- Increased security/crime risks.
  - Ensure the road reserve is kept clear of overgrown vegetation that can harbour criminals.
  - If any sections are overgrown and causing a problem, this should be reported to SANRAL RRM Division, (033 392 8100).

8.5 What effects will the proposed widening/capacity improvements to the N2 and N3 have on cultural heritage?

A summary of impacts (incorporating a summary of specialist findings) is provided below, including recommended measures for management/mitigation of impacts. For further detail, please refer to the Cultural Heritage Resources Impact Assessment specialist report (Appendix D2). According to the assessment, the potential negative impacts on cultural heritage during construction, operation and rehabilitation are of high and low significance, without management. With management, the impacts are considered to be of low and medium significance (see Table 19 in Chapter 9).

8.5.1 Detraction from landscapes and natural features

The main impacts on cultural heritage will be on the Paradise Valley Nature Reserve, which is formally protected and managed by eThekwini Metropolitan Municipality. It has heritage significance for its aesthetic, scientific, social and historical values. Construction within the

reserve will impact negatively on the natural environment and will also require temporary closure of parts of the reserve to the public, for safety reasons.

8.5.2 Potential destruction of parts of the Umbilo Waterworks, a provincial landmark

Inside the nature reserve is the Umbilo Waterworks, which is a Provincial Landmark in terms of Section 39 of the KZNHA, which is equivalent to a Grade II Provincial Heritage Site in terms of Section 27 of the NHRA. Two groups of structures associated with the Waterworks are located within 50 m of the piers of the existing Paradise Valley Bridge. Without mitigation, construction activities associated with the viaduct widening could affect these remains. However, the project engineers have indicated that they will be able to safely barricade these areas and, thus, prevent negative impacts.

8.5.3 Potential impacts on cultural heritage and recommended mitigation/management actions

Note that the mitigation measures below also apply (as relevant) to the proposed relocation of the sections of Transnet Fuel Pipeline near the N3/M7 Solomon Mahlangu I/C, which is to be implemented via a separate contract, prior to the commencement of the works on the N2 and M7.

Design, pre-construction and construction

- Degradation of cultural heritage values associated with Paradise Valley Nature Reserve.
  - To mitigate impacts on the Paradise Valley Nature Reserve's cultural values, the recommendations regarding protection of vegetation and riparian areas must be followed, as well as specific measures related to the social/economic management of the reserve during construction.
- Damage to Umbilo Waterworks Heritage Site.
  - The engineers have indicated that the Umbilo Waterworks can be protected from harm during construction. All remains of the Umbilo Waterworks must be fenced off and barricaded so that access to people is prevented. These heritage structures must be monitored by the Environmental Control Officer (ECO) throughout construction to ensure the prevention of negative impacts.
- General protection of Cultural Heritage.
  - Should any other cultural heritage resources be encountered during the course of construction, work in the affected area must be immediately halted, the area cordoned off and the heritage authority contacted for advice on further action.

8.6 What effects will the proposed widening/capacity improvements to the N2 and N3 have on the biodiversity of protected areas, D'MOSS and other natural habitat (terrestrial and aquatic)?

A summary of impacts (incorporating a summary of specialist findings) is provided below, including recommended measures for management/mitigation of impacts. For further detail, please refer to the Geotechnical, Riparian/Wetland and Vegetation specialist reports (Appendices D3, D4 & D5). According to the assessment, the potential negative impacts on biodiversity and natural habitat during construction, operation and rehabilitation are of high and medium significance, without management. With management, the impacts are considered to be of low and medium significance (see Table 20 in Chapter 9).

8.6.1 Loss/degradation of soils and substrates

The project will entail significant excavation work with heavy machinery, including cuts and fills. River banks and beds will be altered with culverts to channel them beneath the overpasses. Blasting may also be required where steep rock banks occur. These activities will potentially result in increased soil erosion, increased loss of topsoil, increased safety risk due to unstable banks or rockfall, destabilisation of river banks and will also result in high sediment loads entering drains and nearby water courses.

8.6.1.1Potential impacts on soils and substrates and recommended measures for mitigation/management

Note that the mitigation measures below also apply (as relevant) to the proposed relocation of the sections of Transnet Fuel Pipeline near the N3/M7 Solomon Mahlangu I/C, which is to be implemented via a separate contract, prior to the commencement of the works on the N2 and M7.

Preconstruction and construction

- Increased soil erosion and increased slope instability.
  - Topsoil is to be removed separately to subsoil and be safely stockpiled for use in rehabilitation.
  - Exposed soils and cut and filled surfaces are to be adequately safeguarded as per recommendations of the geotechnical report (Appendix D3) and other applicable mitigation measures provided in the EMPr (Appendix F).
  - Specialist geotechnical advice must be followed to ensure all new fill embankments are constructed to rule out the potential for large-scale instability and the associated negative environmental implications.
  - Soil erosion on site must be controlled in accordance with the relevant specifications in the EMPr (Appendix F).
  - Large sediment loads must be prevented from entering drains and watercourses.
  - Controlled blasting is to be undertaken in accordance with legal requirements and best practice.
  - The impacts on soils and substrates must be monitored during construction as part of environmental management of the contract.

8.6.2 Loss/degradation of terrestrial vegetation and natural habitat

The project will require clearance of vegetation, most from within the existing road reserve and to a small degree, from patches adjacent to the road reserve. Woodland vegetation will also be lost due to the relocation of the section of Transnet Fuel Pipeline, as the servitude will need to be kept free of woody vegetation. Degradation of habitat and loss of biodiversity could also potentially occur due to:

- Loss of Red Listed and protected species.
- Edge effects which lead to increased degradation of adjacent veld including spread of alien invasive plant species.
- Increased collection of medicinal plants, firewood, building wood and other plant material from adjacent areas.
- The production of a large amount of inert waste (reinforced concrete rubble) from demolition could be dumped in a manner that degrades vegetation or hinders rehabilitation of cleared areas.

There are affected areas that are considered as sensitive habitat and which fall within the linked open areas of the Durban Metropolitan Open Space System (D'MOSS), and/or fall within Critical Biodiversity Areas of EKZNW's Conservation Plan and/or fall within urban protected areas. Various areas of sensitive natural vegetation have been identified and investigated in detail in the specialist vegetation report (Appendix D5), with site specific recommendations made for mitigation of impacts at the following locations:

- Solomon Mahlangu Interchange (note that this will apply also to the proposed relocation of sections of the Transnet Fuel Pipeline occurring in the south east quadrant of the I/C).
- Westville Viaduct.
- Roosfontein Nature Reserve.
- Paradise Valley.

8.6.2.1 Potential impacts on terrestrial vegetation and natural habitat and recommended measures for mitigation/management

Note that the mitigation measures below also apply (as relevant) to the proposed relocation of the sections of Transnet Fuel Pipeline near the N3/M7 Solomon Mahlangu I/C, which is to be implemented via a separate contract, prior to the commencement of the works on the N2 and M7.

Planning and design

- Loss/degradation of habitat and loss of biodiversity.
  - Ensure during project planning and tender processes that sufficient budget is allowed for plant rescue prior to vegetation clearance and rehabilitation post construction, including the Transnet Fuel Pipeline relocation and full rehabilitation of the viaduct access roads once they are redundant.
  - Ensure sufficient funding will be available for an effective alien plant control programme (excluding the fuel pipeline servitude, which will be the responsibility of Transnet Fuel Pipelines).

Pre-construction and construction

- Loss/degradation of habitat and loss of biodiversity.
  - Where construction occurs close to any sensitive areas of natural vegetation or any plants of high conservation value, these must be suitably and visibly demarcated and cordoned off by the ECO prior to and during construction.
  - A plant 'rescue' operation must be undertaken under the direction of an ecologist/botanist prior to construction, where plants of high conservation value will be impacted by any part of the development (construction or operation phase). The contractor is to conduct plant rescue according to the specifications for plant rescue provided in the Appendices to the EMPr.
  - The construction footprint is to be kept to a minimum. No works are to occur outside of the agreed servitude/working area and the working area is to be clearly demarcated.
  - Clearance and cutting back of natural vegetation are to be kept to a minimum. The contractor is to conduct vegetation clearance according to the relevant specifications in the EMPr, including the relevant Appendices to the EMPr that deal with specific sensitive areas.
  - Stockpile and lay down areas are to be kept away from areas of sensitive natural vegetation.

