UPGRADE OF DISTRICT ROADS FROM COFFEE BAY TO ZITHULELE HOSPITAL, VIA HOLE-IN-THE-WALL, KING SABATA DALINDYEBO MUNICIPALITY

ENVIRONMENTAL IMPACT REPORT (FINAL)

Completed in terms of the National Environmental Management Act 107 of 1998 (as amended) and the Environmental Impact Assessment Regulations, 2006 (Version 1), and in accordance with the requirements of the Transkei Decree, No 9 of 1992

DEDEA Ref No: 15/2/1/1/NEMA/49/09-039

JULY 2010

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DISTRIBUTION LIST FOR FINAL REPORT

ORGANISATION	PERSON/PLACE	DATE
Department of Roads and Public Works	Mr Sandile Booi	26 JULY 2010
Department of Economic Development and Environmental Affairs	Mr Qondile Paliso	26 JULY 2010
SSI Consulting Engineers	Mr Steven Robertson	26 JULY 2010
Terreco Consulting	File	26 JULY 2010

EXECUTIVE SUMMARY

The provincial Department of Roads and Transport (DRT) proposes to upgrade existing gravel district roads which link the coastal resorts and development nodes along the Eastern Cape's Wild Coast in the vicinity of Coffee Bay, Hole-in-the-Wall and Zithulele Hospital.

The Project triggers the need for environmental studies as part of the authorisation process for 'listed activities' described in Section 24 of the National Environmental Management Act 107 of 1998 (as amended). Specifically, the Project requires a Scoping Report and Environmental Impact Assessment (EIA) Report, as described in Section 27-36 of the EIA Regulations 2006 (GN R385). The Department of Economic Development and Environmental Affairs (DEDEA) (Mthatha Office) is the authorising body for this Project.

The Environmental Impact Report serves to fulfil the requirements of the following legislation:

- National Environmental Management Act, Act No 107 of 1998 (as amended):
- Transkei Decree, No 9 of 1992. A permit is required from DEDEA for any activities which take place within the Coastal Conservation Area (CCA), which is defined as the area within 1km of the high-water mark of the sea (including estuaries) along the former Transkei coastline.

It should be noted that separate applications have been made to the Department of Minerals and Energy (DME) and the Department of Water Affairs (DWA) for the mining of road building materials and construction/upgrade of culverts and bridges, respectively.

Further to the approval of the Plan of Study of EIA by DEDEA, it follows the purpose of the EIA part of the process is to:

- Address the issues raised during the scoping phase.
- Undertake a comparative assessment of the identified alternatives.
- Undertake a detailed assessment of identified impacts of particular concern.

The public participation process for the Scoping phase highlighted the following key concerns, as expressed by affected communities and key stakeholders:

- Concerns relating to the general degradation of aesthetic quality in Coffee Bay through traffic noise (especially taxis), dangerous driving, speeding traffic and increased crime.
- Need for improved pedestrian safety within Coffee Bay.
- Need to address drainage and flooding risks from side roads in Coffee Bay.
- Need to upgrade other roads within Coffee Bay to improve access, encourage tourism and/or prevent erosion.
- Need to upgrade parking at ablution blocks at Hole-in-the-Wall as part of the new access road to the view site.
- Specific objections were raised in connection with the KuBomvu River crossing option at the estuary on the basis of noise, severance from access to the beach, visual and aesthetic impacts, safety and socio-economic impacts.
- Support for employment opportunities.

- Queries regarding compensation for the relocation of households and land tenure issues.
- Concerns relating to any impacts on graves.
- Queries regarding community benefits from the use of borrow pits/quarries.

A preliminary impact assessment was undertaken during the Scoping Phase of the project. This assessment served to identify the full range of potential impacts and mitigation measures, highlighting those impacts which require more detailed investigation during the EIA Phase.

Further to this, the Plan of Study for EIA, included in the Scoping Report, and approved by DEDEA, made provision for the following specialist studies:

- Estuary Specialist Study (estuary impacts);
- Aquatic Specialist Study (river and wetland impacts); and a
- Heritage Impact Assessment.

The results of these specialist studies serve to inform the detailed impact assessment.

A project needs and desirability assessment was undertaken, as was an assessment of the "no-go" alternative. As a result of the findings of the Scoping Phase, the two alternative alignments through Coffee Bay were discarded.

The environmental impact statement, which encapsulates the main finding and recommendations of the assessment, is provided below.

ENVIRONMENTAL IMPACT STATEMENT

The Department of Roads and Transport propose to upgrade 27.5km of existing gravel and surfaced district roads accessing and linking the coastal resorts of Coffee Bay and Hole-in-the-wall and the Zithulele Hospital in the King Sabata Dalindyebo Municipality. The project forms part of the proposed Wild Coast Meander, a Provincial Growth and Development Programme (PGDP) initiative and is fully aligned to the Strategic Development Plans for the Wild Coast, the KSD municipality and the Kwa-Tshezi area. The project has the support of the municipality, the traditional leadership, businesses owners, cottage owners and residents of Coffee Bay and Hole-in-the-Wall, and the rural community.

The project will involve the upgrading of the roads along their current alignment with very minor deviations allowed for improved road safety. Of the nine bridges affected, six will be replaced with improved structures, and three will be widened to allow for safe pedestrian access. A new crossing over the wetland at Hole-in-the-Wall will be built to accommodate the improved alignment. The design speed will vary between 60 and 40km/hr across the length of the road. Minor changes will be made to the vertical alignment, with the result that concrete surfacing will be required on some of the steeper gradients.

A new bridge will be required across the Nenga estuary. Dr Peter Fielding of Fieldwork was appointed to assess the impact associated with this. He concluded that, provided strict controls in environmental management are enforced during the construction phase, the long-term net effect on the estuary will be positive as the existing substandard causeway will be removed to make way for an improved structure which will allow for improved function of the system.

The impact of the new alignment across the wetland was assessed by a team of specialists, headed by Dr Mandy Uys of Laughing Waters. No fatal flaws were detected and various mitigating measures were proposed in order to reduce the risk to the wetland functioning. These measures have been incorporated into the design. An application will be prepared in terms of DWA's licensing requirements.

Dr Uys and her team similarly identified the impact of the new bridges on the rivers and streams. A Comprehensive impact assessment was undertaken and recommendations produced. These recommendations have been incorporated, where practical, into the design of the new structures.

Consultations were held with the Department of Water Affairs. DWA: Water Quality Management recorded in a letter, dated the 18/01/2010, that from a water managed perspective, their office had no objection to the proposed road upgrade provided certain conditions were adhered to.

A Heritage Impact Assessment was undertaken by eThembeni Cultural Heritage. A copy of the report was forwarded to the South African Heritage Resources Agency in accordance with the requirements of the National Heritage Resources Act, Act No 25 of 1999. The HIA identified some graves which may require relocation to accommodate the new alignment.

Roughly 16 households will be impacted with some buildings requiring relocation to accommodate the new improved alignment. The household heads have been notified of this and informed of the process to be followed. The DRT have strict procedures for the relocation of households which will take place during the contract at the expense of the Department. No person/s will be relocated against their will. All displaced families will be provided with a new homestead which is equal to, or better than, their former dwelling, located on a site allocated by the local chief or headman.

The impact assessment concludes that the majority of the potential impacts are commonly associated with roads construction works. Where possible, the likelihood and significance of these impacts has been reduced through the implementation of design features (eg at the wetland). A comprehensive Environmental Management Plan which includes a range of environmental specifications will be applied to the construction phase. An External Environmental Auditor will be appointed to provide a monthly monitoring service, with audit reports submitted to the relevant authorities. A full-time environmental representative will be present on site during construction. All staff will undergo environmental induction and training as part of their duties.

It is acknowledged that the work will be taking place in the sensitive Coastal Conservation Area of the Wild Coast, as defined by the Transkei Decree, 9 of 1992. For this reason it is essential that the works are confined to the construction corridor, with all areas outside of this being defined as no-go areas. The Environmental Specifications, which will form part of the contract documentation and hence will be legally binding on the contractor, will specify fines and penalties to be paid in the even of non-compliance with the EMP.

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1. INTRODUCTION AND BACKGROUND

1.1 Background

The Department of Roads and Transport (DRT) proposes to upgrade existing gravel district roads which link the coastal resorts and development nodes along the Eastern Cape's Wild Coast. This project is termed the "Wild Coast Meander" (WCM) and extends from Tombo on the R61 near Port St Johns as far as the Kei River, near Kei Mouth.

The intention of the Wild Coast Meander road upgrading project is to provide a bitumen surfaced road for light traffic which will improve access to the region for tourists and improve road access for local communities. Design speeds and road widths may vary depending on physical constraints and cost considerations. It is not the intention to create a high speed road. The promotion of labour intensive construction methods and cost effective pavement designs are inherent in the design brief.

The WCM route alignment was determined following a Basic Planning Study undertaken by SSI Engineers and Environmental Consultants in 2007. It was proposed that the route be upgraded in Phases, each consisting of between 20 and 30km of existing gravel road. The investigation and design of Phase 1 of the WCM (from Tombo to Mpamba) has recently been completed with authorisation from the Department of Economic Development and Environmental Affairs (DEDEA) pending.

This investigation focuses on the upgrade of the WCM route in the vicinity of Coffee Bay, Hole in the Wall and Zithulele Hospital. This section of the WCM Route was evaluated as having the highest priority under the Basic Planning Study. It links the development nodes of Coffee Bay and Hole-in-the-Wall as well as serving local communities[1].

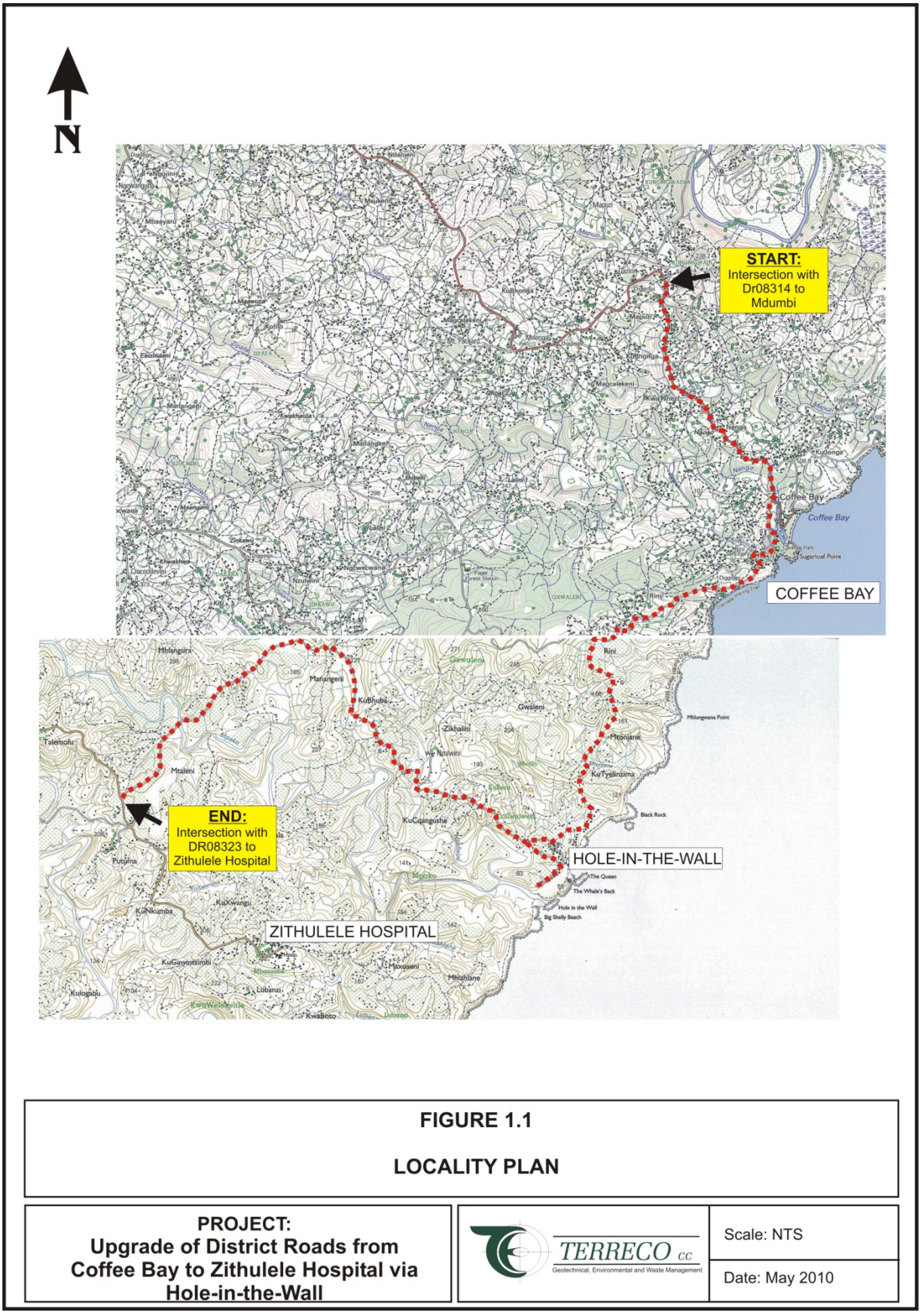
The route follows existing roads of varying standard and condition. It includes portions of proclaimed and non-proclaimed road. The roads included in the appointment may be summarised as follows:

- A 5.6 km portion of the existing bitumen road DR08031 leading inland from Coffee Bay. This portion of road is narrow and in fair to poor condition;
- The existing gravel road from Coffee Bay to Hole-in-the-Wall, located close to the coastline, approximately 9.4 km in length. This road is not a District Road (DR) and instead comprises Access Roads AC30585 and AC60767; and
- A portion of the existing gravel road DR08321 inland from Hole-in-the-Wall, before turning west to link to the Zithulele access road, DR08323. The length of this portion is approximately 12.5 km and part of it comprises Access Road AC30503.

Included in the scope of works is the upgrade of the existing low level bridge accessing hotels and properties located to the north of the estuary in Coffee Bay and upgrade of the 1.5km access road to the view site behind the Hole-in-the-Wall. It will be necessary to construct new structures over some of the streams and rivers, with the remainder being upgraded to allow for the improved standards. Three alternative alignments across and to the south of the KuBomvu River are under investigation. The access road to the view site at Hole-in-the-Wall is included in the project. A locality plan is provided in Figure 1.1.

[1] Basic Planning Study for the Wild Coast Meander Route. 2007. SSI Engineers and Environmental Consultants. Produced for Department of Roads and Transport, Eastern Cape Province.

Figure 1.1 Locality Plan



1.2 Need for and Purpose of the Environmental Impact Report

The Environmental Impact Report serves to fulfil the requirements of the following legislation:

- National Environmental Management Act, Act No 107 of 1998 (as amended):
- Transkei Decree, No 9 of 1992. A permit is required from DEDEA for any activities which take place within the Coastal Conservation Area (CCA), which is defined as the area within 1km of the high-water mark of the sea (including estuaries) along the former Transkei coastline.

It should be noted that separate applications have been made to the Department of Minerals and Energy (DME) and the Department of Water Affairs (DWA) for the mining of road building materials and construction/upgrade of culverts and bridges, respectively.

The listed activities which require authorisation under NEMA are outlined in the section below. Refer to Section 2 for further details on the legislative and permitting requirements.

The need for the EIA process, and reporting thereof, has been determined by the nature of the development in terms of GN R 387 'List of Activities and Competent Authorities Identified in Terms of Sections 24 and 24D of the National Environmental Management Act 1998, 2006'. Any such project or aspect of a project listed in GN R 387 must be subject to a 'Scoping and EIA process' as described in Part 3 of the aforementioned EIA Regulations. The development also contains activities that trigger a 'Basic Assessment' in terms of GN R 386. However, GN R 387 takes precedence and DEDEA confirmed that a Scoping and EIA would be required for this development.

The purpose of the Environmental Scoping Report was to identify issues that will be relevant for consideration in the authorisation process; identify the potential environmental impacts of the proposed Project; and identify any reasonable alternatives to the Project. The Environmental Scoping Report culminated in the preparation of a 'Plan of Study of EIA' which effectively targeted and described the further environmental studies necessary to enable an informed decision to be made by DEDEA with respect to the Project.

Further to the approval of the Plan of Study of EIA by DEDEA (Appendix A), it therefore follows the purpose of the EIA part of the process is to:

- Address the issues raised during the scoping phase.
- Undertake a comparative assessment of the identified alternatives.
- Undertake a detailed assessment of identified impacts of particular concern.

The Plan of Study for EIA, included in the Scoping Report, and approved by DEDEA made provision for the following specialist studies:

- Estuary Specialist Study (estuary impacts);
- Aquatic Specialist Study (river and wetland impacts); and a
- Heritage Impact Assessment.

The results of these specialist investigations are incorporated in this report, with copies of the reports included in the appendices.

The EIA part of the process culminates in the preparation of an Environmental Impact Report (EIR). This report includes a summary Environmental Impact Statement and draft Environmental Management Plan (EMP) which can be used to inform the detailed design, construction and operation of the project, as necessary.

The EMP will also be used to ensure the conditions of the Environmental Authorisation, incorporating the mitigation measures and recommendations from the EIA process, are carried through and implemented at the appropriate Project stages by the relevant parties.

1.3 Listed Activities Requiring Authorisation

The need for the environmental scoping process, and reporting thereof, has been determined by the nature of the Project in terms of GN R387 'List of Activities and Competent Authorities Identified in Terms of Sections 24 and 24D of the National Environmental Management Act 1998, 2006'.

Specifically, the Project related to the listed Activity No 5, GNR 387, *viz*:

> *The route determination of roads and design of associated physical infrastructure, including roads that have not yet been built for which routes have been determined before publication of this notice and which has not been authorized by a competent authority in terms of the Environmental Impact Assessment Regulations, 2006 made under Section 24(5) of the Act and published in Government Notice No. R. 385 of 2006, where (a) it is a national road as defined in section 40 of the South African National Roads Agency Limited and the National Roads Act, 1998 (Act No 7 of 1998), (b) it is a road administered by the provincial authority, (c) the road reserve is wider than 30 meters, or (d) the road will cater for more than one lane of traffic in both directions.*

Although the Project involves the upgrade of an existing road, sections of the road are categorised as Access Roads (between Coffee Bay and Hole-in-the-Wall) and are located well within the environmentally sensitive Coastal Conservation Area (CCA). This effectively elevated the process from a Basic Assessment to a full Environmental Impact Assessment. This approach was confirmed in writing by the DEDEA at the outset of the investigation.

The Project comprises the following listed activities:

Table 1.1 Listed Activities associated with the Project

ITEM	LISTED ACTIVITY	APPLICABLE PROJECT IMPACT
GN R 387 (Listed Activities which require a Scoping and EIA)		
5	*The route determination of roads and design of associated physical infrastructure, including roads that have not yet been built for which routes have been determined before publication of this notice and which has not been authorized by a competent authority in terms of the Environmental Impact Assessment Regulations, 2006 made under Section 24(5) of the Act and published in Government Notice No. R. 385 of 2006, where (a) it is a national road as defined in section 40 of the South African National Roads Agency Limited and the National Roads Act, 1998 (Act No 7 of 1998), (b) it is a road administered by the provincial authority, (c) the road reserve is wider than 30 meters, or (d) the road will cater for more than one lane of traffic in both directions.*	Although the project does not necessarily entail the determination of a new route, the road will be administered by a provincial authority. The requirement for a full EIA was confirmed by DEDEA in writing at the outset of this assessment. This was mainly due to the sensitivity of the affected area, and the fact that much of the route falls within the Coastal Conservation Area, defined as the area within 1km of the high water mark (Transkei Decree, 9 of 1992)

ITEM	LISTED ACTIVITY	APPLICABLE PROJECT IMPACT
GN R 386 (Listed Activities which require a Basic Assessment)		
1(m)	*Any purpose within the one in ten year flood line of a river or stream, or within 32 meters from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including –* *bridges;*	The construction of new bridges, bridge improvements (and/or culverts) will trigger this threshold, at a minimum.
2	*Construction or earth moving activities in the sea or within 100 metres inland of the high water mark of the sea, in respect of –* *embankments;* *stabilising walls;* *infrastructure.*	Any construction of new river crossings with associated supporting structures (e.g. at the KuBomvu, Nenga, Nzulwini and Mpako Rivers) will trigger this threshold, at a minimum.
4	*The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, flood plain or wetland.*	The construction of the alternative crossing through the vlei area to the north of Hole-in-the-Wall will trigger this threshold at a minimum.
6	*The excavation, moving, removal, depositing or compacting of soil, sand, rock or rubble covering an area exceeding 10 square metres in the sea or within a distance of 100 metres inland of the high-water mark of the sea.*	The construction of new river crossings at KuBomvu and Nenga River estuaries may trigger this threshold where activities occur within the tidal zone of the affected rivers.
12	*The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental management: Biodiversity Act, 2004 (Act No 10 of 2004).*	Should the alternative alignment for the KuBomvu River crossing at the estuary mouth be considered then the subsequent loss of coastal dune vegetation may trigger this threshold, at a minimum.
15	*The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.*	The construction of alternative alignments to the existing road corridor and the addition of climbing lanes will trigger this threshold alone.
20	*The transformation of an area zoned for use as public open space or for a conservation purpose to another use.*	Should the alternative alignment for the KuBomvu River crossing be considered then the subsequent loss of coastal dune vegetation within the DEDEA camp site may trigger this threshold, at a minimum.

Projects or aspects of a project listed in GN R387 must be subject to a 'Scoping and EIA' process as described in Part 3 of the aforementioned EIA Regulations. As described in Table 1.1 above, this Project also contains activities that trigger a 'Basic Assessment' in terms of listed activities described in GN R386[2]. However, GN R 387 takes precedence and DEDEA confirmed that a Scoping and EIA would be required for this Project.

1.4 Exemptions

Application is made for exemption from the following Regulations:

[2] GN R386 'List of Activities and Competent Authorities Identified in Terms of Sections 24 and 24D of the National Environmental Management Act 1998, 2006' (April 2006).

Regulation 23 (2) as it pertains to the identification and consideration of site and technology alternatives. Motivation for exemption from the consideration of site and technology alternatives is provided below:

- The project involves the upgrade of existing gravel roads largely along the current alignments with only minor deviations to allow for improved road safety conditions;

- The proposed deviations from the currently alignment, where these exists, are designed to improve road safety conditions without incurring excessive cost or impacting excessively on the existing landuse. There are generally no alternatives to the proposed deviations, other than maintaining the existing alignment. Minor deviations from the existing alignment are covered in detail in Section 3.13.

- Given the design parameters and the budget allocated to the project, there are limited technology alternatives. Road construction generally employs standard techniques depending on a number of factors such as scale, gradient, design life and budget. As part of their investigations, the engineering consultants, SSI, have looked at a range of alternative pavement designs and construction techniques. There are no alternatives to that proposed in Section 3, which are considered to be reasonable or feasible in this instance. No technology alternatives are therefore proposed.

Please also refer to Section 6.9.6 where alternatives, including the “no-go” alternative, are discussed.

1.5 Scope of the Environmental Impact Report

Further to the requirements of the EIA Regulations and the approved Plan of Study of EIA, the approach to the EIA has incorporated the following:

- Notifying the Interested and Affected Parties (I&APs) of the DEDEA approval and commencement of the EIA phase for the Project.

- Obtaining additional, detailed project information from the Project Team.

- Commissioning specialist studies and incorporating the results thereof in the draft EIR.

- Undertaking a detailed assessment of specific impacts associated with the construction and operation phases of the project.

- Preparing the draft Environmental Management Plan (EMP) as per the requirements of Section 34 of the EIA Regulations (Appendix B).

- Preparing the draft EIR and making this available to registered IAPs, stakeholders and the general public for review.

- Finalising the EIR and submitting this to DEDEA.

The scope of the EIA is effectively governed by the Plan of Study for Environmental Impact Assessment (POSEIA). The POSEIA was determined as a result of the scoping study, and is detailed in the Scoping Report. The methodology outlined in the POSEIA, and the way in which these have been addressed in the EIR are detailed in the table below:

Table 1.2 POSEIA Requirements

EIA Methodology (as described in POSEIA)	Response
Registered I&APs will be informed of the DEDEA acceptance of the POSEIA.	All I&APs were informed of DEDEA's acceptance of the POSEIA and instruction to proceed
Collection of detailed project design information	Additional information has been sourced from the engineers, including the final road design and latest traffic figures. The final road layout is included in Appendix D.
Commissioning of a specialist Estuary Impact Assessment	Peter Fielding of Fieldwork was commissioned to undertake the Specialist Estuary Assessment. The results of this report have been incorporated into the EIR.
Commissioning of a specialist Aquatic Assessment	A specialist team, headed by Dr Mandy Uys of Laughing Waters, were commissioned to undertake the necessary specialist investigations into the impacts of road construction on the aquatic systems.
Commissioning of a Heritage Impact Assessment	eThembeni were commissioned to undertake the Heritage Impact Assessment. The results of this assessment have been incorporated into the EIR.
Provision of additional information required by DEDEA, as requested in their letter of acceptance of the ESR (Appendix A), as follows: 1. Layout plan and CCA application for proposed view site and parking area; and 2. Written consent from landowners who will be relocated.	Layout plans for the view site are provided in Appendix D. All landowners were consulted on a one on one basis. Refer to register in Appendix G, which also includes a copy of the letter provided to affected parties. DRPW have a standard process whereby affected households are first informed, then discussions are held with the tribal authority, eg the chief or headman, to identify alternative sites for locating the affected parties. New houses of the same or better quality will be provided at the cost of the client.
Detailed impact assessment of potential impacts deemed to be significant during the scoping assessment.	This has been conducted as part of the EIA. Refer to Section 6.9.
Need and Desirability Assessment	This has been conducted as part of the EIA. Refer to Section 3.16 and Appendix E.
Drafting of an Environmental Management Plan	A detailed Environmental Management Plan has been drafted and is provided in Appendix B.
Make draft EIR available to public for comment	A two week review period was advertised and all registered IAPs were provided the opportunity to provide comments.

Note that the focus of the EIR is very much on those issues which were identified during the scoping phase as being potentially significant. Lesser issues which are of a low significance or are non-significant have not received any further investigation in this assessment. Refer to Section 6.6.

1.6 Approach and Methodology

The Environmental Scoping Assessment has been undertaken in accordance with Regulations 27 - 36 of the EIA Regulations, 2006[3], promulgated in terms of Section 24(5) of the NEMA. Other than the EIA Regulations, cognisance has been taken of the Department of Environmental Affairs and Tourism (DEAT) Guideline documents published in support of the EIA Regulations[4] [5].

The methodology employed in the Scoping process for the Project included the following:

- Confirmation of the EIA process with DEDEA;
- Site visit to familiarise the project team with the route and the affected environment was undertaken in May 2009;
- The application for authorisation was submitted to DEDEA on 29 May 2009 and was accepted by DEDEA on 29 June 2009. A copy of the Application Form and the letter of acceptance are included in Appendix F;
- The proposed Project and the EIA process were advertised in the Daily Dispatch on 3 July 2009. Copies of the newspaper notices are included in Appendix G;
- Signboards indicating the proposed project and the EIA process were placed along the route in early July 2009[6]. Photographs of the signage used are included in Appendix G;
- The public were invited to register as Interested and Affected Parties (IAPs) in the EIA process by 24 July 2009. The list of registered IAPs appears in Appendix G;
- A background information document (BID) indicating the location and nature of the activity as well as outlining the EIA process was circulated to all registered IAPs and other stakeholders, including the DEDEA and the Department of Water Affairs and Forestry (DWAF). A copy of the BID is included in Appendix G;
- Initial contact was made with the Ward Councillor, chief and headmen informing them of the project and community consultation process;
- A site visit to KuBomvu River Bridge Options with DEDEA was made on 17 August 2009;
- A public meeting was held in Coffee Bay on 16 September 2009. The purpose of the meeting was to present detailed information on the development to the public, to inform them of the EIA

[3] Government Notice GN R 385.

[4] DEAT (2005) Guideline 3: General Guide to the Environmental Impact Assessment Regulations, 2005, Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism, Pretoria.

[5] DEAT (2005) Guideline 4: Public Participation in Support of the EIA Regulations, 2005, Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism, Pretoria.

[6] The signs were placed at the intersection with the Zithulele hospital road, in Hole-in-the-Wall and outside Coffee Bay at the start of the Project.

process and to allow IAPs to raise any concerns or issues that they may have with regards to the Project. The attendance register and minutes from the meeting are included in Appendix G;

- Five community meetings were held on 16 and 23 September 2009. These meetings were held at villages located along the route. Minutes are included in Appendix G;

- Focus meetings with affected property owners and businesses located in the vicinity of the KuBomvu River Mouth took place on 2 and 7 October 2009. Minutes and notes from these meetings, as well as associated correspondence are included in Appendix G;

- An 'Issues Trail' was generated on the basis of the results of the public participation process (PPP). The Issues Trail and copies of correspondence received from IAPs are provided in Appendix G;

- A desktop literature review was undertaken of available published information on the strategic planning framework pertinent to the affected area and Project; of the environmental (biophysical and human) characteristics of the affected areas; and, the impacts of roads in general. References to the material consulted are made throughout the document in the form of footnotes;

- Project information was obtained from the consulting engineers, SSI, including the Preliminary Design Report (Appendix C) and design plans (Appendix D);

- A site visit was undertaken on 16 September 2009. The entire route was visited, with a focus on those sections which pass through sensitive or built up areas, or which will be realigned;

- Attendance at monthly project meetings involving the client (DRT), the consulting engineers (SSI) and the geotechnical and health and safety specialists. These meetings provided an opportunity for input into the preliminary design and consideration of alternatives, including alternative alignments;

- A preliminary desktop assessment of the potential impacts of road and bridge construction on the Nenga and KuBomvu River estuaries was undertaken by Dr Peter Fielding. The desktop investigation focussed on the upgrade of the low-level cause way across the Nenga River and the possible construction of the new bridge across the KuBomvu River estuary, one of the route alternatives under consideration during the scoping phase, since discarded. A copy of Dr Fielding's Report is included in Appendix H;

- Having identified the likely range of positive and negative impacts that might be associated with the upgrade of the roads, a preliminary impact assessment was undertaken in order to determine the key issues, impacts and information gaps which should be addressed during the EIA Phase (Appendix K);

- The Draft Scoping Report was compiled, incorporating the Plan of Study of EIA, and made available to stakeholders, registered IAPs and the general public for review and comment for a three week period between 25 November – 16 December 2009. An advertisement was placed in the Daily Dispatch on 25 November 2009 (see Appendix G) and a letter was sent to stakeholders, Ward Councillors and IAPs as listed on the database;

- Comments received during the review and comment period were be taken into account during the finalisation of the Scoping Report for submission to DEDEA, OR Tambo Regional Office. No comments were received;

- A site visit with DEDEA officials took place in March 2010;

- Written acceptance of the ESR was received from DEDEA on 16 February 2010. A copy of the letter is included in Appendix A;

The methodology employed in the Impact Assessment process for the Project included the following:

- Specialist Studies required in terms of the Plan of Study for EIA were commissioned and the specialist teams appointed;

- Additional information on the project, including the final design report and traffic information, was collected;

- Additional information required by DEDEA on acceptance of the ESR was gathered;

- A detailed assessment was undertaken of certain specific impacts identified during the Environmental Scoping Report;

- Consultations with DWA were undertaken as to their requirements, refer to Section 5.

- The draft EIR was completed and made available for public and stakeholder comment. Copies were made available at public locations and on the Terreco website for downloading. A three week comments period was specified.

- Comments received from stakeholders and I&APs were incorporated into the final EIR [no comments were received];

- The final EIR was submitted to DEDEA on the 27 July 2010.

1.7 Details of the Environmental Assessment Practitioner

Regulation 29 (1) (a) of the EIA Regulations, 2006, indicates that the Scoping Report must contain details of the Environmental Assessment Practitioner (EAP) who prepared the report and the expertise of the EAP to carry out environmental impact assessment procedures. The general requirements for EAP's are outlined in Regulation 18 of the EIA Regulations, specifying that the EAP must be independent[7], must have the necessary expertise in conducting environmental assessments and must perform the work in an objective manner.

[7] The EAP must have no business, financial, personal or other interest in the in respect of the application or activity other than fair remuneration for work performed in connection with the activity. Furthermore, there must be no circumstances which may compromise the objectivity of the EAP.

The Scoping Report was undertaken by Ms Joanne Daneel and Louise Jupp of Terreco Consulting. Terreco Consulting is an East London-based environmental and geotechnical consulting firm with extensive experience in a variety of development projects through the Eastern Cape Province.

Ms Joanne Daneel (MSc) is a Director of Terreco Consulting with over 18 years experience in environmental assessment and management. Ms Daneel has been and is currently still involved in a number of development projects related to the construction and upgrade of roads throughout the Eastern Cape. Ms Daneel is experienced in the prediction and assessment of the impacts which may arise from such activities, and the management thereof. Louise Jupp (MSc) has been operating as an Environmental Practitioner in the UK and South Africa for over 17 years. She has undertaken environmental impact assessments for a variety of infrastructure projects in urban and rural settings including new road and road improvement schemes in accordance with South African, UK and other country/funder requirements. Other related environmental experience includes preparing chapters on the principles of and methodology for undertaking EIAs for road scheme for the Cypriot Government.

