Draft Environmental Management Programme

DR 1797 Road Upgrade Project

DEA&DP Reference Number: 16/3/3/1/D1/9/0011/20

Hatch project number: H357403

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30 September 2020

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Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
BGCMA	Breed-Gouritz Catchment Management Agency
CA	Competent Authority
CBAs	Critical Biodiversity Areas
CEMP	Construction Environmental Management Plan
CIDB	Construction Industry Development Board
DEA	Department of Environmental Affair's
DEA&DP	Department of Environmental Affairs & Development Planning
DEFF	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EO	Environmental Officer
EPWP	Expanded Public Works Programme
ESAs	Ecological Support Areas
GA	General Authorisation
GNR	Government Notice Regulation
Hatch	Hatch Africa (Pty) Ltd.
IDP	Integrated Development Plan
I&APs	Interested & Affected Parties
LHS	Left Hand Side
MMP	Maintenance Management Plan
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NFA	National Forestry Act
NWA	National Water Act, 1998 (Act 36 of 1998)
PSDF	Provincial Spatial Development Framework
RHS	Right Hand Side
SANS	South African National Standards
SDF	Spatial Development Framework
WCG	Western Cape Government: Department of Transport and Public Works
WUL	Water Use License

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1. Introduction

1.1 Background

Hatch Africa (Pty) Ltd. (Hatch) is appointed by the Western Cape Government: Department of Transport and Public Works (WCG) to conduct both the engineering and construction management, as well as the associated environmental approval process, for the upgrade of the DR 1797 Road (the project) in the Western Cape Province, South Africa.

The WCG's responsibility is to upgrade, rehabilitate and maintain provincial roads within the Western Cape Province, provide Expanded Public Works Programme (EPWP) work opportunities, develop emerging Construction Industry Development Board (CIDB) contractors and contribute towards black economic empowerment within the local communities.

The DR 1797 is currently a gravel road. The main purpose of this project is to upgrade the road from a gravel road (Class 4) to a surfaced road (Special Class 4). The project is located on the DR 1797, which is a minor road off the N2 Highway in the Bitou Local Municipality of the Western Cape. This road is a dual lane, single carriageway and is situated in the jurisdiction of the Garden Route District Municipality (formerly known as the Eden District Municipality). The upgrade of DR 1797 Road will be from km 0.00 (left off the N2 and just past The Crags Petrol Station) to km 4.87, this includes the limit for construction as well.

The DR 1797 Road upgrade will require vertical and horizontal realignment to allow for a 60 km/hr design speed. Due to this, there are small areas along the DR 1797 Road which will require expropriation (Appendix B).

The landowners which will be affected by the expropriation, have already been contacted and are currently in discussions with the WCG.

1.2 Environmental Approvals

In terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, 4 December 2014 (as amended 2017) (Government Notice Regulation (GNR) 982), the upgrade of the DR 1797 Road will trigger Activities 12 and 19 of Listing Notice 1 (GNR 983). The project will thus trigger the need for EA to be obtained through a Basic Assessment (BA) process. The Competent Authority will be the Western Cape Department of Environmental Affairs & Development Planning (DEA&DP). A General Authorisation (GA) will be conducted in accordance with Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

1.3 Details of the EAP

In terms of the NEMA EIA Regulations, the WCG has appointed Hatch Environmental Services Group as the independent Environmental Assessment Practitioner (EAP) to undertake the BA process. Table 1-1 notes the contact details of the EAP and the curriculum vitae of the EAP is available in Appendix C.

Table 1-1: Details of the Environmental Assessment Practitioner

Item	EAP Contact Details
Name	Michelle Miles
Tel No.	(011) 612 4587
E-mail Address	Michelle.miles@hatch.com
Postal Address	58 Emerald Parkway Road Greenstone Hill Johannesburg

1.4 Purpose of Environmental Management Programme

As part of the BA process, an Environmental Management Programme (EMPr) has been developed. An EMPr takes the planning and design, construction and operational phases of a project into account, and is largely based on the findings and recommendations of the BA process. However, the EMPr is a legally binding document and any changes required to the EMPr must be conducted through the DEA&DP. The EMPr follows an approach of identifying management actions that are aimed at preventing environmental degradation. The management actions are presented in a table format (Table 7-1) in order to show the links between the impacts and mitigation measures as well as responsibilities, monitoring requirements and targets.

This EMPr has the following objectives:

- To recommend measures which will assist in avoid disturbance to the natural environment
- To recommend measures for the prevention or minimisation of environmental impacts by adopting best practical means available to prevent or minimise adverse environmental impacts
- To encourage good management practices through planning and commitment to environmental issues
- To align recommended measures with the environmental legislations
- To describe and assign the roles and responsibilities of the team involved in the DR 1797 Road upgrade such that there is accountability for any environmental impacts which may arise
- To indicate any monitoring or auditing procedures which may be required as well as frequency of these.

As a minimum, the EMPr for the DR 1797 Road upgrade aims to satisfy the legislated requirements stipulated in Appendix 4 of GNR 982 (NEMA EIA Regulations). **Error! Reference source not found.** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1-2: Legislation Requirements as detailed in Appendix 4 of GNR 982

Appendix 4	Legislated requirements as per the NEMA GNR 982	Relevant Report Section
(1)(a)	Details of -	
	(i) the EAP who prepared the EMPr; and	Section 1.3
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.3 and Appendix C
(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2
(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Figure 2-1 and Appendix B
(d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including -	Section 6
	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	
(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	Section 7
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 7
(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 7

(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 7
(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 7
(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 5
(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 4.7
(m)	An environmental awareness plan describing the manner in which -	Section 4.4
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	Any specific information that may be required by the competent authority.	Not Applicable
(2)	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Noted

1.5 Applicable Documentation

The following documents are to be read in conjunction with the EMPr:

- The Draft Basic Assessment Report (BAR) for the upgrade of the DR 1797 Road
- The EA to be issued by the DEA&DP in terms of the NEMA.
- The GA to be issued by the BGCMA in terms of the NWA
- The DR 1797 Road Maintenance Management Plan.

