

FINAL

**ENVIRONMENTAL MANAGEMENT PROGRAMME:
PROJECT SPECIFIC CONDITIONS**

**(PLANNING/DESIGN, PRECONSTRUCTION,
CONSTRUCTION & DECOMMISSIONING)**

FOR THE PROPOSED

**CAPACITY UPGRADES TO THE N3 FROM LYNNFIELD
PARK (KM 30.6) TO GLADYS MANZI (FORMERLY
MURRAY) ROAD (KM 6.1), KWAZULU-NATAL**

DEA REFERENCE NUMBER: 14/12/16/3/3/1/1966

The full EMPr provided for this project comprises SANRAL's standard construction EMP as well as this document (with associated appendices) which address project specific environmental impacts identified in the Basic Assessment process.

Note that compliance with this EMPr will be subject to an audit in terms of Regulation 34 of the Environmental Impact Assessment Regulations (GN 326). Any amendments to this EMPr will be subject to Regulation 35-37 of the Environmental Impact Assessment Regulations (GN 326).

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ADHERENCE TO REGULATORY REQUIREMENTS

Table 1 Required content of an Environmental Management Programme according to GNR 326 (7 April 2017)

| | | Content of Environmental Management Programme according to GNR 326 (7 April 2017) | Reference |
|----|--|--|---|
| 1 | | An Environmental Management Programme must contain the information that is necessary for the competent authority to consider and come to a decision on the application and must include | |
| | a | Details of | |
| | i | The EAP who prepared the EMPr and | Appendix G of this EMPr |
| | ii | The expertise of the EAP, including a curriculum vitae | Appendix G of this EMPr |
| | b | A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description | Refer to SANRAL Generic EMP C1006 and the Basic Assessment Report (BAR5) |
| | c | A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers | Figures 1 & 2, Appendices A1, A2, A3 and B |
| | d | A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including | Refer to SANRAL Generic EMP C1001 and Section 1(d) of this EMPr |
| | i | Planning and design | Section 2 of this EMPr |
| | ii | Pre - construction activities | Refer to SANRAL Generic EMP C1006(a) and Sections 3 and 4 of this EMPr |
| | iii | Construction activities | SANRAL Generic EMP C1006 and Section 5 of this EMPr |
| | iv | Rehabilitation of the environment after construction and where applicable post closure | SANRAL Generic EMP C1006 and Section 6 of this EMPr |
| | v | Where relevant, operation activities | N/A |
| | e | A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d) | Refer to SANRAL Generic EMP C1001, C1006 and Sections 1(d), 2, 3, 4, 5 6 and 7 of this EMPr |
| | f | A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) [and(e)] will be achieved, and must, where applicable, include actions to | |
| | i | avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation | SANRAL Generic EMP C1006 and Sections 2, 3, 4, 5, 6 and 7 of this EMPr |
| ii | comply with any prescribed environmental management standards or practices | SANRAL Generic EMP C1003 and Section 3 of this EMPr | |

| | | Content of Environmental Management Programme according to GNR 326 (7 April 2017) | Reference |
|--|-----|--|--|
| | iii | comply with any applicable provisions of the Act regarding closure, where applicable | N/A |
| | iv | comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable | N/A |
| | g | the method of monitoring the implementation of the impact management actions contemplated in paragraph (f) | SANRAL Generic EMP C1010 and C1012 Section 8 of this EMPr |
| | h | the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f) | SANRAL Generic EMP C1010 and C1012 Section 8 of this EMPr |
| | i | An indication of the persons who will be responsible for the implementation of the impact management actions | SANRAL Generic EMP C1010 and C1012 Section 8 of this EMPr |
| | j | The time periods within which the impact management actions contemplated in paragraph (f) must be implemented | SANRAL Generic EMP C1010 and C1012 Section 8 of this EMPr |
| | k | The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f) | SANRAL Generic EMP C1010 and C1012 Section 8 of this EMPr |
| | l | A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations | SANRAL Generic EMP C1010 and C1012 Section 8 of this EMPr |
| | m | An environmental awareness plan describing the manner in which | SANRAL Generic EMP C1005 |
| | i | The applicant intends to inform his or her employees of any environmental risk which may result from their work; and | SANRAL Generic EMP C1005 |
| | ii | Risks must be dealt with in order to avoid pollution or the degradation of the environment; and | SANRAL Generic EMP C1005 |
| | n | Any specific information that may be required by the competent authority. | N/A |

1. INTRODUCTION

(a) Description of documents included in the Environmental Management Programme (EMPr) for this project (Basic Assessment 1)

This document contains project specific conditions which are drawn from the findings of the Basic Assessment undertaken and applicable to the following national road upgrades:

Proposed Capacity Upgrades to the N3 from Lynnfield Park (Km 30.6) to Gladys Manzi (formerly Murray) Road (Km 6.1), Kwazulu-Natal (Figure 1).

This document is to be read with the South African National Roads Agency SOC Limited (SANRAL) Environmental Management Plan.

In addition, the following Appendices to this EMPr are to be complied with:

- EMPr Appendix A: Sensitive Areas & Vegetation Rehabilitation Plan (with plant rescue, plant translocation, alien invasive plant control, erosion control and soil management guidelines).
- EMPr Appendix B: Wetland and Riparian Areas Rehabilitation Plan.
- EMPr Appendix C: Erosion and Soil Management Plan.
- EMPr Appendix D: Storm Water Management Plan.
- EMPr Appendix E: Noise Management Plan.
- EMPr Appendix F: Transportation and Traffic Management Plan.

Note that compliance with this EMPr will be subject to an audit in terms of Regulation 34 of the Environmental Impact Assessment Regulations (GN 326). Any amendments to this EMPr will be subject to Regulation 35-37 of the Environmental Impact Assessment Regulations (GN 326).

(b) Details of the Environmental Practitioner

This EMPr was prepared by Ms A Mckenzie and Mr G Churchill, ACER (Africa) Environmental Consultants. Details and CVs are provided in Appendix G.

(c) Aspects of the activity covered by the EMPr

The suite of documents comprising the EMPr, as listed above, cover the aspects and impacts associated with road construction, which are listed in C1006 of SANRAL's generic EMP, which forms part of the suite of documents described in (a) above. The extent of the project is shown in Figure 1. Specific areas of sensitivity are shown in specific figures in the relevant appendices to this document.