Terreco, nor any of its members have any business, financial or personal interest in respect of the proposed upgrade of roads along the WCM Route (including the section between Coffee Bay and Zithulele Hospital), other than fair remuneration for work performed in undertaking the Environmental Impact Assessment. A declaration of independence, signed in the presence of a commissioner of oaths, is included in the associated Application Form (see Appendix F).

The Terreco Company Profile and CV's for any of the parties involved in the EIA process are available on request.

1.8 Structure of EIR

The structure and content of the EIR is based on the requirements of Section 32 of the EIA Regulations and continues as follows:

Chapter 2 Legislative and Planning Framework

This chapter provides a summary of the pertinent legislation and strategic planning frameworks that are relevant to the Project and study area.

Chapter 3 Project Description

This chapter provides a detailed description of the Project, the property on which the Project is to be undertaken, the need and desirability of the Project and the alternatives considered.

Chapter 4 Environmental Characteristics of the Affected Area

This chapter comprises an outline description of the affected or receiving environment surrounding and incorporating the Project.

Chapter 5 Public Participation

This chapter sets out the approach to and results of the public participation process (PPP) and includes a description of the issues and comments raised.

Chapter 6 Environmental Impact Assessment

This chapter describes the methodology used in determining the significance of the environmental impacts; the assessment of identified impacts and their significance; a summary of the specialist reports prepared; the assumptions and uncertainties encountered and the mitigation measures identified. This chapter also makes reference to the overall suitability of the Project and/or conditions for approval.

Chapter 7 Environmental Impact Statement

This chapter summarises the key findings of the EIA and includes recommendations for consideration and/or inclusion in the Environmental Authorisation for the Project.

Additional information produced and obtained in support of the main text has been included as Appendices at the back of the document, including:

Plan of Study of EIA and DEDEA Letter of Approval	(Appendix A)
Draft Environmental Management Plan	(Appendix B)
Preliminary Design Report (SSI)	(Appendix C)
Project Layout Plans	(Appendix D)
Need and Desirability Assessment	(Appendix E)
Application form and DEDEA letter of acceptance	(Appendix F)
Public Participation Documentation	(Appendix G)
Specialist Estuary Studies (Fieldwork)	(Appendix H)
Specialist Aquatic Studies (Laughing Waters et al)	(Appendix I)
Specialist Heritage Impact Assessment (eThembeni)	(Appendix J)
Preliminary Impact Assessment as presented in the ESR	(Appendix K)

1.9 Glossary of Terms and Abbreviations

The following definitions and abbreviations apply in the context of this report:

Environment: The surrounds in which humans exist and that are made up of –

- the land, water and atmosphere of the earth;
- micro-organisms, plants and animal life;
- any part of combination of (i) and (ii) and the interrelationships among and between them; and

- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Pollution: Any changes in the environment caused by –

- substances;
- radioactive or other waves; or
- noise, odour, dust or heat emitted from an activity, including the storage or treatment of waste or substances, construction and provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on material useful to people, or will have such an effect in the future.

Construction: The building, erection or expansion of a facility, structure or infrastructure that is necessary for the undertaking of an activity, but excludes any modification, alteration or upgrading of such a facility, structure or infrastructure that does not result in a change to the nature of the activity being undertaken or an increase in the production, storage or transportation capacity of that facility, structure or infrastructure.

Dangerous Goods: Goods that are capable of posing a significant risk to the health and safety of people or the environment and which are listed in South African National Standard No.10228 designated "The identification and classification of dangerous goods for transport".

BID	Background Information Document.
CARA	Conservation of Agricultural Resources Act 43 of 1983.
CCA	Coastal Conservation Area.
CPZ	Coastal Protection Zone.
DAFF	Department of Agriculture, Fisheries and Forestry.
DEAT	Department of Environmental Affairs and Tourism.
DEDEA	Department of Economic Development and Environmental Affairs.
DME	Department of Minerals and Energy.
DRT	Department of Roads and Transport.
DWA	National Department of Water Affairs.
DWA	Department of Water Affairs.
EAP	Environmental Assessment Practitioner.
ECDC	Eastern Cape Development Council.
ECEC	Eastern Cape Environmental Conservation Bill 2001
EIA	Environmental Impact Assessment.
EIR	Environmental Impact Report.
ESR	Environmental Scoping Report.

EMP	Environmental Management Plan.
HIRA	Hazard Identification and Risk Assessment.
IAP	Interested and Affected Party.
ICZMA	Integrated Coastal Zone Management Act 24 of 2008.
IDP	Integrated Development Plan.
IEM	Integrated Environmental Management.
IOCB	Indian Ocean Coastal Belt Biome.
KSD	King Sabata Dalindyebo Municipality.
NEMA	National Environmental Management Act 107 of 1998 (as amended).
NEMBA	National Environmental Management: Biodiversity Act 10 of 2004.
NFA	National Forests Act 84 of 1998.
NGO	Non Government Organisation.
NHRA	National Heritage Resources Act 25 of 1999.
NWA	National Water Act 36 of 1998.
OHS	Occupational Health and Safety.
PGDP	Provincial Growth and Development Project.
PPP	Public Participation Process.
ROD	Record of Decision.
SAHRA	South African Heritage Resources Agency.
SARTSM	South African Road Traffic Signs Manual.
SDF	Strategic Development Plan.
SMME	Small, Medium Micro Enterprises.
SSI	Stewart Scott International Engineering.
TOR	Terms of Reference.
WCM	Wild Coast Meander.
WCTDP	Wild Coast Tourism Development Policy, 2001.

2. LEGISLATIVE AND STRATEGIC PLANNING FRAMEWORK

This chapter lists the key relevant policies, legislation, regulations and planning frameworks within which the Project will need to be aligned and/or operate within.

2.1 Relevant National and Local Policy Frameworks

There are a number of White Papers in place which list overarching aims or principles that apply to the Project from a generic standpoint. These include:

- White Paper: National Water Policy (1997).
- White Paper: Environmental Management Policy (1997).
- White Paper: Integrated Pollution and Waste Management (2000).
- National Waste Management Strategy.

The aims and principles described in these policies often overlap and/or generally strategically support each other. Collectively, the above policies promote a consideration of the environment as a holistic, single, interdependent unit; they promote the application of an integrated, cooperative management approach to resource use so as to achieve the 'some for all forever' principle; they promote the conservation and management of resource demand, the protection of the environment and the prevention of pollution and other impact reduction and control; and they promote the proper management of waste.

The Wild Coast Tourism Development Policy, 2001 (WCTDP) is a particularly important policy document which applies to the study area. The WCTDP is *'intended to promote, facilitate and regulate tourism development along the Wild Coast during the conceptualisation, planning, construction and operational stages.'* The WCTDP also aims to ensure environmental considerations are effectively integrated into all processes relating to tourism on the Wild Coast.

The policy is applicable along the length of the Wild Coast and within a 1000m strip inland of the high water mark such that spatial land use guidelines apply relative to the sensitivity of the coastline to change. The coastline incorporating Coffee Bay and Hole-in-the-Wall is an 'Eco-Tourism Zone' with the two settlements designated as First Order and Second Order Nodes respectively.

The WCTDP also supports the provision of infrastructure, including roads, to ensure tourists can access tourism development nodes, as informed by specific guidelines described in the WCTDP – e.g. spatial guidelines, planning, aesthetic and design guidelines and ecological guidelines. Specific to the Project, pertinent guidelines include:

- Traffic flows should be minimised and pedestrian flows maximised.
- Development should blend into the environment and not be visually intrusive.
- Minimum development footprint.
- As little disruption of the ground form and vegetation as possible during site preparation and close control of disturbances where these occur.
- Minimise/avoid urban runoff. Runoff should not be directly discharged into coastal waters or other water bodies: systems which allow infiltration and remove sediments and toxicants must be used.
- Roads to be designed and constructed as far from the coast as possible and where servicing the coast, perpendicular to the coast so as to minimise impact on drainage lines.

- Roads of all scales should be designed to facilitate the flow of land drainage and coastal waters.
- Essential wetland, tideland and estuarine crossings should be built of elevated structures and not with fill to allow circulation of water.
- Roadways in coastal watersheds should be designed and located to prevent pollution of runoff water or interference with the natural drainage patterns.

2.2 Relevant National and Local Legislation and Regulations [8]

Core legislation and regulations that apply to the Project, in terms of environmental management, environmental protection and pollution control is described in the following section. A summary table illustrating the likely permitting requirements for the Project in terms of the listed core legislation is provided in Section 2.3 below.

2.2.1 Overarching Environmental Legislation

- The Constitution Act 108 of 1996 which includes reference to: the right of all persons to an environment that is not harmful to health or well-being; the Government's duty to prevent pollution and environmental degradation; remediation of environmental damage and the polluter pays principle; and the necessity to promote sustainable development through reasonable legislative and other measures.

- The National Environmental Management Act 107 of 1998 (as amended) (NEMA) establishes environmental management principles that all organs of state are obliged to apply, especially when acting as an authorising agent. The Act also imposes a duty of care on every person who has caused, may cause, or currently is causing, pollution or environmental degradation, to take all reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring. Chapter 5 of NEMA also provides for the environmental authorisation of listed activities as accompanied by an EIA.

- The purpose of the EIA Regulations, 2006 (GN R385) is to give effect to the requirements of Chapter 5 of NEMA in terms of the *'submission, processing, consideration and decision of applications for environmental authorisation of activities.'* Among other things, it contains reference to: the application process; the approach to and content of the Basic Assessment, Scoping and EIA processes and reports; the actions to be taken in terms of the public participation process; and, the role of the competent authorities.

- GN R 386 and GN R387 provides a 'List of Activities and Competent Authorities identified in Terms of Sections 24 and 24D of the National Environmental Management Act, 1998' and describes the types of activities that will be specifically subject to the EIA process, as described in the EIA Regulations. Refer to Table 1.1 for the listed activities relevant to this Scheme.

2.2.2 Management/Protection of Water Environment

- The National Water Act 36 of 1998 provides for the promotion of efficient, sustainable and beneficial use of water in the public interest; for the facilitation of social and economic development; for the protection of aquatic and associated ecosystems and their biological diversity; and for the reduction and prevention of pollution and degradation of water resources.

[8] Prepared with reference to the listed legislation, Juta's Environmental Management in South Africa (2nd Ed) (Strydom and King) (2009) and Environmental Law (Michael Kidd) (2008).

As wetlands fall under the definition of 'watercourse' and is therefore regarded a 'water resource' and estuaries are also listed as a water resource, no activities which negatively impact on a wetland or estuary may proceed without a permit in terms of this Act.

- The Nature and Conservation Ordinance 19 of 1974 provides for the regulation of water pollution in inland waters.

- The Municipal Ordinance 20 of 1974 expressly prohibits the discharge of a wide range of substances into any sewer, public drain or water course.

2.2.3 Management/Protection of Biological Environment

- The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) aims to provide for biodiversity conservation among other foci. Chapter 4 relates to the protection and conservation of threatened species and ecosystems and Chapter 5 focuses on alien and invasive species and other threats to biodiversity. The Chapter 7 of the NEMBA restricts activities involving listed threatened or protected species with a permit.
- Section 7 of the National Forests Act 84 of 1998 makes provision for the Minister to declare a forest to be a 'natural forest'. Cutting, disturbing, damaging or destroying any indigenous, living tree within such an area would be prohibited unless licensed under Subsection (4) or Section 23, or exemption from the provisions of this subsection. The list of declared Natural Forests was published in the Government Gazette of 18 July 2008 (No. 31232) and includes the Scarp Forest group (FOz 5) which occurs within the study area. Section 15 states that the effect of the declaration of protected trees is that no person may cut, damage, destroy or remove any protected tree except under a licence granted by the Minister. Although there are no declared protected areas within the study area, Chapters 1 and 2 and Section 48 of the National Environmental Management: Protected Areas Act 57 of 2003 is applicable to forest protected areas.

- The purpose of the Transkei Decree No 9, 1992 is to manage development and to conserve, protect and control the utilisation of indigenous flora and fauna within 1km of the high water mark (which includes the tidal portion of an estuary). The Transkei Decree is used by Provincial DEDEA in authorising development activities in the Eastern Cape whereby development within this 1km 'Coastal Conservation Area' is prohibited unless permitted by DEDEA. Relevant to this Project a permit is required to:

  (a) Clear any land.
  (b) Construct any road or path.
  (c) Carry on any other activity which disturbs the natural state of the vegetation, the land or any waters.

  A permit is also required to use motor vehicles in the Coastal Conservation Area other than on a declared road.

  The Transkei Decree will be repealed by the Eastern Cape Environmental Conservation Bill, 2001 once the latter is enacted (see below).

- Section 92 of the Eastern Cape Environmental Conservation Bill, 2001 makes provision for the continuation of the existence of Coastal Conservation Areas (CCAs) established under the Environmental Conservation Decree (No 9 of 1992) of the former Transkei.

Within these areas, the following relevant activities are amongst those prohibited unless permitted by the Department, and in accordance with the plan for the control of coastal development approved by the MEC:

(a) Clearing of any land or removal of any sand, soil, stone or vegetation.
(b) Development of any picnic area, caravan park or like amenity.
(g) Establishment of any waste disposal site or dumping of any refuse.
(h) Construction of any road or footpath.
(i) Carrying on with any activity that disturbs the natural state of the vegetation, land or waters which may be prescribed.

The Bill makes provision for the protection of fish in inland waters, wild animals and flora.

- The Conservation of Agricultural Resources Act 43 of 1983 includes provision for promoting the conservation of soil, water resources and vegetation and to combat weeds and invader plants. Section 6 of the Act makes provision for control measures to be applied in order to achieve the objectives of the act: these measures relate to, inter alia: protection of vleis, marshes, water sponges, water courses and water sources; regulation of the flow pattern of runoff water; control of weeds and invader plants; and the restoration or reclamation of eroded land or land which is disturbed or denuded.

2.2.4 Management/Protection of Coastline/Marine Environment

- The Integrated Coastal Zone Management Act 24 of 2008 promotes the conservation, sustainable use and protection of, among other items, estuaries, mangroves and wetlands directly and through the preparation of management plans. A permit is required for activities within the Coastal Protection Zone (CPZ) as described in Section 16 of the Act and which includes any land unit wholly or partially within one kilometre of the high-water mark, any coastal wetland, lake, lagoon or dam which is situated within the aforementioned zone, any land that would be inundated by a 1:50 year flood or storm event. In terms of Section 17 of the Act, the purpose of the Coastal Protection Zone includes:

  (a) Protection of the ecological integrity, natural character and the economic, social and aesthetic value of coastal public property.
  (b) Avoidance of increasing the effect or severity of natural hazards in the coastal zone.
  (c) Protection of people, property and economic activities from risks arising from dynamic coastal processes, including the risk of sea-level rise.
  (d) Maintenance of the natural functioning of the littoral active zone.
  (e) Maintenance of the productive capacity of the coastal zone by protecting the ecological integrity of the coastal environment.
  (f) Make land near the seashore available to organs of state and other authorised persons for (i) performing rescue operations; or (ii) temporarily depositing objects and materials.

  Special permitting is required to undertake any development in the CPZ.

2.2.5 Management of Human Health

- The objectives of the National Health Act 61 of 2003 include protecting, respecting, promoting and fulfilling people's rights to an environment that is not harmful to health or

well-being. It provides for the investigation, inspection, the issuing of compliance notices and/or conviction of those persons found to be causing pollution detrimental to health or health nuisances or contravening Section 24(a) of the Constitution.

- The National Environmental Management Air Quality Act 39 of 2004 provides for the setting of national norms and standards for the regulation of air quality monitoring, management and control, and describes specific air quality measures so as to protect the environment and human health or well-being by preventing pollution and ecological degradation and promoting sustainable development through reasonable resource use.

2.2.6 Management of other issues

- Section 38(1) of the National Heritage Resources Act 25 of 1999 requires the South African Heritage Resources Agency (SAHRA) be notified of the location, nature and extent of any activity listed under this section. Listed activities pertinent to this Scheme include:

  - The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.

  - Any development or other activity which will change the character of a site exceeding 5000m^2 in extent, or involving three or more existing erven or subdivision thereof, or consolidated erven/subdivisions.

2.3 Summary of Permit Requirements

A summary table indicating the relevant legislation and the permit requirements is included in Table 2.1.

2.4 Relevant Local Planning and Policy Frameworks

As noted above, the Project occurs within Ward 23 of the King Sabata Dalindyebo (KSD) Local Municipality which is a constituent of OR Tambo District Municipality.

A more detailed Need and Desirability Assessment for the Project, as per DEAT Guidelines, and relative to the pertinent strategic planning framework documents has been undertaken during the EIA Phase[9]. This assessment was made relative to local and district level strategic planning documents to confirm compatibility with stated objectives and projects, including, at a minimum:

- King Sabata Dalindyebo Municipality Integrated Development Plan (2007-2010).
- Kwa-Tshezi Development Plan (2008).
- Wild Coast Tourism Development Policy.
- Wild Coast Spatial Development framework.

Refer to Appendix E for the detailed Need and Desirability Assessment.

[9] DEAT (2008). Draft Guideline on the Information Requirements to Describe Need and Desirability in the Environmental Impact Assessment Process.

Table 2.1 Summary of Relevant Legal and Permit Requirements

ACT	REF	RELEVANCE	PERMIT OR LICENCE REQ.
National Environmental Management Act	No 107 of 1998	General principles of Integrated Environmental Management. Duty of care and polluter pays principle.	Authorisation required under the Regulations.
EIA Regulations in terms of Chapter 5 of NEMA and associated activity listings	Gov Notices No. R. 385, R.386 and R.387	The new EIA regulations came into effect on the 3 July 2006. Activities listed under Government Notices No. R. 386 and R. 387.	EIA process required by virtue of listing under Item 5 of Government Notice No. 387. See Table 1.1. Authorisation required from DEDEA.
Transkei Decree	No 9 of 1992	Much of the road upgrading approaching Coffee Bay and between Coffee Bay and Hole-in-the-Wall will lie within the CCA. The construction of new bridge/culvert structures at Nenga and KuBomvu will lie within the tidal zone of the estuaries.	Permit required from DEDEA. (application included as part of the EIA)
National Water Act (NWA)	No 36 of 1998	Relates to all construction activities within the river course, affecting river banks, estuaries and wetlands. The construction of new bridges/culvert structures at the Nenga and KuBomvu estuaries and across the vlei is particularly important.	Authorisation (whether License or General Authorisation) required from DWAF (DWAE). Currently underway as a parallel process.
National Environmental Management: Biodiversity Act (NEMBA)	No 10 of 2004	Provides a list of protected plant species, for which permits must be obtained before any protected or listed plants may be removed and/or destroyed. No protected species have been identified as yet. The alternative alignment and crossing of the KuBomvu estuary will affect the Coastal Dune Forest. Any realignment which directly affects Scarp Forest will trigger the requirements of the NFA.	Permits may be required from DEDEA and/or DWAF.
National Forests Act (NFA)	No 84 of 1998		
Eastern Cape Environmental Conservation Bill (ECEC)	2001		
Conservation of Agricultural Resources Act (CARA)	No 43 of 1983	Construction activities within the vicinity of the rivers in particular are sensitive to the spread of invasive alien species. Ground disturbance in general increases the risk of spreading invasive alien species especially along the realignment sections.	Required by law to remove alien plant species.
Integrated Coastal Zone Management Act (ICZMA)	No 24 of 2008	The construction of the new bridges at Nenga and KuBomvu river estuaries in particular will occur within the Coastal Protection Zone.	A permit will be required. Covered by the Authorisation issued by DEDEA.
National Heritage Resources Act (NHRA)	No 25 of 1999	Applies to any development, which covers an area of greater than 5000m^2.	A Phase 1 Heritage Resource Impact Assessment is required.
Mineral and Petroleum Resources Development Act	No 28 of 2002	Where borrow pits and quarries will be opened to supply material for the road construction and related structures.	Mining Permit required. Currently underway as a parallel process.

2.5 Relevant Guidance

- DEAT Draft Guideline on the Information Requirements to Describe Need and Desirability in the Environmental Impact Assessment Process (June 2008).
- DEAT Guideline 3: General Guide to the Environmental Impact Assessment Regulations, 2005. Integrated Environmental Management Guidelines Series.
- DEAT Guideline 4: Public Participation in Support of the EIA Regulations. Integrated Environmental Management Guidelines Series.
- DEAT Guideline 5: Assessment of Alternatives and Impacts in support of the EIA Regulations. Integrated Environmental Management Guidelines Series.

3. DESCRIPTION OF ACTIVITY

This section provides the motivation and description of the proposed project, as well as a discussion on the alternatives which are currently under consideration. Information presented in this section is taken largely from the Preliminary Design Report for the Wild Coast Meander: Coffee Bay to Zithulele. A complete copy of the report is included in Appendix I.

All referenced figures are presented at the end of this chapter unless otherwise stated.

3.1 Applicant Details

Department of Roads and Transport: Eastern Cape Province
Private Bag X0023
BHISHO
5605
Responsible person: Mr Sandile Booi
Telephone: (043) 604 4492
Fax: (043) 604 4490
Email: sandile.booi@dot.eprov.gov.za

3.2 Location and Description of the Route

Refer to Figure 1.1 for the general location of the Project.

The roads to be upgraded under the Project are situated in the Wild Coast region of the Province of the Eastern Cape. Specifically the affected area lies within the jurisdiction of King Sabata Dalindyebo Local Municipality (Ward 23) and OR Tambo District Municipality.

The Project runs (north to south) from the Mdumbi intersection on the existing bitumen surfaced Coffee Bay access road, DR08031, (S31° 56' 43.7", E29° 07' 44.6") to an intersection with the Zithulele Hospital access road, DR08323 to the south west (S32° 01' 31.6", E29° 01' 54.4"). The latter road is in the process of being upgraded to bitumen standard. The overall length of the project is 25.5 km, of which 5.6 km is on the existing bitumen road.

The route follows existing roads of varying standard and condition. It includes portions of proclaimed District and Access Roads, including:

- A 5.6 km portion of the existing bitumen road DR08031 leading inland from Coffee Bay. This portion of road is narrow and in fair to poor condition.

- The existing gravel road (AC30585 and AC60767) from Coffee Bay to Hole-in-the-Wall, located close to the coastline, approximately 9.4 km in length.

- A portion of the existing gravel road DR08321 inland from Hole-in-the-Wall, before turning west to link to the Zithulele access road, DR08323. The length of this portion is approximately 12.5 km and part of it is categorised as AC30503.

In addition, the access road to the Hole-in-the-Wall view site will be upgraded and some improvements will also be done on the access road to the Ocean View Hotel and other facilities in Coffee Bay. Both Coffee Bay and Hole-in-the-Wall are important tourism destinations as recognised in local planning frameworks including the Wild Coast Tourism Development Policy (WCTDP), 2001.

There are five (5) existing bridge structures within the Project plus another two (2) rivers with causeways which will require new structures. Where three (3) of the existing bridges could be retained, there will be at least three (3) and probably four (4) new bridges on the Project. In addition, a vlei area which is crossed near Hole-in-the-Wall which will require a substantial barrage of culverts.

Further to providing access to tourism nodes, the road network also serves rural settlements which are typical of the former Transkei region and are in fact the principal generator of traffic in these areas. Subsistence farming is the main activity, with both livestock and cultivated areas present. There are a number of social facilities along the road such as schools, clinics, police stations, community halls and local government offices.

Refer to Chapter 4 for further detail regarding the characteristics of the area to be affected by the Project.

3.3 Motivation

The motivation for the Project may be summarised as follows:

- To implement the Wild Coast Meander (WCM) tourism route concept as described in the Provincial Growth and Development Plan (PGDP) Initiative – see below.

- To provide access to 1st and 2nd order development nodes which constitute primary tourism destinations, viz Coffee Bay and Hole-in-the-Wall.

- To develop/formalise access to scenic views.

- To provide access to rural settlements and associated clinics, hospitals, police stations, community halls etc. for the surrounding communities.

- To stimulate economic development.

The Project is part of the proposed WCM tourism route. This is a flagship, priority project identified by the PGDP Initiative which is in turn a product of joint deliberations by all of the provincial social partners and it constitutes a consensus position on growth and development path for the next ten years. Extensive consultation between the provincial government, public entities, district municipalities, business, labour and NGO Coalition guided the programme development and implementation plan of the PGDP.

Within the context of the WCM, it is proposed that existing gravel access roads linking coastal resorts and developments between Port St Johns and Kei Mouth be upgraded to surfaced standards. The prime motivations for upgrading roads which would form part of the WCM Route are to:

- Improve access to socio-economic facilities for local residents.
- Stimulate the local, largely rural economy.
- Promote the tourism potential of the Wild Coast.

The aim is not to create a high speed coastal road, but to provide a scenic tourism route following existing roads. The WCM will not be tolled and has no association with the proposed N2 Toll Road.

The proposed WCM has been identified as a means of facilitating the achievement of the above goals. The general concept is to upgrade existing roads on their existing alignments. Environmental protection is an integral component of the WCM project, meaning that new alignments and major earthworks will be minimised where possible. Further, the definition of the word “meander” relates to a winding route linking communities, as opposed to providing a high speed road linking one end of the coast to the other.

The first phase of the Meander project, from the provincial main road, the R61, at Tombo (west of Port St Johns) to the settlement of Mpamba, has already proceeded to the detailed design stage.

3.4 Adjacent Projects

This Project it one of three upgrade projects in the area. The Project at its termination will intersect with a current construction project which is upgrading the access road to Zithulele Hospital. This access road leads inland back to the DR08031 and from there to the N2 at Viedgesville.

At time of writing, the DRT has advertised a professional services tender for the rehabilitation of the DR08031 from Mqanduli to Coffee Bay. It will connect to the starting point of the road covered by this Report.

In addition, it is understood that the access road to Mtata Mouth, which is on the coast to the north of Coffee Bay, has been identified by the DRT for upgrading in future.

3.5 Geometric Design and Elements

The upgrading of the Project roads presents technical challenges due to the rolling terrain and the level of roadside development in places. Gradients of up to 20% are encountered along the existing road, while the available width is restricted in places. The horizontal alignment can be tortuous with radii of less than 30 metres not uncommon. Extremely low design speeds and concrete surfacing on steeper sections can be anticipated.

Given these restrictions, there are portions of the route where only a very low geometric design standard is achievable. Horizontal and vertical curvatures of less than 40 km/h are not uncommon. In

addition, there are areas where the desired cross section is not achievable without recourse to major earthworks and/or specialised retaining structures: this would not meet with the principles of the WCM (see Section 3.3 above).

A flexible approach to the geometric design has therefore been adopted, whereby improvements are proposed in so far as they are practical and cost effective. Nevertheless, road user safety remains a key component of the design.

Finally, the Project design takes cognisance of the Kwa-Tshezi Development Plan (see Chapter 2.4 for more detail).

3.5.1 Summary Design Standards

As eluded to above, the design standards for the upgrading of the road will not fully conform to a specific geometric design speed. Nevertheless, the design philosophy has been to achieve certain standards where possible. Proposed standards include:

- A 60 km/h design speed, although it is recognised that even 40 km/h cannot always be achieved.
- A cross section surfaced width of 8.0 metres, consisting of 2 x 3.4 metre lanes and 2 x 0.6 metre shoulders. This is less than the provincial Class 3 standard of 8.6 metres. The width may be reduced to 6.0 metres in places where constraints dictate.
- A long section with a maximum gradient of 15%. Steeper gradients are, however, necessary to reduce the extent of earthworks.
- Two way traffic across all bridges, with provision for pedestrians on one or both sides.
- Retaining some of the existing sharp bends through Coffee Bay where the urban nature of the environment restricts options and the rural geometric design standards do not apply. There are three options for the alignment through Coffee Bay – see Section 3.13 below for a discussion of alternatives.
- Traffic calming measures within Coffee Bay, such as roundabouts, stop streets and right angled turns.
- Retaining existing sharp bends in certain rural locations where dwellings and cultivated fields lie immediately adjacent to the road.
- An 8.0m width road between km 0.0 and km 5.6 (Mdumbi intersection to Coffee Bay). The existing bitumen road varies in width, but generally has a sealed width of 6.0 metres. The proposed 8.0 m width can be achieved via building up the shoulders and recycling the upper layers to the desired width.

3.5.2 Horizontal and Vertical Alignment [10]

(a) Horizontal Alignment

[10] The design speeds and curve radii referred to are generally in terms of TRH17 – Geometric Design of Rural Roads

The proposed horizontal alignments for the Project are illustrated on the engineering plans 000130/PD/01 – 025 as included in Appendix D.

In summary, the following geometric design standards are proposed for the horizontal alignment – refer to Table 6.1 of the Preliminary Design Report (Appendix C) for further detail:

- 60 km/h design speed where possible.

- However, it must be noted that there are a number of areas where even a 40 km/h design speed would be difficult to achieve. Very tight, hairpin bends will be left in places. In addition, some curves have very short lengths and appear as kinks, especially through Coffee Bay.

- Possible improvements are compromised by the terrain and by roadside development. There are also a number of springs and seepage areas which have induced very tight curves on the existing road. Improvements would require drainage structures.

- Three significant deviations from the existing alignment are proposed in Coffee Bay, near Hole-in-the-Wall, at the intersection with DR08321, and at the Zithulele intersection. These minor improvements to the horizontal alignment have been proposed in places to improve road safety conditions and incorporate the following:

    - KuBomvu River in Coffee Bay; The route through Coffee Bay and the crossing of the KuBomvu River is particularly challenging. Three distinct alignments have been assessed, using two possible bridge locations. These options consist of the following:
        - Existing alignment across the KuBomvu River.
        - Realignment across the KuBomvu River via a new bridge upstream of the existing bridge (Option 1).
        - New Alignment across the estuary of the KuBomvu River, near the mouth (Option 2).
        - These alternatives are discussed further under Section 3.13 below.

    - Vlei area near Hole in the Wall: Where the road approaches the Hole-in-the-Wall hotel and settlement, it crosses a vlei area some 120 metres wide starting at km 13.8 approximately. The existing road effectively forms a low level dyke across the vlei despite provision for cross drainage. The proposed realignment will be moved upstream where the width of the vlei affected is reduced to approximately 35 metres to reduce the impact of the road on the natural flow of water through the vlei. Raised box culverts on a rock fill layer will be installed through the vlei. It is understood the old structure will be removed to restore vlei function.

    - Intersection on DR08321: The intersection is approximately 5.8 km inland from Hole-in-the-Wall along the district road which leads back towards Mqanduli and Viedgesville. Currently, DR08321 is the through route, with local access roads branching off left and right approximately 150 metres apart. As the road being upgraded is part of the Meander Route, it is considered appropriate that this becomes the through route. The intersection layout will be relatively straight forward, there being no physical feature impeding the creation of a T-junction.

      To the west of the junction, however, the road descends rapidly and there are a number of dwellings adjacent to the route. There are 2 possible alignments, but both

will require the relocation of some houses. The existing alignment is perhaps the more problematic in terms of road safety and includes a vertical gradient of 24 %.

These alternatives are discussed further under Section 3.13 below.

(b) Vertical Alignment

Improvements to the vertical alignment are a challenging aspect of the Project considering the rolling, steep terrain which is encountered in places. A maximum gradient of 24% occurs along the route (at roughly km 20), with gradients in excess of 15% common along the section between Coffee Bay and Hole-in-the-Wall.

A suitable grade line has been applied to the long-section as generated from the proposed horizontal alignment. In summary, the following geometric design standards are proposed for the vertical alignment – refer to Table 6.2 of the Preliminary Design Report (Appendix C) for further detail:

- 60 km/h design speed where possible.

- There are numerous locations where the existing alignment has a far lower vertical design speed. A design speed of 40 km/h would require some improvement in the form of cuts and fills.

- A vertical alignment with a maximum gradient of 15% has been applied and the effects assessed. It is clear that careful consideration has to be given to inducing cuttings as this inevitable leads to encroachment on houses and fenced areas.
- In some places, gradients in excess of 15% may have to be accepted to minimise impacts on adjacent properties.

- Generally, improvements will be effected at the river crossings and other well defined watercourses.

(c) Cross Section

The width of the existing road varies along its length with significant differences in places as affected by terrain, drainage structures, adjacent development and maintenance (or lack thereof).

In summary, the following geometric design standards are proposed for the road cross section – refer to Table 7.1 of the Preliminary Design Report (Appendix C) for further detail:

- Seal width of 8.0 metres consisting of 2 x 3.4 metre lanes and 2 x 0.6 metre sealed shoulders where possible. This cross section is of a lower standard than the provincial Class 3 road, which has a seal width of 8.6 metres. However, the WCM route is not intended to be a high class road, particularly when achieving a set design standard would be expensive and would impact on adjacent land use.

- Widening of the existing bitumen section will be involved.

- There are sections where 8.0 metres will not be achievable without recourse to expensive earthworks and/or retaining structures – e.g. through Coffee Bay on the existing alignment or between km 17.8 to km 18.7 where there are very steep cross falls.

- Reductions to 6.0 metres seal width can be considered.

- Regardless of the achievable standard seal width, it is recommended that all bridge structures be designed to accommodate a Class 3 provincial cross section to avoid future widening and to provide safety benefits.

3.6 Bridge Crossings and Culverts

There are six (6) existing major road over river crossings within the project length. Three (3) of these are on the existing bitumen section of DR08031 between the Mdumbi turn-off and Coffee Bay. The low level Nenga Estuary crossing leading to the northern area of Coffee Bay has been added to the Project at the request of the DRT.

In addition to the major river crossings, there are three (3) catchments which require the provision of multi-cell portal culverts, which are listed with the seven (7) crossings below.