1.6 Legal Requirements

The Applicant (WCG) is responsible for complying with all applicable environmental legislation, regulations and guidelines, and ensuring that the Construction Manager undertakes responsibility to do the same. The relevant legislation includes but is not limited to:

- NEMA
- National Environmental Management: Biodiversity Act (Act 10 of 2004)
- National Forest Act (Act 84 of 1998) (NFA)
- National Environmental Management: Air Quality Act (No. 39 of 2004)
- National Environmental Management: Waste Act (No. 59 of 2008)

- National Heritage Resources Act (No. 25 of 1999)
- NWA
- Water Services Act (Act 108 of 1997)
- Hazardous Substances Act (Act 15 of 1973)
- National Road Traffic Act (Act 93 of 1996)
- Occupational Health and Safety Act (Act 85 of 1993).

1.7 National Environmental Management Act

The main aim of the NEMA is to provide for cooperative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the BA process, as well as conduct the public participation process.

The objective of the NEMA EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of activities. The purpose of these procedures is to provide the competent authority (CA) with adequate information to make decisions which ensure that activities which may impact negatively on the environment are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In terms of Section 24F of the NEMA, no person may commence an activity listed in terms of Sections 24(2)(a) or (b) of the NEMA (listed activity) without an EA issued in terms of the NEMA. GNR 983, 984 and 985 published in terms of the NEMA (as amended 7 April 2017), set out the listed activities that cannot be undertaken without an EA.

GNR 984 identifies those activities for which a BA must be undertaken in accordance with the procedure set out in GNR 982; GNR 983 identifies those activities for which a full scoping and environmental impact reporting (S&EIR) process must be undertaken in accordance with the procedure set out in GNR 982; and GNR 985 identifies geographical areas in respect of which an EA must be applied for by undertaking the BA process. It must be noted that GNR 984 and GNR 985 pertains to those activities which are deemed to have a lesser environmental impact whilst those listed in GNR 983 have a more significant impact on the environment and accordingly, a more detailed and extensive level of assessment is required. However, the CA may require a S&EIR process for BA activities if they deem it necessary.

1.7.1 Listed activities

The following activities will be triggered under Listing Notice 1 (GNR 983) and the DR 1797 Road upgrade will thus trigger the need for EA to be obtained through a BA process.

GNR 983: Listing Notice 1

Activity No.	Relevant BA Listed Activities as set out in GNR 983	Description of project activity
12	The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs (a) within a watercourse.	This activity will be triggered due to the development of the major culvert at km 0.705 over a tributary of the Whiskey Creek. The culvert structure will be 5 m wide X 3 m high X 19.5 m long (I.e. ±850 m^2), with the culvert extension outside the Road Reserve.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	This activity will be triggered as more than 10 m^3 of soil, sand, shells, shell grit, pebbles or rock will be infilled at the tributary of the Whiskey Creek, for the development of the major culvert at km 0.705. In addition, the vertical and horizontal realignment between km 0.00 and km 4.87 will entail cut and fill operations, which may entail the infilling of soil, etc. from water courses along the route.

1.8 National Water Act

The NWA guides the management of water in South Africa as a common resource. The Act aims to regulate the use of water and activities, which may impact on water resources through the categorisation of 'listed water uses' encompassing water extraction, flow attenuation within catchments, as well as the potential contamination of water resources.

In terms of Section 22 of the NWA, no person may undertake a water use as set out in Section 21 of the NWA (list of water uses) without a water use licence (WUL) issued in terms of the NWA unless–

- Such water use falls within the ambit of a water use as set out in Schedule 1 to the NWA, which pertains to the use of water for, inter alia, domestic use or small gardening
- Such water use falls within the ambit of an existing lawful water use in terms of Section 34 of the NWA, which pertains to a water use which has taken place at any time during a period of two years prior to the commencement of the NWA, being 1 October 1998
- Such water use falls within the ambit of a GA issued in terms of Section 39 of the NWA
- The Minister of the Department of Human Settlements, Water and Sanitation has dispensed with the requirement for a WUL in terms of Section 22(3) of the NWA.

1.8.1 Regulations requiring a Water User be Registered, GNR.1352 (1999)

Regulations requiring the registration of water users were promulgated by the then Minister of the Department of Water Affairs (now the Department of Human Settlements, Water and Sanitation) in terms of provisions made in Section 26(1)(c), read together with Section 69, of the NWA.

Section 26(1)(c) of the Act allows for registration of all water uses including existing lawful water use in terms of section 34(2). Section 29(1)(b)(vi) also states that in the case of a GA, the responsible authority may attach a condition requiring the registration of such water use. The Regulations (Article 3) oblige any water user as defined under Section 21 of the Act, to register such use with the responsible authority and effectively to apply for a Registration Certificate as contemplated under Article 7(1) of the Regulations.

1.8.2 General Authorisation in terms of Section 39 of the National Water Act

According to the preamble to Part 6 of the NWA, "*This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette…*" "*The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary…*"

The GA for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks, or characteristics of a watercourse) as defined under the NWA, have recently been revised (GNR 509 of 2016). The DR 1797 Road upgrade falls within or adjacent to a river channel or its associated wetland areas, are likely to change the characteristics of the associated freshwater ecosystems and may therefore require a GA. Determining if a water use licence is required for these water uses is now determined based on the risk of the proposed activities degrading the ecological status of a watercourse. An application for the GA is being made to the BGCMA

1.9 National Forest Act

Within the Western Cape, there are several plant species protected by legislation. Section 15(1) of the NFA states that "*no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister*" to an applicant and subject to such period and conditions as may be stipulated.

It has been identified by the botanical specialist that there are two Protected trees namely *Afrocarpus falcatus* (Outeniqua Yellowwood) and *Pittosporum viridiflorum* (Cheesewood), which will be affected by one of the areas which are being expropriated. Due to this, a permit will be required for the removal of these Protected trees.

2. Project Description

2.1 Location of Activity

he DR 1797 Road is located on the DR 1797, which is a minor road off the N2 Highway in the Bitou Local Municipality of the Western Cape. This road is a dual lane, single

carriageway and is situated in the jurisdiction of the Garden Route District Municipality (formerly known as the Eden District Municipality)(**Error! Reference source not found.**).

Table 2-1: Details of the Proposed Locality for the DR 1797 Road Upgrade

Province:	Western Cape
District Municipality:	Garden Route District Municipality
Local Municipality:	Bitou Local Municipality
Ward Number:	Ward 1
Area / Town / Village:	Redford Rd (DR 1797 Rd)
Physical Address:	DR 1797
Property Description:	Existing gravel road
21 Digit Surveyor General Number:	Refer to Appendix A for the Property Information
Coordinates:	Refer to Appendix A for the Property Information

Refer to Appendix B for the Locality Map and Expropriation Map of the DR 1797 Road.