- Alien invasive plants around any excavated areas/work areas and within the road reserve must be kept under control during both construction and operation in accordance with SANRAL's existing protocol. Additional effort (follow ups) will be required in sensitive areas and additional funding will need to be made available.
- Relevant general specifications in the EMPr are to be followed. These include specifications relating to:
  - Vegetation clearance.
  - Site access and working areas.
  - Pollution prevention.
  - Siting of construction camps.
  - Rules for construction teams.
  - Control of alien invasive plants.
  - Site rehabilitation.
  - Dealing with demolition rubble.
- Site specific management of sensitive sites is detailed in the appendices to the EMPr, which deal with Solomon Mahlangu I/C[20], E.B. Cloete I/C, Westville Viaduct, Roosfontein Nature Reserve and Paradise Valley Nature Reserve. The management of soils, vegetation and biodiversity at these sites must be implemented in accordance with these documents, viz.:
  - EMPR Appendix A1: "*Site specific rehabilitation plan for sensitive areas".*
  - EMPR Appendix A2: "*Site specific rehabilitation plan for the Paradise* Valley *Viaduct and access road".*
  - EMPR Appendix A3: "*Site specific rehabilitation plan for the Westville Viaduct and access road".*

Operation

- Spread of alien invasive plants.
  - Alien invasive plants around any excavated areas/work areas and within the road reserve must be kept under control during operation. Additional effort (follow ups) will be required in sensitive areas and additional funding will need to be made available.
  - Note that Transnet Fuel Pipelines, and not SANRAL, will be responsible for ongoing maintenance of the pipeline servitude.

8.6.3 Degradation of wetland and riparian areas

The road widening will require the extension (lengthening) of the existing drainage infrastructure at numerous crossings over small streams, drainage lines and small rivers. Where needed, inlets and outlets will be improved/enlarged and erosion protection provided up and/or downstream.

At the Solomon Mahlangu I/C on the N2/M7, extra crossings over the uMbilo River will be required on the SW and NE quadrants.

The work at the Paradise Valley Viaduct will entail some work on the river bed and the construction of additional piers in the floodplain. SANRAL and the design engineers have been advised of the flood risk so that they can take this into account in their design.

[20] This will include the relocation of the Transnet Fuel Pipeline to the south east of the Solomon Mahlangu I/C.

The works will result in the destruction of small sections of riparian habitat where existing crossings are widened, modification of riparian river bank and beds, and potential degradation of water quality resulting from construction activities and materials.

Many of the riparian habitats assessed are dominated by alien plants, with construction activity, therefore, having limited impact on indigenous species and providing an opportunity for localised removal of aliens and rehabilitation with indigenous riparian species.

Given that the majority of the systems are already highly modified, the construction phase impacts can largely be controlled, mitigated and rehabilitated through an appropriate and comprehensive EMPr and mitigation measures, followed by prompt and appropriate rehabilitation. Key areas of focus would be habitat destruction, erosion, successful and rapid re-vegetation, the maintenance of riparian vegetation and bank stability, and pollution prevention. If the correct measures are implemented during construction, longer term impacts of construction on water quality can be managed. The higher risk is rendering riparian and wetland biophysical habitat unstable as a result of bed, bank and grade modification, particularly when coupled with vegetation clearing and earthworks.

Impact risks related specifically to construction associated with the wetland and riparian areas may include the following:

- The introduction of foreign and hazardous materials to the habitat which may result in pollution, such as fuel, cement, explosives and other building materials.
- Erosion, and the sedimentation of watercourses and aquatic habitat.
- Removal of terrestrial and riparian indigenous vegetation.
- Loss of sections of wetland and riparian habitat.
- Compaction of wetland soils by construction vehicles.
- Modifications to the wetlands, river banks and beds as a result of earthworks, excavations and sloping.
- River canalisation and diversion.
- Erosion and the diversion of subsurface flow if artificial preferential flow paths are created as a result of earthworks.
- Risk of erosion forming if infilling is not adequately compacted or the longitudinal slope of the wetland system is not maintained.
- Vegetation disturbance leading to increased encroachment by alien invasive or ruderal plant species.
- The impoundment of flows upstream of the crossing during construction, and desiccation of the systems downstream during construction. These conditions could continue post-development depending on how effectively the area has been rehabilitated.
- The production of a large amount of inert waste (reinforced concrete rubble) which could be dumped in a manner that degrades watercourses.

8.6.3.1 Potential impacts on wetland and riparian areas and recommended measures for mitigation/management

Note that the mitigation measures below also apply (as relevant) to the proposed relocation of the sections of Transnet Fuel Pipeline near the N3/M7 Solomon Mahlangu I/C, which is to be implemented via a separate contract, prior to the commencement of the works on the N2 and M7.

Planning and design

- Increased erosion and instability due to earthworks and crossings.

- The crossings should be designed to ensure that flow patterns along the stream/river channel are not altered or diverted potentially resulting in stream bed and bank erosion and instability.
- Drains and culverts must be designed in conjunction with relevant experts to the correct invert levels to prevent damming of flows or draining of wet areas. Culverts should be designed to prevent concentration of flows, and to maintain natural flows as free flowing as possible.

- Potential problems due to generation of large volumes of demolition rubble and rock material.
  - SANRAL must ensure that the construction contracts that go out to tender are clear about re-use and/or disposal of material. Should the material need to be stored prior to use on other sections of the N2/N3 upgrades, sites must be identified up front and any necessary authorisations/permits obtained, should they be required.

Pre-construction, construction

- Increased soil erosion, sedimentation and instability due to earthworks and crossings.
  - Earthworks associated with river crossings should take place in the winter months as this is the driest period for this region. It is acknowledged that this is not always practically achievable but should be accommodated as far as possible in construction scheduling. In addition, it should be noted that working in river channels during summer can be dangerous due to sudden flooding following thunder storms upstream in the catchment. Construction personnel need to be aware of this risk.
  - On steep slopes draining towards the identified freshwater ecosystems, small-scale diversion berms should be constructed, to reduce the risk of the earthworks becoming a preferred surface flow path leading to erosion. Where space is insufficient, suitable road fill embankment protection must be designed.
  - “Trench-breakers”, which are in-trench barriers, should be installed within any trench excavations to minimise the interception and accumulation of surface runoff water from upslope areas.
  - During earthworks, the top 50 cm of the wetland/riparian topsoil must be removed and stockpiled during the construction period, to be replaced once activities have been completed. This is to maintain the existing seed bed and soil profiles as best possible.
  - Excavated soils should be placed on the upslope side, minimizing the risk of erosion and excess sediment entering the freshwater ecosystems.
  - The construction footprint across the systems must be as narrow as practically possible, i.e. machinery must utilise the same route through the systems at all times so as to avoid unnecessary disturbance.
- Increased soil compaction due to access and working areas.
  - Each construction working area must be clearly demarcated. Vehicle and personnel traffic must be minimised and must be restricted to within designated working areas.
  - Access to site will be from existing roads only (other than the viaduct access roads to be constructed).
  - Vehicle access routes must not pass through watercourses, wetlands and any areas of sensitive vegetation.
  - If water for construction is to be sourced from local water bodies, then this must occur at existing access points.
  - Existing roads, tracks and pathways should be used wherever possible, and multiple pathways must not be allowed to develop.

- Disturbance to steep slopes must be kept to an absolute minimum.
- The activity must cover as small a working area as is feasible, to minimise the areas disturbed on site at any one time. If applicable to non-working areas, buffers must be established around open water, aquatic habitats, riparian and wetland vegetation and riparian banks.

- Degradation of riparian and wetland vegetation, and faunal habitat.
  - Where applicable, strict buffers must be established around all open water, aquatic habitats, riparian and wetland vegetation and riparian banks. It is recommended that a 32 m buffer be maintained from the edge of wetlands and a 50 m buffer from the edge of riparian zones. These limits are subject to review by the authorities.
  - The buffers become strict no-go areas where habitats must not be disturbed and personnel and machinery are not permitted entry unless directed by the ECO during rehabilitation.
  - The removal, damage or disturbance of any flora outside the working areas is not permitted.
  - Clearing or pruning of indigenous vegetation at the site of activity must be kept to an absolute minimum. This must be done under the supervision of an appropriately qualified specialist.
  - Where clearing is required outside of earthwork/construction areas, vegetation should be brush-cut rather than cleared to speed re-establishment following site closure.
  - No herbicides may be used on indigenous vegetation, particularly within proximity to wetland and riparian areas.
- Increased risk of damage due to erosion and stormwater runoff.
  - Where construction activity takes place within floodlines of watercourses, temporary berms need to be formed to ensure the construction site and disturbed soils are protected from flooding, storm flows and erosion.
  - Erosion that takes place during rainfall events must be rehabilitated immediately.
  - Stormwater control measures must be implemented with all stormwater generated within disturbed earthwork areas channelled to temporary, constructed settling ponds which allow the water to naturally filter back to the watercourse after settling.
  - Storm water retention and other constructed settling ponds must be suitably sited or protected so that river channel high flows will not cause flooding of the ponds. Siting of such ponds must be undertaken by a suitably qualified specialist who must also provide advice as to the size and maintenance of the ponds.
- Increased risk of ppollution.
  - Fuel and hazardous material storage, handling and refuelling areas must not fall within riparian/wetland habitat and buffer zones. Such areas must be located away (at least 50 m) from riparian zones and any other sensitive environments.
  - All spills of foreign or hazardous materials or fluids must be cleaned up immediately, with all spills larger than 20 litres being reported to the ECO immediately.
  - A record must be kept of all spills and the corrective action taken.
  - Vehicles should not be parked in or near sensitive areas, such as watercourses or drainage areas.
  - Drip trays are to be provided under all standing vehicles to minimise hydrocarbon spills.
  - No eating or cooking and cleaning of persons, utensils or equipment may take place in or near rivers, streams or watercourses.
  - Appropriate provision must be made for ablutions during construction. If chemical toilets are used, they must be well serviced, and must be placed on level surfaces

well away from any water courses, drainage lines or seeps, and any areas which may be subject to flooding. No spillage must occur during servicing and contents must be correctly removed from site.