Table 3.1 List of Existing River Crossing Structures and Major Culverts

Reference[11]	Road	Project Chainage (km)	Bridge/Culvert Name
Bridges			
B1	DR 08031	1.02	Mapuzi River Bridge 1
B2	DR 08031	2.10	Mapuzi River Bridge 2
B3	DR 08031	4.56	Nenga River Bridge 1
B4a	Side road in Coffee Bay	~ 4.76	Nenga River Bridge 2 (estuary crossing)
B4	AC 30585	5.98	KuBomvu River Bridge
B5	DR 08321	16.64	Nzulwini River Bridge
B6	AC 30503	23.04	Mpako River Bridge
Culverts			
C1	AC 60767	12.04	Culvert 1 – Mtonjane River
C2	AC 60767	13.90	Culvert 2 – Wetland area
C3	AC 30503	20.36	Culvert 3 – Kumbula River

The design criteria for the bridge crossings include improving the bridge crossing to DRT's standard for Class 3 roads, to suit the cross section of the upgraded road, New Jersey barriers will be provided,

[11] These reference numbers have been created by SSI in the absence of any departmental bridge numbers or as-built drawings.

pedestrians will be accommodated where practical and each bridge widening, raising or new bridge structure will be designed to facilitate ease and safety of construction.

In most cases, a single barrier protected walkway lane of 1.5 metres (to Provincial standards) will be adequate. However, it is proposed that in areas of either particularly high foot traffic or where warranted by geometric constraints to the road, a walkway lane should be provided on both sides of the bridge.

The existing condition and proposed improvements/upgrades are summarised below - refer to Section 8 of the Preliminary Design Report for further detail (Appendix C):

3.6.1 Mapuzi River Bridge (B1 – km 1.02)

Existing: The existing Mapuzi River Bridge (1) is a two-span double lane bridge located at S31° 57' 14.9" and E29° 07' 44.5". The bridge consists of two abutments and one pier of approximately 4m in height. The solid reinforced concrete deck slab is approximately 14m from abutment to abutment and 510mm deep (span to depth ratio of 15). The bridge deck width is approximately 10m. B1 satisfies the Design Flood Levels for an 18.38 year return period.

Proposed: It is proposed that the bridge be left at its current level. The upgrading of the bridge would mainly involve widening the deck to allow two pedestrian lanes. This option could be accomplished by adding approximately 1.7m of reinforced concrete slab along each side of the existing deck and supported incrementally by the existing substructure. Rehabilitation/maintenance of the existing structures would include resurfacing the deck, replacement of the expansion joints, relocation of existing services and sealing of minor cracks.

3.6.2 Mapuzi River Bridge (B2 – km 2.12)

Existing: The second major bridge structure is located at km 2.25 (S 31° 57' 45.4" and E 29° 07' 58.8"). This double lane, 3-span bridge is of similar design to Bridge 1 and consists of two standard bridge abutments and reinforced concrete piers. All three spans are approximately 5m (total length of 15m) with a bridge deck depth of approximately 510mm (span to depth ratio of approximately 9.8). Bridge 2 has a deck width of 9m. From inspection it appears that Bridge 2 has already undergone a widening which took it from a one-lane to two-lane bridge. Bridge 2 satisfies the Design Flood Levels for a 17.92 year return period.

Proposed: Due to the similarities between Bridges 1 and 2, the same design solution proposed for Bridge 1 is applicable for Bridge 2.

3.6.3 Nenga River Bridge (B3 – km 4.56)

Existing: The Nenga River Bridge is located at km 4.7 (S 31° 58' 39.1" and E 29° 08' 54.1"). This double lane, 3-span bridge consists of three box culvert openings. The culvert openings are 5x5m and the total length approximately 20m. Bridge 3 does not satisfy Design Flood Levels for the 20.00 year return period but it should be noted that the existing structure does satisfy 10 year return period flood level requirements.

Proposed: As the river crossing at this location consists of large portal culverts, raising the bridge deck without the complete demolition of the superstructure is not possible. The initial inspection revealed that the existing structure is in a very good condition and, considering that the existing structure is adequate for a 18-year return period flood level, one must consider the substantial costs involved in rehabilitating the structure to satisfy the 20 Year Return Period Design Flood. Upgrading of the bridge if

left at its current height would involve widening the deck to allow a pedestrian lane. This option could be accomplished by adding approximately 1,9m of reinforced concrete slab along the side of the existing deck and supported incrementally by the existing substructure's wingwalls. Rehabilitation/maintenance of the existing structures would include extending guardrails, repairing existing gabions, cleaning abutment, pier walls and deck sides, addressing settlement, resurfacing the deck, extending scuppers, replacing the expansion joints, replacing the parapets with New Jersey barriers and sealing minor cracks.

3.6.4 Nenga River Bridge (B4a – off km4.7)

Existing: Nenga River Bridge 4a occurs off the DR 08031 main road at S31° 58' 45.3" and E29° 08' 56.3". This bridge was included in the project at the request of the DRT. It comprises a single lane causeway consists of four 1m diameter pipes with a 1m concrete covering, 42m long. The causeway has guide blocks and does not provide any protected pedestrian walkway lane. The causeway is inundated on a regular basis meaning that access for residents and hotel guests is restricted. By inspection, the existing culvert bridge does not satisfy even most minimal design flood requirements. The culvert's location, being off the main district road, means a much less significant traffic volume is supported by this structure. However reduced in traffic volume, this ancillary road serves the nearby community and has been deemed worthy of consideration for a partial upgrade.

Proposed: The proposed improvement at Nenga River Bridge 4a is the addition of a raised second culvert structure downstream of, but adjacent to, the existing crossing. This second crossing would raise the road elevation by approximately 1metre. A higher structure is not practical due to adjacent properties and the proximity to the main road. The intersection levels could not be amended without recourse to major and expensive earthworks. The new structure would also be a relatively narrow, but a width of 7.0 metres would allow 2 vehicles to pass safely. Due to low traffic volumes and slow travel speeds, pedestrians would be able to cross without too much risk. To ensure improved hydraulic capacity and ease of construction for the new structure, it is proposed that the 40m river width would be spanned using 20 No x 1.5m box culvert units. The existing structure would preferably be demolished to further improve the hydraulic performance of the new structure.

3.6.5 KuBomvu River Bridge (B4 – km 5.98)

A new bridge is required across the KuBomvu River regardless of the final route alignment through Coffee Bay.

Existing: The existing KuBomvu River Bridge is a six-cell road over river structure composed of prefabricated reinforced concrete box culverts with an in situ concrete slab. The existing bridge is located at S 31° 59' 14.1" and E 29° 08' 41.5". This single lane structure consists of portal culverts built onto stone and cement piers with substandard abutments. The portal culverts measure 2.7m wide by 2.2m high. The length of the bridge is 19m and the average height 3.7m. The piers and abutments are assumed to be founded on dolerite boulders, as these are visible on the southern bank. The existing bridge deck is 3,78m wide (3,32m between barriers). The balustrades are unreinforced stone and cement walls that appear to have suffered collision damage and have not been repaired since. Both the wing walls and plinths are unreinforced stone and cement. It is not considered practical to use the existing structure for a road crossing. However, it could be left in place for pedestrians.

Proposed: The proposed route through Coffee Bay has two different locations at which the KuBomvu River may be crossed. Option 1, also referred to as the "inland" location is adjacent to the existing structure while Option 2 crosses the KuBomvu at the "river mouth" location. These two options are discussed in more detail in Section 3.13 below.

3.6.6 Nzulwini River Bridge (B5 – km 16.64)

Existing: This major bridge structure is located at S 32° 01' 20.8" and E 29° 05' 05.0". The existing single lane, 3-span bridge consists of two bridge abutments and two piers. The piers and abutments are 5 m apart. The length is approximately 15 m and the height 5 m. The existing river bridge has revealed significant undermining of its left abutment due to inadequate founding material. However, a rock outcrop 20m upstream of the bridge offers potentially firm founding for a new bridge along a revised road alignment.

Proposed: The existing river bridge does not satisfy Design Flood Levels and shows signs of damage from past flooding. To satisfy Design Flood Level requirements alone, the bridge would have to be raised by over 1.25m. The existing bridge of approximately 5 m in width can only cater for single lane traffic and has no allowance for pedestrians. Due to these factors, it is not practical to consider rehabilitating the existing Nzulwini River Bridge to suit the upgraded standards. A new structure is required. Minor rerouting of the district road to 20 m upstream provides an adequate location for a single 20 metre span crossing with a pedestrian walkway on one side. The total deck width of the bridge would be 11.6 metres. The new structure will be approximately the same total length as the existing but will be significantly higher to provide adequate freeboard. This design change coupled with being a single-span provides less obstruction of the existing waterway. Currently, debris and tree branches build up against the existing structure.

3.6.7 Mpako River Bridge (B6 – km23.04)

Existing: The last major bridge structure is located at S 32° 00' 48.7" and E 29° 02' 30.8". The existing crossing is a single lane causeway consisting of four 600 mm diameter pipes covered in concrete to a height of 1 meter. The total concrete length is approximately 21 meters. The proposed route crosses the Mpako River 30 to 40 meters downstream of the existing crossing. The initial inspection revealed adequate founding material at this location. The existing structure is totally inadequate for inclusion in the upgraded road. While the old route deviated from a natural alignment to cross the Mpako River in a narrow area, the new road alignment would follow a more direct path over the Mpako River and cross at a wider section of the river.

Proposed: Due to the Mpako River's wide banks at the proposed location, Design Flood Levels would be restricted by a single span bridge. A three-span bridge (3 x10 metres) would not restrict the river flow prohibitively and would provide an economical elevation to the top of bridge deck. The bridge deck would be a 750mm solid-slab with a 30 degree skew. Pedestrian traffic at this location is not substantial enough to warrant two pedestrian lanes. This would keep the bridge deck width to 11.6m.

3.6.8 Culvert 1 – Mtonjane River (C1 – km 12.04)

The proposed solution at this crossing is to provide a new culvert crossing composed of 3 No 2.4 m x 2.4 m box culverts approximately 17m downstream from the existing culvert. The new culvert is on a horizontal curve and adequate fill cover should be maintained. Following the completion of the new culvert, the existing culvert may be removed as necessary pending consultation with the local communities.

3.6.9 Culvert 2 - Wetland Area near Hole-in-the-Wall (C2 – km 13.90)

The proposed crossing of this wetland area requires a roadway at least 2.1 meters above the surveyed ground level. The width of the wetland at the point of the realigned crossing is between 30 and 40 meters, which is considerably less than the current crossing. The structural component of this crossing is calculated as 3 No - 1.8 m x 1.8 m box culverts. However, a longer battery of smaller culverts (say 1.2 m x 1.2 m) may be more suitable from an environmental viewpoint as the natural flow in the vlei

should not be restricted. The provision of a rock pioneer layer across the vlei will be necessary to address settlement concerns. This will provide a firm footing and allow for the percolation of water below the fill. Due to the potential for settlement, this fill should be constructed at least 6 months prior to the subsequent construction of the road pavement layers.

The necessity of removing the existing road crossing, which consists of ten pipes buried just below the gravel road, will be determined in consultation with the environmental specialist.

See also Section 3.13 for a discussion of this alternative routing through the vlei.

3.6.10 Culvert 3 – Kumbula River (C3 – km 20.36)

A new culvert crossing is proposed to replace the existing inadequate structure at km 20.36 of the new road. The recommended culvert system is 3 No, 2.4 m x 2.4 m box culverts.

The upgraded road follows the existing road alignment at this river crossing. There is limited scope for realignment to the meanders in the river channel. Accordingly, some attention to the traffic accommodation is required as the existing structure must be removed. The use of temporary pipes and a bypass road will probably be necessary.

3.7 Materials and Pavement Investigations

The materials and pavement investigations were still in progress at the time the Preliminary Design Report was prepared and pending the completion of these investigations, the pavement design is still at an early, conceptual stage. The materials investigations to date have focussed specifically on the availability of suitable materials for pavement layers and hard rock aggregates, as well as foundation investigations at the bridge sites.

3.7.1 Quarry, Borrow Pits and Sand Sources

It is important to note the use of borrowpits and quarries for the sourcing of road building materials is regulated by the Department of Minerals and Energy via the Minerals and Resources Petroleum Development Act, Act No 28 of 2002, and Regulations. Prior to commencing with the extraction of materials from any of the sources, authorisation in the way of a mining permit or right is required from the DME. As an organ of state, the DRT is exempt from having to undergo the full application process, but is nevertheless still required to submit an Environmental Management Plan for each of the sources. This process is being run in parallel to the DEDEA application for authorisation of the road upgrade. A separate Environmental Management Programme Report is currently being prepared by the EAP for submission to DME.

(a) Quarry
Two potential sources of hard rock aggregate were identified including the existing quarry currently being used for the Zithulele Hospital access road (km 24.0) and the so-called Elliotdale quarry, approximately 50 km by road from km 0.0. It was decided to focus on extending the Zithulele quarry as the source of hard rock aggregates for the Project: the other alternatives were discounted.

(b) Borrow pits and sand sources
A total of 9 potential borrow pits have been identified along the length of the route. However, due to access problems, local resistance, and doubt over the properties of certain sources, the number of borrow pits actually used may vary. The materials available are either decomposed dolerite, weathered siltstone or shales.

Materials could also be obtained from the earthworks and widening of side cuts, for example, dolerite has been noted in the side cuts between km 18 and km 19, however it is important to note the general intention is to minimise cuttings wherever possible.

'Quarry sand' will be utilised for construction purposes as needed as there are no other sand sources in the general area.

3.8 Pavement Design

The design life for the road will be 20 years.

The pavement design will largely be governed by the terrain and steep gradients. As the use of bitumen surfacing materials is not considered to be appropriate at gradients exceeding 12 %, it is anticipated that there will be a significant length of concrete surfaced road, as is the case on the existing paved section approaching Coffee Bay.

In order to maximise local inputs and opportunities for SMME's, consideration has been given to the use of block pavers on flatter sections of the road surface. The longest such section is through Coffee Bay from km 4.5 to km 6.0 (preferred alignment – KuBomvu Bridge Option 2). If the existing alignment is followed, then the scope for using pavers is reduced to km 1.1 km. Within Coffee Bay, a blocked paved road would have aesthetic appeal, and there is scope for using different coloured pavers on roundabouts and street parking. Pavers can also be utilised at view sites and rest areas.

It is assumed that the balance of the road will be bitumen surfaced whereby the preferred surfacing is Cape Seal consisting of a 19 mm aggregate and two slurry applications. This is the preferred surfacing as it is:

- Considered to be constructible over the topography of the roads under consideration and should provide for a durable surfacing over a considerable period of time.
- More resistant to sharp turning movements.
- More labour intensive compared to the other surfacing options discussed above. The slurry component can be spread by hand and has a fairly wide tolerance in its application.

3.9 Additional Design Considerations

3.9.1 Drainage

The control of stormwater run-off, as well as sub-surface water, are important aspects of the design. Similar to other aspects of the road design, the very steep gradients and road side development limits outlet opportunities.

In addition to the bridge and culvert structures described above (Section 3.6), the following stormwater and sub-surfaced drainage features are to be provided for the streams, catchment areas and cuttings:

- Cross drainage will generally be by means of portal and/or pipe culverts although standard sized pipe culverts may also be used. In order to maximise the labour input to the project, it has been suggested that pipe culverts be replaced by rectangular culverts constructed from bricks or cement blocks. The top cover slabs would consist of pre-cast concrete panels made

on site. Such culverts have been used on roads projects throughout southern Africa where labour intensive methods have been specified.

- Stormwater outlets both from culverts and side drains must be controlled to reduce erosion risks. On natural watercourses, culverts will be laid to the natural channel profile, horizontally and vertically. Where additional culverts and side drain outlets are provided, erosion protection measures will be put in place. Gabion baskets and mattresses have proven to be effective energy dissipaters.

- Extensive use of lined side drains is envisaged, with sufficient outlets to cope with high intensity storms. Grouted or plain pitching may be used instead of smooth concrete to reduce the flow velocities. Pitching also tends to be more labour intensive.

- Sub-surface drainage will be provided in cuttings to ensure the long term integrity and maintenance of the road.

- Sub-surface drainage will also be provided where springs and seepage areas are encountered along the route. In these cases pioneer layers, sand blankets, and conduits of crushed stone wrapped in geofabric, may be utilised as appropriate. Outlets from sub-surface drains will be at natural watercourse or culverts as appropriate. Rodding eyes and marker blocks will be provided to facilitate maintenance, in accordance with the DRT's standard details.

3.9.2 Pedestrian Sidewalks

Pedestrian traffic is evident along the entire route length, but is particularly dense in Coffee Bay and in the vicinity of schools. It is recommended that sidewalks be provided where practical in densely populated areas, at least on one side of the road including the following locations:

- At the Mdumbi turn-off, km 0.0, kerbs and sidewalks can be used to define the intersection. There is a school adjacent to the intersection.

- Across Bridges 1 and 2, km 1.02 and km 2.12 respectively, where sidewalks on both sides are proposed. A large number of school children has been observed crossing Bridge 2.

- At Bridge 3, a sidewalk is only practical on the left hand side. To the south of the bridge, a steep hillside would prevent the widening necessary to accommodate a sidewalk on the bridge approach.

- At km 4.58 to km 5.62, through Coffee Bay. A sidewalk could be provided on the left hand side. In front of the Coffee Bay Hotel, a sidewalk on both sides may be justified over a length of 140 metres.

- At km 5.62 to km 6.04, through Coffee Bay. A sidewalk on both sides would be proposed if the lower alignment was adopted. If the existing alignment is followed, then some form of sidewalk on one side only should be provided, even if the width of such sidewalk is reduced.

- At km 14.06, the turn-off to Hole-in-the-Wall hotel, sidewalks would define the intersection. The same applies at km 14.49, which is the turn-off to the Hole-in-the-Wall view site.

- Across Bridges 5 and 6, km 16.64 and km 23.02 respectively, a sidewalk on one side only is proposed.

- At the Zithulele Road intersection, km 24.7, kerbs and sidewalks can be used to define the intersection. There is a trading store at the intersection and numerous residences in the vicinity.

There may be additional areas where sidewalks can be considered. Further assessments will be made during detailed design, taking into account feedback from the community liaison process, general road safety and the proximity of schools to the road.

Consideration shall also be given to the provision of pedestrian crossings. Certainly, crossing points will be demarcated in Coffee Bay to coincide with access roads and walkways to the beach. In the more rural areas, signage and road markings at school accesses, and any other socio-economic facility where pedestrians cross, will be provided.

3.9.3 Intersections and Accesses

Provision will be made for accesses, intersections, right-turning bays and traffic circles, in places. These will be fully addressed in the detailed design.

3.9.4 Climbing Lanes

Although the steepness and length of some of the gradients warrant climbing lanes in terms of the proposed design standards, the wholesale addition of climbing lanes to the Project would be expensive and would not necessarily be appropriate in view of the design speed of 40 km/h in places. The detailed design will assess where localised passing opportunities may be provided on long inclines to reduce driver frustration and risk taking.

3.9.5 Bus Embayments

Although there is currently limited public transport using the route, it is safe to assume that, once the road is upgraded, public transport will be attracted to the area. In general, embayments will be considered close to schools, clinics, community halls, police stations and the major intersections. The exact locations will be guided by consultation with relevant authorities and will be described in the detailed design.

3.9.6 Rest Areas and View Sites

The tourism aspects of the WCM in general, and the scenic beauty of this section in particular, are motivating factors for the provision of rest areas and view sites adjacent to the road. The following areas have been identified as being particularly scenic and could be considered as rest areas / view sites.

- Km 4.1: There is a narrow view of Coffee Bay from the intersection with the old road. This is at the top end of the concrete section.

- Km 6.3 to km 6.7: The road is close to cliff tops overlooking the ocean. It is evident that visitors stop on the natural grass verges to admire the view, resulting in rutted tracks and general degradation. The provision of paved parking and picnic areas would improve the situation and allow visitors to stop comfortably and safely off the road.

- Km 7.5: There is a view down a steep ravine to the ocean.

- Km 12.6: This is a crest on the road from where a broad sweep of land and sea can be viewed. The cliff formations which lead to Hole-in-the-Wall can be seen in the distance. Some earthworks and liaison with adjacent residents would be required.

- Hole-in-the-Wall view site: It is considered necessary to provide paved parking and a picnic area here to prevent degradation of the natural vegetation. The current rutted track is passable only by 4 x 4 vehicles in wet weather and these tend to churn up the top soil, leading eventually to a multitude of tracks.

A further aspect of the provision of view sites is that local residents could be engaged in their construction and maintenance, refuse removal and vegetation control.

3.10 Safety Aspects

The upgrading of the section of the WCM from Coffee Bay to Zithulele presents a number of challenges in respect of road safety. The steep and winding nature of the alignment, the presence of pedestrians and the high number of accesses have all been highlighted during the Project feasibility studies.

At present, the impact of these factors on road accidents is probably not severe due to the very low travel speeds. The lack of accident records makes it difficult to compare the accident rate on the existing bitumen section with typical rural roads in the Eastern Cape. Evidence of collisions, damage to fences, bridge parapets, etc was not specifically noted the site visits.

There is some concern that the upgrading and widening of the road will increase the occurrence and severity of road accidents. It is well known that the surfacing of a road leads to higher traffic volumes and higher travel speeds. This could well result in a higher incidence of loss of control accidents on a tight alignment, as well as collision with stationary or slow vehicles due to the limited sight distances than under current conditions. The general failure of South African motorists to drive responsible only heightens concern.

Potential mitigation measures such as roundabouts, signage and road markings have been noted previously. Specific and general issues are discussed in greater detail below.

General Safety Issues:

- Appropriate warning signs for approaching curves.

- Appropriate warning signs for bus embayments and pedestrians crossing.

- Appropriate warning signs for accesses, particularly concealed accesses, and intersections.

- The cutting back of vegetation where sight distances are impaired.

- Delineators and chevrons on the outside of curves.

- Reflective road studs on the centre line, and on the edge lines.

- Appropriate speed limits as discussed below.

Specific Safety Issues:

- The horizontal and vertical alignment at all of the bridges and major watercourse on the existing gravel section should be improved as described above.

- All bridges shall incorporate pedestrian sidewalks. The standard detail whereby a barrier is provided between pedestrians and vehicles is preferred.

- Pedestrian sidewalks shall be provided.

- Roundabouts are recommended as traffic calming measures where the road passes through Coffee Bay.

- Localised widening on the inside of very tight curves shall be provided where practical. Such widening is recommended in various geometric design manuals where the design speed is less than 60 km/h. The intention is to facilitate the cornering of longer vehicles.

- Passing opportunities shall be provided where practical on long and steep gradients.

- Speed humps shall be provided in the vicinity of schools and outside Coffee Bay to slow down approaching traffic. The humps should not be so severe as to cause a hazard in themselves. Speed humps have been used extensively in similar situations on rural roads in the province.

- Guardrails will be required at numerous locations and will serve as both protective and warning devices. Specific locations include the approaches to bridges, sections with steep crossfalls, and on the outside of very tight curves. Where space is limited, it is considered more appropriate to reduce the width and install guardrails.

- Specific use shall be made of road markings to highlight approaching hazards. Examples include :

    - cross hatching on the shoulders for bridge approaches.
    - wider edge lines on tight horizontal alignments.
    - narrowing the lane width approaching Coffee Bay and painting transverse lines to alert motorists.
    - The use of edge lines is recommended throughout the alignment, even where the seal width is reduced. The intention is to highlight the edge of seal which may not be apparent in misty conditions.

3.11 Speed Limits

The general recommended speed limit is 60 km/h over the length of the Project. Higher speed limits are not considered appropriate. In Coffee Bay, a reduction to a 50 km/h speed limit is recommended.

Where the design speed falls below 60 km/h, then clear warning signs with advisory speeds are recommended. Large rectangular boards shall be used to highlight particularly difficult sections.

3.12 Fencing and Roadside Development

The provision of fencing on rural roads in the Wild Coast and adjacent regions is always a contentious issue with local residents. Despite community consultations before and during construction, it is

inevitable that there will be complaints and requests as construction nears completion. Typical issues include:

- Dissatisfaction with the accesses provided, even though road safety was considered in the location of the access points.
- Requests for direct private access. If this is not provided, then the fences are cut.
- Requests for cattle crossing points. Frequently there is a demand for an underpass where there is no fill to accommodate such a structure.
- The fenced road now splits some locally accepted but unmarked right of way.

On this particular project, the fencing of the entire road reserve is ***not recommended***. There are so many accesses and communal grazing areas that conflict with residents would be out of proportion to the benefits derived. In addition, the terrain would make the installation of fencing difficult and expensive, with numerous straining posts for the changes in direction. Transport of materials and manpower would be very difficult in places.

Nevertheless, where there are existing fences which have to be moved, or where fenced areas are dissected, then new fences will have to be installed so as to maintain the *status quo*. Liaison with the relevant residents and authorities will be necessary to ensure that there is a mutual understanding of the amended fence lines and of any compensation which may be applicable.

The provision of a bitumen or concrete surfaced road is likely to lead to further development alongside the route. It is essential that liaison efforts impress on the local authorities the need to maintain a road reserve, even though this may not be fenced.

3.13 Alternatives

It is a requirement of the EIA Regulations, 2006 to consider project alternatives. Such alternatives may be in the form of site alternatives, activity alternatives, process or technology alternatives and even temporal alternatives.

The primary alternative types for this Project include route alternatives and the compulsory 'No-Go' alternative as described in the following sections.

2.13.1 'No-Go' Alternative

An important element of the required EIA process is to include a 'No-Go' alternative where a given project is not constructed or established. Even if the 'No-Go' alternative is not feasible or reasonable, it is compulsory to assess the implications of this course or action (or inaction).

Specific to this Project, the 'No-Go' alternative involves maintaining the status quo whereby no improvements or upgrading of the focus roads is undertaken and as a consequence the condition of these roads is allowed to deteriorate. Travel conditions will continue to be hampered by the steep gradients and tight corners associated with much of the route, particularly during poor weather conditions. This will continue to affect the realisation of the tourism potential for Coffee Bay and Hole-in-the-Wall, restrict economic development and restrict community access to services and surrounding areas.

The implications of the 'No-Go' alternative will be considered in more detail in the EIA Phase.

2.13.2 Route Alternatives

The main route alternatives presented in the Preliminary Design Report are described in the following sections:

Alignment option at km 13.00
A minor realignment of the road at km 13.00 is proposed for safety purposes on account of the steep gradient where the road descents towards Hole-in-the-Wall at this location. Two options for improving the horizontal alignment were considered, one of which cuts through an existing homestead and the other through fallow fields. In the final design, the latter option was chosen in order to minimise the impact on the homestead.

Alignment through Vlei Area Alternatives at km 13.68
Where the road approaches the Hole-in-the-Wall hotel and settlement, it crosses a vlei area some 120 metres wide. On the existing alignment there is a series of pipes, 12 in number, to allow cross drainage but the road effectively forms a low level dyke across the vlei.

The proposed realignment crosses the vlei upstream where the width of vlei affected is reduced to approximately 35 metres. Raised box culverts would be installed and the road founded on a rock fill layer. This would reduce the impact on the natural flow through the vlei. The proposed alignment is an improvement both horizontally and vertically. It does not affect access to any of the nearby tourist facilities or local residents. Community liaison would be required as some fallow fields and grazing land will be affected.

Intersection on DR08321 Alternatives
The intersection is approximately 5.8 km inland from Hole-in-the-Wall along the district road which leads back towards Mqanduli and Viedgesville. Currently, DR08321 is the through route, with local access roads branching off left and right approximately 150 metres apart. As the road being upgraded is part of the Meander Route, it is considered appropriate that this becomes the through route. The intersection layout will be relatively straight forward, there being no physical feature impeding the creation of a T-junction.

To the west of the junction, however, the road descends rapidly and there are a number of dwellings adjacent to the route. There are 2 possible alignments, but both will require the relocation of some houses. The existing alignment is perhaps the more problematic in terms of road safety and includes a vertical gradient of 24 %.

3.14 Construction Phase

There are currently no details regarding the construction of the Project, however, it is expected further information regarding the construction activities and likely programme will be available for the EIA Phase. Based on experience with other new road and road improvement schemes, it is likely the construction activities will include the following at a minimum:

- Establishing and using the contractor camp incorporating offices, car ports, storage areas, workshops, laboratories, ablution and latrine facilities, services and access.

- Procuring and transferring materials, plant and/or equipment to and from the site or main construction area.

- Storing construction materials and construction waste on site.
- Site clearance including the removal of any illegally dumped waste, demolition activities, the grubbing of the road surfaces to be upgraded, the removal of topsoil and clearing of vegetation.
- Road closures and/or diversions.
- Concrete batching and cement works.
- Bitumen storage, mixing and surfacing.
- Earthworks and spoiling.
- Construction and upgrading of road surfaces.
- New bridge and culvert construction and existing bridge widening.
- Demolishing existing bridge and culvert crossings.
- Undertaking site rehabilitation activities.

In addition to the above, it is understood an emphasis will be placed on offering opportunities for local entrepreneurs to establish small scale emerging construction businesses which could then be utilised in the future for the on-going maintenance of the road. It is also the intention to adopt labour intensive methods for activities including clearing and grubbing, trimming of drains and slopes, stone pitching, gabions, guardrails and landscaping are all conducive to maximising the use of local labour. Pavement and surfacing can also be designed with labour intensive methods in mind, and the same applies to minor drainage structures. Facilitating the inclusion of local contractors and suppliers will also be promoted.

The construction of the bridges and culverts will have to be co-ordinated with traffic accommodation for the roadworks construction. Most of the construction work can be done under partial closures or half width construction. The use of signalised STOP/GO control is recommended. The accommodation of pedestrians during construction will also require consideration.

The DRT has appointed an Occupational Health & Safety agent for the design phase of the project. The agent will provide specific inputs during detailed design and for the construction tender documentation. This will include a Hazard Identification and Risk Assessment (HIRA). The tender procurement document for the construction stage will include in the specifications a separate section on occupational health & safety. This has become standard practice on DRT projects in the Eastern Cape. The specification will be prepared by the Department's agent, with inputs from the Engineers.

3.15 Operational Phase

Current traffic flows, based on available information and commissioned traffic counts, are considered to be 'not particularly high' with a total traffic flow of 2040 observed across four locations along the route in July 2009 – refer to Table 9.1 of the Preliminary Design Report (Appendix C).

It is estimated that in the opening year for the upgraded road, traffic flows will be 770 vehicles per day into Coffee Bay and 320 vehicles per day travelling south of Coffee Bay. The likely increase in traffic on the upgraded road will be attributed to the following:

- The presence of the improved road alone which typically produces short term increases of local traffic. The number of buses on the road are likely to increase (whether public or privately operated) as will delivery vehicles particularly where these support existing tourism facilities.

- The other road improvement projects underway in the area.

- Diversion traffic which may result with the establishment of the N2 Wild Coast Toll Road. A surfaced WCM may be seen by motorists as an alternative route through the region and as a means of avoiding the tolls. Such a diversion of traffic would be particularly important should heavy vehicles use the WCM although this is believed to be unlikely given the principles of the WCM which do not facilitate rapid transit. It is therefore essential that a load restriction be imposed on the Meander Route and that such a restriction be actively policed.

- Local economic stimulus for the rural agricultural sector as a consequence of improvement transport connections.

- Increased tourism traffic to existing and/or new facilities that may be development (services and infrastructure permitting).

A more detailed traffic impact assessment will be undertaken in connection with the detailed design.

It is noted concerns have been expressed about future traffic flows during the PPP, as described in Section 5.4.

3.16 Project Need and Desirability

DEAT have produced draft guidelines regarding a requirement for the 'need and desirability' of a given project to be more clearly considered and discussed during the EIA process.[12] Such a discussion is to be made relative to the Integrated Development Plan and Spatial Development Framework for the relevant local municipality and relative to a specific set of questions described in the guideline document. The overall aim is to *'…determine whether or not the development is 'justified' [and] in other words to ensure that the development will be socially, economically and environmentally sustainable'*.

Essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which *need* refers to *time* and *desirability* to *place* – i.e. is this the right time and is it the right place for undertaking the proposed works?

In light of the above, the need and desirability of the new development, is to be addressed separately and in detail answering a number of questions posed by the DEAT guideline document. A full response to the questions listed in the guideline has been incorporated in Appendix E.

In short, the upgrade of the Coffee Bay, Hole-in-the-Wall and Zithulele Hospital access roads, as described in this document, are entirely compatible with the municipal and provincial planning framework and initiatives which exist for the area. The upgrade forms a link in the Wild Coast Meander

[12] DEAT (2008). Draft Guidelines on the Information Requirements to Describe Need and Desirability in the Environmental Impact Assessment Process.

which is a Provincial Growth and Development Programme (PGDP) initiative and hence a provincial priority. In essence, failure to upgrade the gravel roads would have severe implications for the viability of the WCM. The roads provide access to existing development nodes as identified in the Wild Coast SDF and KSD Municipal SDF. The upgrade of infrastructure to Coffee Bay and Hole-in-the-Wall is a critical feature in the promotion of the development of these nodes, failure to do so would limit further growth and development of these centres.

The upgrade of the gravel roads and resulting provision of all weather access is fully aligned to the Kwa-Tshezi Development Plan (2008). One may conclude that there is a very strong requirement and motivation for the upgrade in terms of promoting further development which is socially, economically and environmentally sustainable.