Figure 2-1: Locality Map

2.2 Objective

The WCG's responsibility is to upgrade, rehabilitate and maintain provincial roads within the Western Cape Province, provide EPWP work opportunities, develop emerging CIDB contractors and contribute towards black economic empowerment within the local communities.

The DR 1797 is currently a gravel road. The main purpose of this project is to upgrade the road from a gravel road (Class 4) to a surfaced road (Special Class 4). The upgrade of DR 1797 Road will be from km 0.00 (left off the N2 and just past The Crags Petrol Station) to km 4.87, this includes the limit for construction as well.

2.3 Expropriation Areas

The DR 1797 Road upgrade will require vertical and horizontal realignment to allow for a 60 km/hr design speed. Due to this, there are small areas along the DR 1797 Road which falls outside of the existing road reserve and therefore require expropriation (Appendix B).

The landowners which will be affected by the expropriation, have already been contacted and are currently in discussions with the WCG.

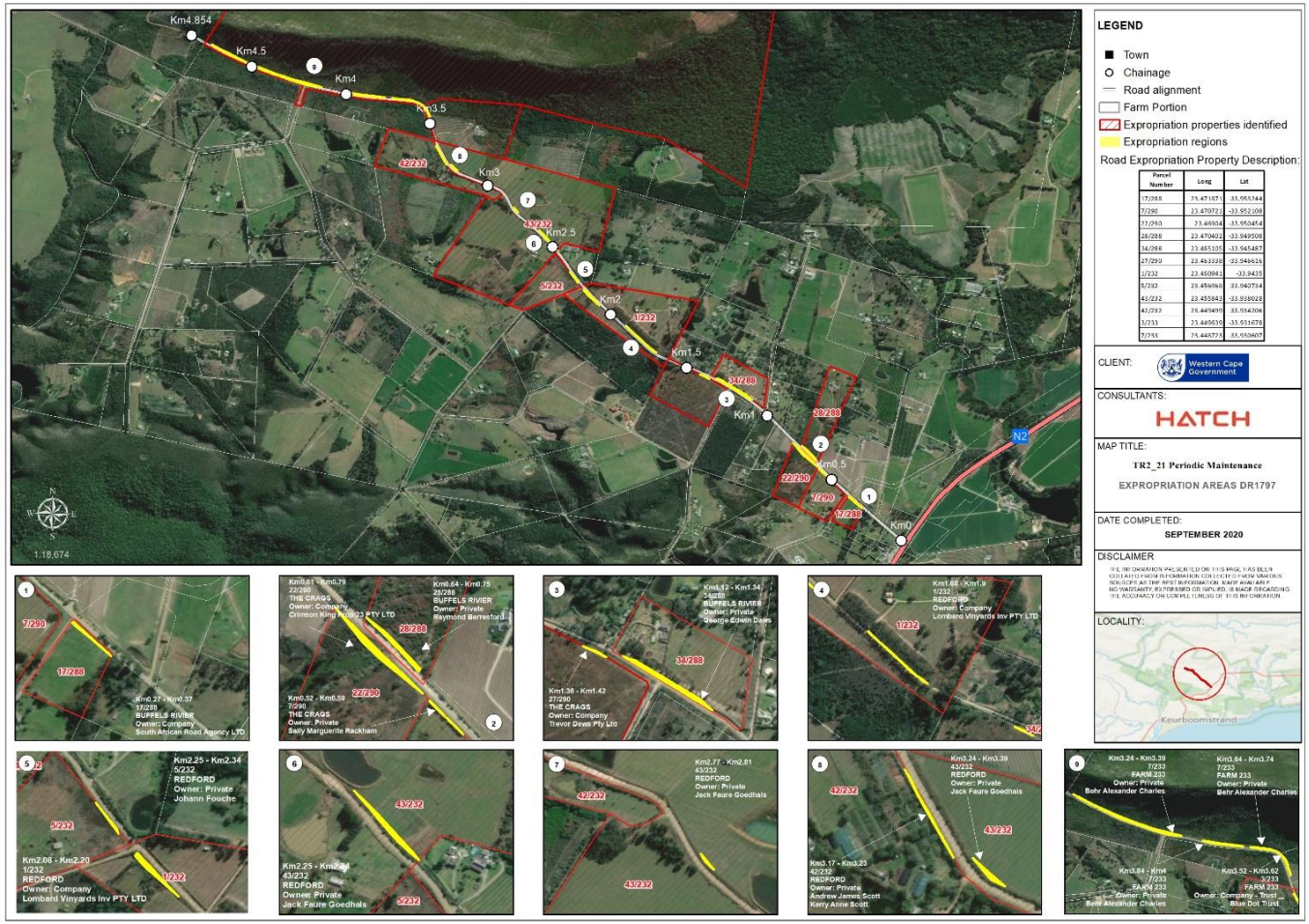


Figure 2-2: Expropriation areas

2.4 Overview of the Proposed Works

The DR 1797 Road surfacing width shall conform to a special Class 4 consisting of 2 m by 3.4 m wide lanes, with a 300 mm gravel shoulder on each side.

2.4.1 Horizontal and Vertical Alignment

Upgrading of the existing gravel DR 1797 Road will require adjustments to the vertical and horizontal alignment. The new alignment shall allow for a 60 km/hr design speed, with advanced warning signage at the sharp curve situated at km 3.4, and will tie into all existing access roads, such as properties and OP Roads, along the section.

2.4.2 Road Works

The following activities will be undertaken:

- Clearing and grubbing
- Accommodation of traffic
- Vertical and horizontal realignment between km 0.00 and km 4.87 which entails cut and fill operations
- Construction of a temporary widening for the accommodation of traffic during half width construction
- Construction of a new pavement between km 0.00 and km 4.87, including the following:
    - Excavation of the wearing course and underlying layers to the required depth
    - Preparation of roadbed
    - Construction of a selected subgrade of at least G7 quality
    - Construction of a C4 stabilised subbase layer
    - Construction of a G4 graded crushed stone base layer
    - Construction of a 20 mm single seal with two layers (Cape seal)
- Construction of a new major culvert at km 0.705
- Construction of side drain structures along the route
- Erecting additional road signs and replacement of missing signs and existing signs in poor condition
- Establishing permanent road markings
- Expropriation of land and fencing where required.