BASIC ASSESSMENT 5: PROPOSED CAPACITY UPGRADES TO THE N3 FROM LYNNFIELD PARK TO MURRAY ROAD

**Proposed widening of N3 from
Lynnfield Park (km 0.8) I/C to Murray Road / Gladys Manzi Road (km 6.0)**

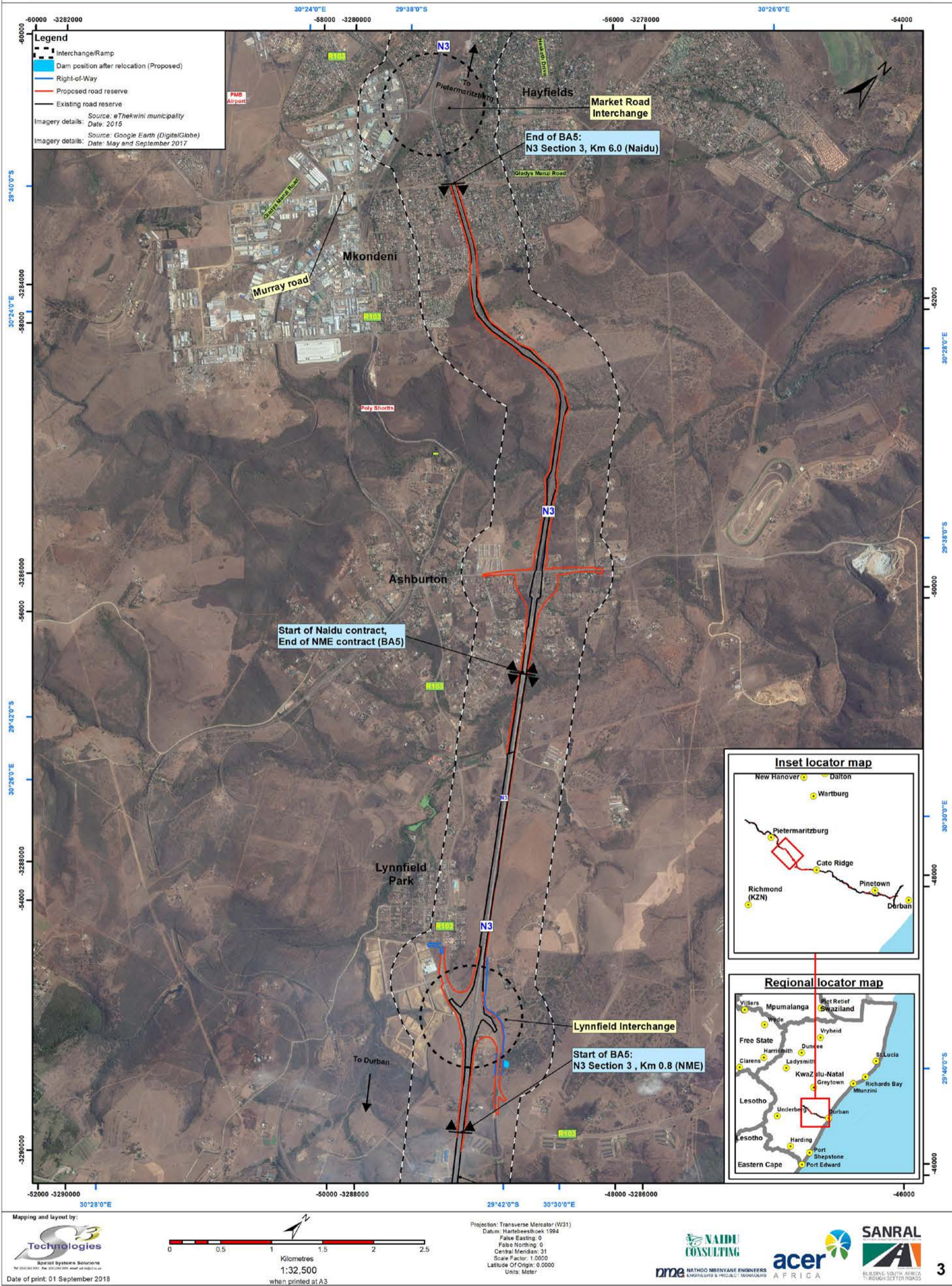


Figure 1 Location of proposed capacity upgrades to the N3 from Lynnfield Park to Gladys Manzi Road

(d) Desired objectives/outcomes of environmental management of this project

- Protect biodiversity and minimise loss of natural habitat.
- Prevent/minimise damage to and loss of soils.
- Prevent/minimise pollution of soils, water and air.
- Prevent damage to cultural heritage resources.
- Minimise social impacts such as those arising from dust and noise.
- Minimise relocation impacts.
- Minimise disturbance of infrastructure and activities of affected parties (adjacent properties, road users).
- Maintain good communication with affected parties.
- Minimise health and safety risks (including crime).

(e) Scope of construction work/project footprint

Road sections to undergo construction are:

- N3 from the south of Lynnfield Park I/C to south of the Ashburton I/C.
- N3 from the south of Ashburton I/C to Gladys Manzi Road.

Within these sections, the major interchanges¹ to be upgraded are:

- Lynnfield Park (N3/Wally Hayward Drive).
- Ashburton (N3/Pope Ellis Drive).

In addition, this project requires:

- Realignment of sections of an Umgeni Water Pipeline.
- Proposed sleeve widening of a section of Transnet's NMPP Multifuel Pipeline.
- Realignment and widening of the R103 within the current road reserve.
- Relocation/widening of two intersections with the R103, MR477 and iBhubesi.
- Relocation/realignment of sections of farm access (gravel) roads.

¹ Note that the reconstruction of the Gladys Manzi bridge forms part of a separate contract.