4. AFFECTED ENVIRONMENT

This chapter provides a broad summary description of the character and sensitivity of the existing biophysical and human environment of the study area. The descriptions are based on information presented in the referenced documents, site observations and discussions with various pertinent role players.

All referenced figures are presented at the end of this chapter.

4.1 Climatic Conditions [13] [14]

Details of the climatic conditions were obtained from the South African Weather Service.

4.1.1 Rainfall

The area traversed by the road is in the summer rainfall area, although on average significant rainfall occurs from September to April. There is less rain on average from May to August. Unfortunately, there is no data available for Coffee Bay as the weather station has been repeatedly vandalised (information provided by the weather service).

The mean annual rainfall at Port St Johns, the northern end of the Meander, is 943 mm. The maximum rainfall events for a single day were recorded in January and February. It is noted, however, that even in the relatively dry months of June and July, high intensity storms have occurred, which produced 24 hour rainfall figures in excess of 100 mm.

Rainfall data was also obtained from stations at Cwebe, on the coast close to the Mbhashe River mouth, and at Wilo Plantation, some 40 km inland. The relevant average annual rainfall figures are 1113 mm at Cwebe and 970 mm at Wilo plantation, respectively.

As can be deduced, rainfall at the 3 stations closest to Coffee Bay is reasonably consistent, in the region of 1000 mm per annum.

[13] SSI. Wild Coast Meander – Mpamba to Kei Mouth Design Section from Coffee Bay to Zithulele: Preliminary Design Report.

[14] Terreco/Fieldwork/Ilitha (2004) Development of the Ridge Tourism Project at Hole-in-the-Wall on the Wild Coast. Final Scoping Report.

4.1.2 Temperatures

Summer temperatures can be very hot and humid, while cold fronts affect the area in winter. The closest weather station for which temperature data is available is at Mthatha. With an altitude of 742 metres, the temperature range is likely to be more diverse than at the coast. However, it can provide a useful indicator.

The average summer daily temperature is about 27 °C, but daytime highs above 35 °C frequently occur. The average daily temperature during winter is around 4.5 °C, while light frosts have been recorded on rare occasions. The variation between the average maximum and minimum temperatures in a month is between 18 and 27 °C and is more or less constant throughout the year. The highest temperature recorded for a given day at Mthatha is 44.0 °C.

Generally, frost does not occur in winter at the coast. However, it can be very cold in the deep valleys.

4.1.3 Wind Conditions

Many of the high coastal cliffs are exposed to windy conditions. The major winds along the Wild Coast are the onshore, north-easterly winds which predominate in the summer months and the south-westerly offshore winds that prevail in autumn and winter.

4.2 Geology and Soils

Refer to Figure 4.1.

The geology of the area principally contains formations belonging to the Beaufort Group and the Ecca Group, which in turn form part of the Karoo Sequence. There are five distinct rock groups which may be described in order from youngest to oldest as follows:

- Post – Karoo, Jurassic Age, igneous dolerite intruded into the younger of the sedimentary rock units as dykes and sills.
- Brownish red and grey mudstones, together with grey sandstones of the Katberg Formation – Beaufort Group.
- Grey and brownish red mudstone and sandstone of the Adelaide Subgroup – Beaufort Group.
- Dark grey shale, mudstone and sandstone of the Ecca Group.
- Dark grey tillite of the Dwyka Formation – Ecca Group.

The road itself crosses only two of these sedimentary groupings including the Ecca shales and mudstones, with isolated instances of sandstones and the Dwyka tillites.

The bedding planes of the sedimentary rocks have a varying dip. Generally the dip is between 5 and 15 degrees, dipping towards the north and north-north-east. However in the southern part of the route, the dip is steeper at between 15 and 30 degrees and dips towards the east.

Overlying the geological formations in the major river systems is a relatively deep Quaternary alluvial succession. Along the coast to the north of the Project, alluvial sand, dune sand and dune rock overlies the Quaternary deposits.

Five geological faults and inferred faults occur within the project area. Four of these intersect with the road alignment. Dolerite dykes do occur, but sills are rare along the road alignment.

4.3 Topography and Drainage

Refer to Figure 4.2.

The general topography along the road alignment is typical of the rolling landscape in the former Transkei region. Whereas it is not actually mountainous, there are numerous very steep gradients and crossfalls due to the steep sided valleys. There are very few flat areas and the route is continuously rising and falling.

There are very steep gradients along the route, particularly where the road crosses from one drainage catchment to the next. There are also steep gradients on the existing bitumen section where the gradient reaches 17.3%. It has been noted that the surface is concrete on this steep portion.

In elevation, the road alignment varies between sea level and 220 metres. The first 15 kilometres from the Mdumbi turn-off (km 0.0) to a point beyond Hole-in-the-Wall are particularly undulating. Starting at 90 metres, the road falls to cross the Mapuzi River twice. It then rises to 105 metres before dropping almost to sea level coming into Coffee Bay at km 4.6. The Nenga River is only a few metres above the tidal zone where the road crosses it on Bridge No 3.

Between Coffee Bay and Hole-in-the-Wall, km 6 to km 14, the route climbs from sea level at the former, up to 180 metres and then falls back to around 10 metres over the vlei area at the latter. In between high points of 180 and 120 metres, the road crosses the Mtonjane River at 55 metres.

From km 14.0 onwards, the road moves inland, climbing away from the coast. Steep gradients continue to be a challenge. After crossing the Nzulwini River at km 16.6, elevation 63 metres, the trend is generally upwards peaking at 220 metres. The end point on the Zithulele Hospital road is at 200 metres. There are, however, a number of valleys with large catchments in this latter portion, notably at km 20.4 and the Mpako River at km 23.04.

Overall it can be anticipated that the topography will have a significant impact on the design speed which can be achieved, as well as influencing the pavement and surfacing design.

4.4 Surface Drainage [15] [16] [17]

Refer to Figure 4.3 to Figure 4.5. Refer also to selection of photographs in Figure 4.9 to Figure 4.13 which include views of the affected rivers and vlei area.

4.4.1 Rivers

The study area lies within the Mzimvubu to Keiskamma Water Management Area (WMA) and specifically within the Mtata Sub Water Management Area.

15 SSI. Wild Coast Meander – Mpamba to Kei Mouth Design Section from Coffee Bay to Zithulele: Preliminary Design Report.

16 Tshani Consulting (2008). Kwa-Tshezi Development Plan (Final Draft Report).

17 CSIR (2005). Wild Coast Conservation and Sustainable Development Project. Conservation Assessment of the Wild Coast.

The road corridor bisects three larger river systems including the Mapuzi, Nenga and Mpako rivers. The land between these larger river systems is generally hilly and numerous minor river systems, tributaries, channels and streams pass flow these intervening areas. Summary details of the location, physical characteristics, river health and water quality is provided in Table 4.1. Much of this information is taken from the aquatic specialist surveys: EIA Summary Report, included in Appendix I.

4.4.2 Wetlands

A vlei/wetland area which is currently bisected by the existing road alignment is located at approximately S32° 01' 51.37", E29° 06' 34.63" (approximate centre) immediately north of Hole-in-the-Wall.

The wetland is located in an unnamed catchment, a short distance upstream of the beach, adjacent to the small resort of Hole in the Wall. Existing impacts in the catchment include scattered houses, cultivated fields and anticipated use of riparian areas for sanitary purposes, washing of clothes and watering of livestock. The nature of ground and surface water abstraction is unknown, but the latter at least is expected. The wetland is traversed by the unpaved road to Coffee Bay. This road also appears to be the only one present in the catchment. Flow beneath the road across the wetland has been facilitated by 10 pipe culverts, some of which have noticeable scour features downstream of the road. Solid waste was evident in the wetland.

The catchment above the wetland is approximately 156ha in extent. The wetland could be classified as a channelled valley bottom and has a slope of 2.5%. Channels are evident in the upper reaches of the wetland and below the road on the right hand side of the wetland. Head cuts were noted at more than one locality in the lower reaches of the wetland.

Typical wetland plants noted in the wetland include inter alia Cyperus spp., Eleocharis sp., Persicaria sp. and Typha capensis. Other species present included Berkheya sp., Ficus sp. and Phoenix reclinata.

4.5 Estuaries

Two estuaries are potentially impacted by the proposed road upgrade: the Nenga River and KuBomvu River estuaries. These are both are located in Coffee Bay.

Recognising the potential impacts of the Project on these sensitive features and habitats, specialist input was commissioned for the Scoping and Impact Assessment phases of this investigation. The work was undertaken by Dr Peter Fielding of Fieldwork. A summary and/or extracts from Dr Fielding's reports have been presented in Table 4.2 below – copies of the full reports are included in Appendix H.

Table 4.1 Summary Details for the River Systems affected by the Project[18]

	MAPUZI RIVER	NENGA RIVER	KUBOMVU RIVER	MTONJANE RIVER	NZULWINI RIVER	KUMBULA RIVER	MPAKO RIVER
Location relative to Proposed Route Alignment	This river is located at the start of the route between the Mdumbi intersection and Coffee Bay.	This river meanders in a roughly west-east direction to the immediate north of Coffee Bay, with the estuary forming a boundary to the northern edge of Coffee Bay.	The KuBomvu River is located within Coffee Bay, on the southern boundary of the settlement.	The Mtonjane River is located north east of Hole-in-the-Wall and lies roughly midway along the focus road corridor.	The Nzulwini River is a tributary of and falls within the Mpako River catchment with its confluence with the Mpako approximately 1km from the river mouth.	The road will cross this tributary of the Mpako River at roughly km 20.5: it is shown as a non-perennial river on the 1:50 000 mapping[19].	The Mpako River is a perennial river which forms a fairly major drainage line to the south and west of the proposed road upgrading.
General Description	It meanders in a roughly NW to SE direction to the north of Coffee Bay and enters the sea immediately north of Mapuzi Point, a rocky coastline outcrop. The existing road to be upgraded crosses this river twice, at km 1.1 and km 2.1, via two-lane bridges.	The Nenga River drains a local catchment of approximately 43km^2 and discharges into a perched lagoon that discharges to the sea. The Nenga River is crossed by the route at an existing bridge on the outskirts of Coffee Bay at km 4.5. The bridge has been recently upgraded and will not require any further structural changes. The ebb and flow of the Nenga River is located downstream of this bridge and just above the low level bridge/causeway which provides access to properties on the left bank of the estuary, including the Ocean View Hotel.	The KuBomvu is a small catchment located west of the Nenga and east of the Mtonjane Rivers, and occurring in quaternary T80A. It flows into the sea at Coffee Bay. Both the existing and new bridges occur in the estuarine zone. Three separate weirs are situated a short distance upstream of the crossings, effectively blocking freshwater low-flows to the estuary. The lowest of the weirs is constructed on a bedrock sill which would, under natural conditions, allow upstream migration of certain fish species during high flows.	The Mtonjane is a small catchment occurring east of the Mpako River and west of the Nenga River, in quaternary catchment T80A. The valley slopes of the majority of the upper catchment are well-forested, and the river at the location sampled is a small, steep bedrock-dominated channel with a riparian canopy.	The Nzulwini River has its confluence with the Mpako River shortly upstream of the Mpako estuary at Hole in the Wall. The catchment falls into quaternary catchment T80A. According to WR90 data, it has a total MAR of 6.74 million m3 at the confluence with the Mpako River. The narrow riparian strip and Coastal forest of the catchment is relatively undisturbed.	The Kumbula is a small tributary of the Mpako River, occurring in quaternary catchment T80A.	The Mpako River occurs east of the Mncwasa River in quaternary catchment T80A. It flows into the sea at Hole in the Wall. It has an MAR of 16.2 million m3/annum.
Current Ecostatus	Not available – no construction will take place within this river.	Not available – no construction will take place within this river upstream of the ebb and flow of the estuary.	C	C	B	C	B/C
Recommended Ecostatus			B/C	B/C	B	B/C	B
Geomorphology	Details not available – did not form part of specialist study as no work will take place within these rivers. The Nenga River Estuary is described in more detail in section 4.5 below.		The site was classified as a "flood plain confined on one side". The channel was regarded as a "single thread" and "sinuous". Both bedrock and alluvium were present, with the reach type classified as "pool-riffle". The substrate of the channel appeared to be cobble dominated. Morphological units present included bedrock pavement, riffle, deep pool and lateral bar.	The site is located on the main stem of the Mtonjane River. The site was classified as a "flood plain confined on one side". The channel was regarded as a "single thread" and probably very slightly "sinuous". Both bedrock and alluvium were present, with the reach type classified as "pool-rapid". The substrate of the channel appeared to be bedrock dominated. Morphological units present included rock steps, bedrock pool, bedrock pavement, lateral bar and lee bar.	The site was classified as a "flood plain confined on one side". The channel was regarded as a "single thread" and "sinuous". Both bedrock and alluvium were present, with the reach type classified as "pool-riffle". The substrate of the channel appeared to be boulder and cobble dominated. Morphological units present included a partial bedrock pool, bedrock pavement, rapid, riffle, shallow pool, deep pool, lateral bar and at least one secondary channel with no water.	The site was classified as a "confined valley flood plain". The channel was regarded as a "single thread" and "sinuous". Both bedrock and alluvium were present, with the reach type classified as "pool-riffle". The substrate of the channel appeared to be cobble dominated. Morphological units present included bedrock pavement, riffle, shallow pool and lateral bar.	The site was classified as a "confined valley flood plain". Pools, possibly representing the remnants of an old channel were present upstream of the site. The channel was regarded as a "single thread", although in the distal area of the site it appeared to split into a number of channels. The channel in the site was regarded as straight, but is clearly meandering when viewed in a wider context. Both bedrock and alluvium were present, with the reach type classified as "pool-riffle". The substrate of the channel appeared to be boulder dominated. Morphological units present included bedrock pavement, bedrock island/core bar (above current water level), riffle, deep pool, backwater, lateral bar, lee bar, secondary channels and a vegetated island.
Riparian Vegetation	Details not available – did not form part of specialist study as no work will take place within these rivers. The Nenga River Estuary is described in more detail in section 4.5 below.		Narrow riparian zone as a result of the steep topography, which limits the extent of the riverbank inundation under normal flow conditions. Excessive wood harvesting and grazing has also allowed grassland species to encroach directly onto the riverbanks. Plant communities are dominated by three main species Millettia grandis (Umzimbeet), Phoenix reclinata (Wild date palm) and the invasive Inkberry (Cestrum laevigatum). Small forb and grass species such as Plectranthus spp,	8 - 15 m wide riparian zone found within a narrow bedrock dominated channel. The bedrock along the riverbanks limits the extent of the inundation under normal flow conditions, i.e. mostly impervious to water. Wood harvesting and grazing has also allowed grassland species to encroach directly onto the riverbanks, together with a large cultivated land on the eastern bank, above the current bridge. Plant communities are dominated by three main species Millettia grandis (Umzimbeet), Phoenix	Narrow riparian zones (5 - 10m) are found within an incised bedrock dominated channel, with steep rocky sections found along the western bank. The bedrock along the riverbanks thus limits the extent of the inundation under normal flow conditions and species observed were mostly Coastal Forest species. Large cultivated lands are found along the eastern bank. Plant communities are dominated by three main species Millettia grandis (Umzimbeet), Phoenix reclinata (Wild date palm) and the	Narrow riparian zones (5 - 10m) are found within steep riverbanks. Plant communities are dominated by three main species Millettia grandis (Umzimbeet), Phoenix reclinata (Wild date palm) and the invasive Inkberry (Cestrum laevigatum). Small forb and grass species such as Plectranthus spp, Setaria megaphylla and Cotula coronopifolia are found along the riverbank margins. The majority of indigenous plants are in an early recruitment phase, indicating significant utilisation of the riparian	With the exception of the current road bridge, this site from a riparian vegetation standpoint was found to be largely stable and intact. The existence of the remnant channel upstream of the bridge increases the habitat and biological diversity of the site. The riparian zones are between 15 - 20 m with steep riverbanks, which limits the extent of the inundation under normal flow conditions. Wood harvesting and grazing has also allowed grassland species to encroach directly onto the riverbanks. Plant communities are

[18] General description, Geomorphology, Riparian Vegetation, Fish and Invertebrates: information taken from Aquatic Specialist Surveys: EIA Summary Report (included in Appendix I)

[19] 1:50 000 Sheet 3229 AA Hole-in-the-Wall (2001).

	MAPUZI RIVER	NENGA RIVER	KUBOMVU RIVER	MTONJANE RIVER	NZULWINI RIVER	KUMBULA RIVER	MPAKO RIVER
			Setaria megaphylla and Persicaria spp. are found along the riverbank margins. The steep rocky ledges or cliff areas are dominated by Coastal and Scarp forest species, which as an ecosystem unit is considered critically endangered and thus requires protection under the Eastern Cape Biodiversity Conservation Plan.	reclinata (Wild date palm) and the invasive Inkberry (Cestrum laevigatum). Small forb and grass species such as Plectranthus spp, Setaria megaphylla and Persicaria spp. are found along the riverbank margins. A species usually associated with swamp forests namely Syzygium cordatum (Waterberry) was also found within the riparian zone. Swamp forests were located within the catchment of this system within nearby seeps. A number of coastal forest species such as Haemanthus spp and Cussonia spictata were also found along the upper margins of the riparian zone.	invasive Inkberry (Cestrum laevigatum). Small forb and grass species such as Plectranthus spp, Setaria megaphylla and Persicaria spp. are found along the riverbank margins. Miscanthus capensis dominates the mariginal sections of the river and bars formed by sedimentation.	zone in the past. Some plant species which prefer full sun conditions (Cyperus dives) are found along the channel further substantiating the fact that this stream had little canopy cover in the recent past. This possible due to the quarrying activities and the current road bridge. A number of the floodplain areas have also been converted into cultivated areas, demarcated with Sisal plants (Agave sisalana).	dominated by three main species Millettia grandis (Umzimbeet), Phoenix reclinata (Wild date palm) and the invasive Inkberry (Cestrum laevigatum). Small forb and grass species such as Plectranthus spp, Setaria megaphylla and Miscanthus capensisare found along the riverbank margins. The swamp forest species Syzygium cordatum (Waterberry) was also found within the riparian zone.
Fish	Details not available – did not form part of specialist study as no work will take place within these rivers. The Nenga River Estuary is described in more detail in section 4.5 below.		Slow shallow and slow deep habitat with good fish habitat and cover in form of overhanging vegetation, undercut banks and boulders and cobble in pools. Weir is a total barrier to catadromous fish (mullet, mooneys, etc.) which would migrate upstream from estuary, and partial to severe barrier to upstream migrating Macrobrachium prawns and eels (Anguilidae). This man-made migration barrier reduced the PES of the fish in upstream reaches of river that were sampled. However, the natural rock cascade 50m upstream of the 2m weir was probably a natural instream barrier to fish migration.	Only slow shallow (SS) habitat present, but with good fish cover in form of overhanging vegetation, undercut banks and boulders and cobble in pools. According to locals a high (>3m) waterfall or cascade exists downstream of the site. Google Earth indicates that the river cascades over the coastal escarpment into the sea about 1km from the site. The presence of a high barrier at the coast to upstream migration would explain the apparent absence of fish at the Study Area. The site was assessed for habitats required by Glossogobius callidus and Anguilla mossambica.	Excellent fish habitat and cover in the form of overhanging vegetation, undercut banks and substrate (cobbles and boulders). Low flow ensured minimal fast shallow FS) and no fast deep (FD) habitats present at time of sampling. Large numbers of river gobies as well as frogs, shrimps and crabs indicated good instream habitat as well as excellent water quality.	Sampled stream for 200m below existing road crossing. In spite of low flows (barely a trickle), good fish habitat present in slow deep (SD) and slow shallow (SS) areas with fish cover in the form of overhanging vegetation, undercut banks and root wads and snags (branches, fallen trees) in river bed, and cobbles on substrate. Evidence of unnaturally high sediment on deeper pools, and fines coating cobbles.	Apart from localised impact of existing causeway (sediment input, vegetation clearing, etc.), excellent slow deep (SD) and slow shallow (SS) habitat for fish with abundant cover in the form of loose boulders and cobbles, overhanging vegetation and undercut banks and root wads. Good catches of expected fish species found at site. Low flow at the time ensure minimal fast shallow (FS) and no slow deep (SD) habitat present. Water quality appeared good with minimal siltation away from the existing causeway.
Invertebrates	Details not available – did not form part of specialist study as no work will take place within these rivers. The Nenga River Estuary is described in more detail in section 4.5 below.		Flow in the reach sampled was insignificant (trickle), such that no flow habitats could be sampled. The dominant substrate was angular cobbles and boulders, with a bedrock pavement at the upper end of the reach. Scant marginal vegetation was available for sampling, and where it was, comprised largely overhanging stems (*Miscanthus* and *Cyperus* spp). All coarse substrates were covered by a matrix of sediment and algae, and embeddedness was >50% (in fines, sand and gravels). Instream Habitat was thus non-diverse and of poor quality, earning a IHAS score of 34% (in part due to the lack of flow).	The invertebrate habitat at this site comprised gravels, coarse substrates out of flow, and sparse overhanging vegetation. The biotopes sampled were Stones out of Current (SOOC) and Marginal Vegetation out of Current (MVOC). The habitat quality was poor due to the lack of flow, low water levels, and a matrix of silt and algae draped over the angular cobbles downstream of the bridge. This is however largely a natural situation borne out of a protracted drought. Fine sediments blown/washed into the river from the current dirt road surface exacerbate the condition.	Invertebrate habitat at this site was relatively diverse as a result of the flow (albeit a trickling flow). Hydraulic habitats available include coarse sediments in low velocity flow (0.1-0.3m/s; sampled as Stones In Current / SIC), instream and marginal vegetation out of flow (sampled as Marginal Vegetation / MV), coarse sediments out of flow (sampled as Stones out of Current / SOOC), and gravels and sands (sampled as gravel/sand/mud or GSM). The flow was confined to shallow areas only, with an average depth of 10cm, whereas the non-flowing pool areas had a depth of up to 0.5m. Water quality was fair (low nutrients indicated by only isolated algae on rock surfaces), with water clarity >1m. The instream habitat was conducive to a healthy population of flow and non-flow dependent taxa.	The upstream section has been impacted by the presence of an upstream quarry and at least a portion of the gravels in this section are likely to have washed downstream from this source. The lower portion of the reach comprises a cobble/boulder run and a series of pools. This portion of the site is disturbed as a result of the road crossing, concrete and building rubble in the channel, and pollution from the villages in the vicinity. Habitat quality is impaired due to prolonged no flow and the associated silt/algal drape over cobble and gravel surfaces. The latter is exacerbated by the presence of the dirt road. Invertebrate biotopes sampled were the scant Marginal and instream vegetation, and gravels in and out of flow.	The upstream portion, in which the flow habitats were sampled, is a bedrock-step morphology with significantly habitat than that of the portion of the river in the vicinity of the bridge (which is impacted by the bridge, road, and disturbance related to current construction water abstraction). Mobile cobbles in the chute areas (avg.10cm depth) were sampled. Coarse sediments out of flow were sampled immediately below the flow area (avg 30-50cm depth). Siltation was evident on cobble surfaces and embeddedness was approx. 50%. Marginal vegetation largely comprised hanging stems of *Miscanthus* species out of flow.

Table 4.2 Summary of Estuarine Characteristics[20]

	NENGA RIVER ESTUARY	KUBOMVU RIVER ESTUARY
Location	The Nenga River estuary is located to the north of Coffee Bay at 31.985436°S; 29.151600°E and is classified as a temporarily open/closed estuary.	The KuBomvu River estuary is located within Coffee Bay at 31.988903°S; 29.149264°E. It is classified as a temporarily open/closed estuary.
Physical Features	Rocky points are located immediately south west of the estuary mouth and as a consequence it is likely the location of the river mouth remains fairly consistent. The Nenga River estuary is larger than the KuBomvu estuary.	It is also classified as a temporarily open/closed estuary and also has a rocky point to the immediate SW of the river mouth.
Vegetation	The estuary as whole has been significantly impacted by human activities and edges of the estuary support a range of alien species. The island at the lower end of the lagoon is vegetated almost exclusively with the dune slack rush (*Juncus kraussi*) and buffalo grass (*Stenotaphrum secundatum)* and provides a localised reed habitat. At the level of the high shore where the beach gives way to vegetation, the western bank of the channel on the back beach is lined with mature red milkwoods (*Mimusops caffra*) and patchy scrub dune forest. The area has been impacted by high levels of human use associated with the adjacent campsite and hotel. Upstream of the channel, the west bank of the lagoon all the way up to the causeway is vegetated mainly with buffalo grass. Dune slack rushes lines the waters edge in places and small isolated individual wild date palms (*Phoenix reclinata*) and umzimbeet (*Milletia grandis*) occur together with the alien species. Much of the flat part of the western bank in the upper estuary appears to have been cleared at some stage in the past, and there is still an extensive maize field that has been cultivated right up to the edge of the bank. There are no mangroves in the estuary. On the eastern bank, the area immediately upstream of the causeway and the face of the cliff are heavily vegetated with large coastal forest species that include wild date palms, coral trees (*Erythrina caffra*), red milkwoods, hibiscus (*Hibiscus tiliaceus*) and wild figs.	The estuary as whole has been greatly impacted by human activities and alien vegetation species are present throughout. Along the shoreline of the eastern bank isolated red milkwood trees occur, and inland of the vehicle beach crossing point the vertical rock face is quite densely overgrown with elements of coastal forest that include umzimbeet voacangas (*Voacanga thunbergi*), red milkwoods, yellowwoods (*Podocarpus latifolius*) and wild figs. The west bank is flatter and grassed in the areas that form the lower edge of the Coffee Shack and Bomvu Backpacker facilities, but becomes steeper further upstream. The area around the road bridge is largely grassed (buffalo grass) and populated with alien species (inkberry, lantana, bugweed). There is no significant vegetation that will be impacted by the construction of a new bridge.
Invertebrates	The rocks at the mouth of the estuary are sparsely colonised with barnacles (*Octomeris angulosa* and *Chthamalus dentatus*), rock oysters (*Saccostrea cucullata*) several species of patellid limpets and the upper shore periwinkle (*Nodilittorina Africana*). Coralline algae are present in the rock pools towards the sea. The largely rocky benthic environment of	The rocks at the mouth of the estuary were colonised by barnacles (*Cthamalus dentatus* and T*etraclita serrata*), rock oysters, several species of patellid limpets and the upper shore periwinkle. Rock crabs (*Grapsus grapsus tenuicrustatus*), red algal turf, (*Jania spp.*) and the estuarine tubeworm (*Ficopomatus enigmaticus*) were also present. Inland of the

[20] Information taken largely from Fielding (2009): preliminary estuary report, and Fielding (2010): Specialist Study: Nenga and KuBomvu estuaries, Coffee Bay.

	NENGA RIVER ESTUARY	KUBOMVU RIVER ESTUARY
	the estuary does not lend itself to the establishment of burrowing invertebrates and the diversity and numbers of invertebrates observed was low. There is a very small population of mud prawns (*Upogebia africana*) on a little mudflat along the western bank of the lagoon and apparently limited numbers of the large mud crab (*Scylla serrata*) are also found on this mudflat (Mike Conig, local resident, pers. comm.). No sand prawns (*Callianassa kraussi*) were observed either subtidally or on the sand flats. Ghost crabs (*Ocypode ryderi*) occur on the beach at the mouth, and very small numbers of fiddler crabs (*Uca spp*.), mangrove crabs (*Neosarmatium meinerti*) and marsh crabs (*Sesarma catenata*) were found on the vegetated island near the mouth of the estuary. Swimming prawns (*Penaeus spp*.) might also occur in small numbers in the estuary if the mouth is open in the late winter is and early spring	mouth and marine environment, the KuBomvu estuary was remarkably devoid of macro-invertebrates. A very small population of sand prawns was present in two of the pools of standing water above the Backpackers, but no other signs of common estuarine invertebrates were seen
Fish	Fish species sampled in the Nenga Estuary are indicated in Table 4.3. Harrison *et al*. (2000) sampled the Nenga estuary for fish as part of a national estuarine evaluation programme. A total of 21 fish species occurred in the estuary and, because of the limited sampling regime, this must be regarded as a minimum number. A local resident angler indicated that the estuary also supports juveniles of several kingfish species (Mike Conig, local resident, pers. comm.) The Nenga estuary therefore has a moderately high fish biodiversity and clearly plays a role as a nursery and feeding area, but the small size of the estuary indicates that it is a relatively minor role in the context of South African inshore fish species.	Because of the current state of the Ka Bomvu estuary mouth, the estuary functions more as a tidal inlet than an estuary. Common inshore marine fish species are certain to occur in the mouth area at high tide, but inland of the Backpackers, there is almost no aquatic habitat suitable for fish. Tilapia (*Oreochromis mossambicus*), moonies (*Monodactylus falciformis*) and river gobies (*Glossogobius callidus*) occur in the pools above the weirs (pers. obs. Anton Bok pers comm. Mike Conig pers. comm.). The KuBomvu estuary must be considered as impoverished with regard to fish species and plays very little role as a fish nursery, feeding or breeding area.
Mammals and Birds	The grasslands, scarp and riverine forest is in the Coffee Bay area are home to a high diversity of birds and 380 species have been recorded from the Coffee Bay area (Roberts Multimedia Birds of South Africa 1997-2002). However, the bridge developments over the Nenga and KuBomvu estuaries are unlikely to affect bird populations to any great extent. Sensitive areas are the forest environment immediately upstream of the Nenga causeway, the umzimbeet stand immediately below the causeway and the forest border along the eastern bank of the Ka Bomvu estuary. The rock dassie (*Procavia capensis*) probably occurs in some of the rocky cliff areas of the Nenga river. Small buck (duikers, steenbok and bushbuck) are possibly found in very small numbers in the patches of forest environment along the banks of both rivers.	
Water Quality	The Nenga river passes through a dense rural settlement. The wastewater & sewage systems for both the Ocean View and Coffee Bay Hotels impact on river water quality. There are no formal arrangements for solid waste management in the Coffee Bay area which is expected to affect water quality.	There is no specific water quality data, however, the river passes through an area that has extensive informal rural housing and tourism developments with poor sewage/waste disposal systems in place. The smell of sewage is a common feature. There are no formal arrangements for solid waste management in the Coffee Bay area which is expected to affect water quality.
Importance	Rated 164 out of a possible 250 estuaries in South Africa.	KuBomvu estuary is too small to be included in the estuary rating list.

	NENGA RIVER ESTUARY	KUBOMVU RIVER ESTUARY
	Rated 45 out of a possible 68 estuaries along the Wild Coast. The low ratings are indicative of impacted nature of the estuaries.	
	The ecological services of both estuaries (e.g. fish nurseries) are considered to be relatively small. However, all estuaries are sensitive environments and should be treated with care.	
Current Condition	Field information indicates that neither the Nenga nor the KuBomvu estuary is in a particularly good condition relative to their original states. Both are, and will continue to be, heavily impacted by development and human activities, particularly with regard to bank structure and water quality. The coastal topography largely stabilises the mouth area of both estuaries, but water flow is impeded in the Nenga estuary by the existing causeway, and in the KuBomvu by three weirs upstream of the road bridge.	

Table 4.3 Fish Species in Nenga Estuary (April 2010)

Site Nos.	Fish Caught		Remarks
	Scientific Name	Common Name	
1 & 2	*Myxus capensis*	Freshwater mullet	Large numbers of juveniles caught. Catadromous, breeds at sea. Very common in estuaries and fresh water reaches of south-east coastal rivers
1	*Glossogobius calludus*	River goby	Breeds in both freshwater and in estuaries, common in estuaries and in coastal reaches of south-east rivers
2	*Rhabdosargus holubi*	Cape stumpnose	Large numbers of juveniles caught. Estuarine species, spawns in sea near shore in winter
2	*Ambassis sp (natalensis?)*	Glassy	Large numbers present at site. Common in middle reaches of estuaries in Transkei region
2	*Terapon jarbua*	Thornfish (pest of St Lucia)	Large numbers of juveniles (< 20mm) caught. Common in estuaries in the region, euryhaline species

4.6 Coastline and Marine Environment [21]

The most notable features are the many promontories, cliffs and small bays. In general, this area of the Wild Coast is characterised by large undulating hills and sea front cliffs. It is a south-east facing linear trending coastline with irregular indented rocky shores separating linear to aruate features. Beaches are usually comprised of sandy or gravely material and are either linear trending, when associated with estuaries, or crescent shaped when situated within the rocky areas of the coastline.

Subsistence collecting of intertidal shellfish, crabs, lobsters and other organisms has had a significant impact on the intertidal ecology of the Wild Coast resulting in a greatly reduced biomass of many organisms and community composition.

Humpback whales (*Megaptera novaeangliae*) undertake a breeding migration up the east coast from May to July and then to return in August. Southern Right whales (*Eubalaena australis*) do not usually penetrate as far north as Coffee Bay. Large schools of dolphins (*Delphinus delphus* and *Tursiops truncates*) are frequent visitors to the inshore areas along the entire coast.

21 Terreco/Fieldwork/Illitha (2004). Development of the Ridge Tourism Project at Hole-in-the-Wall on the Wild Coast. Final Scoping Report.

4.7 Protected Areas and Biodiversity

4.7.1 Protected Areas [22]

There are no provincial nature reserves or marine protected areas within the general study area for the Project. However, much of the road corridor lies within the 1km Coastal Conservation Area (CCA) as described in the Transkei Decree 9 of 1992 and the 1km coastal strip described in the Wild Coast Tourism Development Policy 2001. Both these documents provide for the management of development in general and tourism activities, respectively within the defined 1km coastal strips. They specifically focus on conserving, protecting and controlling and promoting the responsible utilisation of indigenous flora and fauna within these areas.