2.4.3 Pavement Design

The type of surfacing and pavement layers are shown (Figure 2-3) are summarised below. For additional details refer to the drawings GD50/093 to GD50/097 in Appendix D.

Pavement Structure		
Layer	**Thickness**	**Description**
Surfacing	20 mm	S4 20 mm single seal using 65% cationic spray grade emulsion as tack coat and 30% spray-grade emulsion as second application of binder with two layers of slurry (20 mm Cape Seal)
Base	150 mm	G4 crushed stone base compacted to 86% BRD
Subbase	150 mm	C4 stabilised subbase compacted to 97% MDD
Upper Selected Subgrade	150 mm	G7 gravel selected subgrade compacted to 95% MDD
Lower Selected Subgrade	150 mm	G9 gravel selected subgrade compacted to 93% MDD

In wet areas or areas that are unstable, a pioneer layer or rock fill may be required at the bottom of the road formation. In cuttings, the selected subgrade layer may be replaced with a drainage layer.

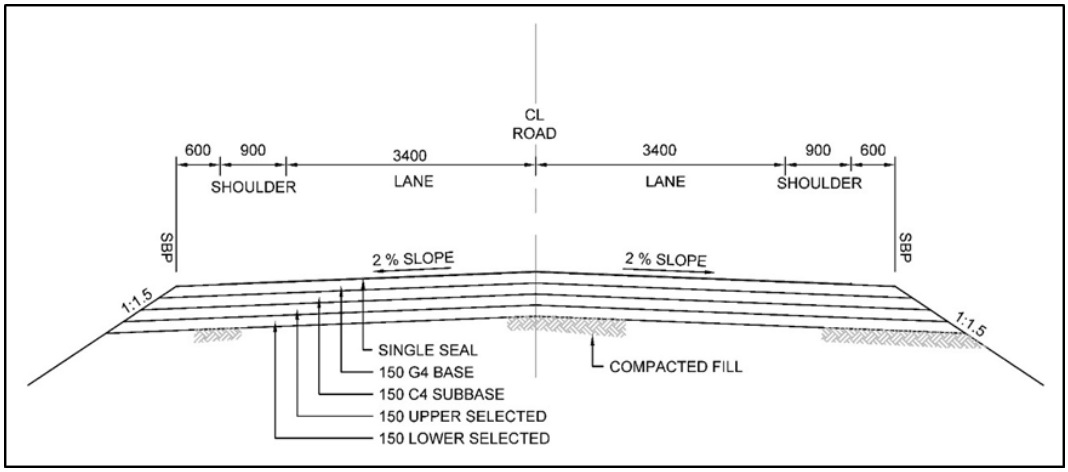


Figure 2-3: Typical cross section and pavement design

2.5 Proposed Construction Strategy

2.5.1 Roadworks

It is envisaged that the upgrade of the DR 1797 Road will be carried out under long term half-width lane closures, commencing at the end of the project at km 4.87 and working back towards the start of the project to allow construction of the major culvert at km 0.705. Traffic shall be controlled by means of a stop-and-go system during the day and a traffic light signalling system at night.

The proposed construction strategy envisaged for the upgrade of the DR 1797 Road per identified period, is to be carried out in the sequence of work noted below however, activities are subject to change should such be necessary.

- Phase 5A (km 3.64 to km 4.87)
  - Installation of moveable temporary barriers and channelization devices on the left hand side (LHS) of roadway
  - Construction of a temporary widening on the LHS
  - Relocation of the moveable temporary barriers and channelization devices to new centreline of roadway
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the right hand side (RHS)
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the RHS
  - Relocation of the moveable temporary barriers and channelization devices to LHS of the newly constructed RHS lane
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the LHS
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the LHS
  - Application of temporary road markings and road studs.
- Phase 5B (km 2.70 to km 3.64)
  - Installation of moveable temporary barriers and channelization devices on LHS of roadway
  - Construction of a temporary widening on the LHS
  - Relocation of the moveable temporary barriers and channelization devices to new centreline of roadway
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the RHS
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the RHS
  - Relocation of the moveable temporary barriers and channelization devices to LHS of the newly constructed RHS lane
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the LHS
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the LHS

  - Application of temporary road markings and road studs.
- Phase 5C (km 1.43 to km 2.70)
  - Installation of moveable temporary barriers and channelization devices on LHS of roadway
  - Construction of a temporary widening on the LHS
  - Relocation of the moveable temporary barriers and channelization devices to new centreline of roadway
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the RHS
  - Construction of new minor culverts
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the RHS
  - Relocation of the moveable temporary barriers and channelization devices to LHS of the newly constructed RHS lane
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the LHS
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the LHS
  - Application of temporary road markings and road studs.
- Phase 5D (km 0.00 to km 1.43)
  - Installation of moveable temporary barriers and channelization devices on LHS of roadway
  - Construction of a temporary widening on the LHS
  - Relocation of the moveable temporary barriers and channelization devices to new centreline of roadway
  - Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the RHS
  - Construction of new minor culverts
  - Construction of new pavement layers of the lane as specified
  - Construction of a 20 mm single seal with two slurry layers on the RHS
  - Relocation of the moveable temporary barriers and channelization devices to LHS of the newly constructed RHS lane

- Excavation of existing pavement layers to the required depth or fill for the proposed new pavement structure on the LHS
- Construction of new pavement layers of the lane as specified
- Construction of a 20 mm single seal with two slurry layers on the LHS
- Final road markings and road studs over the entire length of the road
- Installation of final road signs and other ancillary works as specified and required.

2.5.2 Drainage

2.5.3 Side Drains

As part of the DR 1797 Road upgrade, unlined side drains (**Error! Reference source not found.**) and lined side drains with subsoil drains (Figure 2-5) will be constructed along the road. Refer to Drawings GD50/093 to GD50/097 (Appendix D) for the specific location of these side drains.