- Increased risk from demolition rubble and rock material.
  - No rubble or rock/soil from earthworks may be temporarily stockpiled or dumped within 32 m of the river channels and wetlands.

Construction and post construction

- Site rehabilitation following construction (construction and post construction).
  - In riparian areas, backfilling should occur as soon as possible, with compaction undertaken and shaping to original levels.
  - All disturbed areas are to be rehabilitated, with the wetland and riparian habitat at the crossing points and areas where disturbance has resulted from excavation being restored to near-natural conditions. This must be implemented immediately following completion of construction at each localised crossing.
  - The crossings should be rehabilitated to ensure that no barriers exist within the stream and that in-stream habitat is comparable to the natural state.
  - Re-vegetation and rehabilitation must take place at worked sections immediately following completion so that vegetation can re-establish.
  - Within, and in proximity to riparian and wetland areas, successful re-vegetation is crucial to stabilise soils and limit infestation by invasive alien plant species and dominance by ruderal species.
  - Simple re-vegetation with terrestrial species will not be suitable. Correct species for riparian and wetland habitats of the region must be re-established in consultation with an appropriately qualified specialist.
  - Progress of vegetation re-establishment must be monitored and additional intervention applied if necessary to ensure site recovery and integrity, as well as physical stability.
  - Vehicle access tracks, footpaths and other areas of soil compaction and vegetation denudation as a result of construction activities must be contoured, scarified and re-vegetated where required.
  - Any soil stockpile sites and sites of excavation must be rehabilitated in the same fashion. Rehabilitation of such sites must be monitored and the results reported to the ECO.
  - All excess soil stockpiles not taken off site must be spread evenly over the disturbed areas prior to rehabilitation and re-vegetation.
  - Construction areas must be rehabilitated to a land surface which integrates with the surrounding slope morphology and river channel form so as not to create areas of soil instability, or flow paths which incorrectly direct storm flows and floods causing scour, erosion and damage to adjacent habitats and infrastructure.
  - Areas subject to concentrated water flows during rainfall or high flow events must receive particular attention during rehabilitation and re-vegetation. Where possible, these must be identified prior to commencement of construction activities. Where required, erosion protection structures may need to be designed and installed.
  - Artificial embankments, depressions and holes created by the construction activity must be contoured/rehabilitated to minimise risk to, and death of, all fauna types from large mammals to small invertebrates.
  - Upon site closure, all infrastructure, foreign materials, waste, litter and contaminated water, rock or soil must be removed from site and disposed correctly at a facility licensed to accept particular waste streams.

8.6.4 Faunal mortalities and negative effects on local faunal populations due to disturbance, loss of habitat and poaching

All disturbance to natural habitat (whether degraded or not) will impact negatively on the fauna that uses this habitat. Various types of fauna including reptiles, rodents, spiders and various other invertebrates will be disturbed and exposed during the works. Some may be injured and/or killed due to physical impact from machinery. Those that are exposed and displaced will be vulnerable to harm from other predators and from human beings. The project will result in a loss of habitat (albeit disturbed) when the road reserve is paved for the widened road. The existing nature reserves fortunately will continue to protect local species.

With respect to the Crowned Eagles in Paradise Valley Nature Reserve, the proposed construction activity is not likely to make the pair leave the area, according to McPherson (2016). However, although familiar with recreational activity in the nature reserve, novel or increased human activity is likely to disrupt their breeding behaviour. If novel (new/unfamiliar) disturbance is introduced when the eagle is incubating or with a young chick (July-November) this will cause breeding failure. If, however, new disturbances begin from February-June of any year, the previously fledged juvenile can adjust to these changes. New activity at this time may encourage the pair to abandon the more disturbed Nest 2 as a breeding site and return to the undisturbed Nest 1 or find an alternative site for a new nest.

It has been suggested by McPherson (2016) that post construction provisioning of artificial platforms may help to offset potential negative impacts of construction on the Crowned Eagles. McPherson states that these nest poles will be possible options for the Crowned Eagles during the construction period but will be especially valuable for the years after completion of construction and reduced activity thereafter. It is suggested that two artificial nest poles (consisting of a steel or wooden pole >15 m tall to the platform) could be considered, one each upriver and downriver of the viaduct. It is most likely to be occupied if the artificial structure is placed in the lower third or flood plain of the uMbilo River and as far as possible from foot traffic and exposed viewpoints. However, there are various practicalities and costs associated with this undertaking that need to be further investigated to determine whether it is a feasible course of action. For example, it must be considered that there are sufficient indigenous trees available in the reserve for new nests (albeit that the eagles prefer tall, sparsely leafed trees). Also, siting options will be limited by the ability to deliver the pole to the location, which will require access for a large crane. The poles will also require a large concrete base. Should it be necessary to clear and build tracks for crane and materials access, the economic costs of construction and rehabilitation of environmental damage will be high. Further discussion with reserve management would also be required to establish whether there are suitable, accessible sites which would require minimal clearance.

Given that the project's negative impact will be on breeding success during the construction phase and not during the operation phase, it is recommended that timing the commencement of construction to between February and June be the first consideration. Breeding success during the construction period must then be monitored. The need for the platforms should be established and assessed (with inputs from Dr McPherson, SANRAL and reserve management) once actual effects of construction are known via monitoring.

8.6.4.1 Potential impacts on fauna and recommended measures for mitigation/management

Note that the mitigation measures below also apply (as relevant) to the proposed relocation of the sections of Transnet Fuel Pipeline near the N3/M7 Solomon Mahlangu I/C, which is to be

implemented via a separate contract, prior to the commencement of the works on the N2 and M7.

Construction

- Increased animal mortalities (including poaching).
  - Mortalities of various types of animals are inevitable due to the earthworks and movement of heavy machinery. This should be minimised by keeping the construction footprint to a minimum and by using existing access roads and disturbed areas for vehicle access and for stockpiling.
  - If snakes are encountered, they are not to be killed. There are several snake experts who can be contacted to remove and relocate snakes (e.g. the Fitzimons Snakepark in Durban, Tel: 031 337 6456; or Byron Zimmerman, Highway/Hillcrest area, Cell 082 894 6783).
  - Where possible, exposed vulnerable animals should be removed from the work area along with some of the soil/substrate they were found in (if applicable) and placed carefully in similar but safe habitat adjacent to/up or downstream of the works. The ECO must be notified and consulted in this regard.
  - Fishing must be strictly prohibited in and around the working areas.
  - No project staff are permitted to catch, trap, poison, kill or disturb any animals present in the project areas.
  - No disturbance of nesting or feeding sites and fauna habitat is allowed. Advice from the ECO should be sought if such sites are encountered in the work areas.
  - All drivers must obey the speed limits and be on the lookout for animals particularly in the vicinity of the Paradise Valley Nature Reserve, so that collisions with animals can be avoided.
  - Monitoring of impacts on fauna must be included in environmental compliance monitoring.
- Potential breeding failure of Crowned Eagles at Paradise Valley.
  - The breeding status of the Crowned Eagle pair must be determined well before construction commences and during the construction period.
  - Starting disturbing construction activities between July-November must be avoided if the eagles are incubating eggs or have a small chick. It will be safest to commence construction between February and June to avoid breeding failure.[21]
  - Breeding success during the construction period must be monitored.

Operation

- Potential breeding failure of Crowned Eagles at Paradise Valley.
  - The need for nesting platforms needs to be established and assessed (with inputs from Dr McPherson, or a similarly qualified raptor ecologist, SANRAL and reserve management), once actual effects of construction are known via monitoring.