The Gxwaleni Forest (approximately 900 hectares of Scarp Forest) to the northwest of Coffee Bay was identified as a Forest Priority Area in the conservation assessment for the Wild Coast[23]. There are also numerous declared state forests in the general area and forests which have been entrusted to village headmen for management.

Land use management guidelines described in the Kwa-Tshezi Development Plan provide for 'No Development Areas' which incorporate the Nature Reserves, coastal forest areas, coastal grasslands, estuaries, river banks, steep slopes and the area within 100m of the high water mark. The purpose of the 'No Development Area' is to promote compliance relative to specific legislation including the Transkei Decree and the Environmental Management: Integrated Coastal Zone Management Act. Specifically, the No Development Areas in the study area includes:

- The DEDEA Camping Site and primary dune on the northern bank of the KuBomvu river/estuary mouth.
- The lower section of the KuBomvu River either side of the existing bridge crossing.
- The Coffee Bay cliffs from the KuBomvu River mouth to White Clay.

These and other designated No Development Areas in the Hole-in-the-Wall area are shown on Figure 4.6.

4.7.2 Biodiversity

(a) Flora [24]

Refer to Figure 4.7.

From a general perspective, the study area lies predominantly within the Indian Ocean Coastal Belt Biome (IOCB) which incorporates much of the eastern coast of South Africa including the Wild Coast area. The major vegetation types associated with the IOCB found within the study area include the Transkei Coastal Belt (CB5) and Scarp Forest (FOz5). The Transkei Coastal Belt typically comprises 'a mosaic of grassland vegetation on the higher lying areas and characteristically on hill tops and upper hill slopes, alternating with bush clumps and small forests' viz the Scarp Forest. Scarp Forest

22 Includes information from Terreco Consulting (2007). Wild Coast Meander Basic Planning Study Draft Report: Environmental Screening Report.

23 CSIR (2005). Specialist Study: Conservation Assessment of the Wild Coast (Report No. ENV-S-C-2005-022. Part of the Wild Coast Conservation and Sustainable Development Project.

24 Mucina L & Rutherford MC (eds) 2006. The vegetation of South Africa, Lesotho & Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

occurs at the coast, within gorges and distinctive coastal features (such as scarps and coastal platforms) and generally comprises tall, species rich, structurally diverse and multilayered forest patches. On the seaward border, the Transkei Coastal Belt, is 'fringed by an interrupted belt of coastal dune thicket' or Sub Tropical Dune Thicket (AZs3) and the vegetation of young coastal habitats (dunes and beaches)' (AZs4). In terms of conservation status, the Transkei Coastal Belt is described as Vulnerable, the Scarp Forest is Least Threatened but is noted to be particularly vulnerable to 'over exploitation for bark stripping, muthi collection, and through disputed land claims'.

Specific to the area between Coffee Bay and Hole-in-the-Wall, the following has been summarised from the specialist study undertaken in connection with a separate application: [25]

- Three grassland communities present in the general area between Coffee Bay and Hole-in-the-Wall. These communities are all dominated by *Stenotaphrum secundatum* accompanied by *Eragrostis plana* and *Centella asiatica*.

- The species composition of these grassland communities generally includes cosmopolitan and exotic weed species and grass species indicating disturbance – is either highly disturbed or secondary in nature, as justified by cultivation and stocking rates of domestic livestock and shifting cultivation practices.

- Six threatened species of vegetation (Red Data List plant species) are likely to occur in the general area of which four occur in forest, one in rocky grassland or scrub forest and one in grassland.

- Non-grassland plant communities – riverine forest, scarp forest, coastal dune forest and bush clump savannah. Some littoral strand vegetation, mangrove forest, salt marsh communities also occur in limited habitats.

Finally, it is possible the Project terminates within or close to the vegetation types associated with the Savannah Biome, including Eastern Valley Bushveld (SVs6) and Bhisho Thornveld (SVs7). A north-west to south east orientated belt of this vegetation types appears to be associated with the Mncwasa River and more specifically with deeply incised valleys and their lower reaches and with undulating to steep slopes and shallow incised drainage valleys. Both vegetation types are listed as Least Threatened.

A number of invasive alien plant species are found along the route and especially at river crossings where disturbance by grazing animals and human activity has lead to the spread of alien vegetation into the riparian vegetation.

(b) Fauna [26]

Domestic stock constitutes the majority of the fauna in the area. Larger wildlife species are probably limited to the patches of forest and possibility the steep cliffs. Hunting with dog packs and snaring is likely to have reduced buck populations to extremely small numbers. Rock dassies probably occur in some of the rocky cliff areas.

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25 Source: Ecological Assessment undertaken by David Hoare Consulting as incorporated in Terreco/Fieldwork/Illitha (2004). Development of the Ridge Tourism Project at Hole-in-the-Wall on the Wild Coast. Final Scoping Report.

26 Terreco/Fieldwork/Illitha (2004). Development of the Ridge Tourism Project at Hole-in-the-Wall on the Wild Coast. Final Scoping Report.

At least 380 species of birds have been recorded in the Coffee Bay area of which 201 species are common and 33 species are endemic to South Africa. Some of the identified species have a fairly limited distribution along the east coast. The Coffee Bay area therefore offers an excellent birding experience.

As far as can be ascertained there are no rare or endangered species of fauna or flora within the general Coffee Bay Hole-in-the-Wall area and given the general upgrading nature of the Project, there is unlikely to be any encroachment into areas (other than the rivers/wetlands) which could be of sensitivity.

4.8 Socio Economic Conditions [27] [28]

Refer to **Figure** 4.8 for the Spatial Development Framework Plan

The study area falls within Ward 23 under the King Sabata Dalindyebo Local Municipality within the OR Tambo District Municipality.

Ward 23 has a population of approximately 20709 inhabitants with an approximate 2693 households across 40 villages. Importantly, the level of service of sanitation is extremely low, waste disposal is largely informal and uncontrolled and water supply is highly dependent on local water resources (rather than bulk services). There is generally a strong reliance on the natural resource base for service provision.

The local economy is based primarily on tourism and predominantly subsistence agriculture. However only 5% of the inhabitants are employed with the remaining 95% represented by unemployed and non-economically active people. The poverty and the high unemployment characterise this area with 50% of households having no source of income. Much of the population is dependent on welfare and pensions.

Both Coffee Bay and Hole-in-the-Wall are important tourism centres and coastal development zones.

4.9 Land Use

Refer to the photographs in **Figure** 4.9 to **Figure** 4.13. The location of the photographs is illustrated on **Figure** 4.14.

The route for the proposed upgraded road runs through a variety of land uses including subsistence or small scale agriculture, grazing areas, forestry, rural settlements, urban development and tourism/recreational resorts. Other land uses noted within the route corridor include numerous borrow pits, the large construction camp at Hole-in-the-Wall and a large quarry close to the end of the Project corridor.

In terms of sensitive land uses, it has been noted that *'homestead areas and areas used for agricultural purposes must be regarded as sensitive* [and] *the entire coastline is a sensitive zone with regard to subsistence fishers. Access to the coast and the maintenance of functioning inshore ecosystems are thus critical to subsistence fisher livelihoods.'*[29] Given the importance of local natural

[27] Incorporates information from Tshani Consulting (2008) Kwa-Tshezi Development Plan.

[28] SRK Consulting (2006). Strategic Environmental Assessment for the Wild Coast. Prepared for the Wild Coast Conservation and Sustainable Development Project.

[29] Terreco/Fieldwork/Illitha (2004). Development of the Ridge Tourism Project at Hole-in-the-Wall on the Wild Coast. Final Scoping Report.

resources for service provision, access to forests and rivers (and/or any impacts that affect the surrounding natural resources) should be regarded as sensitive.

The Wild Coast/Transkei Hiking Trail hugs the coastline throughout the study area.

4.10 Cultural Heritage

eThembeni Cultural Heritage was appointed by Terreco to undertake a heritage impact assessment of the proposed upgrade of the Coffee Bay, Hole-In-The-Wall and Zithulele Hospital access roads in the Eastern Cape Province, in terms of the National Heritage Resources Act No 25 of 1999. An eThembeni staff member inspected the area on 21 September 2009, and completed a controlled-exclusive surface survey, as well as a database and literature search.

Various ancestral graves were observed within the proposed development area. Although the general area is one of living heritage, no specific places associated with living heritage were observed within the proposed development site. The Heritage Impact Assessment made various recommendations in connection with their findings. This specialist study is discussed further in Section 6.7.3, with a complete copy of the report provided in Appendix J.

The rock formation of the Hole-in-the-Wall is understood to be the source of a Xhosa myth regarding sea people/deities. [30]

4.11 Environmental Quality

Ambient air quality is generally expected to be very good on account of the largely rural character of the area, as represented by low population density and the absence of commercial and industrial land uses. Sources of air pollution in these rural areas are most likely to be associated with wood burning for cooking and heating, veld burning and wind borne dust/sand particularly in the drier months. The existing road and use thereof will also be a local source of vehicle emissions although the low volumes of traffic relative to the low density settlement will reduce the significance. Odours associated with the poor sanitation practices within Coffee Bay have been observed particularly in the vicinity of the KuBomvu and Nenga Rivers.

The noise environment observed within the Project focus area is characteristic of a largely rural setting, and within the context of tourism and recreational activities in the area, is an important aesthetic quality which contributes to the Wild Coast experience. Noise levels in Coffee Bay are more significant on account of the larger settlement and that it represents a local employment, service and commercial node for surrounding communities. Ambient noise levels during the holiday season would be expected to increase with the influx of visitors. It is also understood noise levels in the vicinity of the main through-route and Coffee Bay Hotel can be especially intrusive on account of taxi activity[31].

In terms of the landscape character and quality of the area surrounding and incorporating the road corridor, the following broad landscape characteristics were observed[32]:

- The landscape of the study area is characterised by a rolling undulating landscape with a rugged, cliff-lined coastline, rocky points on the shore line (including at Coffee Bay), and numerous rivers and estuaries of various sizes and condition. The rock formation of the Hole-in-the-Wall is a distinctive and characteristic feature often used to symbolise the Wild

30 Source: Coast Care Fact Sheet Series 2001 as quoted in Terreco/Fieldwork/Illitha (2004). Development of the Ridge Tourism Project at Hole-in-the-Wall on the Wild Coast. Final Scoping Report.
31 As highlighted by residents during the public participation process – see Appendix G.
32 Refer also to the photographs which illustrate views of the general route corridor.

Coast. Vegetation cover is dominated by grasslands and scarp or coastal dune forests with the latter associated with the river/drainage lines and the immediate coastline (see Section 4.7).

- Much of the land use character of the study area is rural with the main exceptions noted at Coffee Bay and Hole-in-the-Wall which are more densely populated and urban in nature. The rural settlements are generally set back from the coastline whereas holiday destinations, such as the Ocean View and White Clay guest lodge and/or holiday homes are located closer to the shoreline. Coffee Bay and Hole-in-the-Wall are distinctive detractive features in the landscape on account of the cluttered and often inappropriate and uncontrolled nature of development that has occurred. This is exacerbated by the various states of disrepair of buildings and structures and the littering/illegal dumping which has occurred in the KuBomvu River and others. The extension of tracks onto the cliffs at Coffee Bay has also created scars on the slopes approaching the cliffs. There are numerous, formal and informal road corridors which pass through the general area.

- A particularly important land use of particular sensitivity is the Transkei Hiking Trail which runs along the coastline throughout the study area.

- The rural areas are characterised by scattered homesteads and family kraals with distinctively coloured rondavels present. These homesteads are often dispersed along the crest and brows of ridges and occasionally in valley bottoms where flatter slopes prevail. An element of ribbon development has also occurred where people have settled close to the road corridors and become especially clustered around key at junctions. Cultivated fields and grazing areas generally surround the settlements.

- The landscape quality of the study area is considered to be moderate overall where much of the appeal of the Wild Coast relates to its undeveloped coastline and sense of place. The main detractions in the study area where landscape quality is reduced to low include the Coffee Bay and Hole-in-the-Wall settlements.

- In light of the above, the visual character and quality of the road corridor, on a scale of very poor, poor, ordinary, attractive to very attractive, is largely considered to be ordinary to attractive on account of the predominantly rural and distinctive Wild Coast features present. The section of the road to the immediate south of Coffee Bay which passes alongside the coastline is considered to be very attractive given the views of the coastline in particular. The views of the rock feature at Hole-in-the-Wall are also very attractive but are restricted by the otherwise poor visual quality of the Hole-in-the-Wall settlement. Coffee Bay is also considered to be of poor visual quality on account of the nature of development that has taken place as exacerbated by littering, illegal dumping and the general condition of structures and services.

Figure 4.1 Geology

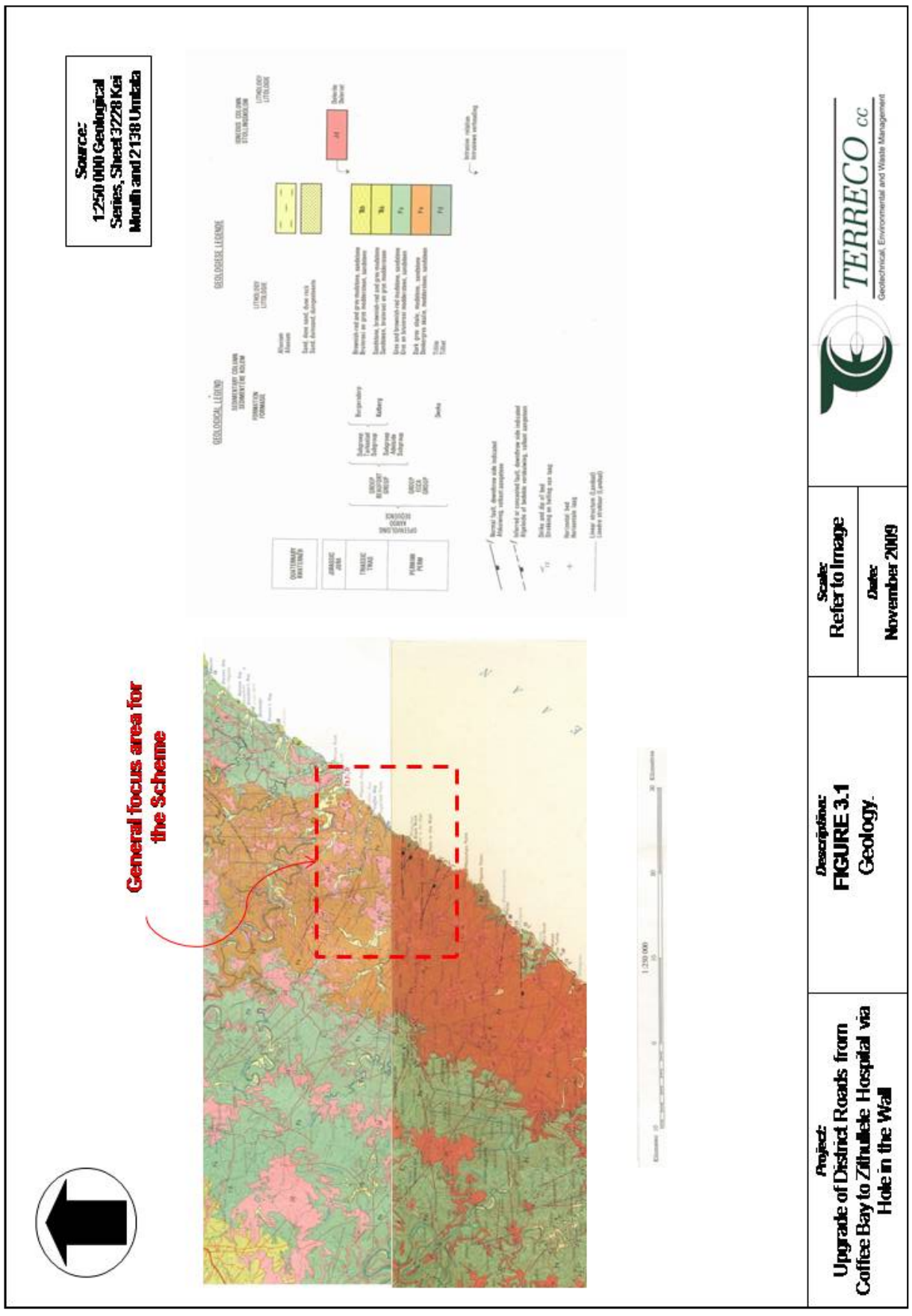


Figure 4.2 Topography

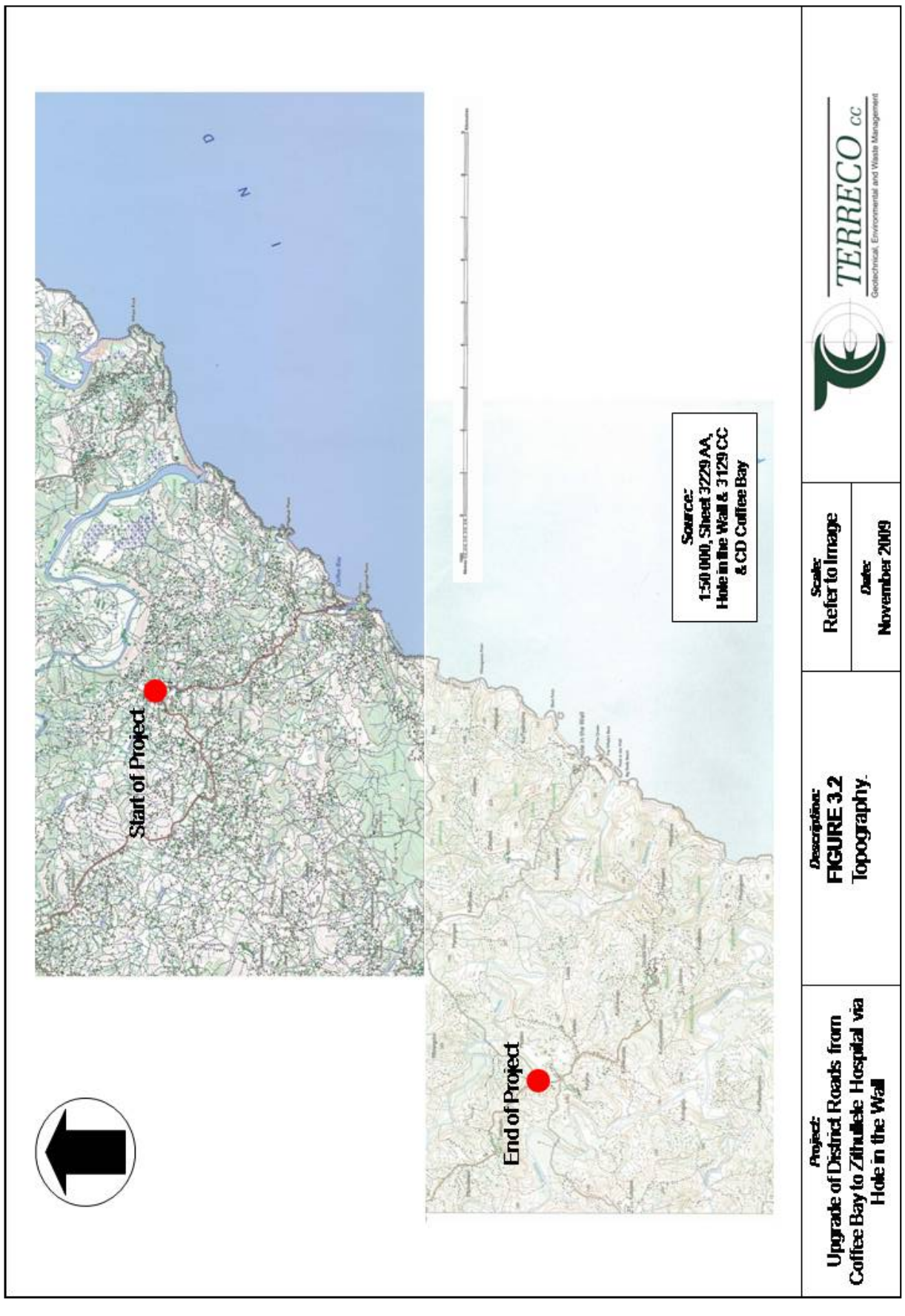


Figure 4.3 Drainage (1 of 3)

Figure 4.4 Drainage (2 of 3)

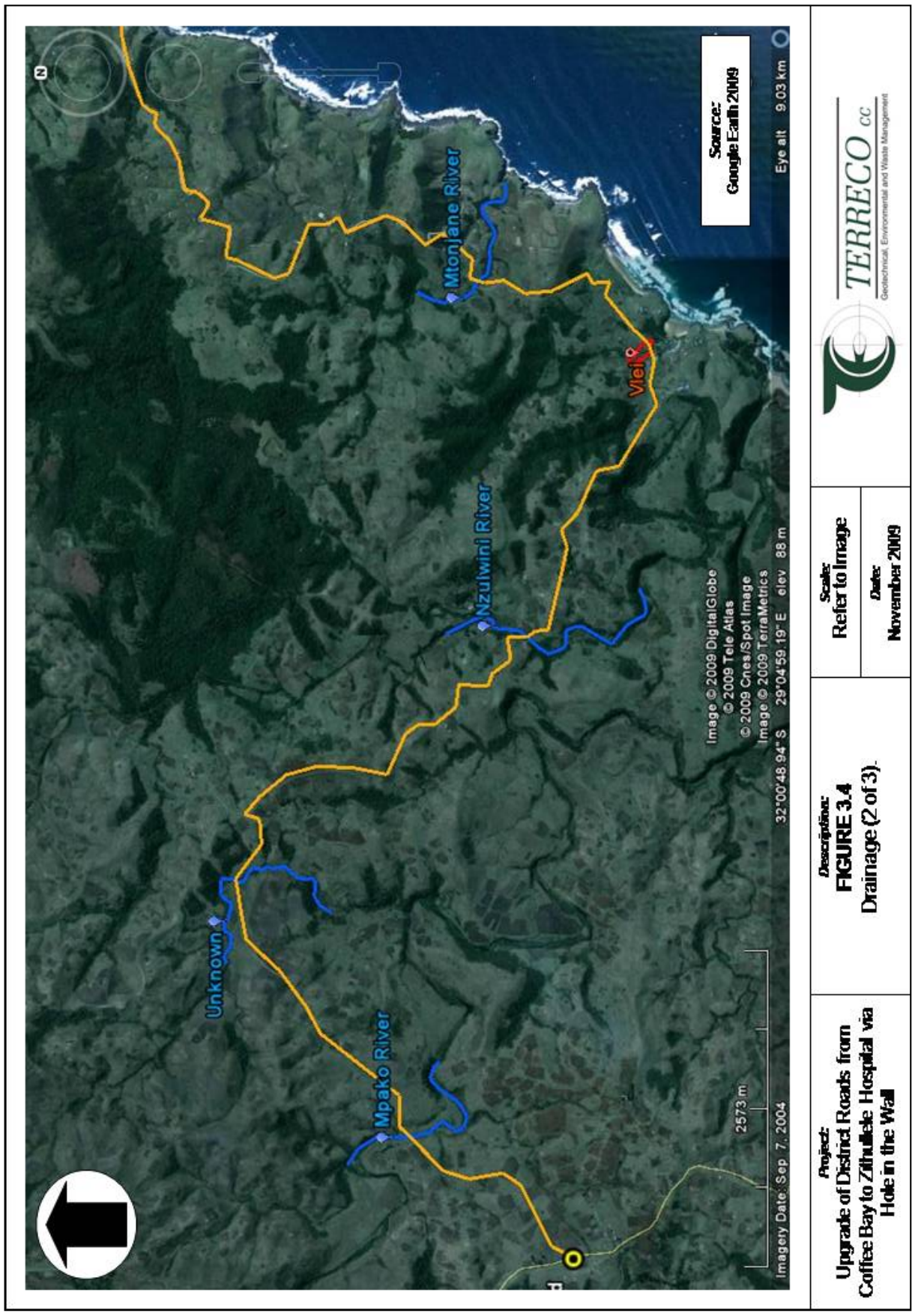


Figure 4.5 Drainage (3 of 3)

Figure 4.6 Protected Areas/Environmental Characteristics.

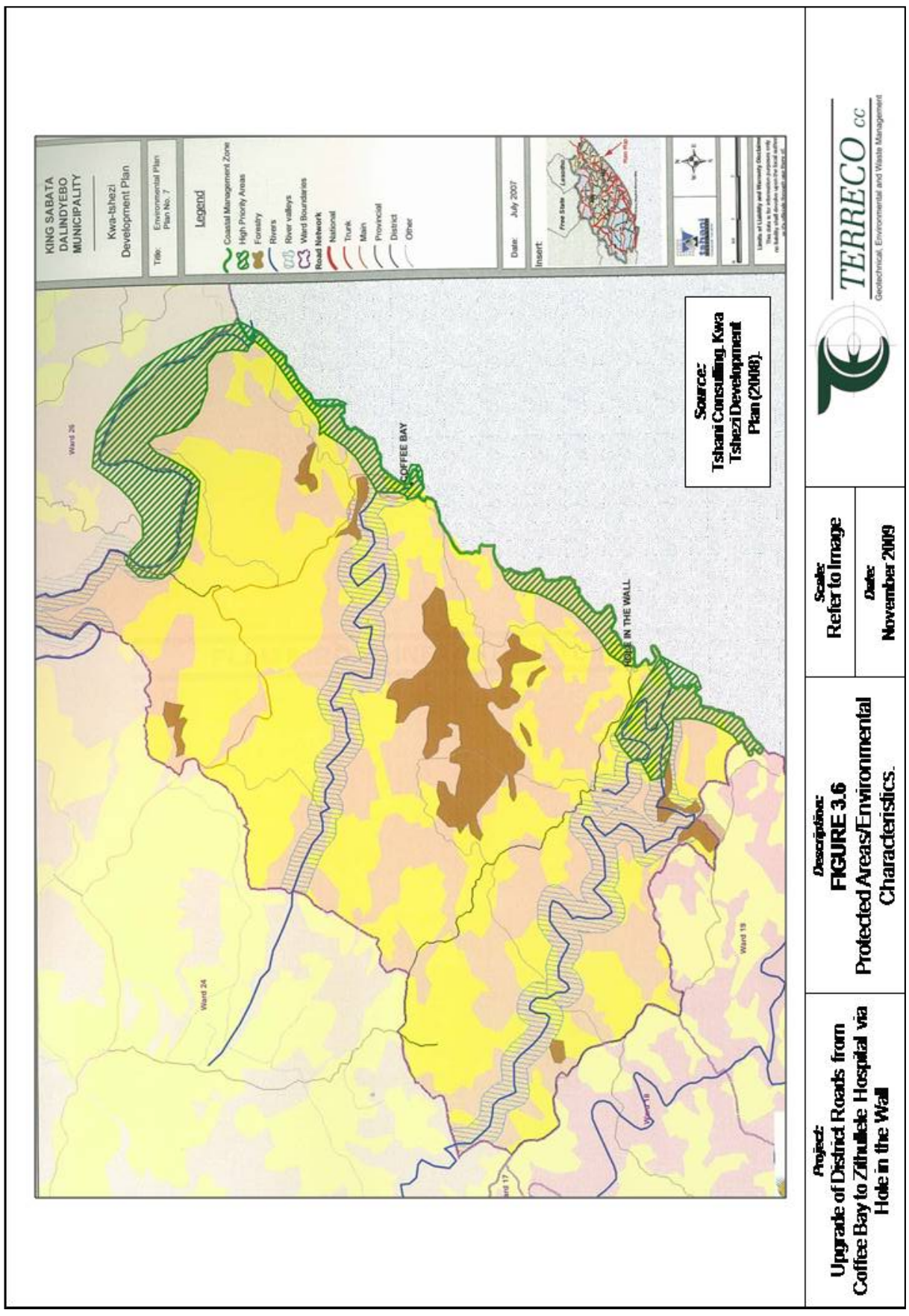


Figure 4.7 Vegetation

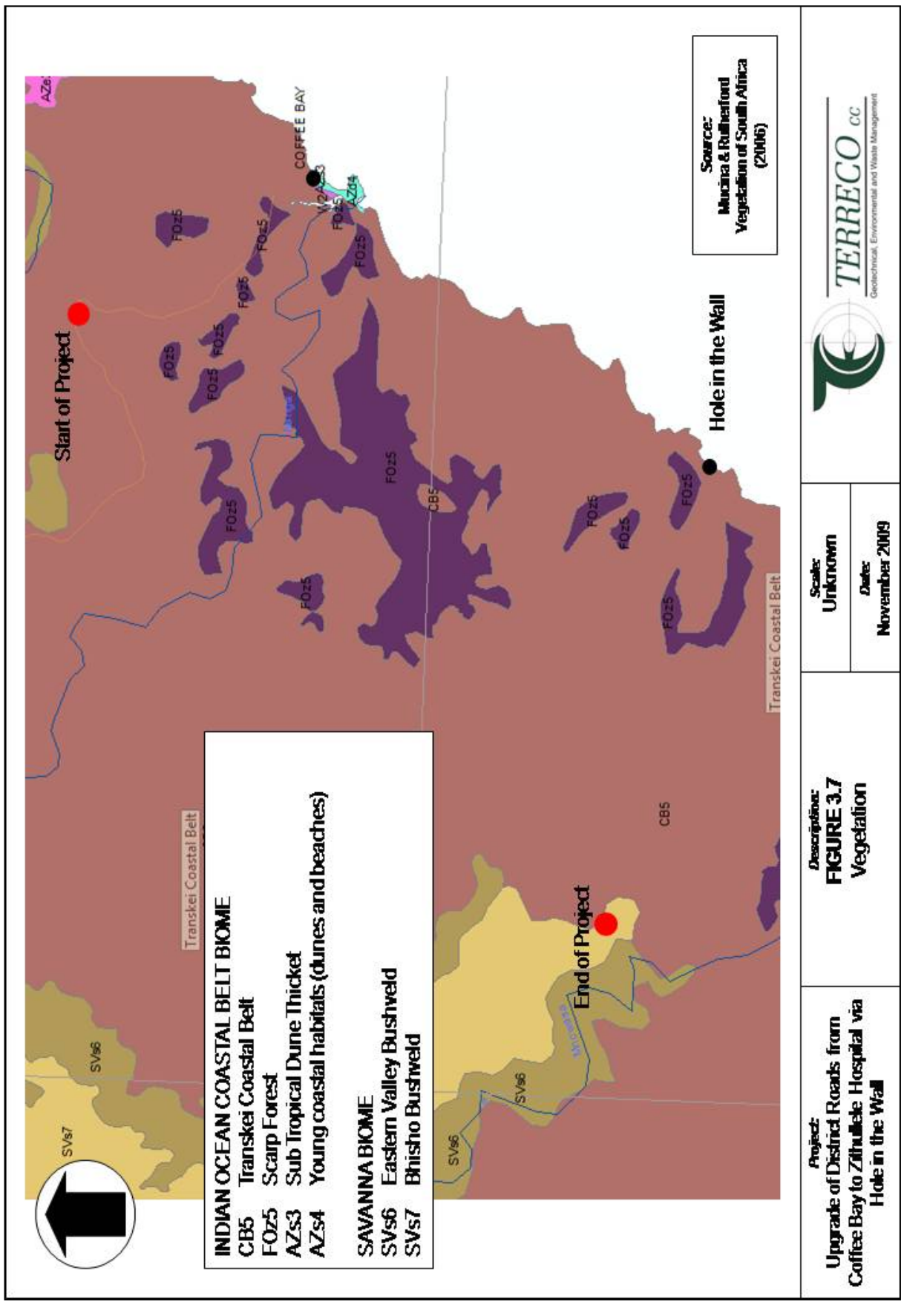


Figure 4.8: Land Use Planning.