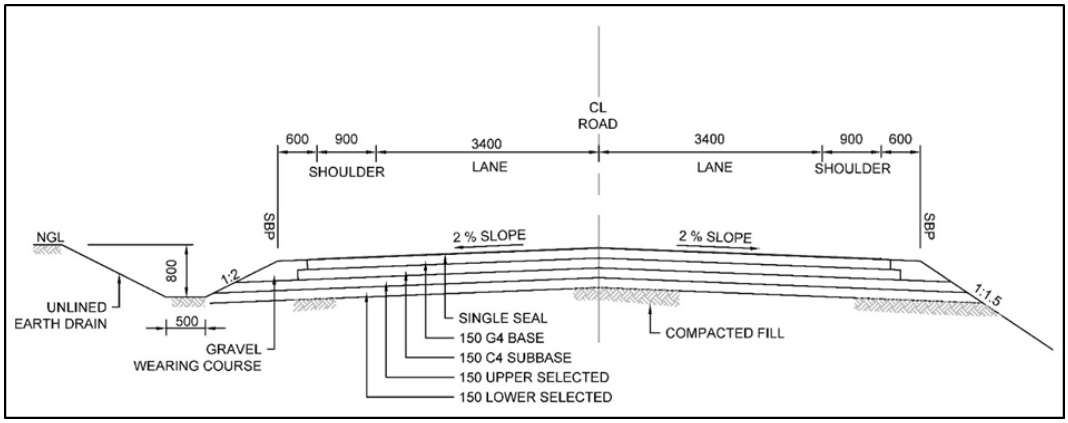


Figure 2-4: Typical unlined earth drain

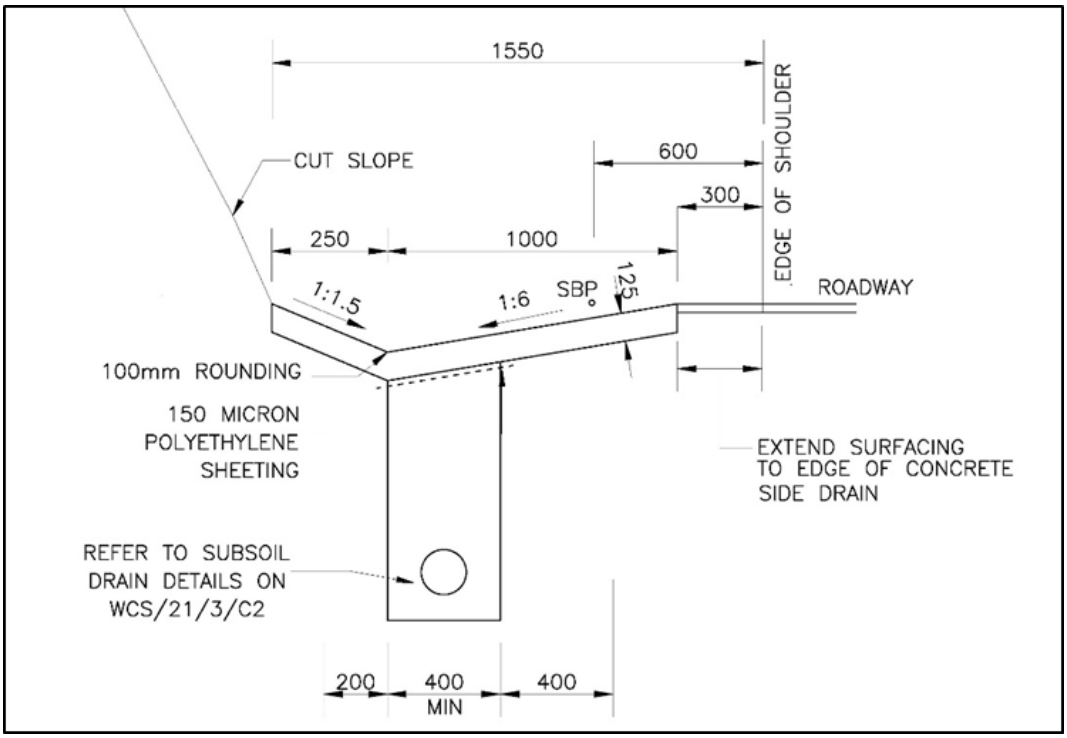


Figure 2-5: Typical concrete side drain with subsoil drain

2.5.4 Minor Culverts

The minor culverts will be replaced and additional culverts installed to facilitate drainage. All minor culverts will be replaced like for like with pipe culverts. Please refer to Drawings GD50/093 to GD50/097 (Appendix D) for the specific location of these minor culverts.

2.5.5 Major Culvert

Culvert no. 12270 at km 0.705 over a tributary of the Whiskey Creek will be constructed as follows, as part of the DR 1797 Road upgrade:

- Phase 6 (km 0.50 to km 0.90)
    - Construction of a new double cell reinforced concrete culvert with cell dimensions of 2.4 m wide x 1.5 m high. Downstream, the culvert will have wing walls and an apron slab with erosion protection works consisting of a gabion mattress
    - The culvert is to be constructed in two phases for traffic accommodation purposes. The traffic will be accommodated to either the existing road or on the new culvert, once completed
    - The final road fill on top of the culvert will be 5 m high and traffic will be required to be switched over multiple times as the layer works are constructed. The traffic is to be accommodated on the opposite side to where construction is taking place. No traffic or fill will be allowed on the structure prior to the concrete having achieved its design strength.

Figure 2-6 indicates the current geometric design (red line) of the area where the major culvert will be installed. The green line indicates the new geometric design of the area where the major culvert is proposed.