8.7 What potential cumulative impacts can result from the proposed widening/capacity improvements the N2 and N3?

A cumulative impact is an incremental impact on the environment that results from the impact of a proposed action when added to existing and reasonably foreseeable future actions. Cumulative effects can be both positive and negative. Also, the nature of cumulative impacts can be both temporary in nature (i.e. impacts that are restricted to the construction phase) and permanent (i.e. impacts that occur in both the construction and operation phases).

[21] However, this will need to be balanced practically against construction schedules and construction activities involved. To stop work completely for a five month period would result in substantial costs being incurred, due to an extended program.

To enhance positive impacts of the proposed widening/capacity improvements to the N2 and N3 and, thus, enhance positive cumulative effects, the project should be implemented efficiently according to best environmental practice and the infrastructure should be well maintained.

To minimise negative impacts of the proposed widening/capacity improvements to the N2 and N3 and, thus, its negative contributions towards cumulative effects on the environment, the project should be implemented with the recommended mitigation measures.

Potential cumulative impacts from the proposed widening/capacity improvements to the N2 and N3 to the environment, as related to the key identified issues and impacts, are described below. Where relevant and applicable, significance ratings are assigned to impacts, according to the assessment conventions (Table 14) in the relevant impact tables (Chapter 9).

8.7.1 Cumulative national, regional and local economic and social benefits arising from an improved transport corridor between the Port of Durban and Twickenham Road

This project, along with other planned upgrades to further sections of the N3 as well as to other linking roads (e.g. M13) will cumulatively contribute to the improved road and transportation conditions, which will allow for more efficient and better functioning of most aspects of day to day business and the provision of services which rely on transport. The project's contribution towards SIP2 goals along with other SIP2 projects will contribute to social and economic development and growth and allow for increased income generation opportunities.

The cumulative contribution of the project to the local, regional and national economy in South Africa is considered to be of high (+) significance (see Table 15 in Chapter 9).

8.7.2 Cumulative impacts on adjacent properties (including nature reserves), infrastructure and services

All or most of the health, safety, security and nuisance impacts discussed in Section 8.3 have the potential to be compounded if other developments in close proximity occur simultaneously in the area. It is possible that expansion of informal settlements adjacent to or into the road reserve may increase over time prior to the commencement of construction, and this could cause delays to the project. Also, it is possible that disruptions to services caused by the relocation of infrastructure (for example, water, electricity and telecommunications) could cumulatively affect the functioning and delivery of these services, should other developments cause additional disruptions. The cumulative contribution of the project on adjacent properties and infrastructure is considered to be of medium (-) significance with or without mitigation (see Table 16 in Chapter 9).

8.7.3 Cumulative health, safety, security and nuisance impacts

All or most of the health, safety, security and nuisance impacts discussed in Section 8.3 have the potential to be compounded if other developments in proximity occur simultaneously in the area. Activities that place additional pressure on traffic flow could be particularly problematic. Possible cumulative impacts may include increased traffic congestion on alternate routes, damage to alternate routes as a result of increased traffic, and public dissatisfaction. In the eventuality of contracts running concurrently, cumulative impacts will be experienced. These potential cumulative impacts are considered to be of high (-) significance without mitigation and of medium (-) significance with mitigation (see Table 17 in Chapter 9).

8.7.4 Cumulative impacts on the social and socio-economic environment during operation

The national road is generally a conduit for commerce. Increasingly, business premises are being constructed on properties close to national roads. As widening decreases the distance between the national road and adjacent residences, living on these properties will become less attractive due to the disturbance and noise from the road. Over time, road widening, could therefore, contribute cumulatively to a change of land use/zonation from residential to business, along sections adjacent to the national road. The significance of this impact would vary, depending on the precise locality, properties and individuals that it affects.

When the road is widened, the source of vehicle emissions (carbon dioxide and nitrous oxide) will encroach closer to residences than previously and will cumulatively contribute to other sources of air pollution. The significance of this impact would vary, as the concentrations/dilution of emissions and other air pollutants at different positions along the N2 and N3 will vary depending on time of day, traffic volumes, topography, prevailing winds, weather conditions and whatever other emissions are being released at the time. Serious concerns regarding persistent high levels of air pollution in a particular area should be reported to the relevant authority for further investigation and monitoring.

8.7.5 Cumulative impacts on natural habitat

Along with other developments taking place, the proposed project will contribute cumulatively to the loss of good quality natural habitat and biodiversity in the study area and may accelerate degradation of adjacent areas through soil erosion, edge effects, spread of alien invasive plants, etc. The cumulative impact of the project on natural habitat is considered to be of medium (-) significance without mitigation and of low (-) significance with mitigation (see Table 20 in Chapter 9).

8.8 What are the impacts of the No Development Alternative (not implementing widening/capacity improvements to the N2 and N3)?

The No Development Alternative would imply that the proposed widening of the N2 and N3 sections of interest, and the upgrading of the associated interchanges, will not occur. This would avoid or, at least defer till a later date, the negative impacts of construction that have been described in this report (including the impacts associated with relocation of services and a section of Transnet's fuel pipeline). However, even with other potential interventions (such as rail) to reduce the future predicted traffic volumes, widening will still eventually be required, because these sections of road are operating currently at full capacity and are not designed to accommodate further growth in traffic. The failure to upgrade will, thus, lead to increasing congestion as traffic volumes increase over time. Interchanges will come under increasing pressure. Road safety risks will increase and there will likely be an increase in accidents. Commuter time will increase along with road user frustration. Heavy volumes of traffic will increase the need for maintenance. Without additional lanes, maintenance activities will exacerbate traffic congestion and associated negative impacts. The No Development Alternative will, thus, have widespread negative effects on the social and economic environment. The No Development Alternative is likely to have significant negative indirect impacts on the national, local and regional economy as freight haulers, commuters and businesses would have to move, alter their routes or otherwise adapt to a poorly functioning road network, more difficult access and increased safety risks. The No Development Alternative is not consistent with the strategic infrastructure planning of Government and will fail to assist in achieving SIP2 goals.

According to the assessment, the predicted impacts of the No Development Alternative are considered to be of high (-) significance without mitigation. Mitigation measures are not applicable in this case (see Table 21 in Chapter 9).

For the above reasons, the No Development Alternative is not recommended.

9. ASSESSMENT OF THE SIGNIFICANCE OF POTENTIAL IMPACTS

9.1 Assessment

This Chapter deals with the assessment of the significance of the potential impacts, both with and without management measures (mitigation). Impact tables, **where applicable** to the key issues discussed in this report, are provided in Tables 15-21.

Table 15	What economic and socio-economic benefits will result from the proposed widening/capacity improvements to the N2 and N3, at a local, regional and national scale?
Table 16	What effects will the proposed widening/capacity improvements to the N2 and N3 have on adjacent properties, infrastructure and services, and *vice versa*?
Table 17	What potential health, safety, security and nuisance impacts may be experienced as a result of the proposed widening/capacity improvements to the N2 and N3 during construction?
Table 18	What negative impacts will the proposed widening/capacity improvements to the N2 and N3 have on the social environment during operation?
Table 19	What effects will the proposed widening/capacity improvements to the N2 and N3 have on cultural heritage resources?
Table 20	What effects will the proposed widening/capacity improvements to the N2 and N3 have on the biophysical environment (soils, riparian, wetland and terrestrial natural habitat, fauna) during construction, operation and rehabilitation?
Table 21	What are the impacts of the No Development Alternative (not implementing widening/capacity improvements to the N2 and N3)?