Co-ordinates of the existing and proposed linear road sections affected by the project

| | Latitude (S) | Longitude (E) |
|---|---------------------|----------------------|
| N3 from south of Lynnfield I/C to south of Ashburton I/C (approx 4.6 km) | | |
| Starting point of the activity | 29°41'58.67"S | 30°29'21.49"E |
| Middle/additional point of the activity | 29°40'53.16"S | 30°28'24.53"E |
| End point of the activity | 29°39'59.98"S | 30°27'39.40"E |
| Access Road 1 to Martin Bekker Property (approx 0.29 km) | | |
| Starting point of the activity | 29°41'36.69"S | 30°29'15.98"E |
| Middle/additional point of the activity | 29°41'26.54"S | 30°29'7.66"E |
| End point of the activity | 29°41'13.03"S | 30°28'42.55"E |
| Access Road 2 to Dave Rigby's and other properties (approx 1.27 km) | | |
| Starting point of the activity | 29°41'36.69"S | 30°29'15.98"E |
| Middle/additional point of the activity | 29°41'35.60"S | 30°29'13.64"E |
| End point of the activity | 29°41'32.41"S | 30°29'10.77"E |
| Ibhubesi Road 1 (approx 0.310 km) | | |
| Starting point of the activity | 29°41'19.87"S | 30°28'29.11"E |
| Middle/additional point of the activity | 29°41'23.14"S | 30°28'25.22"E |
| End point of the activity | 29°41'27.05"S | 30°28'22.92"E |
| Ibhubesi Road 2 (approx 0.09 km) | | |
| Starting point of the activity | 29°41'26.37"S | 30°28'23.96"E |
| Middle/additional point of the activity | 29°41'26.43"S | 30°28'21.26"E |
| End point of the activity | 29°41'27.98"S | 30°28'18.06"E |
| MR477 (approx 0.09 km) | | |
| Starting point of the activity | 29°41'41.23"S | 30°29'20.61"E |
| Middle/additional point of the activity | 29°41'40.87"S | 30°29'24.10"E |
| End point of the activity | 29°41'41.35"S | 30°29'26.75"E |
| N3 from south of Ashburton I/C Gladys Manzi Road (approx. 5.2 km) | | |
| Starting point of the activity | 29°39'59.88" | 30°27'39.64" |
| Middle/additional point of the activity | 29°38'51.88" | 30°26'42.30" |
| End point of the activity | 29°38'25.56" | 30°25'16.32" |

Co-ordinates of the existing interchanges to undergo improvements

| Interchanges | Latitude (S) | Longitude (E) |
|--------------------------------------|---------------------|----------------------|
| N3/Wally Hayward Drive Lynnfield I/C | 29°41'28.35"S | 30°28'54.38"E |
| MR477/R103 Intersection | 29°41'41.02"S | 30°29'21.97"E |
| N3/Pope Ellis Drive Ashburton I/C | 29°39'34.05" | 30°27'17.85" |

2. ENVIRONMENTAL MANAGEMENT PLANNING, DESIGN & BUDGET CONSIDERATIONS

These considerations must be taken into account by SANRAL during the design stage. Where applicable, provision must be made in the tender documents for any aspects to be taken forward by the Contractor.

(a) River and wetland crossings

- The crossings should be designed to ensure that flow patterns along the stream/river channel are not altered or diverted which could potentially result 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.
- The Mpushini River crossing is considered a sensitive area. Clearing of a track parallel to the N3 and through the floodplain must be avoided. Rather, temporary access for construction to the Mpushini River must be designed from the N3 embankment where least environmental damage can be caused. Originally, it was expected that a new access road to the river would be required from below, parallel to the N3, to gain access for construction at the Mpushini bridge. This would impact negatively on a large area of vegetation associated with the river and floodplain. However, it was subsequently advised by the engineers that this will not be necessary and that access to the construction area required for the Mpushini bridge can be gained directly from the N3, using temporary gravel fill to enable excavation plant to move down the N3 embankment to the foundation positions of the extended bridge. This material is to be removed after the completion of construction and the area rehabilitated. No foreign material will be required to be deposited inside the river flood plain. The deck construction will be environmentally friendly, with no supports or staging required for the deck construction. The deck will consist of prefabricated concrete beams, placed in position from above using a crane. The Contract documents are to specify the need to bring the access track from the N3 and not along the river floodplain. Rehabilitation of this area is addressed in Appendix A of this EMPr (Sensitive Areas Rehabilitation Plan).

(b) Informal Settlements, land acquisition and relocations

- No informal settlements were identified at the time of the study, for the section of road between Lynnfield Park and Gladys Manzi Road. However it must be taken into consideration that, where informal settlements are very near to and/or encroaching over the road reserve boundary, there is a high risk of increased settlement prior to construction taking place and these areas should be fenced off by SANRAL as soon as possible where they are identified, to prevent further encroachment.
- 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 gain. SANRAL and the Human Settlements Department at eThekweni must formulate a plan of action that ensures the correct channels and procedures are followed.
- Land acquisition negotiations must be conducted timeously and professionally and in accordance with SANRAL's policies and the country's legal framework.

(c) Pedestrian Access

- There may be road sections which have formal pedestrian access that will be disrupted during construction. SANRAL (or their appointed engineers) must, in the planning stage, identify these areas and ensure that alternative and practical access can be made available prior to closure of pedestrian access ways during construction. The affected pedestrian access must be reinstated post construction.

(d) Unlawful structures in the road reserve

- SANRAL must identify any existing unlawful structures in the road reserve where widening is to take place and notify the property owner concerned. Property owners will not be compensated for the loss of unlawful building or structures in the road reserve. The owner will be responsible for the cost of demolition or removal of these structures.

(e) Noise reduction

- Noise levels already exceed regulated standards, generally within about 300 m either side of the national road investigated in this project. With increasing traffic volume and loads over time, noise will increase. SANRAL should, therefore, build noise reduction measures into the road design (mainly road surfacing and where feasible, both practically and economically, barrier walls).
- Refer to Appendix E: Noise Management Plan for further mitigation measures.

(f) Vibration control

- Vibrations experienced by close neighbours to the national roads should be taken into account in road design, to ensure that the risk of undue vibration is minimised².

(g) Funding for rehabilitation of natural habitat/biodiversity

- Widening of the N3 will negatively affect areas which are valuable in terms of their protected area status, their biodiversity priority and/or as ecological linkages. Sufficient funds are to be set aside for rehabilitation of these areas post construction, to help limit the impacts of widening. Sensitive areas may have additional rehabilitation requirements or offsets. Refer to Appendix A of this site specific EMP, for site specific rehabilitation measures.

(h) Funding for alien plant control

- Linked to (g) above, sufficient funds are to be set aside to ensure that alien plants are properly controlled for a sufficiently long period after the Contractor has left the site³, because without repeated follow-up operations, alien plant control as part of rehabilitation is unlikely to be successful. Follow up operations at 3 month intervals should be done after the completion of construction. This will give the natural vegetation a chance to establish in disturbed areas and keep the alien vegetation out (time and effort to do this should decrease as time goes on, if done correctly). It is likely that a 2 year period will be required overall.

² Roads are constructed on a stable platform, which should not pose a vibration problem. This is taken into account in design.

³ SANRAL's routine maintenance team generally undertakes ongoing alien plant control.