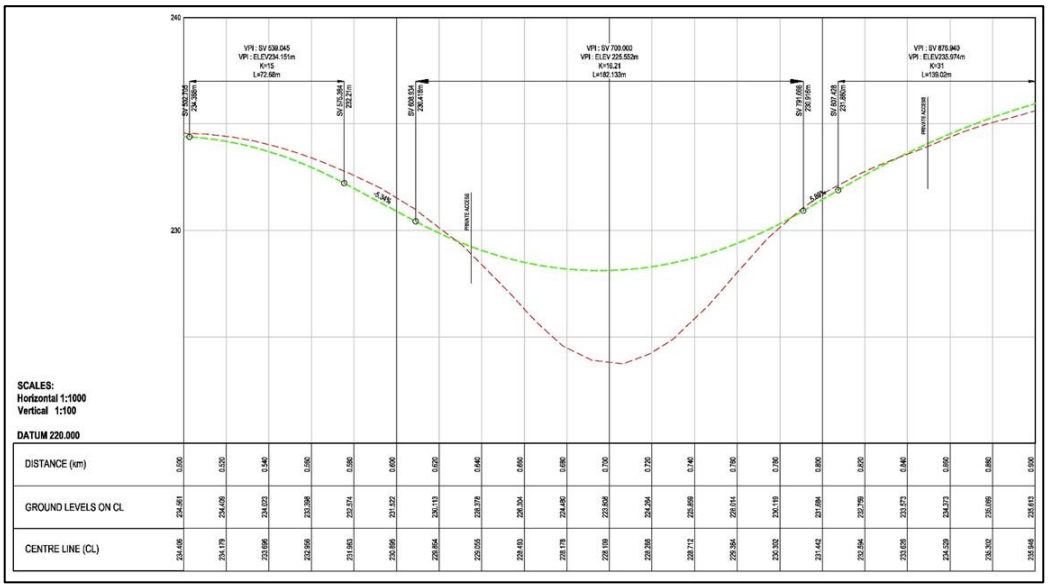


Figure 2-6: Geometric design of the major culvert proposed

The construction phase of the DR 1797 Road upgrade will involve the following aspects:

- Erection of laydown and material storage area
- Provision of services
- Material supply
- Waste management.

2.5.6 Laydown and material storage area

A laydown area shall be constructed for use and shall be located within a designated area as approved by the EAP and construction management team. The defined area and will involve the establishment of a site office and compacted pad, which will be used for various construction activities such as diesel storage, cement storage and mixing. Designated areas of the laydown shall be bunded and lined to prevent any fuel or pollutant spills from entering the surrounding environment. Roofed, lockable storage containers shall be utilised to house all hazardous and sensitive construction materials. Absorbent material shall be accessible and located within easy access to the workers in case of a spillage.

The laydown and material storage area will be fenced off for safety and control requirements.

2.5.7 Provision of Services

2.5.7.1 Potable Water Supply

It is anticipated that construction activities will require approximately 10,000 litres of water per month, and such water will be sourced from the Bitou Local Municipality. No water will be sourced from onsite watercourses.

2.5.7.2 Sewerage

Dedicated portable ablution units will be provided for the construction phase and shall be maintained and the contents of such shall be disposed of at a licenced wastewater treatment facility.

2.5.7.3 Power Source

Power will be provided by diesel generator to the site office and construction working areas.

2.5.7.4 Waste Management

An area for temporary waste collection and storage shall be demarcated for duration of the construction phase. This waste shall be stored in designated areas in covered, tip proof drums for collection and disposal. Disposal of waste shall be at a licensed landfill site or at a site approved by the DEA&DP in the event that an existing operating landfill site is not within reasonable distance from the site. No waste shall be burned or buried on site. A concerted effort shall be made to collect and separate materials suitable for recycling and disposal of such at recycling centres.

3. Need and Desirability of the Project

3.1 Ecological Need and Desirability

Currently, majority of the culverts along the DR 1797 Road are blocked with debris and vegetation. Due to this, the integrity of the culverts have been compromised requiring the culverts to be replaced as indicated in accordance with the construction strategy for the installation of the minor and major culverts. The removal of the debris and vegetation will allow for correct drainage of the area and allow for the natural flow of water. As part of the removal of the debris and vegetation, all alien invasive plants will also be removed from the culverts. This will have a positive impact on the surrounding ecosystems as the watercourses will be restored to a natural state.

3.2 Socio-Economic Need and Desirability

The Bitou Local Municipality has the third smallest population within the Garden Route District Municipality, after Hessequa and Kannaland. As of 2019, the Bitou Local Municipality had a population of 61,645 people with an annual growth of 0.8%. There is an unemployment rate of 27.9% within the Bitou Local Municipality.

The area where the DR 1797 Road upgrade will occur, is mainly known for attracting tourism, especially as there are Protected Areas within a few kilometers of the area. The main objective of upgrading the road is to ensure it is safe to drive, as well as to provide easy access to an area which is expected to increase in tourism, which could in turn lead to employment opportunities.

Another objective of the DR 1797 Road upgrade is to provide EPWP work opportunities, develop emerging CIDB contractors and contributing towards black economic empowerment within the local communities. Thus the DR 1797 Road upgrade will create local employment.

3.3 Planning Need and Desirability

3.3.1 Western Cape Spatial Development Framework (PSDF)

The Western Cape PSDF focuses on accessibility of smaller communities to improve the economy of these communities, as well as improve access to services and amenities such as hospitals and schools. The DR 1797 Road is in support of the PSDF as this road provides an important connection for the surrounding community to the N2 National Highway, which provide access to Plettenberg Bay and Knysna.

3.3.2 Integrated Development Plan (IDP) of the Bitou Local Municipality

The Bitou Local Municipality IDP[1] outlines the priority projects / actions for implementation within the area. One of these projects under the Roads and Transport Department, is to "*Ensure proper maintenance of priority secondary tourism routes: Forest Hall, Redford, Keurbooms, Harkerville, R340*". Due to this, the upgrade of the DR 1797 Road (Redford) is within the municipal and provincial plans to be upgraded to maintain tourism routes.

3.3.3 Spatial Development Framework (SDF) of the Bitou Local Municipality

The Bitou Local Municipality SDF[2] highlights municipal land use and spatial structure major road networks, which are important to the municipal area as they provide access to rural parts of the municipality. The DR 1797 Road (Redford Road) has been identified as one of these roads.

3.3.4 Spatial Development Framework (SDF) of the Eden District Municipality

One of the objectives of the Eden District Municipality SDF[3], is equitable and inclusive regional accessibility. This objective looks mainly at the development of transport systems within the Eden District Municipality, which must gear the region for increased levels of growth and jobs. The upgrade of the DR 1797 Road is in support of this objective.

The DR 1797 Road is part of the Learner Transport Route, which is the route that learners use to access schools. The DR 1797 Road upgrade is along this route and will thus improve the access to schools in the area.

[1] Bitou Municipality Revised Integrated Development Plan 2017-2022 (2020/2021)
[2] Bitou Local Municipality Draft Spatial Development Framework, November 2019
[3] Eden District Municipality Spatial Development Framework, November 2017

4. Matters Pertaining to the Implementation of the EMPr

4.1 Organisational Structure and Responsibilities

Formal responsibilities are necessary to ensure that key management measures / procedures are executed. Specific responsibilities are defined in Table 4-1.