Table 15 Assessment of potential beneficial economic and socio-economic impacts resulting from the proposed widening/capacity improvements to the N2 and N3, at a local, regional and national scale, during planning, construction, operation and rehabilitation (with and without mitigation)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts**(Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Employment creation and capacity building	Unmitigated	Positive	High	Low	Low	N/A	Low	Low	Low	Low
	Mitigated	Positive	High	Low	Medium	N/A	Low	Medium	High	Medium
Opportunities for local contractors and SMMEs	Unmitigated	Positive	Medium	Low	Low	N/A	Low	Low	Low	Low
	Mitigated	Positive	Medium	Low	Medium	N/A	Low	Medium	Medium	Medium
Improved road safety	Unmitigated	Positive	High	Medium	Medium	N/A	Low	Medium	Medium	Medium
	Mitigated	Positive	High	High	High	N/A	Low	High	High	High
Reduced travel time	Unmitigated	Positive	High	Medium	Medium	N/A	Low	Medium	Medium	Medium
	Mitigated	Positive	High	High	High	N/A	Low	High	High	High
Stimulation of the local, regional and national economy	Unmitigated	Positive	High	Medium	Medium	N/A	Low	Medium	High	Medium
	Mitigated	Positive	High	High	High	N/A	Low	Medium	High	High
Improved transport corridor	Unmitigated	Positive	High	Medium	Medium	N/A	Low	Medium	High	Medium
	Mitigated	Positive	High	High	High	N/A	Low	Medium	High	High
Cumulative benefits to the country's economy	Unmitigated	Positive	High	Medium	Medium	N/A	Low	Medium	High	Medium
	Mitigated	Positive	High	High	High	N/A	Low	Medium	High	High

Table 16 Assessment of potential impacts of the proposed widening/capacity improvements to the N2 and N3 on adjacent properties (including nature reserves), infrastructure and services, and *vice versa*, during planning, construction, operation and rehabilitation (with and without mitigation)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts**(Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Increased interaction with landowners and entry onto private properties by investigative teams (e.g. geotechnical)	Unmitigated	Neutral	Low	Low	Medium	Low	High	Low	High	Low
	Mitigated	Neutral	Low	Low	Low	Low	High	Low	High	Low
Potential losses and disruption due to expropriation of properties	Unmitigated	Negative	Low	High	Medium	Medium	Low	Medium	Medium	Low
	Mitigated	Negative	Low	High	Low	Medium	Low €	Low	Low	Low
Resettlement of formal households and loss of privately owned land	Unmitigated	Negative	Low	High	High	N/A	Low	High	High	High
	Mitigated	Negative	Low	High	Low	N/A	Low	Low	Low	Low
Damage to/disruption of services and infrastructure in and adjacent to the road reserve	Unmitigated	Negative	Low	Low	Medium	Low	High	Low	Medium	Low
	Mitigated	Negative	Low	Very Low	Low-Medium	Low	High	Low	Low	Low
Impacts on Paradise Valley Nature Reserve	Unmitigated	Negative	Medium	Medium	Medium-High	Medium	Medium	Medium	High	Medium
	Mitigated	Negative	Medium	Medium	Low-Medium	Medium	Medium	Medium	High	Medium

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts**(Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Facilities and Operations										
Unintended damages to private property	Unmitigated	Negative	Medium	Low	Medium	N/A	High	Medium	Medium	Medium
	Mitigated	Negative	Medium	Low	Low	N/A	High	Low	Low	Low
Temporary loss and damage to public open space	Unmitigated	Negative	Low	Low	Low	N/A	High	Low	High	Low
	Mitigated	Negative	Low	Low	Low	N/A	High	Low	Medium	Low
Expansion of informal settlements into road reserve	Unmitigated	Negative	Medium	Low	Medium	N/A	High	Medium	High	Medium
	Mitigated	Negative	Medium	Low	Low	N/A	High	Low	Medium	Low
Resettlement of informal settlements	Unmitigated	Negative	Low	High	High	N/A	Low	High	High	High
	Mitigated	Negative	Low	High	Medium	N/A	Low	Medium	High	Medium
Increased repairs and maintenance to adjoining affected roads	Unmitigated	Positive	Low	Low	Low	Low	Medium	Medium	Medium	Low
	Mitigated	Positive	Low	Medium	Low	Low	Medium	Low	High	Low
Cumulative impacts on adjacent properties, services and infrastructure	Unmitigated	Negative	Medium	Low	Medium	N/A	High	Medium	Medium	Medium
	Mitigated	Negative	Medium	Low	Medium	N/A	High	Medium	Medium	Medium

Table 17 Assessment of potential health, safety, security and nuisance impacts resulting during construction of the proposed widening/capacity improvements to the N2 and N3 (with and without mitigation)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Increased likelihood of road traffic accidents	Unmitigated	Negative	Medium	Low	Medium	N/A	High	Medium	High	Medium
	Mitigated	Negative	Low	Low	Low	N/A	High	Low	Medium	Low
Disruption to vehicle traffic and access	Unmitigated	Negative	High	Low	High	N/A	High	High	High	High
	Mitigated	Negative	Medium	Low	Medium	N/A	High	Medium	High	Medium
Disruption to pedestrian access in specific localised areas	Unmitigated	Negative	Low	Low	High	Low	Low	Medium	High	Medium
	Mitigated	Negative	Low	Low	Low	Low	High	Low	High	Low
The effect of increased noise on surrounding receivers during construction	Unmitigated	Negative	Medium	Low	High	N/A	Low	Medium	High	Medium
	Mitigated	Negative	Low	Low	Medium	N/A	Low	Medium-Low	High	Medium- Low
Health and safety risks to those in proximity to construction activities	Unmitigated	Negative	Low	Medium	Medium	Low	High	Medium	Medium	Medium
	Mitigated	Negative	Low	Medium	Low	Low	High	Low	Low	Low
Increased crime (increased security risk)	Unmitigated	Negative	Medium	Low	Medium	N/A	High	Medium	Medium	Medium
	Mitigated	Negative	Medium	Low	Low	N/A	High	Low	Low	Low
Increased dust and	Unmitigated	Negative	Medium	Low	Medium	N/A	Medium	Medium	High	Medium

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
vehicle emissions	Mitigated	Negative	Low	Low	Low	N/A	High	Low	Medium	Low
Potential protest action by informal settlements, business forums and/or disgruntled sub-contractors.	Unmitigated	Negative	Medium	Low	High	N/A	Low	Medium	High	Medium
	Mitigated	Negative	Medium	Low	High	N/A	Low	Medium	Medium	Medium
Increased spread of disease	Unmitigated	Negative	High	Low	Medium	N/A	Low	Medium	High	Medium
	Mitigated	Negative	High	Low	Low	N/A	Low	Low	Medium	Low
Direct and indirect effects of the production of large volumes of demolition rubble and inert material	Unmitigated	Negative	High	Medium-High	Medium	Medium	Low-Medium	Medium	High	High
	Mitigated	Negative	High	Medium	Low	Low	Medium	Low	High	Low
Degraded aesthetics	Unmitigated	Negative	Low	Low	Low	N/A	Low	Low	High	Low
	Mitigated	Negative	Low	Low	Low	N/A	Low	Low	Low	Low
Cumulative health, safety, security and nuisance impacts	Unmitigated	Negative	Medium	Low	High	Low	Medium	High	High	High
	Mitigated	Negative	Medium	Low	Medium	Low	High	Medium	High	Medium

Table 18 Assessment of potential negative impacts of the proposed widening/capacity improvements to the N2 and N3 on the social and socio-economic environment during operation (with and without mitigation)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Safety risks to nearby properties and occupants during operation of the widened road	Unmitigated	Negative	Low	High	Medium	N/A	Medium	Medium	Medium	Medium
	Mitigated	Negative	Low	High	Low	N/A	Medium	Low	Low	Low
Increased noise *(note that this is due to traffic growth not road widening)*	Unmitigated	Negative	Medium	High	High	N/A	Low	High	High	High
	Mitigated	Negative	Low	High	Medium	N/A	Low	Medium	High	Medium
Increased vibrations from heavy vehicles as a result of passing closer to buildings and residences	Unmitigated	Negative	Low	High	Medium	Low	Low	Medium	High	Medium
	Mitigated	Negative	Low	High	Low	Low	Medium	Low	Medium	Low
Damage to adjacent properties due to poorly designed stormwater drainage	Unmitigated	Negative	Low	Medium	Medium	Medium	Medium	Medium	Low	Medium
	Mitigated	Negative	Low	Low	Low	Low	High	Low	Low	Low

Table 19 Assessment of potential impacts of the widening/capacity improvements to the N2 and N3 on cultural heritage resources during construction, operation and rehabilitation (with and without mitigation)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Partial destruction of Umbilo Waterworks, a provincial landmark	Unmitigated	Negative	Low	High	High	High	Low	High	Medium-High	High
	Mitigated	Negative	Low	High	Low	High	Low	High	Low	Medium
Detraction from landscapes and natural features, viz. Paradise Valley Nature Reserve	Unmitigated	Neutral-Negative	Low	High	Low	Low	Medium	Low	Medium	Low
	Mitigated	Neutral-Negative	Low	High	Low	Low	Medium	Low	Medium	Low

Table 20 Assessment of potential impacts of the proposed widening/capacity improvements to the N2 and N3 on the biophysical environment (soils, riparian, wetland, terrestrial natural habitat and fauna) during construction, operation and rehabilitation (with and without mitigation)