(i) 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 an expectation created by government for individual and business work opportunities to be provided. 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 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. SANRAL should conduct open and transparent procurement in accordance with procurement policies and encourage appointed Contractors to make use of both local and non-local sub-contractors.

(j) Relocation of Services

- SANRAL and Service Owners are to engage regarding services relocations and abide by any conditions stipulated by either party.

3. ENVIRONMENTAL AUTHORISATIONS AND PERMITS

(a) Environmental Authorisation

- The application process for Environmental Authorisation, in terms of the 2014 Environmental Impact Assessment (EIA) Regulations (as amended) under the National Environmental Management Act (Act No 107 of 1998) has been undertaken by SANRAL. The Environmental Authorisation (EA) is to be appended to this EMPr and relevant conditions of the EA are to be included in the project specific conditions to be adhered to by the Contractor.

(b) Protected Areas Permit

- In terms of Section 50 (5) of the Protected Areas Act (Act No 57 of 2003) no development, construction or farming may be permitted in a nature reserve without the prior written approval of the management authority. Should any construction take place within the Mpushini Protected Area, SANRAL must obtain such approval in writing from the management of the reserve.

(c) Heritage permits

- Various structures associated with the Bellevue Farmstead, located at 29 38' 46" S 30 26' 13" E, have heritage significance for their historical, architectural, social and aesthetic values and landmark qualities. Two structures of the Bellevue Farmstead are located less than 20 m from the existing road reserve and 15 m from the proposed road upgrade. The road design has been modified to reduce the extent of land required in the vicinity of Bellevue Farmstead, to avoid impacting directly on structures. A destruction permit from Amafa to destroy any part of these structures is therefore not required. However, care will have to be taken during construction to avoid any impacts from construction activities.

No other heritage resources were identified within the project footprint. However, in the event that such indicator(s) of heritage resources are identified, various actions are required to be undertaken, as described in Section 5 (u).

(d) Water Use Authorisations

- The required submissions to the Department of Water and Sanitation for the following water uses (in terms of Section 21 of the National Water Act No 36 of 1998) will be undertaken by SANRAL on the Contractors behalf:
 - Taking water from a water resource (if applicable).
 - Impeding or diverting the flow of water in a water-course (Section 21 (c)).
 - Altering the bed, banks, course or characteristics of a watercourse (Section 21 (i)).
- No construction is to commence until the relevant authorisations have been issued by the Department of Water and Sanitation. Note that in terms of GN 509 of 2016 regarding Section 21 (c and i) water uses, "all maintenance of bridges over rivers, streams and wetlands and new construction of bridges done according to SANRAL Drainage Manual or similar norms and standards" fall under the General Authorisation. SANRAL must register these water uses with the Department of Water and Sanitation.
- The Contractor and SANRAL are to abide by the conditions of the above water use licenses/ general authorisations and registrations, as applicable.

(e) Protected indigenous plants and trees - application for permits

- The Contractor is to ensure that the required permits are obtained prior to vegetation clearance.
- Where construction/operation may impact on plants designated as specially protected under the Natal Nature Conservation Ordinance (15 of 1974), an application must be submitted to EKZNW to clear or translocate these plants as part of the plant rescue operation (refer to Appendices A and B).⁴
- Where construction/operation may impact on plants listed as threatened or protected species (TOPS) under the National Environmental Management Act: Biodiversity Act, 2004 (10 of 2004), an application must be submitted to EKZNW to translocate these plants as part of the plant rescue operation (refer to Appendices A and B).
- Where construction/operation may impact on natural forests or individual trees protected in terms of the National Forests Act, 1998, an application must be submitted to the Department of Agriculture, Fisheries and Forestry (DAFF).
 - For this application process, once an Environmental Authorisation (and BAR and EMPr), and more accurate layouts of access routes/footprints are available, a botanist/ecologist will need to quantify the number, species and characteristics of protected trees affected, and complete an application form (no payment to DAFF required). The applicant's representative will need to sign the form and provide a copy of their identity document. Once the application has been submitted, the relevant DAFF official will then arrange a site visit, if necessary. Generally, the permit processing timeframes are about 3 months, and the permit is generally valid for a period of 2 years from the date of issue.

(f) Listed Alien Invasive Plants - permits in terms of regulations under the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

- A list of invasive alien plant species is printed in GN 78 of 214, listing Categories 1a, 1b, 2 and 3, in terms of which certain restricted activities are prohibited in terms of Section 71A(1); Exempted in terms of Section 71(3) or Require a permit in terms of Section 71(1).
- SANRAL has a long-term routine road maintenance plan which includes removal of undesirable vegetation, in terms of best practice and in accordance with the intention that declared invader species should be eradicated. Alien species are removed by SANRAL on an on-going basis in their road reserves, in response to site-specific conditions during construction and operation in accordance with the "SANRAL Plan for Monitoring Control and Eradication of Alien and Invasive Species, which was prepared in accordance with the NEMBA Regulations and submitted previously to DEA.

(g) Waste - permits in terms of regulations under the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008)

- No activities requiring permits with respect to the storage or disposal of waste are proposed.

(h) Emissions- permits in terms of regulations under the National Environmental Management: Air Quality Act (Act No 39 of 2004)

- No activities requiring permits with respect to air emissions are proposed.

⁴ There are several protected species of *Aloe* which occur adjacent to the N3 in the project area.

4. ENVIRONMENTAL MANAGEMENT PRE-CONSTRUCTION

(a) Scheduling

- 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. (Note 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).

(b) Employment creation for local people

- Ensure that, wherever possible, use of local labour is maximised.
- Sub-contractors should be sourced locally and nationally where the requisite skills exist.
- Wherever feasible, employ local service providers.

(c) Plant (Botanical) rescue and relocation prior to construction

- It is the Contractor's responsibility to ensure that plant rescue is undertaken under the direction of an ecologist/botanist prior to construction, in accordance with the plant rescue guidelines provided in Appendices A and B of this EMP. Areas of particular importance for plant rescue are located in the following plant communities on site:
 - Xeric Cliff Community near Ashburton I/C.
 - Riparian thicket at Mpushini River.
 - Wetland and Riparian communities.
 - Various *Aloe* species that are present in some of the vegetation flanking the N3, are specially protected and may require relocation.
- Note that because the visibility of herbaceous plants varies depending on flowering season, an ecologist/botanist should visit the site during spring and summer to identify any additional plants of high conservation value, so that these plants can be marked and transplanted prior to construction commencing.
- The Contractor must make provision in his schedule, for the time required by the specialist to come out and demarcate or mark up any vegetation requiring relocation, and to effect the relocation prior to vegetation clearance on site.
- Where rescued plants cannot be transferred to new areas of road reserve, they should be offered to the Mpushini Protected Environment.