Table 4-1: Roles and Responsibilities

Responsible Person	Responsibilities
Project Manager	The Project Manager is responsible for managing the contractors on site on behalf of the Applicant (WCG). The main environmental responsibilities will include, but not be limited to, the following: • Ensuring that WCG and the Contractor are aware of the conditions of the EA, GA and EMPr commitments • Being fully conversant with the BAR, and the conditions of the EA, GA and EMPr.
Construction Manager	The Construction Manager will report to the Project Manager. The specific environmental responsibilities of the Construction Manager will include, but not be limited to, the following: • Being fully conversant with the BAR, the conditions of the EA, GA and EMPr • Approving method statements • Having overall responsibility for the implementation of the conditions of the EA, GA and EMPr • Ensuring that audits are conducted as prescribed in the EA, GA and EMPr • Liaising with the Project Manager on matters concerning the environment • Preventing actions that will harm or may cause harm to the environment, and take steps to prevent pollution and unnecessary degradation on site • Confining construction activities to the demarcated areas.
Environmental Officer (EO)	The EO will report to the Construction Manager. The EO will be responsible for, but not limited to, the following: • Conducting weekly inspections as prescribed in the EA, GA and EMPr • Compiling Monthly Environmental Reports.
Environmental Control Officer (ECO)	Due to the nature of the project, it is recommended that an independent ECO (appointed by WCG) conduct monthly environmental audits. The ECO will be a separate appointment to the EO, with the main responsibility of independently auditing the

	construction activities. The ECO will be responsible for the following: • Conveying the contents of the conditions of the EA, GA and the EMPr to the Project Manager and Construction Manager prior to the commencement of construction • Undertaking of a monthly site audit as prescribed in the EA, GA and EMPr.

4.2 Conflict in the Interpretation of Conditions between this EMPr and the EA and GA

Should there be conflict in the interpretation of conditions between this EMPr and the EA and GA, the stipulations in the EA, and GA shall prevail over that of the EMPr. Similarly, any provisions in current legislation overrule any provisions or interpretations within this EMPr.

4.3 Availability of the EMPr

Copies of the EMPr and any environmental permits shall be available at the site office.

4.4 Environmental Awareness Training

4.4.1 Introduction

An Environmental Awareness Plan must be developed to describe the manner in which the Contactor intends to inform his or her employees, subcontractors or any person working on site, of the environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment. The material / source of information for the Environmental Awareness Plan will be the approved BAR, EMPr, GA and EA.

4.4.2 Induction

All Contractor's employees, subcontractors or any person working on site shall undergo induction before commencement of work. Part of the induction will include environmental awareness training module based on the Environmental Awareness Plan. Environmental impacts and risks and their mitigating measures will be discussed, explained and communicated to employees. A refresher induction shall be conducted on an annual basis.

All attendees shall remain for the duration of the Induction and, on completion, sign an attendance register that clearly indicates the participants' name. A copy of the register shall be kept by the ECO.

4.4.3 Toolbox Talks

The contractor shall undertake fortnightly environmental toolbox talks to provided to all personnel on site with details on environmental aspects, for example:

- Environmental issues on site
- The construction environmental management measures
- Cultural awareness

- Chance Find Procedure.

- All attendees shall remain for the duration of the Toolbox Talks and, on completion, sign an attendance register that clearly indicates the participants' name. A copy of the register shall be kept by the ECO.

4.5 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) must be compiled and implemented prior to the commencement of construction. The main objective of the CEMP will be to outline any management procedure which will be required as part of construction, as well as to consolidate the relevant construction-related conditions of all permits and licenses (i.e. EA and GA), including this approved EMPr, which have been authorised.

Other key objectives of the CEMP, are to:

- Describe how the environment will be managed
- Detail the roles and responsibilities with respect to the implementation of the CEMP for the project
- Ensure that the legal and best practise obligations pertaining to environmental management are included in the ambit of the Contractor's responsibilities
- Provide a set of standards for environmental management during the construction phase
- Provide integrated mitigation and management measures
- Provide for inspections and audits.

The CEMP is important to both the Contractor and any Sub-Contractors reporting to the Contractor. The CEMP shall form an integral part of the contract documents and must inform the Contractor as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. Obligations imposed by the CEMP will be legally binding in terms of the general conditions of Contractor's contract that pertain to the project.

4.6 Environmental Method Statements

A method statement is a document compiled by the Contractor explaining on how they plan on executing the activity. As a minimum, the following Method Statements much be compiled:

- Site establishment
- Vegetation, topsoil and subsoil management
- Materials and stockpile management
- Stormwater management and temporary erosion control
- Hydrocarbon management

- Refuelling
- Waste management
- Cement management
- Emergency maintenance.

Additional Method Statements may be requested from the Construction Manager, EO and ECO.

The following information must be included as part of each method statement:

- The proposed activity, the handling, storage and transportation of materials and equipment used as part of the activity, labour and method the Contractor proposes to carry out the activity
- The potential negative environmental impacts and environmental risks associated with the activity
- How the impact will be prevented or managed
- The relevant environmental standards to be met
- Environmental monitoring to be undertaken and records to be maintained
- Timing and location of activities
- Any other information deemed necessary by the EO and ECO.

Each Method Statement compiled by the Contractor must be submitted to the Construction Manager who may request assistance from the EO and ECO. Once the review process is complete the Method Statement must be signed off by the Construction Manager, and implemented by the Contractor.

4.7 Environmental Incidents and Non-conformances

4.7.1 Emergency Management Plan

The Applicant will develop an emergency management plan in order to address potential environmental incident and non-conformances which may occur on site. The emergency management plan will:

- Establish, implement and maintain procedures to identify potential emergency situations and potential incidents that can have impacts on the environment and how to respond to such
- Respond to potential and actual emergency situations and accidents and prevent or mitigate associated adverse environmental impacts, and record such
- Periodically review and, where necessary, revise its emergency preparedness procedures, in particular, after the occurrence of accidents or emergency situations
- Periodically test such procedures where practicable.

4.7.2 Environmental Incident and Response Procedures

Environmental incidents must be avoid during the construction phase of the project, however, in the event that an environmental incident does occur the following must conducted as a minimum:

- The incident must be attended to and rectified as soon as possible, if not immediately
- The environmental incident must be rated (major, medium or minor)
- The incident must be reported including measures in order to prevent such incident in the future
- When required, reported to the CA.