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Loss of topsoil	Unmitigated	Negative	Medium	High	High	Medium	Low	High	High	High
	Mitigated	Negative	Low	Low	Low	Medium	Low	Low	Low	Low
Destabilisation of banks, erosion, sedimentation	Unmitigated	Negative	Medium	High	Medium	Low	Medium	Medium	High	Medium
	Mitigated	Negative	Low	Low	Low	Low	High	Low	Low	Low
Loss/ degradation of disturbed grassland/ shrubland/ thicket mosaic	Unmitigated	Negative	Medium	High	Medium	Low	Medium	Medium	High	Medium
	Mitigated	Negative	Low	High	Low	Low	High	Low	High	Low
Loss/ degradation of natural vegetation at Solomon Mahlangu Interchange (including pipeline relocation)	Unmitigated	Negative	Medium	High	High	High	Low	High	High	High
	Mitigated	Negative	Medium	High	Low	Medium	Medium	Medium	High	Medium
Loss/	Unmitigated	Negative	Medium	High	High	High	Low	High	High	High

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
degradation of natural vegetation at Westville Viaduct	Mitigated	Negative	Medium	High	Low	Medium	Medium	Medium	High	Medium
Loss/ degradation of natural vegetation at Roosfontein Nature Reserve	Unmitigated	Negative	Medium	High	Medium	Low	Medium	Medium	High	Medium
	Mitigated	Negative	Low	High	Low	Low	High	Low	High	Low
Loss/ degradation of natural vegetation at Paradise Valley Nature Reserve	Unmitigated	Negative	Medium	High	High	High	Low	High	High	High
	Mitigated	Negative	Medium	High	Low	Medium	Medium	Medium	High	Medium
Loss/ degradation of riparian and wetland areas[22]	Unmitigated	Negative	Medium	High	Medium	Low	Medium	Medium	High	Medium
	Mitigated	Negative	Low	High	Low	Low	High	Low	High	Low
Faunal mortalities and negative effect on local faunal populations due to disturbance, loss of habitat and poaching	Unmitigated	Negative	Medium	Medium	Medium	Low	Medium	Medium	High	Medium
	Mitigated	Negative	Medium	Medium	Low	Low	High	Medium	Medium -Low	Low

[22] Excluding those located in Westville Viaduct, Roosfontein Nature Reserve and Paradise Valley Nature Reserve.

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Cumulative impacts on natural habitat	Unmitigated	Negative	Medium	High	Medium	Medium	Medium	Medium	High	Medium
	Mitigated	Negative	Medium-Low	High	Low	Low	High	Low	High	Low

Table 21 Assessment of potential impacts of the No Development Alternative

Description and Nature of Impact	**Mitigation**	**Nature** (Positive, Negative, Neutral)	**Spatial Extent** (Low, Medium, High)	**Duration** (Very Low, Low, Medium, High)	**Intensity** (Low, Medium, High)	**Irreplaceable Loss of Resources** (Low, Medium, High)	**Reversibility of Impacts** (Low, Medium, High)	**Consequence** (Low, Medium, High)	**Probability** (Low, Medium, High)	**Significance** (Low, Medium, High)
Deferment/avoidance of the negative impacts of construction (social disruption, noise and nuisance, and destruction/disturbance of natural habitat)	Unmitigated	Positive	High	N/A	N/A	N/A	N/A	N/A	High	Low-Medium
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Increased traffic congestion and increased commuter time	Unmitigated	Negative	Medium	High	High	High	Low	High	High	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Decreased road safety	Unmitigated	Negative	Medium	High	High	High	Low	High	High	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Disadvantages to the local, regional and national economy	Unmitigated	Negative	High	High	Medium	High	Low	Medium	High	High
	Mitigated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

10. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, a summary of the environmental impacts of the proposed activity (after mitigation) is provided below.

Effects of the project on the social environment and *vice versa*

This project is located along approximately 21 km of national road within a highly built-up (urbanised) area of the eThekwini Metropolitan Municipality. Furthermore, the project constitutes major roadworks (including widening of bridges and viaducts) to be implemented on national roads carrying high volumes of traffic including heavy vehicles. As such, during the construction period (each contract approximately 4-5 years) there will be numerous negative impacts on the social environment, which will be experienced by both road users and adjacent property owners/occupiers on the affected sections. These will largely be nuisance impacts related to the disruption of traffic flows, road access, increased noise, increased crime risks and general construction related disturbances. Due to the construction and use of temporary of access roads to viaducts, parts of the residential areas of Chesterville and Paradise Valley will experience construction noise, which will need to be carefully managed. The road restrictions will pose higher road safety risks to motorists and pedestrians. Equally, high traffic volumes and space constraints will make it more difficult for contractors to execute construction efficiently.

Existing services in the current road reserve will have to be relocated/realigned and related disruptions may ensue. While all these impacts will be temporary, it can be anticipated with a high level of certainty that thousands of road users and local residents will be affected on a daily basis at varying intensities over a period of several years. If the different construction contracts are not run concurrently, negative cumulative impacts will be reduced. However, this is unlikely to be possible, given SANRAL's programming and budget restraints. While the majority of the road widening will be contained within the existing road reserve, limited sections will require expropriation of adjacent land and, thus, some property owners will lose land. SANRAL has entered into property acquisition processes with affected property owners and fair compensation will be negotiated in line with legislated procedures. Concerning the relocation of the Transnet Fuel Pipeline, minimal disruption to the service is anticipated. This is because only after the new pipeline is laid will the current service be disconnected, with reconnection following immediately thereafter. Transnet Fuel Pipelines will schedule the disconnection/reconnection to minimise disruptions to fuel product supplies to the interior of the country.

It should be noted that in the project area, there are localised informal settlements on the boundary of the national road, with some informal dwellings possibly encroaching into the road reserve. If not managed timeously and sensitively by SANRAL and eThekwini, this issue has the potential to cause delays and attendant negative impacts on the project. Similarly, there are cases of structures and buildings located unlawfully in the road reserve and this matter will need to be dealt with between adjacent property owners and SANRAL. With efficient and proper project management and implementation by SANRAL, as well as the application of the mitigation measures recommended in this report (carried over into the EMPr), **the negative social impacts during construction, while onerous, will be of medium and low significance, with no negative social impacts of high significance.**

The positive impacts of the project on the social environment during operation will be of high significance. They can be predicted with a high level of certainty to benefit thousands of road users on a daily basis through improved road travelling conditions, including improved road safety and reduced travel times.

Negative impacts during operation such as increased traffic noise and exhaust emissions are not a result of the project but rather a result of increasing traffic volumes over time, which will unavoidably affect any occupiers and users of properties adjacent to any national road. In the case of this project, the intensity of impacts will increase where the widened road brings the receivers into closer proximity to the traffic. With respect to emissions, the impacts will be variable, depending on the topography and micro-climate of the location. Indeed, some areas where previously there was congestion may improve with respect to emissions, as free flowing traffic is likely to decrease the concentration of exhaust emissions. With respect to operational noise, it is clear that noise levels are already problematic within generally 300 m from the road and they are predicted eventually (over the next 30 years and in the absence of mitigation) to reach unacceptable levels according to predicted increases in traffic volumes. SANRAL, as the road authority, is tasked with ensuring that the roads can safely and efficiently accommodate traffic growth and to do this, has to widen the road. SANRAL has taken into consideration low noise surfacing in the road design and is in the process of appointing an acoustic specialist to investigate further possible noise control measures over time. Control of the growth of traffic volumes is a broader issue that requires high level interventions such as improved public transport and migration of freight from road to rail. These issues are being addressed but will take time. Ultimately, there must also be an adaptation to prevailing conditions i.e. a change of land use/receptors adjacent to national roads, towards those which are less sensitive to noise. **With mitigation, the negative impacts on the social environment associated with operation of the widened national roads are anticipated to be of low and medium significance.**

Effect of the project on the economic/socio-economic environment

During the construction period, it is definite that some **positive economic/socio-economic impacts of medium significance will accrue to the local and regional community** due to the provision of temporary jobs for semi skilled and unskilled workers, the increased opportunities for local contractors and SMMEs, and a general increase in spending on a wide range of goods and services in Durban and KZN.