(d) On site plant (Mechanical)

- The Environmental Authorisation for this project does not make any provision for onsite plant. No plant may be established on site. Should the Contractor require plant for asphalt, concrete batching etc, he shall be responsible for identifying and procuring land on which to establish the plant and for obtaining all the required legal permits and environmental authorisations prior to commencement of construction.

(e) Materials, quarries and borrow pits

- The Environmental Authorisation for this project does not make any provision for mining of any nature. The Contractor shall acquire material from legal commercial sources, or approved sources provided by SANRAL.

(f) Contractors camp and stockpile areas

- Contractor's camps and stockpile areas are to be sited within existing disturbed areas and at least 100 m from areas of sensitive natural vegetation, wetlands, streams and river banks.
- Clearing of natural forests for construction camp sites is not permitted.
- No staff may be housed on site. Only security guards may remain on site at night.
- Open fires are not permitted anywhere on site.

(g) Planning for disposal of demolition rubble

- The Contractor will be dealing with large volumes of demolition waste and must ensure the disposal is properly planned for. Demolition rubble from bridges and pavements etc (inert waste) may not be disposed of on site, unless it is used as fill in earthworks or in layerworks and ancillary works. Excess inert material must be disposed of at an authorised landfill site or may be sold to outside parties provided it is used for fill. Where the design for concrete structures allows use of crushed concrete as aggregate, the necessary approval shall be obtained for such crushed concrete aggregate.

(h) Water quality and quantity

- Contractors must liaise with the municipality prior to construction to ensure sufficient potable water will be available when construction commences.
- Prior to construction, the Contractor must check and monitor water quantity and quality at any abstraction points that have been authorised by the Department of Water and Sanitation, in case alternatives need to be found.
- Contractors should use recycled water where possible.

(i) Environmental Awareness Plan

- Please refer to the SANRAL Generic EMP C1005 (Training) for specifications on induction and environmental awareness training.

5. ENVIRONMENTAL MANAGEMENT DURING SITE ESTABLISHMENT AND CONSTRUCTION

(a) Site access and working areas

- Activities must cover as small a working area as is feasible to minimise disturbance of vegetation on site. Demarcated buffers must be established around open water, aquatic habitats, riparian and wetland vegetation and riparian banks that are not within the footprint of the works.
- The Contractor shall use existing roads for site access.
- In the exceptional cases where construction of additional access tracks or widening of existing access tracks is required (e.g. near sensitive environments), the following applies:
 - Adequate drainage (mitre drains) is to be constructed at regular intervals, in accordance with the local topography, to minimise soil erosion potential. Alien plant control must also be undertaken along these access tracks.
 - Soil compaction is to be minimized by keeping vehicle and construction plant access ways and parking areas to a minimum and making use of existing compacted/hardened surfaces wherever possible.
 - Where drainage lines or stream crossings are unavoidable along temporary access routes, 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 must be designed to prevent concentration of flows, and to maintain natural flows as free flowing as possible.
 - Where water for construction is to be sourced from local water bodies, then this must occur at existing disturbed sites, due to potential damage caused by temporary access roads and water tankers.
 - Temporary access tracks are to be rehabilitated as quickly as possible after construction ceases by removing excess imported material, ripping compacted soils, reinstating natural ground levels, implementing soil erosion controls and re-establishing a dense cover of indigenous vegetation appropriate to the plant community in which the road is located.
- When clearing/working in riparian and wetland zones:
 - The Contractor must supply a method statement, with input from an ecologist, outlining the intended approach to clearance at riparian and wetland crossings, in accordance with the specifications below.
 - Work is to be timed for the winter low flow period (for riparian zones).
 - The width of temporary crossings is to be reduced to the bare minimum required for construction.
 - Where dewatering of silt laden water is required at excavations, this water must not be pumped directly into streams and natural water bodies. Separate collection areas/sumps should be created in existing disturbed areas where this water can infiltrate into the surrounding soil.
 - Temporary crossings are to be rehabilitated as quickly as possible:
 - Temporary coffer dams or diversion works⁵ must be carefully removed from the riparian zone once construction is complete.
 - For riparian crossings, the original profile and cross-section of the channel is to be restored, so as not to interfere with the hydrology of the downstream environment. Use the original soil excavated from the channel bank or channel bed, as appropriate.

⁵ Note that a water use license from Department of Water Affairs may be required for diversions and coffer dams.

- For wetlands, to maintain the hydrological regime and physio-chemical properties of wetland soils, the original topography and soil profile must be carefully restored. No unnatural depressions or hummocks of soil should remain.
- Natural re-colonisation of hydromorphic soils is usually rapid; however, where this process needs to be sped up, replanting can be done with locally occurring hygrophilous reeds, sedges and hygrophilous grasses.

(b) Communication with affected landowners/occupiers and conduct with respect to private property

- The Contractor shall ensure that he is provided by SANRAL, with all relevant contact details of the adjacent affected property owners/occupiers well in advance of construction commencing.
- The Contractor shall ensure that affected property owners/occupiers are informed with prior notice as to when construction will start.
- The extent of the project boundary must be clearly demarcated to ensure that no work spills over onto private property that has not been acquired by SANRAL for road reserve.
- Where ever possible a 30 m buffer must be implemented between the works area and the Mpushini Nature Reserve boundary.
- Private property outside of the works area shall be regarded as a No-Go area, unless permission has been obtained from the land owner.
- The Contractor is to ensure that construction teams are clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on the body.
- The Contractor shall ensure that affected property owners/occupiers are informed with prior notice of any activities that may occur outside of normal working hours and/or activities which may result in excessive noise (e.g. blasting).
- The Contractor shall ensure that all staff are briefed, as to conducting themselves with due consideration and respect for people and property. Any disregard to other people's property and privacy could be regarded as a reason for either instant dismissal or serious reprimand.
- The Contractor shall maintain good communication with affected landowners/occupiers throughout the project lifecycle.

(c) Communication with public road users

- The Contractor will notify the public regarding construction activities, by way of construction contract boards posted on either end of the road section under construction. The boards will also list 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 are to be communicated via media advertisements as well as additional construction information boards.