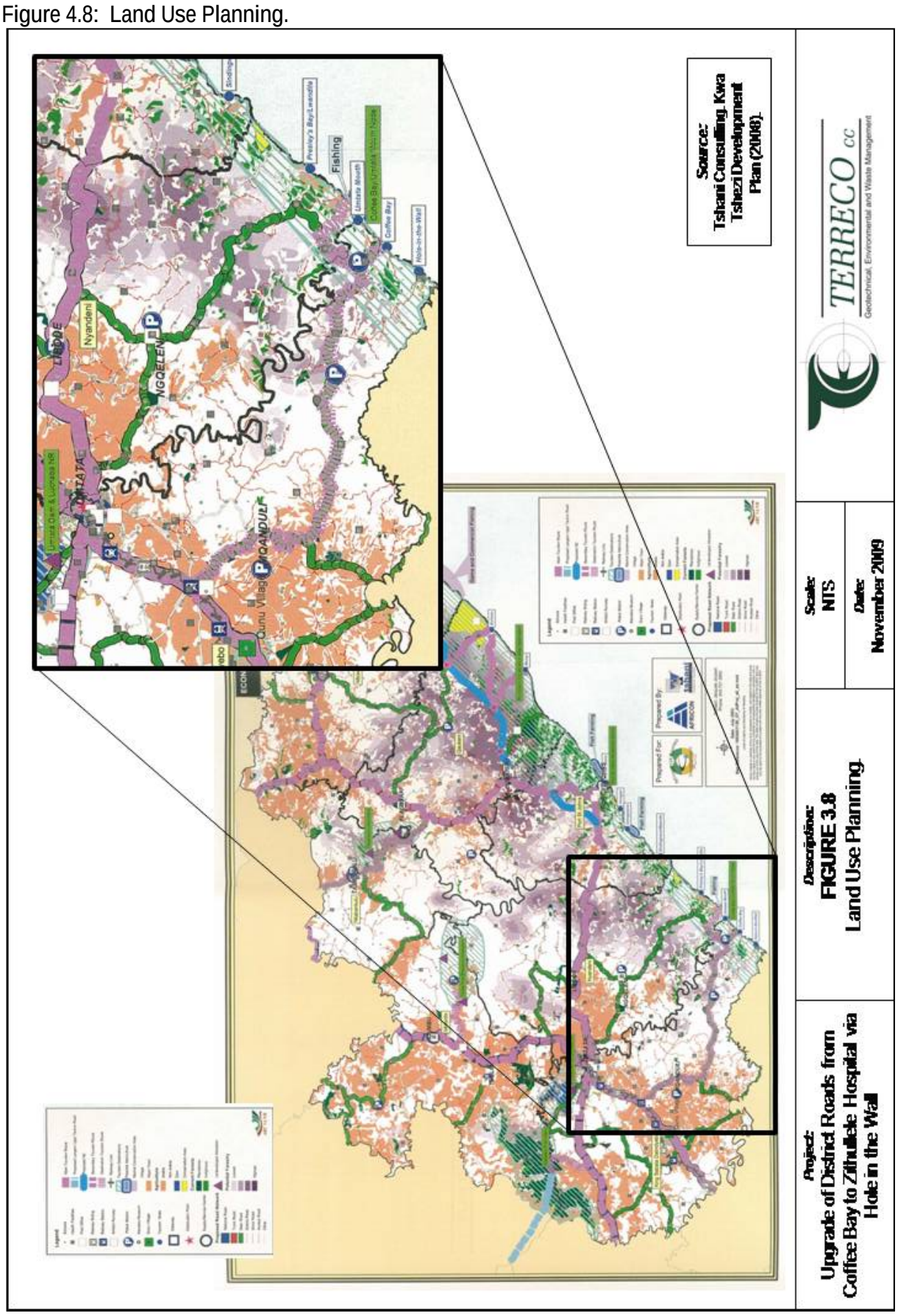


Figure 4.9: Photographs of the route corridor (1 of 5).

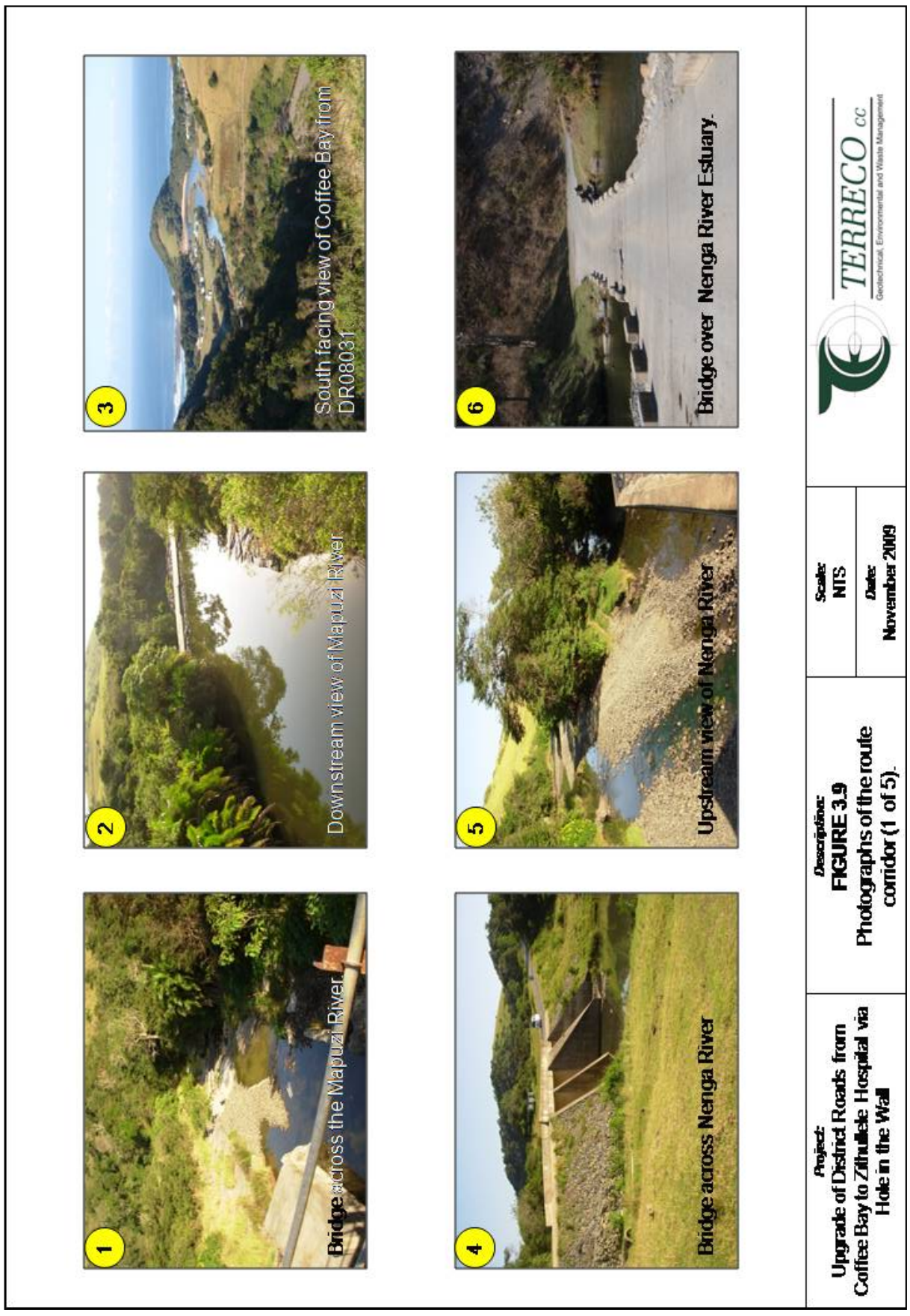


Figure 4.10 Photographs of the route corridor (2 of 5)

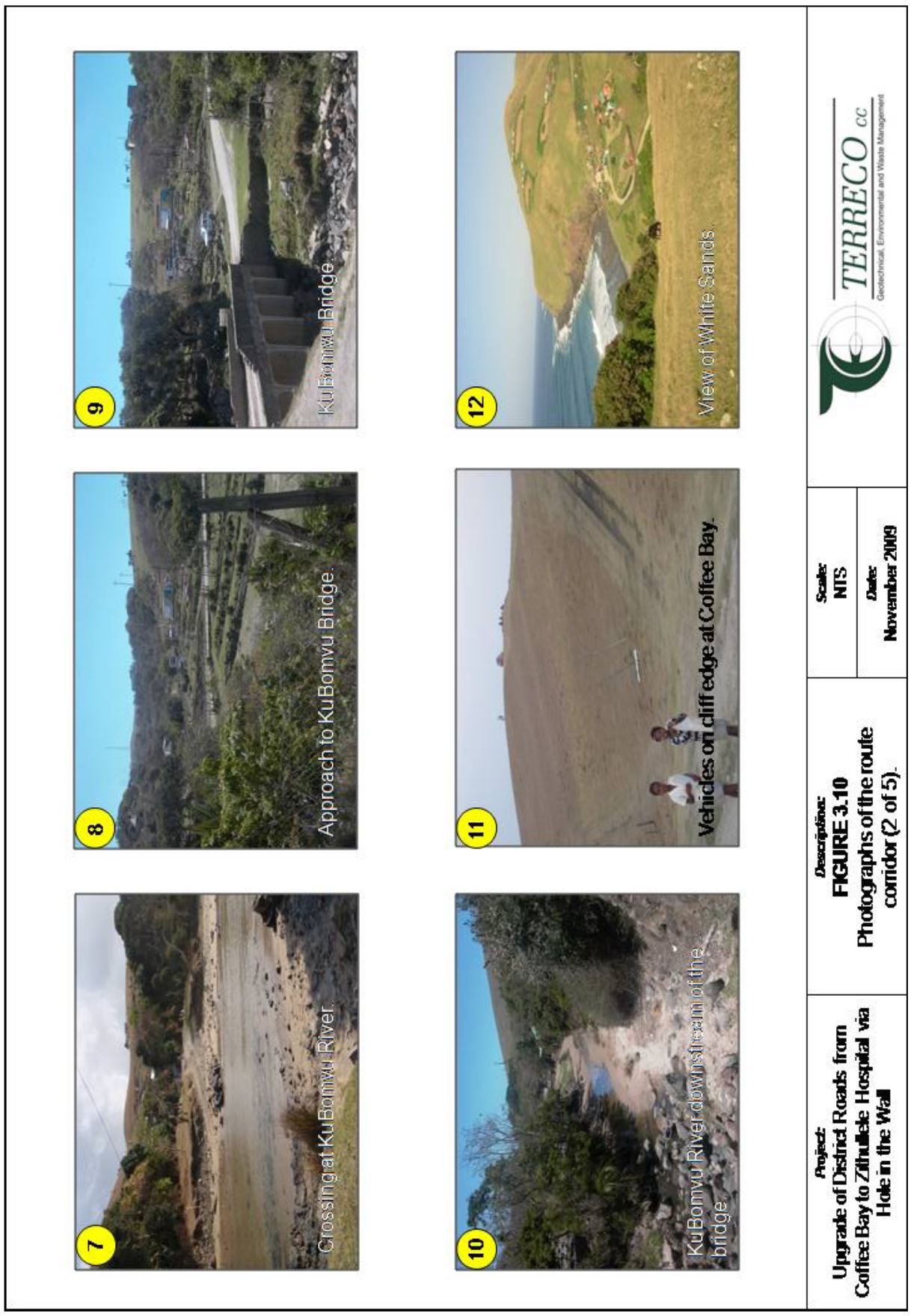


Figure 4.11 Photographs of the route corridor (3 of 5)

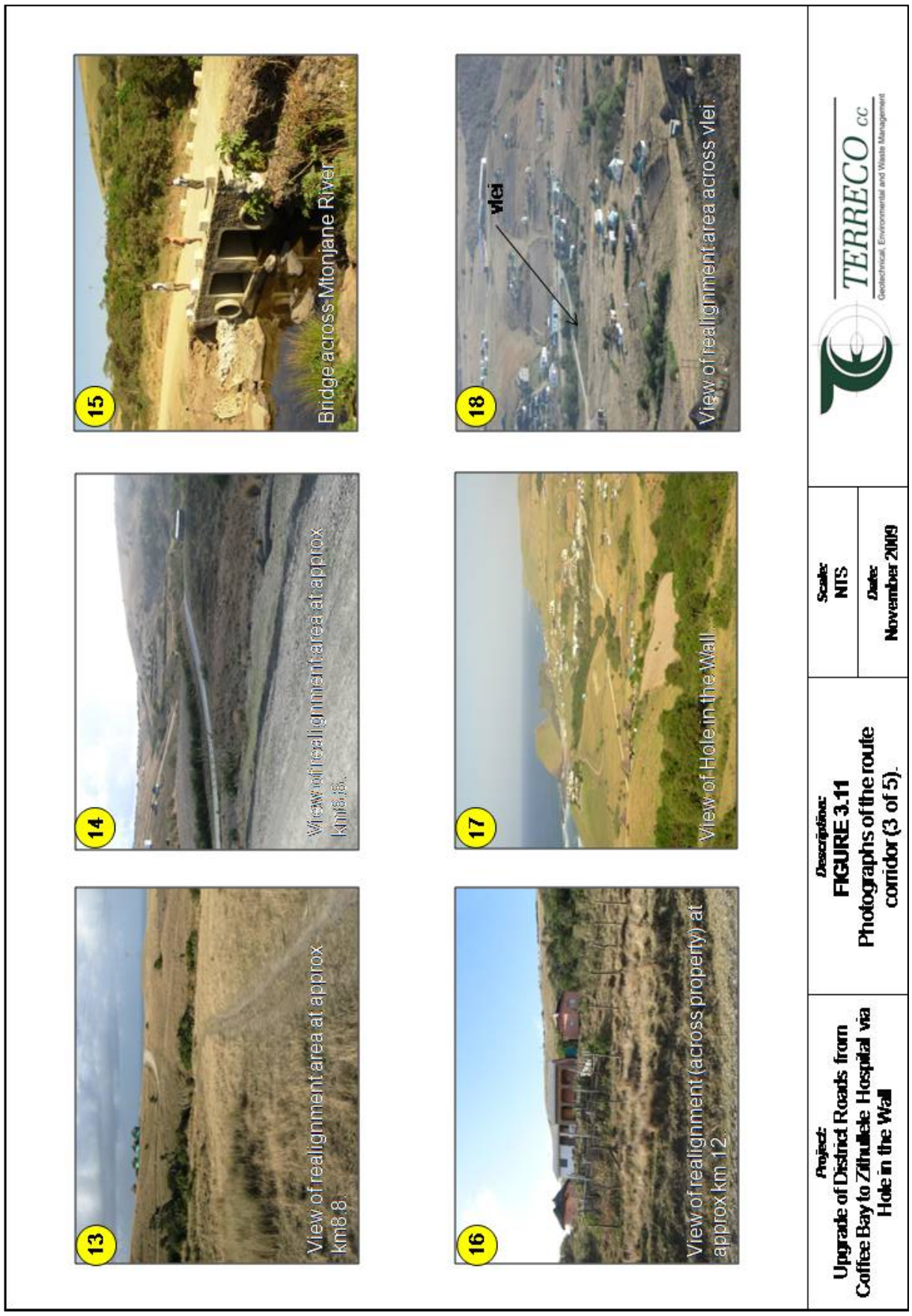


Figure 4.12 Photographs of the route corridor (4 of 5)

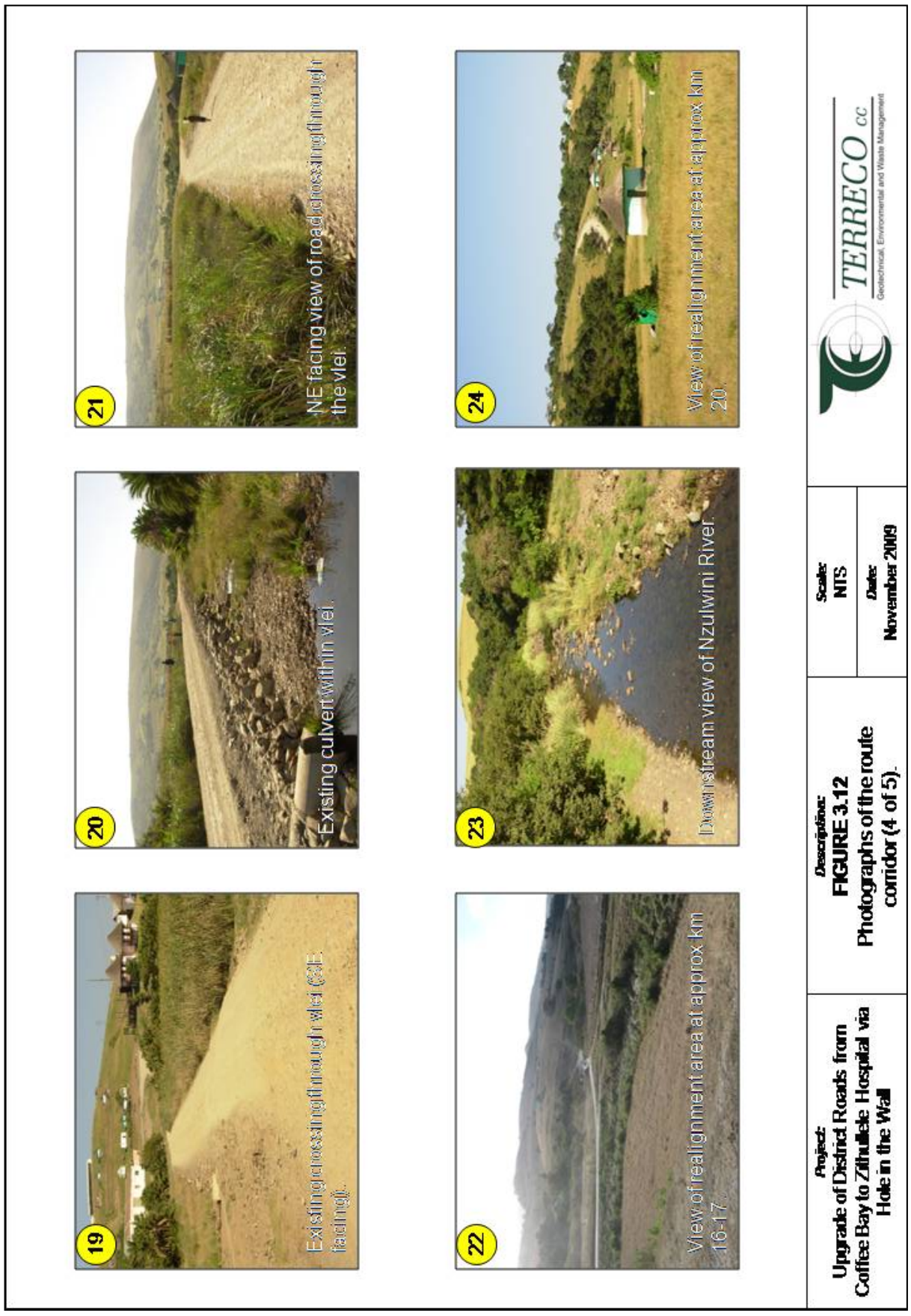


Figure 4.13 Photographs of the route corridor (5 of 5)

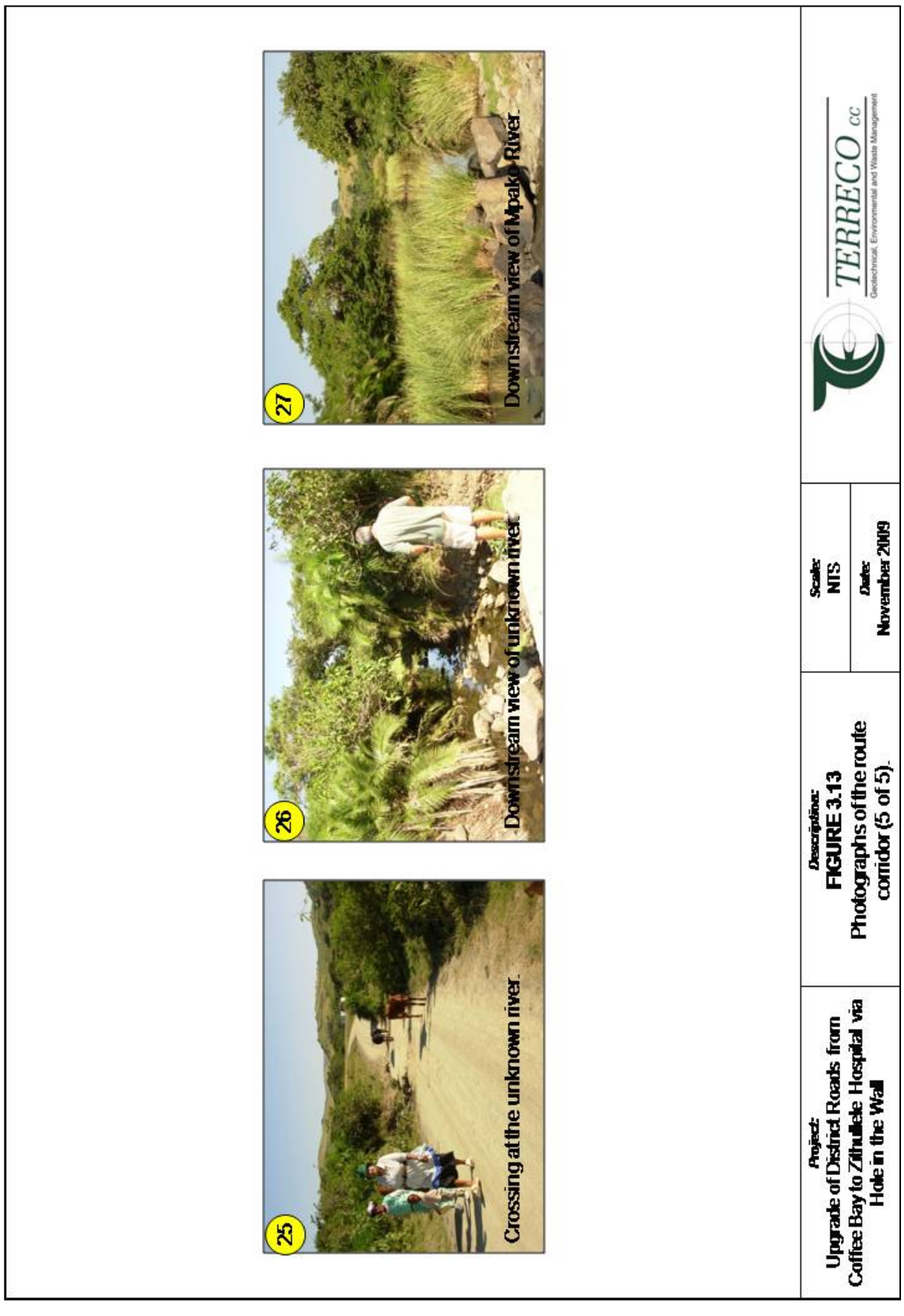
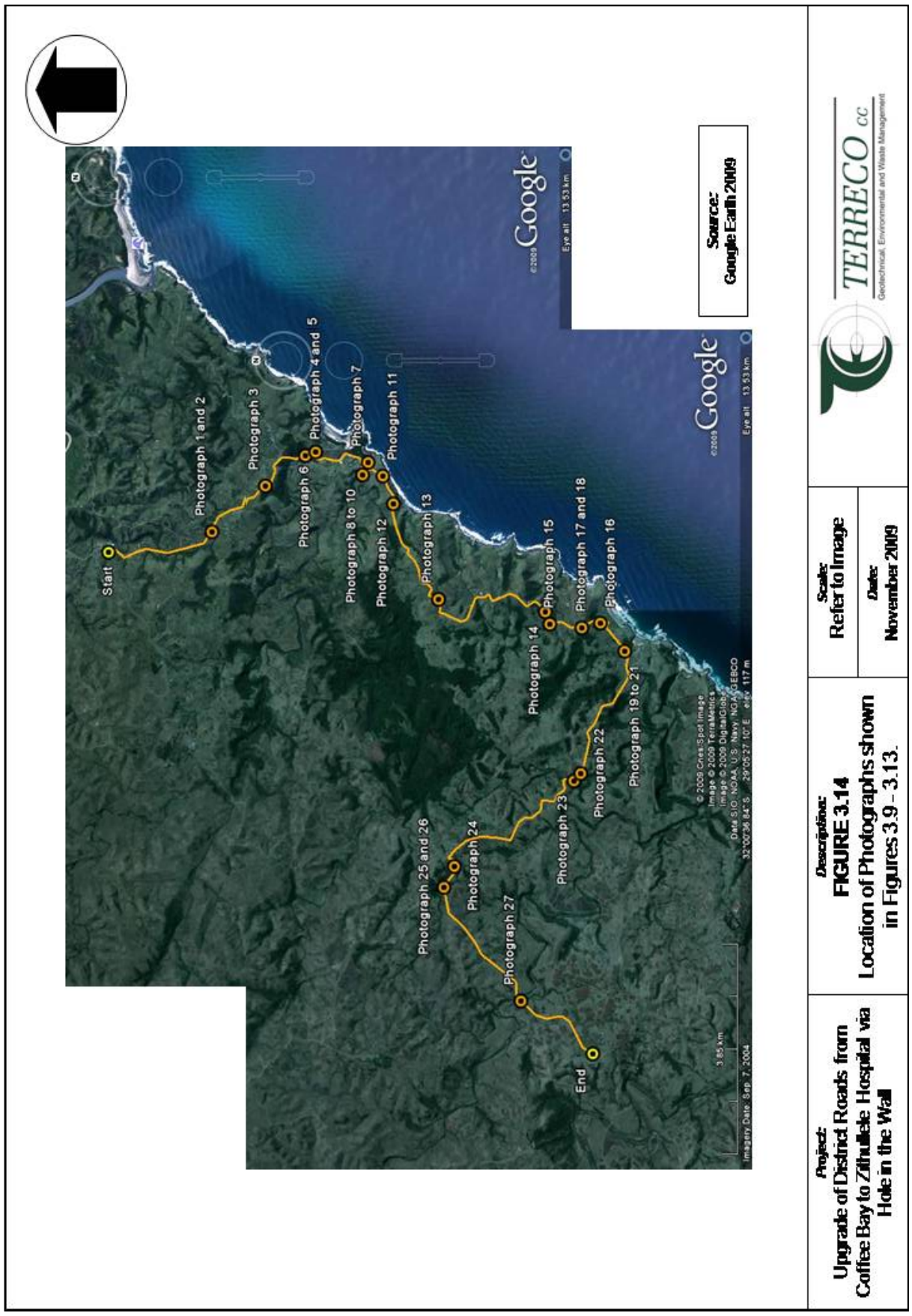


Figure 4.14 Location of Photographs shown in Figures 3.9 – 3.13.



5. PUBLIC PARTICIPATION PROCESS

This chapter describes the public participation process (PPP) adopted for the Scoping Report and includes reference to the issues raised as a consequence of the activities undertaken.

5.1 Introduction

The public participation process for the proposed project is undertaken in terms of Regulations 56 – 59 of the EIA Regulations, 2006, following the guidelines provided in the DEDEA Guideline Series: Public Participation[33]. Public Participation is considered as one of the most important aspects of the environmental authorisation process. People have the right to be informed about potential decisions that may affect them and they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the DEDEA to make informed decisions.

According to the DEAT's Guideline 4: Public Participation, the process:

- Provides an opportunity for interested and affected parties (I&APs) to obtain clear, accurate and comprehensive information about the proposed activity, its alternatives or the decisions and the environmental impacts thereof;
- Provides the I&APs with an opportunity to indicate their viewpoints, issues and concerns regarding the activity, alternatives and/or the decision;
- Provides I&APs with the opportunity of suggesting ways of avoiding, reducing or mitigating negative impacts of an activity and for enhancing positive impacts;
- Enables an applicant to incorporate the needs, preferences and values of affected parties into the activity;
- Provides opportunities to avoid and resolve disputes and reconcile conflicting interests; and
- Enhances transparency and accountability in decision-making.

In short, public participation allows interested and affected parties the opportunity to give their viewpoints and influence the process and decisions of the competent authority.

5.2 Methodology

The methodology employed in the public participation process is outlined as follows:

- The proposal project and the EIA process were advertised in the Daily Dispatch on 3rd July 2009. A copy of the newspaper notices is included in Appendix G. The public were invited to register as IAPs in these advertisements by 24 July 2009.

[33] DEAT (2005) *Guideline 4: Public Participation, in support of the EIA Regulations, 2005, Integrated Environmental Management Guideline Series*, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

- Three signboards indicating the proposed project and the EIA process was placed at strategic locations along the route in early July. The signs were in English and Xhosa. Photographs of the signs are included in Appendix G.

- The public were invited to register as IAPs and to submit comments. The list of registered IAPs appears in Appendix G.

- A BID indicating the location and nature of the development as well as outlining the EIA process was circulated to all registered Interested and Affected Parties and other stakeholders. The BID is included in Appendix G.

- Relevant departments were notified of the project through the circulation of the BID by fax and email. Notices were sent to DEDEA, DWAF, Marine and Coastal Management and the King Sabata Dalindyebo Local Municipality. Their details are included in the aforementioned database.

- A public/stakeholder meeting was held in Coffee Bay on the 16 September 2009. The purpose of the meeting was to present more detailed information on the development to the public, to inform them of the EIA process and to allow IAPs to raise any concerns or issues that they may have with regards to the proposed road upgrade – refer to Appendix G.

- Five Community meetings were organised following initial liaison with the Ward Councillor and the traditional leadership. These meetings took place along the route as follows:
    - Mapuzi Vocational School (16/09/2009).
    - Elalini Village (16/09/2009).
    - Mdedeleni Village (23/09/2009).
    - Bunene Village (23/09/2009).
    - Zithulele Village (23/09/2009.
    - Minutes from these meetings are included in Appendix G.

- A meeting was held with Shane Lang, the co-owner of the Hole-in-the-Wall, Coffee Bay and Ocean View Hotels, on the 2 October 2009. Mr Lang also has interests in the properties affected by the proposed Option 2 alignment across the mouth of the KuBomvu River. Notes taken from this meeting are included in Appendix G.

- A special focus meeting was held with the businesses located along the proposed KuBomvu crossing route Option 2. This meeting took place on the 7 October 2009 and was attended by representatives of the Coffee Shack and Bomvu Backpackers. Minutes from this meeting are included in Appendix G.

- The Draft Issues Trail resulting from the meeting was complied and is included in Appendix G. The Issues Trail documents the views, concerns and objections expressed by the stakeholders and IAPs. All correspondence received from stakeholders and IAPs is included in Appendix G.

- The Draft copy of the ESR was made available to all registered IAPs. A two week comments period was specified. No comments were received.

5.3 Stakeholders and Interested and Affected Parties

Section 57 of the EIA Regulations sets out requirements for establishing and maintaining a database of stakeholders and registered IAPs. A full copy of the database compiled for this Project has been included in Appendix D.

Stakeholders
The following organisations and/or parties were specifically notified and invited to take part in the PPP - these included those bodies/organisations listed in Section 56(2)(b) of the EIA Regulations:

- DEDEA: Environmental Management, DEDEA: Marine and Coastal Management;
- Department of Agriculture, Fisheries and Forestry (DAFF);
- Department of Water Affairs: Water Quality Management;
- King Sabata Dalindyebo Municipality.
- Eastern Cape Tourism Board and Wild Coast Tourism.
- Wildlife and Environmental Society of South Africa.
- East Cape Parks Board.
- Local Businesses (including hotels, backpackers and lodges).
- The Wild Coast Cottage Owners Association, and well as individual cottage owners;
- Ward Councillor.
- Traditional Leadership.

5.4 Issues Trail

The points, queries and issues raised during the PPP and the responses given are presented in Appendix G. In summary, the points, queries and issues raised related to the following:

- Consideration of a possible bypass road around Coffee Bay was expressed by some of the residents on the basis of concerns related to the following[34]:
    - Through road detracts from the tranquil and resort nature of the town.
    - Noise from taxis.
    - Dangerous driving through town, particularly by taxis, endangering pedestrians and other motorists. Children and tourists are particularly at risk.
    - Improvements to the road will encourage motorists to speed.
    - Main through road in town will increase the likelihood of crime.
    - Taxis do not use the designated taxi rank on the outskirts of town. The upgrade of the road will further undermine the use of this facility.
- Road safety through Coffee Bay must be improved. Consideration must be given to pedestrian walkways, safety barriers, road signage (hidden entrances etc).
- Drainage and flooding from side roads in Coffee Bay.

[34] It is important to note the concept of a bypass for Coffee Bay has been described in the strategic planning documents prepared for the area. However this provides for a future scenario which is in turn a product of specific thresholds of growth and development at Coffee Bay. To provide a bypass at this stage is not consistent with the Wild Coast Meander concept to upgrade existing roads – see Section 3.3.

- Upgrade of other roads within Coffee Bay as part of the project to improve access, encourage tourism or to prevent erosion.

- Upgrade of road to the HIW view site should also include the upgrade of the parking outside the ablution blocks.

- Objections to the proposed Bridge Option 2 over the KuBomvu River:
    - Noise from construction.
    - Access to beach.
    - Visual impacts.
    - Impact of bridge on the "Sense of Place".
    - Safety of backpackers who frequent the area.
    - Impact on backpacker business as a result of the degradation of the natural environment and peaceful surrounds. Subsequent impact on the economy of Coffee Bay.

- Employment and training of local people during the contract;

- Relocation of households impacted by the realignment or widening of the road. Compensation for land incorporated into the road reserve.

- Impact of road upgrade on graves located within the road reserve.

- Community benefits from the use of quarries and borrowpits in the way of royalties.

- Land tenure issues.

These comments have been taken into consideration in the preliminary impact assessment undertaken as part of the Environmental Scoping Process and provided in Appendix K.

DWA: Water Quality Management, in a letter dated the 18/01/2010, stated that they have no objection to the proposed road upgrade provided certain conditions are adhered to. Refer to the Issues Trail. A copy of the letter is included in Appendix G.

5.5 Public Review of Draft EIR

The Draft Environmental Impact Report was submitted to DEDEA on 24 November 2009 for review. A copy of the document was also placed at the Ocean View Hotel on 25 November 2009 for review until 16 December 2009. Key stakeholders and registered IAPs were advised directly via email/fax that the document was available for review and could be downloaded directly from the Terreco web site. Copies of the Executive Summary were made available to the Ward Councillors.

Any comments received during the review period would be incorporated into the text of the Final Environmental Impact Report accordingly: no comments were received.

All I&APs will be informed once DEDEA have reached a decision and either accepted or rejected the application. All I&APs will be provided with an opportunity to appeal the decision or aspects of the decisions, such as the conditions of authorisation.

6. ENVIRONMENTAL IMPACT ASSESSMENT

This chapter presents a detailed environmental impact assessment of the impacts and issues identified in the Final Environmental Scoping Report for the Project (November 2009).

6.1 Objectives of the EIA

The primary objective of an EIA is to identify and predict the significance of the potential impacts and issues that may arise from interactions between Project activities and the surrounding biophysical and human environment.