There will also be negative economic/socio-economic impacts during the construction period. Economic losses are likely to be incurred indirectly due to poorer access, poorer road and travelling conditions, possible damage to infrastructure and services, expropriation of properties, resettlement processes, etc. The widening of Paradise Valley Viaduct will negatively affect the Paradise Valley Nature Reserve and will require closure of some popular areas to the public, during the construction period, with attendant economic losses for the reserve. Excavations and demolition of redundant road structures will result in large volumes of inert material which will require re-use and/or disposal potentially at a high cost. **With mitigation, the negative economic/socio-economic impacts of the project during construction are anticipated to be of low and medium significance.**

Economic impacts during operation will be positive. The project has SIP2 status (and as such, national priority). The primary motivation for implementing this project is to stimulate economic growth through improved transport infrastructure and an improved logistics/transport corridor between Durban and Gauteng. In conjunction with several other short-, medium- and long-term strategic Government plans and interventions it is, thus, designed to positively impact on the economy of the country. Positive economic benefits will be incurred locally, regionally, provincially and nationally as a result of the improved transport infrastructure. **With good project management and execution, the positive impacts of this project on the economy will be of high significance. The project will also contribute cumulatively with other SIP projects to significantly benefit the country's economy.**

Effects of the project on cultural heritage resources and *vice versa*

During construction, the landscapes of the Paradise Valley Nature Reserve will be temporarily affected and visitor access will be restricted. The construction team will likewise be restricted to a minimal footprint of activity. Potential negative impacts on the historical site of the Umbilo Waterworks, which is a provincial landmark and heritage site along the uMbilo River, and sited within the reserve, can be prevented by barricading the site and preventing access to it. **With mitigation, it is anticipated that the potential impacts on cultural heritage resources will be of low and medium significance.**

Effects of the project on the biophysical environment and *vice versa*

While construction will inevitably impact negatively on natural habitat, it should be noted that this project is an upgrade of an existing road. It is located primarily within the existing road reserve and, furthermore, is within a highly modified urbanised area. The works will, thus, largely affect previously disturbed habitat. Road widening will entail lengthening of existing drainage structures and existing culverts at stream crossings. There are, however, some expanded interchanges, some road sections as well as two required viaduct access roads (each approximately 400 m) which will affect terrestrial and riparian areas outside of SANRAL's road reserve. The project will also affect eThekwini's D'MOSS, which runs adjacent to the N2 and N3 in some areas, as well as the Paradise Valley Nature Reserve. The EAP has worked closely with EPCPD to ensure that the areas of most sensitive biodiversity along the affected sections have been identified and suitable mitigation planned (for implementation in both the design and construction phases). Further interaction with eThekwini Parks and Recreation will be required prior to construction, to co-operate and co-ordinate the works within the Paradise Valley Nature Reserve so as to incur the least impact possible on the reserve as well as its visitors. Once rehabilitation post construction is complete, the impacts during operation of the road will not be significant. **With mitigation, the negative impacts of construction and operation on the biophysical environment (soils and substrates, terrestrial and riparian habitat, as well as associated fauna) will be of medium and low significance.**

Effects of the No Development Alternative

While the No Development Alternative would defer the negative impacts of construction on the social and biophysical environment, as described above, this would be of short term benefit only. In the longer term, the No Development Alternative will result in increasingly congested, unsafe and inefficient national road infrastructure. The negative consequences of not widening and upgrading the national roads, will be severe and will have far reaching impacts on all South Africans and be contrary to the strategic plans of the South African Government. **The negative impacts of the No Development Alternative have been assessed as being of high significance. For these reasons, this alternative is not recommended.**

11. RECOMMENDATION OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

It is the opinion of the EAP that the information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of the activity applied for, viz the proposed capacity upgrades to the N2 (Solomon Mahlangu Interchange (I/C) to south of Umgeni Rd I/C), including expansion of the EB Cloete and Solomon Mahlangu interchanges, and the N3 (EB Cloete to Paradise Valley) including provision of temporary access for construction below the Westville and Paradise Valley Viaducts.

It is the opinion of the EAP that the proposed activity can be authorised, based on the findings of the assessment process and conditional on the following:

- Compliance with the SANRAL EMP and site specific EMPr.
- Financial provision must be made for environmental management of the contract in accordance with the specifications of the Environmental Management Programme and associated subsidiary plans. This includes provision for:
  - Alien plant control additional to SANRAL's standard provisions.
  - Plant rescue and site-specific rehabilitation of specified sensitive areas (as per the rehabilitation plan).
  - Offset mitigation for Crowned Eagles (if required).
  - Public liaison to ensure timeous notification to the public and affected landowners, and particularly regarding requirements in the Noise Management Plan.
- All proposed works in the Paradise Valley Nature Reserve are to be clearly explained to reserve management and strategies agreed upon between reserve management, SANRAL and SANRAL's appointed design engineers. This includes ensuring that good boundary fencing is in place at all times. The outcome of these agreements must be noted in writing and specified as necessary in the contract documents.
- The nesting and breeding status of the resident Crowned Eagle pair at Paradise Valley must be monitored prior to, during and after construction to inform final implementation of mitigation measures.
- SANRAL is to compile a detailed plan for the re-use and/or disposal of demolition rubble and excess inert material, and the relevant specifications are to be included in the contract documents.
- The Umbilo Waterworks must be safely fenced off, barricaded and monitored during construction.
- The Contractor is to submit a detailed noise management plan to the Engineer for approval, for the affected parts Chesterville and Paradise Valley (affected due to viaduct access).
- Crime is rife in eThekwini, and the costs of crime to the victims and to the municipality and province are far reaching. During construction, the integrity of boundary fences of adjacent properties is to be maintained and/or other contingency measures put in place to ensure that security is not compromised due to construction activities. This must be priced by contractors as part of their tenders.
- The planning and management of any potential resettlement of informal settlements is to be done in conjunction with the Human Settlements Department at eThekwini.
- SANRAL is to ensure that close liaison is maintained with the KZN Department of Transport and the eThekwini Transport Authority to ensure that the authorities and public are kept informed of road closures and deviations that affect provincial and municipal roads.
- SANRAL is to ensure that close liaison is maintained with eThekwini's relevant departments, so that eThekwini can inform the public as relevant, regarding affected services and temporary closure of public open space/nature reserves.

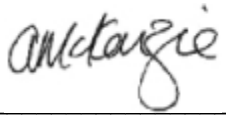
- The relocation of the Transnet Fuel Pipeline must be contingent on the favourable outcome of the hazardous installation risk assessment.

12. CONCLUDING REMARKS

This draft BAR has been submitted to the competent authority, DEA, along with an application for environmental authorisation. This BAR has been made available for public review and will be finalised after consideration of comments. Thereafter, the final report will be submitted to DEA. Registered I&APs will be kept informed of all further submissions and DEA's decision-making with respect to the issuing of an Environmental Authorisation (EA), as well as the appeal procedure which should be followed should a member of the public wish to appeal the EA.

MA McKenzie

NAME OF EAP:



SIGNATURE OF EAP

27 September 2018

DATE

13. REFERENCES

ACER, 2015. Proposed Widening of the N3 Between Durban and Cedara, Kwazulu-Natal. Application for Environmental Authorisation and Water Use License Applications. Record of Meeting & Site Visit with eThekwini to Identify Routes to Access Areas below Paradise and Westville Viaducts. 04 December 2015. ACER (Africa) Environmental Consultants, PO Box 503, Mtunzini, 3867.

ACER, 2016. Proposed Capacity Improvements to National Route 2 (N2) and National Route 3 (N3), Kwazulu-Natal. Terms of Reference for Updates of Existing Specialist Reports. ACER (Africa) Environmental Consultants, PO Box 503, Mtunzini, 3867.

eThekwini IDP, 2011/2012. eThekwini Municipality, Integrated Development Plan 5 Year Plan: 2011 to 2016.

Ground Truth, 2013 (updated 2016). N3 Capacity Improvements from the EB Cloete Interchange to Paradise Valley (M13 East) Interchange. Wetland and Riparian Impact Assessment Draft Specialist Report.

McPherson, S. 2016. SANRAL N3 Viaduct, Paradise Valley, Durban. Impact Assessment-Crowned Eagles. Prepared for ACER (Africa) Environmental Consultants.

Mucina, L. & Rutherford, M. (eds). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19.

Scott-Shaw, C.R and Escott, B.J. (Eds), 2011. KwaZulu-Natal Provincial Pre-Transformation Vegetation Type Map – 2011. Unpublished GIS Coverage [kznveg05v2_1_11_wll.zip], Biodiversity Conservation Planning Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.

Statistics South Africa, 2012. Census 2011 municipal report, KwaZulu-Natal.