(d) Services and infrastructure in and adjacent to the road reserve

- Existing fences /walls between the N3 and neighbouring properties are to be protected from construction damage.
- Where existing fences/walls need to be removed, the Contractor is to provide a new fence/wall to the same standard, unless agreed differently with the landowner. .
- Any affected banks in and adjacent to the road reserve must be stabilised to the required geotechnical standard.
- Relocation of services will be undertaken as per agreements with the service providers.

- Should demolition of unlawful structures be required, this should be discussed with the owner(s) beforehand. SANRAL will not compensate for structures illegally located in the road reserve.

(e) Safety and Security

- 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 prior to the commencement of construction, or temporary fencing (or other contingency measures e.g. guards) arranged until the permanent structure can be put in place.
- Construction teams must be clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on the body.
- The Contractor is to 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.

(f) Prevention of 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.

(g) Traffic Management Plan

- A Traffic Management Plan must be adhered to. Refer to Appendix F of this EMP. When the contract is awarded, the Contractor is to submit a detailed and finalised road traffic management plan to the Engineer for approval.
- The Contractor must ensure that provision is made for access by emergency vehicles if required.
- The Plan is to include specifications for the management of pedestrian access.

(h) Road safety

- The Contractor is to submit the final detailed Road Safety & Traffic Management Plan to the Engineer for approval (see above) prior to construction commencing.
- All staff and visitors on site are to undergo a road safety briefing.
- All staff and visitors on site are to wear suitable Personal Protection Equipment (PPE) at all times.
- Suitable signage warning road users of construction activities are to be erected.

(i) Preventing spread of disease

- All construction staff must go through an HIV and AIDS education awareness programme as part of induction, prior to the project commencing.
- Education material regarding general hygiene, HIV and AIDS, and sexually transmitted diseases should be readily available to staff.
- Condoms should be readily available to staff.

(j) Noise control during construction

- Noise control, noise monitoring and communication with affected receivers is to be undertaken in accordance with the Noise Management Plan in Appendix E of this EMPr.
- The Contractor shall ensure that all site personnel have read and understood the Noise Management Plan.
- Construction workers should be made aware that they are not to make excessive noise (e.g. shouting, hooting).
- Normal working hours and working days are sunrise to sunset Monday to Saturday. However, it is understood that some night work and work over public holidays and Sundays will be required and this must be timeously and clearly communicated to affected parties.
- No machinery/equipment which may lend itself to creating noise nuisance, to be utilized on Sundays and Public Holidays.
- All employees including management must undergo environmental noise induction and awareness training.
- Reduce fixed point noise sources by the use of screening barriers where practically and economically feasible.

(k) Complaints register

- The Contractor shall hold a complaints register on site, record any complaints received and forward such complaints to the ECO on a regular basis.

(l) Vegetation clearance

- Plant rescue is to precede clearance.
- Clearance and cutting back of natural vegetation is to be kept to a minimum.
- The disturbance of natural forest vegetation must be restricted to the development footprint and working area.
- All forested areas that do not form part of the development footprint as well as the working area and do not interfere with the normal functioning of the road must be avoided and retained even if they form part of the road reserve.
- Where construction/operation may impact on protected plants, the necessary permits (refer to section 2c above) must be obtained.
- Refer to Appendix A of this EMPr for a full description of specific sensitive areas and recommendations for plant rescue and rehabilitation of vegetation at these sites.

(m) Protection of soils and control of soil erosion

- Topsoil is to be removed separately to subsoil and be safely stockpiled for use in rehabilitation.
- Topsoil stockpiles should not be handled/ moved, and should be kept free of alien invasive plants.
- Exposed soils, cut and filled surfaces to be adequately safeguarded as per recommendations of the geotechnical report.
- All new fill embankments are to be constructed to an appropriate stable batter to rule out the potential for large-scale instability and the associated environmental implications.
- The control of soil erosion and siltation associated with construction and operation is important at all locations on site, and particularly adjacent to wetlands, drainage lines and streams/rivers. Both temporary and permanent soil erosion control measures must be used during the construction and operation phases.

- Large sediment loads must be prevented from entering drains and watercourses.
- Where there is potential for erosion, energy dissipaters must be installed at the end of drainage structures associated with the upgraded highway to reduce the velocity and erosive force of the exiting water. Energy dissipaters could range from reno mattresses to stilling chambers through to planting of indigenous vegetation buffers which may be better able to diffuse high-velocity runoff.
- Any trenches associated with the upgrade are to be reinstated to a convex (as opposed to flat or concave) surface to prevent the channelling of any surface runoff as the soil settles/compacts over time.
- Any earth-worked areas, which may lay bare for extended periods, should be temporarily grassed.
- During rehabilitation, prompt and progressive reinstatement of bare areas is required. The topsoil layer is to be replaced on top during reinstatement.
- Bare surfaces should be grassed as soon as possible after construction to minimise time of exposure. Locally occurring, indigenous grasses should be used. Alien invasive grasses such as *Pennisetum clandestinum* (Kikuyu) must not be used.
- Erosion that takes place during rainfall events must be rehabilitated immediately.
- Soil erosion controls must be inspected and maintained on a regular basis during construction.
- Refer also to Appendices A and C of this EMPr.

(n) Control of stormwater

- The Contractor shall submit a detailed stormwater management plan for approval by the engineer. Refer also to the Storm Water Management Plan in Appendix E.

(o) Earthworks and crossings in riparian and wetland areas

- Earthworks associated with river crossings must take place as far as possible in the winter months as this is the driest period for this region.
- 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.
- 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.
- “Trench-breakers”, which are in-trench barriers, should be installed within any trench excavations to and minimise the accumulation of surface runoff water from upslope areas running down the trenches.
- During earthworks, the top 50 cm of the wetland/riparian topsoil must be removed and stockpiled, to be replaced once activities have been completed. This is to maintain the existing seed bed and soil profiles as best as possible.
- Excavated soils should be placed on the upslope side of excavated areas, to allow the excavated area to intercept any surface water runoff from entering the excavated areas minimizing the risk of the loose soils 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.
- Each construction working area must be clearly demarcated.
- Vehicle access routes must not pass through watercourses, wetlands and any areas of sensitive vegetation. Where access routes have to cross wetland communities these must be single track entry and exit routes. The ECO must be notified of any spills or leakages in these sections. These spills/leaks should be treated with hydrocarbon degrading bacteria (products such as or similar to biologX or Oil Spill Gobbler™).