As part of the prescribed authorisation process, an EIA enables authorities to make an informed decision regarding a given Project and to determine whether or not such a Project should proceed and under what conditions the Project can proceed.

The EIA process also provides for the identification of appropriate mitigation measures which can be introduced at given stages of a Project to facilitate a more environmentally acceptable project by reducing negative impacts and/or enhancing benefits. The mitigation measures are both proactive and reactive insofar as the former are aimed at ensuring, for example, specific design or operational principles/activities are put in place where absent at present. The latter responds to potential impacts that may result despite the best available design and operational principles being in place.

A range of mitigation measures have been incorporated into the EMP (Appendix K).

6.2 Definitions

Impact: The positive or negative effects on human well-being and/or the environment.

Aspect: Elements of an activity, product or service which can have a beneficial or adverse impact on the environment.

Fatal Flaw: Any problem, issue or conflict (real or perceived) that could result in proposals being rejected or stopped.

6.3 Activities and Aspects

An aspects-based approach was followed in the scoping phase to identifying the potential impacts which may result from the development, with “environmental aspects” defined as above. For example, it could involve a discharge, an emission, the consumption or re-use of a material, or noise. A number of environmental aspects were determined for the proposed development. These are presented in Table 6.1.

Table 6.1 Environmental Aspects

MAIN CATEGORY		SUB-CATEGORIES	EXAMPLE
INPUTS	Resource Consumption	Raw Materials Manufactured Products Energy	Electricity, Diesel Materials for construction of the roads and bridges (cement, bitumen etc) Natural materials used in construction, such as gravel and sand.
		Water	Water for construction works Potable water for domestic purposes. sanitation
OUTPUTS	Releases to Water	Point sources (piped source) Diffuse sources (seepage/run-off)	Stormwater runoff – possibly polluted. Discharge and disposal of sewage water
	Releases to Air	Dust Gasses and fumes	Dust generated from construction. Gasses and fumes generated from exhaust emissions during construction and operation.
	Other Releases	Noise Solid waste Spillages Light Vibrations	Construction noise Traffic noise Solid waste from construction Spillages from bulk fuel supplies and from construction activities. Light pollution from construction phase (contractor's camp)
Land Transformation		Surface disturbance Topographical change	Removal of vegetation. Bulk earthworks. Excavation of bridge and culvert abutments Construction of road surface, stormwater drains and structures, bridges. Spoiling of material
Social Aspects		Employment & Training	Staff Subcontractors
		Changes in Landuse / zoning	Change of landuse and zoning for incorporation into the road reserve..
		Provision of facility	Provision of all weather access to resorts, villages and amenities (such as Zithulele Hospital).

Environmental "aspects" (or mechanisms) provide the link between activities and impacts. Significant impacts will only result where there is a significant "aspect". Potential impacts associated with the proposed activities were identified during the scoping phase using an activity/aspect/impact matrix. The matrix illustrates the interactions between the activities, aspects and the affected environment.

The matrix for the upgrade of the roads is included in Appendix K.

6.4 Generic Impact

The range of positive and negative environmental impacts typically associated with the construction and/or use of new road and road improvement projects include the following:

- Construction phase impacts generally relate to vegetation and ground clearing, grading or road bed construction, foreclosure of other land uses, the modification of natural drainage patterns, erosion, stream sedimentation, degradation of vistas, destruction of cultural sites, interference of wildlife and livestock and severance of communities from resources/social

facilities and services. Other impacts specifically relate to air emissions, soil and water pollution, dust generation, noise emissions and vibration that may be specifically associated with plant, equipment and vehicle use, blasting, spills and accidents and waste generation, at a minimum. Coastal zone impacts from road construction can result from excavations, spoiling, obstructions to drainage and tidal flows, alteration of drainage lines and increased runoff with siltation risks. Socio-economic benefits associated with the construction phase include employment, training and skills development.

- Direct impacts associated with the use of a new/improved road typically relate to traffic accidents, air emissions, noise, roadside litter, severance and unsafe crossing and water pollution from spills or accumulated contaminants on road surfaces. Indirect effects can result from unplanned 'ribbon' development and greater access to natural areas.

- Socio-economic benefits are usually connected to the all weather reliability, reduced transport costs, increased access to markets, access to employment centres and better access to social services associated with using new/improved roads.

6.5 Preliminary Assessment

The Environmental Scoping Assessment served to identify the full range of potential impacts, describing the nature, spatial extent, duration and probability of each. The assessment also highlighted those impacts which require further investigation and those which do not require any further assessment during the EIA stage due to a low level of significance. The preliminary assessment which served to identify the full range of potential impacts associated with the construction and operation phases of the project is provided in Appendix K. A summary is included in Table 6.2 and Table 6.3, overleaf

Table 6.2 Summary of Potential impacts (Construction)

	PREDOMINANT IMPACT CHARACTERISTIC							Further study/ specialist consultation Required
	Nature of Impact	Spatial Extent	Duration	Probability	Mitigation Potential	Public Comment	Significance (with mitigation)	
Physical Environment	Negative	Site to Local	Short Term	Probable to Definite	High	None	SLIGHT	Aquatic studies for the Nenga & KuBomvu River estuaries and vlei area. Water quality monitoring for all rivers affected.
It is expected that construction–related impacts on the physical environment will be predominantly SLIGHT overall. The exception will be related to impacts on the river dynamics which are deemed to be MODERATE and which will continue into the operational phase (see below). It is concluded that specialist studies to assess the impact of the new bridge/culvert structures on the Nenga and KuBomvu river estuaries and on the vlei to the north of the Hole-in-the-Wall are a 'Must Have' on account of the potential sensitivity of these sites to change and the likely additional permitting requirements. Water quality monitoring will be undertaken on the Nenga and KuBomvu Rivers prior to construction commencing at the request of DRT.								
Biological Environment	Negative	Site	Short term to permanent	Probable to Definite	High to Moderate	None	SLIGHT	Vegetation assessment for KuBomvu realignment. Estuarine & vlei studies. Vegetation surveys for new alignments where affects natural vegetation.
The significance of the construction related impacts on the terrestrial ecosystems for much of the road corridor and in relation to invasive alien species is expected to be SLIGHT on account of the control measures which can be put in place through the EMP and/or on account of the low sensitivity of these areas which is largely a product of the Project focussing on an existing road corridor. The impact of construction activities on the DEDEA Camp Site, the riparian vegetation at new bridge/culvert sites and the estuarine ecosystems is currently UNKNOWN. It is concluded that: • A specialist vegetation survey is a 'Must Have' where the route alternative through Coffee Bay, with the new crossing on the KuBomvu estuary, is considered as it will affect the Coastal Dune Forest in the DEDEA Camp Site. The condition of the vlei to the north of Hole-in-the-Wall should also be confirmed with a view to identifying mitigation and rehabilitation options. • Further to the studies highlighted from the physical environment perspective, specialist inputs to assess the biological consequences of the construction of the new bridges within the Nenga and KuBomvu river estuaries is considered a 'Must Have'. • Vegetation surveys for the route realignments are 'Recommended' where these affect natural vegetation such as at new bridge crossings and new culverts.								

	PREDOMINANT IMPACT CHARACTERISTIC							Further study/ specialist consultation Required
	Nature of Impact	Spatial Extent	Duration	Probability	Mitigation Potential	Public Comment	Significance (with mitigation)	
Human Environment	Positive	Local	Short Term	Definite	High	Yes	MODERATE	Need and Desirability Assessment Heritage Impact Assessment
	Negative	Site	Short Term	Probable to Definite	High to Moderate	Yes	MODERATE	

The significance of the positive construction-related impacts on the human environment is considered to be at least MODERATE. The negative construction-related impacts are expected to be SLIGHT on account of the mitigation measures that can be applied through the aforementioned EMP. The visual impacts are expected to be more MODERATE in significance especially in the vicinity of Coffee Bay, the coastline and Hole-in-the-Wall. The significance of any construction-related impacts on any cultural features present in the road corridor is UNKNOWN at this stage.

In terms of whether further studies are required to assess construction-related impacts on the human environment, the following studies are considered a 'Must Have':

A Need and Desirability Assessment for the Project relative to the existing strategic local planning framework as per DEAT guidelines.

A Phase 1 Heritage Impact Assessment of the affected road corridor.

Table 6.3 Summary of Potential impacts (Operation)

	PREDOMINANT IMPACT CHARACTERISTIC							Further study/ specialist consultation Required
	Nature of Impact	Spatial Extent	Duration	Probability	Mitigation Potential	Public Comment	Significance (with mitigation)	
Physical Environment	Negative	Site	Long Term	Definite	Low	No	LOW	Aquatic studies for the Nenga & KuBomvu River estuaries and vlei area.
	Positive	Site	Long term	Probable to Definite	High	Yes	LOW	
Taking into account the above, it is expected the significance of the positive and negative impacts associated with the use of the upgraded road will be of SLIGHT significance. It is concluded that detailed studies for the operational-impacts on the physical environment are 'Not Required'.								
Biological Environment	Negative	Site	Short term	Possible	High	No	SLIGHT	None
	Positive	Site	Long term	Probable	High	No	SLIGHT	Estuarine & vlei studies.
In the absence of information on the sensitivity of the estuarine/vlei ecosystems and biodiversity to change associated with the Project overall impact of the Project on the biological environment is expected to be of SLIGHT significance at a minimum. In terms of further studies, the '<u>Must Have</u>' specialist studies triggered in connection with confirming the impact of the new bridges on the dynamics of the Nenga and KuBomvu river estuaries and vlei to the north of Hole-in-the-Wall will provide an opportunity to confirm the impact of these structures on the living environment								

	PREDOMINANT IMPACT CHARACTERISTIC							Further study/ specialist consultation Required
	Nature of Impact	Spatial Extent	Duration	Probability	Mitigation Potential	Public Comment	Significance (with mitigation)	
Human Environment	Positive	Local	Long Term	Definite	Moderate	Yes	MODERATE	Need and Desirability Assessment Traffic analysis review
	Negative	Site	Long Term	Probable	Low to Moderate	Yes	SLIGHT TO MODERATE	

The significance of the positive impacts on the human environment are expected to be at least MODERATE pending the need and desirability assessment. In the absence of more information regarding traffic volumes and cultural heritage value, the significance of the negative impacts is expected to be SLIGHT TO MODERATE on account of the potential difficulty of reducing the scale of the adverse impacts.

In terms of further studies, the following are regarded as '<u>Must-Have</u>':

- To assess the significance of any traffic flow changes on the Coffee Bay community in particular and the general area.
- To confirm the cultural heritage significance of the general route corridor and specifically for those areas where route realignments are proposed.
- A 'Need and Desirability' assessment as per the DEAT guidelines.

6.6 Scope of EIA

Scope of the detailed Impact Assessment is limited to those impacts identified, during the Scoping Phase, as having a potentially significant negative environmental impact. The need for further environmental studies during the EIA Phase was described in the Scoping Report in terms of "Must Have"; Recommended but not Essential" and Not Required (see Section 6.5 and Appendix K). The criteria used to differential between these categories are as follows:

Table 6.4 Findings of the ESR and Scope of the EIA

CATEGORY:	CRITERIA:	FINDINGS:
Not required:	• Impacts are largely contained within the site, are short-term, unlikely to possible and of high mitigation potential. • Impacts are generally of slight significance. • Low level of concern expressed during the PPP.	Construction related impacts which do not required further investigation during the EIA Phase include: • Air pollution; • Soil Compaction/erosion/ pollution; • Surface water and groundwater pollution; • Terrestrial ecosystem and biodiversity impacts; • Spread of terrestrial invasive alien plant species • Compatibility / incompatibility with existing land uses; • Public Nuisance; • Public health and Safety and security / crime; • Landscape and Aesthetic Impacts; • Socio-economic Impacts; Operation related impacts which do not required further investigation during the EIA Phase include: • Air Pollution; • Soil Erosion and pollution; • Surface and Groundwater Pollution; • Alteration of drainage systems; • Terrestrial ecosystems and biodiversity impacts; • Aquatic ecosystem and biodiversity impacts; • Compatibility / incompatibility with existing land uses; • Aesthetic Impacts; • Socio0economic impacts.
Recommended by not Essential	• Impacts have a largely local effect, are medium-term, probable and of moderate mitigation potential. • Impacts are generally of slight to/or moderate significance. • Moderate level of concern expressed during the PPP.	Construction related impacts for which further investigation is recommended, but not essential, include: • Terrestrial ecosystem and biodiversity impacts – vegetation survey where route alignment passes through remaining natural environment and at the vlei north of Hole-in-the-Wall;
Must-Have	• Impacts are largely regional to national in extent, are long term to permanent, definite and of low mitigation potential. • Impacts are generally of moderate to/or substantial significance. • High level of concern expressed during the PPP.	Construction related impacts for which further investigation is essential, include: • Water Quality Monitoring; • Alteration of drainage systems; • Consideration of alternative alignment on the KuBomvu River[35] • Aquatic Ecosystem and Biodiversity Impacts; • Compatibility/incompatibility with municipal strategic frameworks. • Heritage Resource Impacts. Operation related impacts for which further investigation is essential, include: • Compatibility/incompatibility with municipal strategic frameworks.

[35] This is no longer required as the sensitive alternative located across the mouth of the KuBomvu Estuary has been abandoned.

The need for the additional investigations translated into the identification of specialist studies and inputs as defined in the Plan of Study for Environmental Impact Assessment as follows:

- To confirm the sensitivity of the Nenga and KuBomvu river estuaries and vlei area to the north of Hole-in-the-Wall to change and identify the mitigation measures required.

- Undertaking water quality sampling of rivers affected by the Project, specifically Nenga, KuBomvu and Mpako Rivers where new structures are proposed.

- To confirm the sensitivity of natural vegetation in the vicinity of the new bridges and culverts to change, and any other areas where new realignments affect stands of natural vegetation, and to identify appropriate mitigation measures.

- To review the likely significance of traffic flow changes on the local community within Coffee Bay.

- To confirm the cultural heritage significance of the route corridor in general and particularly in the vicinity of the route realignments.

6.7 Specialist Assessments and Inputs

6.7.1 Estuary Study

(a) Background and Terms of Reference

As part of the Scoping Investigations, Dr Peter Fielding of Fieldwork was commissioned to provide preliminary specialist input into the likely impact of the road construction works on the Nenga and KuBomvu Estuaries. A copy of his report is included in Appendix H. As a result of his findings, as well as concerns expressed by neighbouring property owners, the alternative alignment of the road across the mouth of the KuBomvu River Estuary was abandoned in favour of the current proposal, ie to build a new bridge immediately downstream of the existing structure.

In response to the Plan of Study for EIA, Dr Fielding was appointed to undertake a detailed assessment of the impact of the construction of two new bridge / culvert structures over the Nenga and KuBomvu River estuaries. A copy of this report is provided in Appendix H. The focus of the investigations was:

1. The construction of a new low-level bridge over the Nenga River Estuary, downstream of the existing causeway, accessing the developments to the east of Coffee Bay, including the Ocean View Hotel. The existing structure will be demolished; and

2. The construction of the new bridge over the KuBomvu River located immediately downstream of the existing structure. The existing structure will be retained as a pedestrian walkway.

Observations were made and information collected during a field survey of the two estuaries over the period 13-14 April 2010. An evaluation of the important features of the estuary was made in order to provide input into the Environmental Impact Assessment process related to the development described above. A general assessment and description of the main ecological features of the estuary was undertaken in order to asses the likely impacts of the construction and operation of the proposed road bridges and pedestrian walkway on the ecological functioning and status of the estuary.

The current condition of the estuaries in terms of physical characteristics, water quality and biota, as well as human impacts, is summarised in Section 4.5.

The information relating to the Nenga and KuBomvu estuaries was evaluated in relation to the following three aspects:

1. The current condition of the estuaries;

2. The importance of the estuaries to the conservation and biodiversity estate of the east coast of South Africa and the warm temperate Agulhas Bioregion; and

3. The impacts that are likely to arise from the proposed developments and their importance with regard to maintaining the current functionality of the system.

(b) Likely ecological consequences of the proposed developments

The new bridge over the Nenga estuary will be adjacent to and downstream of the existing causeway. The structure will consist of 14 pre-cast concrete portal culverts with a bank to bank span of slightly more than 35 m. Culverts will be laid on a 220 mm thick concrete platform that is 11 m wide. Thus significant concrete will be laid in the river bed to support the culverts. Each culvert has a barrel width of 2 m, a height of 1.5 m and a vertical concrete support width of 295 mm. In effect slightly more than 4 m (12%) of the 35 m span will be blocked by the vertical components of the concrete culvert structure. This is very much better than the existing arrangement in which the maximum flow path, even without siltation, is 3.6 m wide and one meter high. The new roadway is 5 m wide with a 1.4 m wide pedestrian walkway on either side. The old causeway will be demolished once the new bridge is functional.

There are limited details available for the new bridge over the KuBomvu. It will be adjacent to, and downstream of, the existing bridge and comprises a 3 x 6 meter span structure, approximately one meter higher than the existing bridge. It is unlikely to impact very much on water flow. The old bridge will remain in place for pedestrians. It would be a desirable ecological service if the low weir nearest the bridge was demolished when the new KuBomvu Bridge was constructed.

At a very general level, the most likely negative impacts of the proposed developments are the temporary destabilisation of the banks of both estuaries during construction, some minor erosion and sedimentation, and the destruction of a few indigenous trees immediately below the existing Nenga causeway. There would be a reduction in water quality around the three bridges during the construction phase, but provided the mitigation measures described below are implemented, this will be temporary and should not affect much of the estuarine habitat.

There may also be some sedimentation of the channel beds of the estuaries during construction if it is necessary to restrict water flow, but this could be cleared after construction was complete. Restriction of water flow would be unlikely to greatly affect estuarine functioning. Its impact would be least if it was done in the winter low rainfall months. Noise arising from the operation of machinery, and inconveniences associated with interrupted traffic flows will be factors at all construction sites.

Positive impacts would derive from improved road access to the Ocean View Hotel and the Hole-in-the-Wall area and the benefits associated with increased tourism to the area. There would probably be a general permanent improvement in water quality in the Nenga estuary once the new Ocean View

access bridge was functional, and the old causeway had been demolished and all rubble and sedimentation had been cleared from the river bed. The old KuBomvu Bridge will not be demolished, but it has a relatively minor impact on water flow.

Likely impacts and their mitigation potential are discussed in Section 6.9 below.

6.7.2 Aquatic Study

A specialist aquatic survey of the new bridges and culverts, as well as the proposed new wetland crossing, was commissioned during the EIA Phase. The survey was furthermore a requirement of the DWA Water Use Licence application process.

Dr Mandy Uys of Laughing Waters was appointed as project manager and tasked with co-ordinating a multi-disciplined specialist team of scientists as required by DWA. The team was constituted as follows:

Dr Mandy Uys (Laughing Waters):	Project Management Integration Invertebrate Survey
Dr Pete Illgner:	Geomorphology and wetland survey
Dr Anton Bok (Anton Bok Aquatic Consultants):	Fish Survey
Dr Brian Colloty (Scherman Colloty and Associates):	Riperian Vegetation and Wetland Survey

The fieldwork was undertaken in early April 2010. This culminated in the production of an EIA Summary Report, which has been included in Appendix I. The summary report provides a detailed description of the geomorphology, riparian vegetation, fish and invertebrates present at each of the streams and wetlands impacted by the road upgrade (refer to Sections 4.4.1 and 4.4.2).

Potential impacts associated with the construction and operation of the new road through the Hole-in-the-wall wetland and of new bridge and culvert structures (and demolition of the existing structures) are covered in Sections 6.9.2 and 6.9.3.

6.7.3 Heritage Impact Assessment

(a) Background and Terms of Reference

eThembeni Cultural Heritage was appointed Terreco to undertake a heritage impact assessment of the proposed upgrade of the Coffee Bay, Hole-In-The-Wall and Zithulele Hospital access roads in the Eastern Cape Province, in terms of the National Heritage Resources Act No 25 of 1999. A full copy of the report is included in Appendix J. Section 38(1) of the Act requires such an assessment in case of:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50 m in length;
- any development or other activity which will change the character of a site—

1. exceeding 5 000 m² in extent; or
2. involving three or more existing erven or subdivisions thereof; or
3. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
4. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

- the re-zoning of a site exceeding 10 000 m² in extent; or

- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

The Act defines a heritage resource as any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes, but is not limited to, the following wide range of places and objects:

- living heritage as defined in the National Heritage Council Act No 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);

- ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity;

- places, buildings, structures and equipment;

- places to which oral traditions are attached or which are associated with living heritage;

- historical settlements and townscapes;

- landscapes and natural features;

- geological sites of scientific or cultural importance;

- archaeological and palaeontological sites;

- graves and burial grounds;

- sites of significance relating to the history of slavery in South Africa;

- movable objects, but excluding any object made by a living person;

- battlefields; and

- traditional building techniques.

A Heritage Impact Assessment must address the following key aspects:

- the identification and mapping of all heritage resources in the area affected;

- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

(b) Findings

- Living heritage: Although the general area is one of living heritage, no specific places associated with living heritage within the proposed development area were identified.
- Ecofacts: None were identified within the proposed development area.
- Places, buildings, structures and equipment: None were identified within the proposed development area.
- Places to which oral traditions are attached or which are associated with living heritage: Although the general area is one of living heritage, no specific places associated with living heritage within the proposed development area were identified.
- Historical settlements and townscapes: None were identified within the proposed development area.
- Landscapes and natural features: The proposed developments are in keeping with the changing nature of this landscape. Although the road upgrades could facilitate other developments in the area that might be considered incongruent with the Wild Coast landscape (such as hotels and casinos), this issue is not part of this heritage impact assessment. Any future proposed developments will be subject to environmental and heritage impact assessments, which will take landscape change into consideration.
- Geological sites of scientific or cultural importance: None were identified within the proposed development area.
- Archaeological and paleontological sites; None were identified within the proposed development area.

- Graves and burial grounds: We identified various ancestral graves, as described below. All human remains have high heritage significance at all levels for their social value.

- Movable objects excluding any object made by a living person: None were identified within the proposed development area.

- Battlefields: None were identified within the proposed development area.

- Traditional building techniques: None were identified within the proposed development area.

(c) Recommendations

It was recommended that the development proceed with the proposed heritage mitigation. A copy of the Heritage Impact Assessment was submitted to the South African Heritage Resources Agency in fulfilment of the requirements of the National Heritage Resources Act. According to Section 38(4) of the Act the report shall be considered timeously by the Council which shall, after consultation with the person proposing the development, decide –

- whether or not the development may proceed;
- any limitations or conditions are to be applied to the development;
- what general protections in terms of this Act apply, and what formal protections may be applied to such heritage resources;
- whether compensatory action shall be required in respect of any heritage resources damaged or destroyed as a result of the development; and
- whether the appointment of specialists is required as a condition of approval of the proposal.

Relevant staff members may be contacted at the SAHRA Cape Town head office (Mary Leslie telephone 021 462 4502; mleslie@sahra.org.za).

6.8 Impact Assessment Methodology

As mentioned previous, the detailed impact assessment centres on those impacts identified during the Scoping Phase as requiring more detailed investigations, with specialist input.

6.8.1 Impact Prediction

The methodology of the Impact Prediction is presented below. The results are presented in the detailed Impact Tables.

Nature and significance
Once potential impacts have been identified (refer to Tables 6.2 and 6.3 and Section 6.5), further investigation is required to predict the nature and significance of an impact. The nature of the impact is essentially the type of impact which may occur from undertaking an activity. The impacts may be positive or negative and may be categorised as being direct (primary), indirect (secondary) or cumulative impacts.

Where significant environmental aspects are present (as indicated in the matrices), significant impacts may result. The final significance of the impact is a function of probability and consequence. The consequence is determined by considering the severity, spatial extent and duration of the impact. The severity of the impact is determined by qualitative or quantitative criteria as well as by community response. Criteria for the ranking of Severity are presented in Table 6.5.

Table 6.5 Criteria for Ranking Severity

RANK		CRITERIA
NEGATIVE	HIGH-	• Substantial, Measurable deterioration, Death, illness or injury • Recommended Level always exceeded • Widespread complaints from community • Complete loss of land capability • Soil alteration resulting in a high level impact in one of the other environments • Disturbance to areas that are pristine, have conservation value or are an important resource to Humans • Destruction of rare or endangered species • Deterioration of water quality/quantity, resulting in a high negative impact on one of the other environments • Is difficult to manage • May require an alternative course of action. • May affect the viability of the project.
	MEDIUM-	• Moderate, measurable deterioration and discomfort • Recommended level will occasionally be violated • Widespread complaints from community • Partial loss of land capability • Soil alteration resulting in a moderate impact on one of the other environments • Disturbance of areas that have some conservation value or are of some potential use to humans • Complete change in species variety or prevalence • Deterioration of water quality/quantity, resulting in a moderate negative impact on one of the other environments • May be managed. • Is low or medium only if managed according to a management programme. • Does not affect the viability of the project.

	LOW⁻	• Minor, deterioration, nuisance or minor irritation. Change not measurable • Recommended level will never be violated • Sporadic community complaints • Minor deterioration in land capability • Disturbance of areas that are degraded, have little value or are unimportant to humans as a resource. • Minor changes in species variety or prevalence • Deterioration of water quality/quantity, resulting in a low negative impact on one of the other environments
POSITIVE	LOW⁺	• Minor Improvement in quality • Change not measurable • Sporadic complaints
	MEDIUM⁺	• Moderate improvements • Measurable improvements • Will be within or better than recommended level • No observed reaction from public
	HIGH⁺	• Substantial improvements • Measurable improvements • Will be within or better than recommended level • Favourable publicity

Potential impacts are furthermore assessed according to spatial extent, duration and probability as follows:

Table 6.6 Criteria for Ranking Spatial Extent, Duration and Probability

CRITERIA	CATEGORIES	EXPLANATION
Spatial Extent	Site (S)	*Immediate area of activity*
	Local (L)	*Area within 500m of the site.*
	Regional (R)	*Entire municipality, drainage basin, landscape etc*
	National (N)	*South Africa*
Duration	Short-term (S)	*Less than the construction/ operation period*
	Medium Term (M)	*Construction / operation period*
	Long-term (L)	*Less than 5 years post construction / operation*
	Permanent (P)	*Permanent change*
Probability	Unlikely (U)	<40% probability
	Possible (P)	>40% probability
	Likely (L)	>70% probability
	Definite (D)	>90% probability

6.8.2 Mitigation Potential

The significance rating provided in the impact tables is the significance WITH mitigation and WITHOUT mitigation. Mitigation potential describes the ability to manage or mitigate an impact given the necessary resources. Some impacts, by their very nature, are extremely difficult to mitigate, while others may be managed to an acceptable level with the implementation of a sound environmental management plan. Mitigation potential is described in Table 6.7.

Table 6.7 Mitigation Potential

MITIGATION POTENTIAL	DESCRIPTION	EXAMPLE
HIGH:	The impact is relatively easy and cheap to manage. Specialized expertise or equipment is generally not required. The nature of the impact is understood and may be mitigated through the implementation of a managed plan, with regular monitoring undertaken to ensure that any negative consequences remain within acceptable limits. The significance of the impact after mitigation is likely to be LOW to Non-Significant. These impacts are normally mitigated by "good housekeeping".	Noise Dust Soil contamination from accidental spillages and leakages Litter
MEDIUM:	Management of this impact requires a higher level of expertise and resources in order to maintain within acceptable levels The significance of the impact after mitigation is likely to be LOW to MEDIUM depending on the level of management applied. May not be possible to mitigate the impact entirely – may result in a residual impact (e.g. topographical change)	Visual Impacts Changes to landscape form and functioning Alteration of stream flow patterns Soil Erosion
LOW:	Will not be possible to mitigate this impact entirely regardless of the expertise and resources applied. The potential to manage the impact may be beyond the scope of the Project Management of this impact is not likely to result in a measurable change in the level of significance.	Change of land use

It should be noted that a LOW mitigation potential does not necessarily imply that the impact is highly significant. An impact with a low significance rating may be extremely difficult to mitigate, such as noise generated by earthmoving machinery during construction, while a highly significant impact may be relatively simple to mitigate with the implementation of the correct management measures. Concern naturally arises when an impact with a HIGH significance has a LOW mitigation potential. In some instances this may present a fatal flaw, and motivation for rejecting the development.

6.9 Detailed Impact Assessment

Tables outlining the significance of the impacts associated with the construction and operation phases of the road upgrade, are included below. To reiterate: the focus of this detailed assessment is solely on those areas identified in the Scoping Phase as warranting further investigation, which specialist input. For a full description of the potential impacts, refer to Appendix K: Preliminary Assessment, and to Section 6.5.

6.9.1 Impacts on Terrestrial Vegetation

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
Plant Biodiversity, Species of Special Concern. (grasslands)	Surface Disturbance	Construction	Impact of road construction activities on grasslands. Potential impact on species of special concern, eg species protected in terms of the legislation.	Most of the road works will be confined to within the existing road reserve. Deviations may impact on short sections of grasslands. Spoiling of material will likely take place within old borrowpits and similarly disturbed areas and the construction camp and workshop will be located on previously disturbed areas. The grasslands are generally degraded, particularly in those areas immediately adjacent to the road. The loss of biodiversity is not anticipated to be significant. Similarly, there will be minimal impact on trees and forest species as construction will be largely confined. The impact on riparian vegetation is discussed below.	No	Negative	Direct	Medium	Site	Permanent	Definite	Low	Low	Medium	Low	The impact of road construction activities on the natural grasslands may be minimised through the implementation of the **Environmental Management Plan**, particularly in so far as works will be confined to the road corridor and areas outside of this will be regarded as no-go areas. An **Environmental Control Officer** (ECO) will be appointed to provided an external auditing function and a full time designated environmental representative will be appointed on site for the duration of construction. **Environmental awareness training** will be undertaken at the outset of the project and with each new intake of staff.
Riparian Vegetation: Impact on Riparian vegetation where bridges are to be upgraded, or new bridges constructed and the old demolished.	Surface Disturbance	Construction	Loss of vegetation biodiversity	According to the specialist aquatic report, the riparian vegetation is dominated by *Millettia grandis* (Umzimbeet), *Phoenix reclinata* (Wild data palm) and invasive inkberry (*Cestrum laevigatum*). There were no protected species recorded within the sample area which included the new bridge sites up or downstream of the existing structures. Habitat fragmentation could result from clearing of sections of the river banks for bridge construction	No	Negative	Direct	Low	Regional	Long term	Unlikely	Medium	High	MEDIUM -ive	MEDIUM -ve	**KuBomvu**: Bridge footprint is limited to the current bridge crossing locality, with due consideration of extending the width in the downstream direction - no Scarp forest / coastal forest found on the eastern bank should be impacted upon. **Mtonjane:** The proposed road-crossing site would have limited impact on the continued functioning of the riparian zone and the associated vegetation, however the back-flooding or ponding created by the current bridge as a result of sedimentation must not occur as a number of tree species observed are not tolerant of permanently inundated conditions, and are subsequently dying. **Nzulwini:** The proposed downstream site would have limited impact on the continued functioning of the riparian zone and the associated vegetation, however the mature Coastal Forest (Terrestrial) found above and below the current bridge must be avoided, while a number of the tree species found would in any case require permits for removal or pruning. These permits would have to be obtained from the Department of Agriculture, Fisheries and Forestry under the National Forestry Act. **Kumbula:** The proposed site would have limited impact on the continued functioning of the riparian zone and the associated vegetation, however further incision of the riverbank should be minimised, using appropriate engineering structures and replanting with indigenous vegetation. **Mpako**: The proposed bridge site would have limited impact on the continued functioning of the riparian zone and the associated vegetation, the inundated remnant channel should not be utilised or impacted, being demarcated by the ECO as a no-go area (S32.012399° E29.040991°). **All Rivers**: Removal of indigenous vegetation should be kept to a minimum, with clearing and grubbing being monitored by a ECO. Active replanting with indigenous species in the disturbed areas is encouraged to minimise future erosion and prevent alien invasive encroachment.
		Construction	Loss of ecological riparian corridors and resulting habitat fragmentation.		No	Negative	Direct	Low	Site	Long term	Unlikely	Medium	High	MEDIUM -ive	LOW -ive	
		Operation	Spread of alien invasive plants where banks are disturbed by bridge construction	Sections of the river banks which have been previously disturbed, such as immediately up and downstream of the existing bridges, are characterised by a prevalence of alien invasive plant species, eg inkberry.	No	Negative	Indirect	Low	Site	Long term	Probable	Medium	Medium	MEDIUM -ive	LOW -ive	All banks disturbed by bridge construction efforts must be monitored for further spread of alien plants and trees for a two year period after construction has been completed. All invasive plants must be removed.