APPENDIX A: FACILITY ILLUSTRATIONS

- A1 BA1 Bridge Summary
- A2 BA1 Master Key Plan
- A3 BA1 Solomon Mahlangu IC
- A4 EB Cloete IC
- A5 BA1 Westville IC (Spine Road)
- A6a BA1 Paradise Valley IC - 1
- A6b BA1 Paradise Valley IC - 2

APPENDIX B: SITE PHOTOGRAPHS

- Appendix B N2 N3 BA1 photos

APPENDIX C: ZONATION, PROPERTIES AND ENVIRONMENTAL SENSITIVITY MAPS

- C1 BA1 Land Use and Zonation
- C2 BA1 Properties within 50 m of site.
- C3 BA1 Properties to be acquired.
- C4 BA1 Cultural and Environmental Sensitivities
- C5 BA1 watercourses

APPENDIX D: SPECIALIST STUDIES

- ❑ D1 BA1 Social Impact Assessment.
- ❑ D1a BA1 Social Impact Assessment Specialist Declaration.
- ❑ D2 BA1 & BA2 Heritage Impact Assessment Phase 1.
- ❑ D2a BA1 & BA2 Heritage Impact Assessment Specialist Declaration.
- ❑ D3 Preliminary Geotechnical Report.
- ❑ D4a BA1 Riparian Crossings Overview.
- ❑ D4b BA1 Riparian & Wetland Assessment.
- ❑ D4c BA1 Riparian & Wetland Assessment Specialist Declaration (1).
- ❑ D4d BA1 Riparian & Wetland Assessment Specialist Declaration (2).
- ❑ D5 BA1 Vegetation Assessment.
- ❑ D5a BA1 Vegetation Assessment Specialist Declaration.
- ❑ D6 BA1 Noise Assessment.
- ❑ D6a BA1 Noise Assessment Specialist Declaration.
- ❑ D7 Specialist Terms of Reference for Report Updates.

APPENDIX E: PUBLIC PARTICIPATION DOCUMENTATION & CORRESPONDENCE

Project Announcement

- E1 Adverts, BID & Notices.
  - E1 BA1&2 Site Notices Placed.
  - E1a BA1&2 Advert Citizen (25.07.16).
  - E1b BA1&2 Advert Highway Mail (29.07.16).
  - E1c BA1&2 Advert Mercury (25.07.16).
  - E1d BA1&2 Advert Ilanga (25.07.16).
  - E1e BA1&2 Advert Isolezwe (23.09.16).
  - E1f BA1&2 Advert Daily News (23.09.16).
  - E1g BA1&2 Advert Mercury (23.09.16).
  - E1h BA1&2 Facebook Post on Upper Highway Community Network 05.08.16
  - E1i BA1&2 Background Information Document.
  - E1j BA1&2 Cover Letter Announce to Database.
  - E1k BA1&2 Comment Sheet sent with BID (English).
  - E1l BA1&2 Comment Sheet sent with BID (Zulu).
  - E1m BA1&2 Cover Letter Adjacent Landowners BID (Companies).
  - E1n BA1&2 Cover Letter Adjacent Landowners BID (Private Owners).

- E2 List of Registered I&APs.
  - E2a BA1&2 Database (Company).
  - E2b BA1&2 Database (Surname).
  - E2c BA1 Owners of Property to be acquired.

- E3 Comments and Responses Report.
  - E3a BA1&2 CRR Project Announcement 20 09 18 (Rev 0)

- E4 Proof of Key Stakeholder Notification.
  - E4a BA1&2 Proof of Postage Cover Letter and BID (21.07.16).
  - E4b BA1&2 Proof of Sent Emails Cover Letter and BID (21.07.16).
  - E4c BA1&2 Proof of postage Cover letter & BID (2nd time)12.08.2016
  - E4d BA1&2 Proof of postage Cover letter & BID (2nd time)26.08.2016
  - E4e BA1&2 Proof of postage Cover letter & BID (new Ward Cllr & Taxi Ass)30.08.2016
  - E4f BA1&2 Proof of Postage Adjacent Landowners (02.12.16).
  - E4g BA1&2 Proof of Bulk sms Adjacent Landowners No Address (24.02.17).
  - E4h BA1&2 Proof of Further Bulk sms Adjacent Landowners (09.03.17).
  - E4i Email log N3 BA1&2 - POD Reminder 11 August 2016
  - E4j Proof of SMS for update 2017 (12.02.2018)
  - E4k N3 BA1&2 Project update -11.12.17 Proof of Postage
  - E4l N3 BA1&2 Project update 11.12.17 Proof of email
  - E4m N3 TFP & Richmond Road Update Proof of Email (25.07.2018)

- E5 Proof of Written Notification to Authorities.
  - E5a N3 BA1&2 email log announce 21.07.16 proof authorities & org state
  - E5b N3 BA1&2 Proof of postage Cover letter & BID (2nd time)12.08.2016
  - E5c N3 BA1&2 Proof of postage Cover letter & BID (new Ward Cllr & Taxi Ass)30.08.2016
  - E5d N3 TFP & Richmond Road Update Proof of Email (25.07.2018)
  - E5e N3 BA1&2 Project update 11.12.17 Proof of email
  - E5f N3 BA1&2 Project update -11.12.17 Proof of Postage
  - E5g Email log N3 BA1&2 - POD Reminder 11 August 2016

- E6 Authorities Correspondence and Meetings.
  - E6.1 DWS
    - E6.1a N3 BA1-6 Meeting DWS 10 01 15 (Rev 0)
    - E6.1b BA1&2 Meeting Department of Water and Sanitation (19.07.16).
  - E6.2 EKZNW
    - E6.2a N3 BA1&2 EKZNW comment (Rev 0)
  - E6.3 eThekwini
    - E6.3a Mins Meeting Ethekwini Env Planning 12.03.15(Rev 0)
    - E6.3b eThekwini consolidated comments 29 Sep 16 (Rev 0)
    - E6.3c1 N3 Batch 1 Meeting Human Settlements Ethek 22.09.16 (Rev 0)
    - E6.3c2 Appendix to meeting Human Settlements 22.09.16 (Rev 0)
    - E6.3d N3 Paradise Westville Viaducts Site Visit 4 Dec 2015 (Rev 1)
    - E6.3e BA1 Paradise Valley Nature Reserve 18 06 18 (Rev 0)
  - E6.4 Transnet Fuel Pipelines
    - E6.4a Meeting with Transnet Pipelines

- E7 I&AP Correspondence

- E8 Public Open Days
  - E8a N3 BA1&BA2 Attendance Register - POD1- 16 08 16
  - E8b N3 BA2 Attendance Register - POD2- 15 08 18
  - E8c N3 BA2 Ashley Sports Club Registers (only part of it) 29.08.2018
  - E8d N3 BA2 Ashley Sports Club Registers 29.08.2018

- E9 Additional TFP
  - E9.1 N3 BA1 Flyer TFP relocation (final) 20 06 18
  - E9.2 N3 Batch 1 update letter with TFP, Richmond and Farningham Rd (25 07 18) Final
  - E9.3 N3Batch1 - TFP and Richmond Road Update July 2018 (27.07.18) Proof of Sending

- E10 Additional Richmond Rd
  - E10.1 Richmond RD Area for Knock and Drop (Aug 2016)
  - E10.2 Richmond RD Knock and Drop Package (August 2016)
  - E10.3 N3 batch 1 Flyer Rich Rd Open Day Final (July 2018)
  - E10.4 Richmond RD Knock and Drop Area (July 2018)
  - E10.5 Richmond RD Knock and drop register (30.07.2018)
  - E10.6 N3 Batch 1 update letter with TFP Richmond Farningham Rd (25 07 18) Final
  - E10.7 N3Batch1 - TFP and Richmond Road Update July 2018 (27.07.18) Proof of Sending

APPENDIX F: ENVIRONMENTAL MANAGEMENT PROGRAMME (DRAFT)

- 1 BAs 1-6 EMPr SANRAL Generic EMP (Rev 1)19 09 18
- 2 BA1&2 EMPr Project Specific (Rev 0)19 09 18
- 3 BA1&2 EMPr Appendix A1 Sensitive Areas Rehab Plan (Rev 0)19 09 18.
- 4 BA1 EMPr Appendix A2 Paradise Viaduct Rehab Plan (Rev 0)19 09 18
- 5 BA1&2 EMPr Appendix A3 Westville Viaduct Rehab Plan (Rev 0)19 09 18
- 6 BA1&2 EMPr Appendix B Wetland Riparian Areas Rehab Plan (Rev 0)19 09 18
- 7 BAs 1-6 EMPr Appendix C Erosion & Soil Management Plan (Rev 0)19 09 18
- 8 BAs 1-6 EMPr Appendix D Stormwater Management Plan (Rev 0)19 09 18
- 9 BAs 1-6 EMPr Appendix E Noise Management Plan (Rev 0) 27 09 18
- 10 BAs 1-6 EMPr Appendix F Traffic Management Plan (Rev 0)19 09 18

APPENDIX G DETAILS AND EXPERTISE OF EAP

- ❑ G1 N3 BA1-6 Details of EAP (Rev 2)
- ❑ G2 N3 BA1-6 CV A McKenzie (Mar 2017)
- ❑ G3 BA1 EAP Declaration of Interest 2014 EIA Regs

APPENDIX H DEA CORRESPONDENCE & MEETINGS

- H1 Pre-Application
  - H1a BA1&2 Minutes DEA Pre-Application Meeting 25 07 16
- H2 Application
  - H2a BA1 Application DEA (Rev 1) 20 09 18 final