- 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 area disturbed at any one time.
- Vehicle and personnel traffic must be minimised and must strictly be kept to within designated working areas.
- Strict buffers must be established around all open water, aquatic habitats, riparian and wetland vegetation and riparian banks outside of necessary access routes and designated work areas. 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 authorities.
- The buffers, outside of necessary access routes and designated work areas, become strict no-go areas where habitats must not be disturbed and with personnel and machinery not permitted entry unless directed by the Contractor's Environmental Officer, during rehabilitation.
- No herbicides may be used on indigenous vegetation, particularly within proximity to wetland and riparian areas.
- Storm water control measures must be implemented where required, with all storm water 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 (e.g. agricultural/wetland engineer) who must also provide advice as to size and maintenance of the ponds.
- Fuel and hazardous material storage, handling and refuelling areas must not fall within the 1:100 year flood line of riparian / wetland habitat and buffer zones. Such storage areas must be located 100m (horizontal distance) 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.
- No eating or cooking and cleaning of persons, utensils or equipment may take place near rivers, streams or watercourses.
- Appropriate provision must be made for ablutions during construction. If chemical toilets are used, they must be well serviced regularly, and must be placed on level surfaces well away (at least 40 m) 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.
- Refer also to Section 8 of the Wetland Rehabilitation Plan (Appendix B).

(p) Protection of vegetation and fauna

- 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.
- Collection of medicinal plants, firewood, building wood, and poaching within areas of natural vegetation is prohibited. Fishing must be strictly prohibited in and around the working areas.

- 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.
- Where protected or otherwise important fauna and flora are encountered and require removal, the ECO should be consulted and the individuals transferred to a nearby 'safe', similar habitat.
- 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.
- If snakes are encountered, they are not to be killed. There are local snake experts who can be contacted to remove and relocate snakes (e.g. Pat McKrill 083 303 6958 or Zane Barnard 082 850 7713 who can be contacted to remove snakes in the Cato Ridge, Camperdown, Ashburton and Drummond areas).
- No project workers 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.
- Natural water bodies may not be used to wash out construction vehicles, concrete mixers, or for domestic ablutions.
- No dumping of solid waste or domestic ablutions is to occur within areas of natural vegetation and adequate ablutions must be provided for staff.
- Adequate precautions must be taken to ensure that fires are not started as a result of the construction team.
- 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.
- All drivers must obey the speed limits and be on the lookout for animals particularly in the vicinity of any sensitive areas, so that collisions with animals can be avoided.
- Monitoring of impacts on fauna must be included in environmental compliance monitoring.

(q) Control of Alien invasive plants

- 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 policy and the guidelines provided in the rehabilitation plans contained in section 6 of Appendix A to this EMPr.
- Additional effort (follow ups) will be required in sensitive areas .Refer to the rehabilitation plans contained in Appendices A, for specific target areas.

(r) Prevention of pollution of riparian and wetland areas

- Fuel and hazardous material storage, handling and refuelling areas must not fall within riparian / wetland habitat and buffer zones.
- 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.
- Significant spills must be reported to the relevant section of the regional Department of Water and Sanitation.

- 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.
- Natural water bodies must not be used to wash out construction vehicles, concrete mixers, or for domestic ablutions.
- Appropriate provision must be made for ablutions during construction. If chemical toilets are used, they must be well serviced regularly, 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.

(s) Dealing with demolition rubble

- No rubble may be temporarily stockpiled or dumped on vegetated areas, within no-go areas or within 32 m of the river channels and within 100 m of wetlands. Where possible, it should be stockpiled onto areas that are already disturbed, hardened or surfaced with asphalt.

(t) Protection of cultural heritage resources

- Ensure that structures of Bellevue Farmstead (29 38' 46" S 30 26' 13" E) are protected from damage throughout the construction period and that all Contractors' staff are informed accordingly.

(u) Potential Heritage Resources

In the event that indicator(s) of heritage resources are identified during construction, the following actions should be taken immediately:

- All construction within a radius of at least 20 m of the heritage resource should cease. This distance should be increased at the discretion of supervisory staff if heavy machinery or explosives could cause further disturbance to the suspected heritage resource.
- This area must be marked using clearly visible means, such as barrier tape, and all personnel should be informed that it is a no-go area.
- A guard should be appointed to enforce this no-go area if there is any possibility that it could be violated, whether intentionally or inadvertently, by construction staff or members of the public.
- No measures should be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone or stone.
- If a heritage practitioner has been appointed to monitor the project, he/she should be contacted and a site inspection arranged as soon as possible.
- If no heritage practitioner has been appointed to monitor the project, the head of archaeology at Amafa's Pietermaritzburg office should be contacted; Tel: 033 3946 543.
- The South African Police Services should be notified by an Amafa staff member or an independent heritage practitioner if human remains are identified. No SAPS official may disturb or exhume such remains, whether of recent origin or not.
- All parties concerned should respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time.
- Any extension of the project beyond its current footprint involving vegetation and/or earth clearance should be subject to prior assessment by a qualified heritage practitioner, taking into account all information gathered during this initial heritage impact assessment.

(v) Management of social impacts

The following mitigation measures must be implemented to reduce potential negative impacts and to enhance possible positive impacts on the social environment which may occur during the construction phase of the project:

Disruption to vehicle traffic

- Adhere to the final approved traffic accommodation plan. The traffic accommodation plan should be inclusive of traffic management measures for alternative routes. Refer to Section 5.
- Ensure there is suitable road signage, including the use of the variable messaging system informing road users of construction activities and potential delays.
- Where possible, separate fast- and slow-moving traffic into specific lanes.
- During peak periods (morning and evening) stack heavy duty vehicles and allow through during non-peak times.
- Encourage road users to avoid the affected section of road during peak hours (particularly the population of Pietermaritzburg who have alternatives routes to consider).
- Make use of local radio stations, newspapers and social media to inform the public well in advance of any road closures or extended delays.

Increased noise

- The Contractor is to actively manage the site in order to reduce noise nuisance.
- Night work must be kept to the minimum possible.
- Affected parties are to be informed of unduly noisy activities, in advance.
- Ensure that mitigation measures stipulated Noise Management Plan (Appendix E) are adhered to.

Increased dust

- Dust must be controlled at all times in accordance with SANRALs specifications.

Unintended damages to private property

- Ensure a photo record is kept of all areas where private property will be affected.
- Ensure that any unintended damages to private property including walls, access routes, etc. are repaired immediately.
- In the event of security being compromised as a result of unintended damages, suitable arrangements should be made to ensure suitable security is provided until such time as repairs have been made.