6.9.2 Impact on Wetlands (Hole-in-the-Wall)[36]

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
Wetland Impacts	Surface Disturbance	Construction	Damage to wetland vegetation during the construction phase.	Damage to wetland vegetation adjacent to the planned crossing may effectively temporarily increase the spatial extent of the structures footprint.	No	Negative	Direct	High	Local	Short	Definite	Medium	Medium	MEDIUM -ive	LOW -ive	This impact is difficult to prevent, but a construction area should be demarcated with a suitable means and workers informed of the importance of not moving outside the indicated area.
	Surface disturbance; Change in landform	Construction and operation	Physical damage to the wetland impacting on its functioning	Establishment of a step in the wetland surface. A step in the wetland surface may represent a barrier to the movement of some biota. In unconsolidated sediments headward migration of a step in a channel bed (headcut) will be accompanied by channel incision immediately downstream and hence a local lowering of the watertable.	No	Negative	Direct	High	Unknown	Permanent	Unknown	Medium	High	MEDIUM -ive	None	Culverts should extend the full width of the wetland and be suitably sized in order to accommodate at least all low to moderately high flows. There should be no flow concentration zones associated with the crossing. Suitable measures to prevent scour could be employed downstream of the crossing.
				Accelerated erosion (scour) of wetland sediments downstream of culverts.	No	Negative	Direct	High	Unknown	Permanent	Unknown	Medium	High	MEDIUM -ive	LOW -ive	
				Establishment of a crossing related headcut. See comment above for its importance.	No	Negative	Direct	High	Local	Permanent	Unknown	Medium	High	MEDIUM -ive	None	
				Discontinuity in channel substrate type at the crossing. A substrate discontinuity may represent a dispersal barrier for some species.	No	Negative	Direct	High	Unknown	Permanent	Unknown	Medium	High	MEDIUM -ive	None	
				Impoundment of water upstream of the crossing.	No	Negative	Direct	High	Local	Permanent	Unknown	Medium	High	MEDIUM -ive	None	
	Releases to water (Diffuse and Point)	Construction and operation	Impact of runoff from nearby road	Alteration of the hydrological regime of the wetland due to discharge of runoff from roadside drains into the wetland.	No	Negative	Direct	Low	Local	Permanent	Definite	Low	Medium	MEDIUM -ive	None	Runoff from roadside drains should be diverted on to adjacent slopes and not into the wetland.
				Discharge of sediment from roadside drains into the wetland. *Sediment transported in roadside drains may be discharged into the wetland, potentially leading to a loss of wetland habitat.*	No	Negative	Direct	High	Local	Permanent	Possible	Low	High	MEDIUM -ive	None	

[36] Also refer to Specialist Aquatic Report in Appendix I

6.9.3 Impact on Aquatic Ecosystems and Functioning[37]

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
Hydrology	Change of landform Release of water, including Stormwater	Design and Operation	Increase in runoff in the river channels, increases the threat of scour, downstream sediment delivery and water quality deterioration	There is an increase in overland flow due to the smooth, hardened (impermeable) surfaces and cut slopes of the road (existing and upgraded). Rapid runoff, sediments, and road-associated chemicals (for example, spills, oils) generated on the road surface and cutslope are provided an efficient route into the natural channel network. In the instance of both the current and proposed upgraded road, there is existing road-river hydrological connectivity, with an associated increase in runoff into the river channels, particularly during storm events (along with an increase in peak flows and stream power). This increases the threat of scour (of both bridge and riverine elements), downstream sediment delivery, and water quality deterioration.	No	Negative	Direct	Medium	Site	Long-term,	Definite	Low	Medium	MEDIUM -ive	MEDIUM -ive	This is an existing impact but can be mitigated with improved drainage design for the upgraded road. Wherever possible, and particularly in areas where road slope is steep on either approach to the river, cross-drainage should be designed in. Where lateral drains (parallel to the road) are present, frequently-placed cross drainage structures should divert flows away from the road well in advance of the river-crossing. Roughness elements can be built into these cross-drains for flow resistance, and they should terminate in a drainage infiltration 'apron' (grassy or wetland type area, or fan of coarse-grained material to promote infiltration). The principle is to retard the non-natural overland flow velocity, increase infiltration, and prevent overland flows from reaching the river.
	Change in landform	Design and Operation	Flood damage resulting from impedances (bridges and culverts)	Floods, and in the case of the KuBomvu, high seas, may cause instabilities at the various bridge/river interfaces (abutment/road, stabilisation/bank, culvert/bed), and consequent erosional issues over the design life of bridge. The impact is both on bridge safety and on riverine/estuarine morphology and habitat quality.	No	Negative	Direct	Low	Regional	Short term	Unlikely	Low	High	MEDIUM -ive	LOW -ive	Design of the bridge must take into account the hydrological dynamics, i.e. river flow in a downstream direction, sea water ingress in an upstream direction, and road runoff into the river during storm events. All bridge interfaces (culvert - river bed, abutment - bank; gabion stabilisation - river bank) to be designed to maximise prevention of scour and erosion resulting from storm / flood events. Use of a combination of geotextiles and planting over the non-wetted interfaces is an effective means of protection. Planting into gabions and fill effectively improves the life of the gabions and structural strength of the stabilisation. In the case of the culvert/bed interface, Reno mattresses or gabion baskets or sacks can be used. .
	Change in landform	Construction	Construction of Coffer Dams	Potential for dewatering of downstream channel as a result of coffer dam construction and operation; potential for entry of coarse sediments into the downstream river in the event of the use of a sandbag coffer dam and failure thereof.	No	Negative	Direct	Medium - High	Local	Short – Long term	Possible	medium	Medium	HIGH -ive	MEDIUM -ive	Where coffer dams are necessary, these should be engineered to be fail-safe in order to prevent the destruction of downstream habitats should the coffer wall be compromised during high rainfall and high flow events. Failure of coffer dams is common. Sand-bag coffer dams should be avoided, as the failure of these results in a 'slug' of sediment being delivered to the downstream environment, causing damage to habitat and thus biota. Best engineering practice should be followed in choice of materials and in construction and decommissioning of the structure. If cement or cement products are used, this must be done with extreme caution: wet concrete and concrete washwater is lethal to aquatic biota due to its high pH. Concrete must be set or cured before any river water comes into contact with it. At least 20-25% of normal flows should be discharged into the downstream environment while the coffer dam is in place. Emergency procedures should be in place to respond immediately in the event of the failure of the coffer dam.
	Change in Landform	Operation	Accelerated erosion (scour) of the channel bed and a change in substrate type as a result of new structure	Scour may result in a localised change in substrate type and lowering of the channel bed. The change in substrate type will probably be a shift to a coarser sediment cover, as fines are winnowed away. Localised lowering of the channel bed may result in the formation of pools, although probably of limited depth and spatial extent. These pools could act as refugia during low flow conditions.	No	Negative	Direct	Low	Local	Permanent	Possible	Low	Medium	LOW -ive	None	If the river is spanned this is unlikely to be an issue. If culverts are used they should be suitably sized in order to limit the likelihood of this impact.

[37] Also refer to Specialist Aquatic Report in Appendix I

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
				Accelerated erosion (scour) of the channel bed and hence establishment of scour pools.	No	Negative	Direct	High	Local	Permanent	Possible	Low	Medium	LOW -ive	None	
			Accelerated erosion (scour) of the channel bank and an increase in turbidity downstream.	Accelerated erosion will lead to increased sediment delivery to the channel and possibly bank failure. The latter may negatively affect the approaches to the bridge. Erosion of the channel banks may lead to an increase in turbidity as a result of the release of fines and also potentially contribute coarser sediments to the channel. The latter sediments are likely to be transported as bedload. Please refer to comment on the potential impacts of turbidity.	No	Negative	Direct	High	Local	Permanent	Possible	Low	Medium	Medium -ive	None	Provide erosion protection on the channel banks immediately up and downstream of the structure.
			Accelerated erosion (scour) of the channel bank and an increase in bedload downstream.	Depending on the nature of the bank material this may lead to a local increase in large clastic material in the channel and increased deposition of sandy sediments downstream. If both size classes are available this may result in a local increase in habitat diversity and homogenisation of the substrate downstream.	No	Negative	Direct	Low	Local	Permanent	Possible	Low	Medium	LOW -ive	None	Mitigated as described above.
			Erosion of the channel bed and banks as a result of the failure of a debris dam	Large woody debris trapped behind a structure may fail during high flows, releasing a pulse of water and sediment downstream into the river or downstream estuary (in the case of KuBomvu River). This slug of water is assumed to be highly erosive.	No	Negative	Direct	High	Local	Long	Unlikely	Low	Medium	HIGH -ive	LOW -ive	In order to limit the possible formation of a debris dam comprised of large wood debris upstream of the crossing, the river crossing should ideally span the channel. If this is not possible the design of the crossing should take into account the likely transport of both large and small woody debris by flood events.
	Change in landform	Decommissioning of existing structures	Alteration and destabilisation of beds and banks of rivers where existing structures are removed.		No	Negative	Direct	High	Local	Medium - Long	Likely	Medium	Medium	HIGH -ive	MEDIUM -ive	Particularly where a bridge has created bed or bank scour (e.g. Mtonjane) Banks should be reshaped to mimic their upstream and downstream cross-sectional profiles. Bank stabilisation may be necessary. Initially bank angle is stabilised or terraced. Regarding stabilisation materials, modern bank restoration strategies tend to avoid hard structures (rocks, concrete rubble, rip rap) which can create erosional problems elsewhere in the stream, and based rather on returning plant cover to stream banks. The use of geotextiles in combination with planting to minimise the threat of scour and erosion on exposed bank surfaces is recommended. Bed stabilisation and rehabilitation will require the acquisition and placement of instream substrates which are as similar as possible to substrate types occurring upstream and downstream of the structure. A river ecologist should be consulted.
			Alteration of longitudinal bed profile as a result of bridge removal		No	Negative	Direct	High	Local	Long	Possible	Low	Medium	HIGH -ive	MEDIUM -ive	
	Resource Use (Water)	Construction	Potential for impact on low-flows due to abstraction of water for construction purposes	Impact on aquatic biota and riverine vegetation.	No	Negative	Direct	Medium	Local	Short	Possible	High	Medium	MEDIUM -ive	LOW -ive	DWA: Water abstracted for the purposes of dust-control and other construction-related operations must be carefully monitored against flow. In the instance of low-flow, or no-flow, the benefits of non-essential water use, such as dust-control, should be weighted against the loss of water to the riverine ecosystem, which can cause system deterioration over a season or longer (loss of breeding taxa and/or eggs). It is suggested that both the Mpako River (already in use) and the Nzulwini River (high Ecostatus) are EXCLUDED as options for abstraction for the current road; and that the effects of ongoing abstraction for construction be assessed by DWA using the Desktop Reserve model.

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
Water Quality	Releases to water (diffuse)	Construction	Increase in turbidity (suspended sediments) downstream as a result of sediment input associated with construction work, excavation of banks and/or bed, heavy vehicular traffic, and general construction disturbance.	Elevated turbidity causes a deterioration of instream habitat, can inter alia lower primary production, affect the foraging behaviour of fauna and create respiratory problems for biota.	No	Negative	Direct	High	Local	Short	Definite	Medium	Medium	HIGH -ive	MEDIUM -ive	Sediment inputs are difficult to mitigate. Construction time should be kept as short as possible, and all Environmental BMPs in the EMP regarding pollution prevention and dust management should be rigidly adhered to. It may also help to carry out most if not all construction during the driest time of the year. Strict precautions (e.g. placement of stop-boards) must be taken to prevent loose soil entering river channel during construction, or from any cofferdams. Adequate rehabilitation measures (e.g. grassing or use of geotextile plus planting over river banks) must be taken to stabilize any disturbed surfaces.
			Deposition of fine sediments downstream of the bridge as a result of construction work.	The deposition of fine sediments over habitat elements (cobbles, bedrock, plant stems) causes an immediate loss of surface habitat area for certain sensitive elements of the macroinvertebrate fauna (which have a preference for these areas, particularly those in flow).	No	Negative	Direct	High	Local	Short	Possible	Medium	Medium	HIGH -ive	MEDIUM -ive	
		Decommissioning of existing structures	Increase in turbidity (suspended sediments) downstream as a result of sediment input associated with removal of existing structures, disturbance of banks and/or bed, heavy vehicular traffic, and associated disturbances.		No	Negative	Direct	High	Local	Short	Possible	Medium	Medium	HIGH -ive	MEDIUM -ive	Sediment inputs are difficult to mitigate. Removal of bridges and other structures should be well-planned and rapidly executed, preferably during low-flow or no-flow periods. Once structures have been removed from their current position, all resulting material and rubble must be removed off site immediately. This material must NOT enter the river channel. Measures must be taken to stabilise and prevent erosion of the disturbed / exposed banks and river bed. Geotextiles of various sorts, combined with planting, are useful for this practice (consult technical guidelines). Bed and bank stabilisation, replanting of riparian trees, and instream habitat replacement are required. A riverine ecologist should be consulted for technical advice.
			Possible release of anoxic sediments into downstream environment with the removal of existing structures.	Anoxic sediments released into the downstream environment will have immediate lethal effects (fish and invertebrate kills).	No	Negative	Direct	Medium - High	Local	Short	Possible	Medium	Medium	HIGH -ive	MEDIUM -ive	This is site-dependent and is only likely to occur where the existing structure has been blocked upstream or has created a 'damming' effect and upstream sediments have become anoxic (potentially the Unnamed River crossing). In this case, all upstream sediments to be excavated manually (spade) and removed off-site PRIOR to the removal of the structure)
		Construction Phase	Chemical pollution of stream as a result of construction materials or byproducts thereof entering river (e.g. uncured cement, hydrocarbons from machinery & vehicles, wet, uncured bitumen from road surface).	The washwater from uncured cement raises the alkalinity of the receiving waters, with lethal effects on certain biota. Runoff from uncured bitumen can have similarly lethal effects on biota.	No	Negative	Direct	High	Local	Medium - Long	Possible	Medium	Medium - high	HIGH -ive	MEDIUM -ive	Strict control of construction methods, following the EMP. This must include strict control of cement use, ensuring wet, uncured cement does not come into contact with river water. Run-off from wet uncured bitumen must not allowed to enter the river or drainage. Regular monitoring of pH, EC, clarity, turbidity and water quality variables 50m upstream and 50m downstream of the new structures is recommended during construction.
Aquatic biodiversity	Change of landform	Design and Operation	Habitat discontinuity and movement of biota	Potential for the river-crossing structure to create habitat discontinuity, and to impede upstream/downstream movement of instream biota, particularly fish, eels, prawn and shrimp species. Upstream/downstream migration between freshwater and estuarine areas is critical to certain species at particular life stages.	No	Negative	Direct	Medium	Site	Long term	Possible	Low	High	MEDIUM -ive	LOW -ive	River-crossing design should ensure substrate continuity upstream and downstream of the structure to enable free movement of instream biota from the estuary or lower river reaches. Ideally, single-span bridges should be used (as in the case of the Nzulwini). Where this is not possible, open-bottom structures or culverts should be used, over natural instream substrates that generally match upstream and downstream substrates. Stream depth and velocities in the crossing structure during low-flow conditions should approximate those in the natural river/stream channel. Where open-bottom structures are not possible, and where the base is not bedrock, culverts should be embedded to a depth of approximately 0.5m, and substrates resembling the natural bed material (in mobility, slope, stability and confinement) should be placed within the structure. The sizing and placement of substrate elements is important. Where scour protection downstream of the structure is necessary to prevent a step forming in the channel, this should take the form of a gradually-sloping apron with coarse substrate elements, or of gabion mats with similar substrates to those found in the stream if possible.

6.9.4 Impact on Estuaries[38]

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
General Estuary: Pre-construction	Surface Disturbance Land Transformation	Pre-construction	Clearing / excavation of development areas for construction	• Nenga - Destruction (cutting) of umzimbeet and other forest species. Destruction of small vegetated (grass and juncus) islands and grassland. • DR08031 and KuBomvu – Removal of alien vegetation and grassland Erosion of soils • Sedimentation of estuary channels • Pollution of estuary waters and sediments with hydrocarbon spillages or leaks from construction plant and vehicles. • Deterioration of water quality, reduction in presence and abundance of sensitive estuarine fauna,	No	Negative	Primary and secondary	Medium	Local	Short	Definite	Medium	Low	MEDIUM-ive	LOW -ive	• All vegetation and topsoil to be removed off site immediately. Topsoil to be conserved or stockpiled off-site for use in rehabilitation. Stock piles to be on flat ground and well away from drainage lines. • Umzimbeet and forest species cutting to be reduced to a minimum. • Clearing to be done in phases that match construction requirements – sites not all cleared at once. • Use of machinery and vehicles on estuary banks to be limited as far as possible • Measures in place to minimize wind-blown dust, and to avoid washing of sediments into the estuary. • Draw up and enforce a strict Construction Environmental Management Plan (CEMP) to minimise possible pollution of the estuary water and sediments from pre-construction related activities. • Enforce CEMP Guidelines regarding construction camp, lay-down area, litter, etc. • Develop and implement a monitoring and response protocol.
General Estuary: Construction	Surface Disturbance Land Transformation	Construction	Construction of Nenga bridge, KuBomvu bridge and DR08031 pedestrian walkway including possible construction of a coffer dam for Nenga bridge	Primary Impacts: • Erosion of soils • Sedimentation of estuary • Pollution of estuary water and sediments with construction materials • Contamination of estuary with high pH concrete wash water from uncured cement used in construction. • Contamination of estuary with wash water from uncured epoxy grout used in construction. • Incidental pollution of estuary as a result of use and storage of construction materials and stockpiling, and from hydrocarbon spillages or leaks from construction plant and vehicles. • Destruction of channel bank/s and vegetation cover as a result of excavation and construction activities. • Possible closure of estuary mouth (if coffer dam required) Secondary Impacts: • Pollution of water: Reduction of ecosystem function in the Nenga estuary for a substantial period after construction. Reduction in biodiversity. • Sedimentation: Deterioration in water quality, destruction of habitat, loss of habitat variability and quality, and resultant reduction in presence and abundance of sensitive biota, deterioration in present ecological status. • Destruction of channel banks: sedimentation of downstream channel, exposure of root zone of riparian vegetation and eventual collapse of vegetation, landward scour of banks, erosion of riparian zone, invasion of cleared areas by alien vegetation. • Destruction of channel banks and vegetation cover as a result of stock fording the river upstream of construction site.	No	Negative	Primary and secondary	High	Local	Short - Medium	Probable	Medium	Medium	HIGH-ive	MEDIUM -ive	• Reduce vegetation cutting (trees and grassland) to a minimum • Implement measures to prevent the washing of sediments into the downstream system. • Limits as far as possible use of machinery and vehicles on estuary banks • Construction camp and materials lay-down area to be situated well away from construction area and above the 1:200 year floodline for the Nenga river. The camp to be clearly demarcated and maintained as per EMP. All construction materials and plant to be restricted to this area when not in use. • Prevent spillage of construction materials into estuarine ecosystem. Construction area to be clearly demarcated and all activities to be limited to demarcated area. • Consider using the old causeway as a coffer dam by blocking pipes • Erect barrier to limit upstream migration of stock crossing • Develop and implement an aquatic monitoring protocol

[38] Refer to specialist estuary report in Appendix H

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
		Construction	Demolition of existing Nenga causeway	Primary Impacts: • Pollution of estuary water and sediments with materials from demolished structure • High water turbidity and suspended sediment load • Reduction in water oxygen content • Incidental pollution of estuary as a result of use and storage of demolition materials and stockpiling, and from hydrocarbon spillages or leaks from demolition plant and vehicles. • Destruction of channel banks and vegetation cover as a result of demolition activities. Secondary Impacts: • Pollution: Possible reduction in ecosystem function in the Nenga estuary for a substantial period after construction. Loss of biodiversity • Sedimentation: Deterioration in water quality, destruction of habitat, loss of habitat variability and quality, and resultant reduction in presence and abundance of sensitive biota, deterioration in present ecological status. • Destruction of channel banks: sedimentation of downstream channel, exposure of root zone of riparian vegetation and eventual collapse of vegetation, landward scour of banks, erosion of riparian zone, invasion of cleared areas by alien vegetation.	No	Negative	Primary and secondary	High	Local	Short - Medium	Probable	Medium	Medium	HIGH-ive	MEDIUM -ive	• Take all measures possible to prevent the washing of sediments into the downstream system. • Clear away and dispose of all excavated materials immediately • Complete demolition and excavation of material in as short a time as possible • Limit machinery and vehicles approach to estuary banks as far as practical • Prevent spillage and leakage of hydrocarbons • Construction camp and materials lay-down area to be situated well away from construction area and above the 1:200 year floodline for the Nenga river. The camp to be clearly demarcated and maintained as per EMP. All construction materials and plant to be restricted to this area when not in use.
General Estuary: Operation	Change in Landform	Operations	Operation of Nenga bridge, KuBomvu bridge and DR08031 pedestrian walkway	*Primary Impacts:* • Increased human and vehicle traffic • Increased litter and associated pollution • Improved estuarine function – increased fish and invertebrate populations • Increased aquatic resource use (Fish and invertebrates) in Nenga • Cutting of vegetation as a result of increased use of picnic site (Nenga) • Disturbance of avifauna and forest mammals *Secondary Impacts:* • Increases in abundance and diversity of fish and invertebrates • Increased habitat diversity • Resultant increase in presence and abundance of sensitive biota, improvement in ecological status rating. • Degradation of the lower riparian zone; erosion of the banks by water, human activity, and cattle trampling; invasion of the riparian zone by alien invasive vegetation; • Alteration of water quality both upstream and downstream of bridges (nutrient load, turbidity, dissolved gases, concentration of heavy metals and minerals) as a result of increased litter and solid waste. • Eventual degradation of riparian zone, with concomitant increase in erosion and invasion by alien invasives.	No	Negative	Primary and secondary	High	Local	Long - permanent	Probable	Medium	Medium	HIGH-ive	MEDIUM -ive	• Increase compliance activities – train local people as Fishery Control Officers and Coastal Activity Monitors • Improve facilities available at picnic site (Nenga) • Limit recreational activities to demarcated areas. • Clearly demarcate sensitive areas • Strict waste management protocols to be drawn up and enforced • Monitor invertebrates, fish and water quality against a baseline state • Conduct regular road maintenance

6.9.5 Cultural Heritage Impacts[39]

IMPACT	ASPECT	PHASE	DESCRIPTION	COMMENTARY	IAP Issue?	NATURE	TYPE	SEVERITY	SPATIAL EXTENT	DURATION	PROBABILITY	REVERSIBILITY	MITIGATION POTENTIAL	SIGNIFICANCE		MITIGATION (also refer to EMP in Appendix B)
														WITHOUT MITIGATION	WITH MITIGATION	
Cultural heritage Impacts	Surface transformation; change in landform	Construction	Clearing of land for road deviations, construction camps and approaches to new bridges, as well as at spoil sites may have an impact on sites of cultural or heritage significance, such as graves.	The heritage impact assessment identified some graves adjacent to the construction site, some of which may be negatively impacted by the road construction activities. These graves are generally associated with existing households. While the HIA recommended that these deviations be abandoned, it is common practice on behalf of the DRT to relocate households and to facilitate the exhumation and reburial of ancestral graves at the new site. This is allowed for in the contract budget and is dealt with via protracted negotiations with the chief, headman and the affected families. None of these graves are thought to be more than 60 years old	No	Negative	Direct	Medium	Site	permanent	Likely	Low	Medium	HIGH -ive	MEDIUM -ive	Where possible, the alignment of the road must be adjusted to minimise the impact on adjacent landowners and to avoid having to relocate homesteads. However, for safety reasons, it will be necessary to implement some realignments and there will be some households affected. These are likely to have ancestral graves located within the property and even if these are not directly affected, they will need to be moved along with the household, to a new location identified by the chief and agreed to by the residents. The DRT have a formal procedure for the relocation of households as this is a common feature of road construction projects. This involves negotiations both with the affected family as well as the chief, who will be instrumental in identifying an alternative site. A new house / homestead will be built as part of the contract for each of the displaced families. The new homestead will be of the same quality, or better, than their former residence. No monetary compensation is paid to displaced families, rather a new, normally improved, residence is provided.

[39] Also refer to Heritage Impact Assessment Report in Appendix J.

6.9.6 Compatibility with Planning Frameworks

Refer to the Needs and Desirability Assessment included in Appendix E and to Section 3.16.

The upgrade of the roads is fully in keeping with the recently complete Tshezi Spatial Development Framework, KSD SDF and the Wild Coast SDF.

6.10 Comparative Assessment of Alternatives

A preliminary comparative assessment of alternatives was undertaken as part of the scoping phase. This focussed mainly on the alternative routes through Coffee Bay as mooted in the Preliminary Design Report. These alternatives have subsequently been abandoned, largely based on the findings and recommendations of the ESR. There is hence no need to undertake a detailed comparative assessment of these alternatives.

Additional alternative alignments assessed during the scoping stage were as follows:

- Minor realignment option at starting km 13.00: Two options for improving the horizontal alignment at this location were considered viz: an eastern option cutting across fallow fields and passing marginally closer to a number of homesteads on the coastline; and a western option which will pass directly through an existing homestead and the fallow field also affected by the eastern option. Of the two options the eastern alignment was considered to be more environmentally acceptable from the perspective of avoiding permanent loss of property and/or relocation. This option was selected in the final alignment, with the result that the homestead will be unaffected

- Realignment options at 13.80 through vlei with new crossing: The proposed realignment of the route 'upstream' of the existing crossing through the vlei to the north of Hole-in-the-Wall should represent an improvement for drainage dynamics within the vlei, provided: the design of the new culvert is constructed in a manner which maintains base flow within the vlei; and the existing crossing is removed and the area rehabilitated. The latter will need to be guided by the results of specialist studies and construction activities will need to be carefully controlled to reduce the area of disturbance to a minimum.

  The new alignment across the wetland was assessed as part of the specialist studies and was not found to be fatally flawed. The impacts associated with this alignment are provided in Section 6.9.2. These impacts may be mitigated to within acceptable levels. The option of retaining the existing alignment will have obvious drawbacks in terms of the horizontal and vertical alignment of the road and will be substandard in terms of the required design standards. The retention of the current wetland crossing is therefore viewed as being unreasonable.

- Realignment options at junction from km 19.7: Two options for the route were proposed at the existing junction with the DR08321/DR08031 including a southerly route which is currently the main through-route and a northerly route which also utilises an existing but less used road corridor. The northerly route is the engineer's preferred route from the perspective of safety due to the steepness of the route corridor to the west of the junction. As both options will result in the potential loss of property and relocation, the northerly route is also considered to be the better option from an environmental perspective provided the adjacent stand of trees is not

significantly adversely affected by this option. In the detailed design, the northern route was selected, mainly for safety reasons: the steep incline and the sharp curve of the existing alignment increase the risk of traffic accidents, and the location of the household immediately belong the sharp curve make it particularly vulnerable to collisions.

As noted above, a number of comments were made during the PPP regarding the establishment of a bypass at Coffee Bay. The basis for these comments is the Kwa-Tshezi Development Plan (2008) which describes the future provision for a bypass at Coffee Bay, however this relates to a future threshold of socio-economic activity which has not yet been achieved.

The consideration of a Coffee Bay bypass is both outside the scope of this Project and in conflict with the concept for the Wild Coast Meander which is to utilise and upgrade existing roads as a means to facilitating access for communities and promoting socio-economic development, including tourism.

6.10.1 No-Go Alternative

The "No-Go" alternative simply involves leaving the roads in their current condition and undertaking routine maintenance, ie occasional grading of the road surface, clearing of drains etc, and repairs (eg to bridge and culvert structures damaged by floodwaters). The poor condition of the roads would seem to indicate that maintenance and repair works are not being undertaken as often as required with the result that the road has deteriorated to a stage which is beyond simple maintenance and requires major reconstruction in places. Gravel roads generally require a high level of maintenance and there is no guarantee that the current level of care given to the road by the DRT's maintenance unit, will improve in the foreseeable future.

The impacts associated with the "No-Go" option are summarised as follows:

- Air Pollution: Households living in close proximity to the gravel roads and road users will continue to be subjected to dust, both wind blown and that generated by traffic;

- Soil Erosion: Substandard stormwater drainage systems along the existing gravel roads are currently causing erosion. This will continue in the absence of an upgrade;

- Surface water pollution: During heavy rains, it is anticipated that a large amount of sediment is carried from the road surface into the drainage lines through runoff from the approaches to the culverts and bridges. This will have a negative impact on the aquatic biodiversity and habitats.

- Alteration of drainage systems: Many of the structures are substandard and are currently having a negative impact on the flow dynamics of the streams and rivers, resulting in bank erosion and downstream sedimentation. The Mtonjane River, for example, shows signs of repeated overtopping and repairs to the approaches as a result of flood damage.

- Aquatic ecosystem and biodiversity impacts: Alternation of drainage systems and an increase in turbidity as a result of stormwater ingress from the gravel roads will have a negative impact on the aquatic biota as described in the specialist impact assessment (Appendix I).

- Public Nuisance: Neighbouring residents are affected by dust generated by traffic along the gravel road. Access to their properties, to social services and to the coastal resorts of Coffee Bay and Hole-in-the-Wall is hindered by the poor quality of the road, which is often impassable in wet weather conditions.

- Public Health and Safety: The current roads are substandard in terms of their geometric alignment, resulting in unsafe driving conditions. There are a number of houses which are located very close to the alignment and are in danger of being damaged by vehicles leaving the road. The low-level bridges may become impassable in flood conditions, such as the access across the Nenga estuary to the Ocean View Hotel. Access to the Zithulele Hospital may be hindered by the poor condition of the road, especially during very wet conditions.

- Aesthetic Impacts: The erosion occurring along side the gravel roads, and the damage to rivers as a result of substandard structures has an aesthetic impact. The condition of the parking area in close proximity to the Hole-in-the-Wall feature distracts from the aesthetics of the area (the parking area is polluted and eroded);

- Socio-economic Impacts: Coffee Bay and Hole-in-the-Wall are identified as 1st and 2nd order development nodes in the Wild Coast SDF, respectively. The "no-go" option of not upgrading the road infrastructure will be counteractive to the initiative to encourage development within the designated nodes, and to provide social-upliftment to communities and businesses. There will be no added benefit to the current businesses operating in Hole-in-the-Wall and Coffee Bay as a result of the "no-go" option, and the community will not benefit from the employment and training which will result from the construction phase.

  The upgrade of these roads is furthermore identified as a critical link in the Wild Coast Meander initiative. The "no-go" option will be in direct conflict with this initiative and will essentially hamper its implementation, unless a suitable alternative route for the WCM can be identified.

7. ENVIRONMENTAL IMPACT STATEMENT

The Department of Roads and Transport propose to upgrade 27.5km of existing gravel and surfaced district roads accessing and linking the coastal resorts of Coffee Bay and Hole-in-the-wall and the Zithulele Hospital in the King Sabata Dalindyebo Municipality. The project forms part of the proposed Wild Coast Meander, a Provincial Growth and Development Programme (PGDP) initiative and is fully aligned to the Strategic Development Plans for the Wild Coast, the KSD municipality and the Kwa-Tshezi area. The project has the support of the municipality, the traditional leadership, businesses owners, cottage owners and residents of Coffee Bay and Hole-in-the-Wall, and the rural community.

The project will involve the upgrading of the roads along their current alignment with very minor deviations allowed for improved road safety. Of the nine bridges affected, six will be replaced with improved structures, and three will be widened to allow for safe pedestrian access. A new crossing over the wetland at Hole-in-the-Wall will be built to accommodate the improved alignment. The design speed will vary between 60 and 40km/hr across the length of the road. Minor changes will be made to the vertical alignment, with the result that concrete surfacing will be required on some of the steeper gradients.

A new bridge will be required across the Nenga estuary. Dr Peter Fielding of Fieldwork was appointed to assess the impact associated with this. He concluded that, provided strict controls in environmental management are enforced during the construction phase, the long-term net effect on the estuary will be positive as the existing substandard causeway will be removed to make way for an improved structure which will allow for improved function of the system.

The impact of the new alignment across the wetland was assessed by a team of specialists, headed by Dr Mandy Uys of Laughing Waters. No fatal flaws were detected and various mitigating measures were proposed in order to reduce the risk to the wetland functioning. These measures have been incorporated into the design. An application will be prepared in terms of DWA's licensing requirements.

Dr Uys and her team similarly identified the impact of the new bridges on the rivers and streams. A Comprehensive impact assessment was undertaken and recommendations produced. These recommendations have been incorporated, where practical, into the design of the new structures.

Consultations were held with the Department of Water Affairs. DWA: Water Quality Management recorded in a letter, dated the 18/01/2010, that from a water managed perspective, their office had no objection to the proposed road upgrade provided certain conditions were adhered to.

A Heritage Impact Assessment was undertaken by eThembeni Cultural Heritage. A copy of the report was forwarded to the South African Heritage Resources Agency in accordance with the requirements of the National Heritage Resources Act, Act No 25 of 1999. The HIA identified some graves which may require relocation to accommodate the new alignment.

Roughly 16 households will be impacted with some buildings requiring relocation to accommodate the new improved alignment. The household heads have been notified of this and informed of the process to be followed. The DRT have strict procedures for the relocation of households which will take place during the contract at the expense of the Department. No person/s will be relocated against their will. All displaced families will be provided with a new homestead which is equal to, or better than, their former dwelling, located on a site allocated by the local chief or headman.

The impact assessment concludes that the majority of the potential impacts are commonly associated with roads construction works. Where possible, the likelihood and significance of these impacts has been reduced through the implementation of design features (eg at the wetland). A comprehensive Environmental Management Plan which includes a range of environmental specifications will be applied to the construction phase. An External Environmental Auditor will be appointed to provide a monthly monitoring service, with audit reports submitted to the relevant authorities. A full-time environmental representative will be present on site during construction. All staff will undergo environmental induction and training as part of their duties.

It is acknowledged that the work will be taking place in the sensitive Coastal Conservation Area of the Wild Coast, as defined by the Transkei Decree, 9 of 1992. For this reason it is essential that the works are confined to the construction corridor, with all areas outside of this being defined as no-go areas. The Environmental Specifications, which will form part of the contract documentation and hence will be legally binding on the contractor, will specify fines and penalties to be paid in the even of non-compliance with the EMP.