Increased crime

- Construction teams should be clearly identified by wearing uniforms and/or identification cards that should be exhibited in a visible place on their body.
- Instant dismissal and prosecution must take place for any staff member caught engaging in criminal activities of any kind.
- Inform local law enforcement agencies of the possibilities of increased criminal activity in the area.
- In the event of boundary fences being temporarily compromised alternative security measures should be put in place.
- As far as possible, source labour locally.
- Employ a community liaison representative to ensure the free flow of information between the project team and local communities.
- Engage with the various role players (community leaders, ward councillors, taxi associations, business forums, etc.)

Opportunities for local contractors and SMMEs

- Establish what services could potentially be provided by local contractors and SMMEs.
- Develop a database of local contractors and SMMEs that provide the required services.
- Ensure that sub-contractors are sourced locally where the requisite skills exist.

6. SITE REHABILITATION OF SENSITIVE AREAS

(a) Site rehabilitation in sensitive areas along the N3

- Refer to Appendix A of this EMPr for a full description of specific sensitive areas and recommendations for rehabilitation of vegetation at these sites. This includes specifications for plant rescue, plant translocation and alien plant control.
- Indigenous, endemic species are to be used in rehabilitation of disturbed areas.

(b) Site rehabilitation within the road reserve

- Planting within SANRAL's road reserve should make use of aesthetically pleasing indigenous species. Guidelines for planting of the road reserve are provided in Appendix A1 of this EMPr. The Contractor shall plant species that are allowed by SANRAL and will, therefore, submit a list to SANRALs environmental officer for approval, prior to planting.

(c) Site rehabilitation at river crossings and wetland areas

- Revegetation of riparian and wetland areas must be in accordance with the Wetland and Riparian Areas Rehabilitation Plan (Appendix B).
- Indigenous, endemic species are to be used in rehabilitation of disturbed areas.

(d) Site rehabilitation of disturbed areas

- Construction sites and any temporary access roads should be successfully rehabilitated to the preconstruction state or better as soon as the completion of construction activities allows.

7. ENVIRONMENTAL MANAGEMENT DURING DECOMMISSIONING

The N3 upgrade itself will not undergo decommissioning. However, the disused Cleland Overpass Bridge structure will be demolished as part of the N3 upgrade.

- Signage must be placed at both ends of the bridge well in advance of decommissioning (at least 4 weeks). Signage must indicate planned dates of demolition and which alternative bridges can be used to cross the N3 in that area.
- SANRAL and/or the Contractor must also notify the adjacent landowners well in advance and consider notification of the general public via other media as well.
- Ensure all demolition rubble from demolished structures is removed timeously and disposed of at an authorised landfill site.
- All disturbed areas are to be made good and all excavations are to be levelled, filled in and re-paved or re-vegetated as per the specifications of this EMPr.
- All applicable specifications for the construction team's general activities, as contained in this EMPr, are to be adhered to by SANRAL and the Contractor.

8. ENVIRONMENTAL MONITORING FOR THE CONSTRUCTION & DECOMMISSIONING PHASES

The purpose of monitoring is to ensure that specified actions are undertaken timeously and that they achieve the desired results in terms of preventing or minimising the anticipated negative environmental impacts on the natural, social and socio-economic environments (including cultural heritage).

a) Responsibilities for Environmental Management, Monitoring and Reporting

Refer to C1004 of SANRAL's overarching EMP for roles and responsibilities. According to this, the Engineer acts for SANRAL, and appoints an independent environmental specialist to objectively and regularly monitor the Contractor's compliance with the conditions of authorisation and the EMPr. The Contractor appoints an environmental officer, who must be approved by the Engineer, and who is the responsible person for ensuring that the provisions of this EMPr are complied with during the life of the contract.

A pre-construction meeting is recommended in order to reach agreement on specific roles of the various parties and penalties for non-compliances with the EMPr.

b) Environmental Monitoring

The Contractor's environmental officer shall:

- Monitor the impacts of the project on the natural, social and socio-economic environments on a continuous basis, throughout construction. This will include monitoring of water quality, where appropriate and applicable. He/she will compile an appropriate monitoring plan in accordance with the construction program.
- Determine and set simple indicators and targets against which to monitor and manage environmental impacts.
- Ensure that any monitoring requirements specified in the appendices to this EMPr are implemented.
- Where required in order to effect optimal environmental management, consult with directly affected landowners and the management of nature reserves from time to time, via the resident engineer.
- Guide the Contractor on environmental management actions as required, based on the outcomes of monitoring.

c) Monitoring Indicators

A clear and simple system to monitor impacts on soils, vegetation and riparian areas during construction, based on key indicators is provided below.

- Regular visual assessments of the progress of clearing and grubbing within the road reserve to ensure no works occur beyond the road reserve boundaries.
- Regular visual assessments of the condition of translocated plants, checking for signs of water stress such as wilted leaves.
- Regular visual checks for the presence of unnecessary vehicle tracks through areas of natural vegetation.
- Regular visual assessments to identify any soil erosion issues, particularly any erosion scars or recently deposited drifts of silt associated with construction, drainage structures or spoil.

- Regular visual checks within riparian and wetland areas, for any head-cut erosion, erosion scars, die-off of riparian/wetland vegetation or drying out of a riparian or wetland area, particularly at the outer edges.
- Regular visual observations to identify emerging alien plants in any area disturbed by project activities. If alien plant control is successful, follow-up checks should reveal that the cover of alien plants is decreasing over time.
- Regular visual assessments to identify any pollution issues within and downstream/down slope of work areas. These include death of fish and other aquatic organisms, unexplained dieback of vegetation, unusual discoloration of water/soil/vegetation, silt plumes, and unusual odours emanating from wetlands or water bodies.

d) Auditing

- Environmental Audit reports shall be submitted to the competent authority (in this case the national Department of Environmental Affairs) according to the requirements of the EIA Regulations (at this time of writing this report, Regulation 34 of GN 326, 07 April 2017).

e) EMPr Amendments/EMPr Instructions

- No EMPr amendments (relaxation or revision of any mitigation measure) shall be allowed without approval from the relevant authority (DEA). Motivations for amendments to the EMPr may be discussed with the Engineer's environmental specialist, who may propose EMPr amendments on behalf of the proponent or issue EMPr instructions (corrective actions, remediation and rehabilitation). These amendments or instructions shall be implemented within the specified time frame.