4.7.2.1 Rating of Environmental Incidents

Environmental incidents are divided into three categories, e.g. major, medium and minor, defined as follows:

4.7.2.1.1 Major Environmental Incident

A major environmental incident is an incident or sequence of incidents that results on widespread, long-term, irreversible significant negative impact on the environment and / or has a high risk of legal liability. In addition to this, if a medium environmental incident is present for more then 120 days after the occurrence, the incident will be reclassified as a major incident.

4.7.2.1.2 Medium Environmental Incident

A medium environmental incident is an incident or sequence of incidents that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and / or has a risk of legal liability. In addition to this, if a minor environmental incident is still present 1 week after occurrence, the minor incident will be reclassified as a medium incident.

4.7.2.1.3 Minor Environmental Incident

A minor environmental incident is an incident or sequence of incidents that results in a small negative impact on the environment and can be rectified after a once-off internal intervention on the day. In addition to this, in instances where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. Examples are leaking water pipes, escaping steam and wastage of electricity.

4.7.2.2 Close out of Environment Incidents

The following information must be recorded for an environmental incident:

- Nature of incident
- Cause of incident
- Party / parties responsible for causing incident
- Immediate actions undertaken to stop / reduce / contain the causes of the incident
- Additional corrective or remedial action taken and / or to be taken to address and to prevent reoccurrence of the incident

- Timeframes and the parties responsible for the implementation of the corrective or remedial actions
- Procedures to be undertaken and / or penalties to be applied if corrective or remedial actions are not implemented.

4.7.3 *Environmental Non-conformances*

A non-conformance may be issued to the Contractor by the Construction Manager in the event of any non-compliance to the EA, GA, EMPr and / or CEMP. In the event that a Contractor is issued with an environmental non-conformance an action plan must be submitted to the Construction Manager. The action plan should include the:

- Nature of non-conformance
- Cause of non-conformance
- Party / parties responsible for causing non-conformance
- Immediate actions undertaken to stop / reduce / contain the causes of the non-conformance
- Additional corrective or remedial action taken and / or to be taken to address and to prevent reoccurrence of the non-conformance
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions
- Procedures to be undertaken and / or penalties to be applied if corrective or remedial actions are not implemented.

The non-conformance action plan must be submitted to the Construction Manager who may request assistance from the EO and ECO. Once the review process is complete the Method Statement must be signed off by the Construction Manager, and implemented by the Contractor. Once the document has been approved by the Construction Manager the Contractor must implement the action plan. Once the Contractor has implemented the action plan the Construction Manager, EO and or ECO will conducted a close out inspection which, will be recorded and kept by the EO.

4.8 Penalties

Penalties may be issued per environmental incident at the discretion of the Construction Manager. The value of the penalty imposed shall be enforced as per contractual agreements.

4.9 Public Complaints

The Contractor will direct members of the public, who complain about environmental issues related to construction activities to the Construction Manager. The Construction Manager shall be investigate the complaint and based on the investigation, the Construction Manager will respond to the complainant. All complaints must be recorded in an onsite register and kept by the EO. The following information must be recorded:

- Nature of complaint

- Causes of complaint
- Party / parties responsible for causing complaint
- Immediate actions undertaken to stop / reduce / contain the causes of the complaint
- Additional corrective or remedial action taken and / or to be taken to address and to prevent reoccurrence of the complaint
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions
- Response provide to the complainant
- Procedures to be undertaken and / or penalties to be applied if corrective or remedial actions are not implemented.

All complaints will be discussed at the monthly project and captured in the records.

4.10 Environmental File: Documentation and Records

An Environmental File shall be created by the EO on behalf of the Contractor. The Contractor shall keep copies of the following documents in the Environmental File:

- EA and GA
- EMPr (this document)
- CEMP
- Approved Environmental Method Statements
- Environmental awareness plan and attendance registers of all training conducted
- Completed weekly and/or monthly inspection checklists
- Proof of proper disposal of hazardous waste
- Proof of sewage and sanitation service slips.

The following documentation must be kept onsite in order to record compliance with the EMPr:

- Record of public complaints
- Record of incidents
- Record of non-conformance.

The above records will form an integral part of the EOs and ECO's reports and records. Copies of these records will be made available for scrutiny if so requested by the CA.

4.11 Communication and Consultation

4.11.1 Internal Communication

Internal communication of environmental issues will be done by the following means: meetings; memos; notice boards; briefs; reports; e-mail; telephone; induction training.

4.11.2 Project Meetings

Monthly project meetings will be held for the duration of the project and will be the platform to ensure that environmental awareness, potential problems, complaints, etc. are raised and addressed appropriately. These meetings will be held on site, where relevant project personal will be in attendance.

4.11.3 External Communication

External communication will take place in the event a request from the CA or public.

5. Environmental Inspection and Auditing

Environmental inspections and audits are typically conducted using five basic techniques:

- Interviews with Contractors staff (including sub-contractors and suppliers)
- Document checks
- Observations
- Monitoring
- Measurement and verification.

The table below not areas and aspects of the construction site that will be inspected or audited, the frequency of such, the inspectors / auditor and auditee.

Place	Inspector / Auditor	Auditee	Inspection / Audit Frequency
Work places	Construction Manager / EO	Contractor's team (incl. sub-contractors)	Weekly Inspections
Construction site	ECO	Contractor's team	Monthly

5.1.1 Work Places Inspection

During construction the Construction Manager / EO will undertake weekly site inspections to monitor environmental performance and conformance with the EA, GA, EMPr and CEMP. The Contractor will take immediate action when non-compliance is noted and implement corrective actions. Feedback on the inspections shall be provided at monthly meetings and recorded.

5.1.2 Construction Site Audit

The ECO will conduct a monthly site audit to monitor environmental performance and conformance with the EA, GA, EMPr and CEMP. The Contractor will take immediate action when non-compliance is noted and implement corrective actions. Feedback on the audit shall be provided at monthly meetings and recorded. On a quarterly basis the audit reports will be submitted to the CA as per the conditions of the EA, GA and EMPr.

6. Findings of the Impact Assessment

A summary of the identified impacts and corresponding (initial and residual) significance ratings for the proposed development is provided in Table 6-1 to Table 6-3.

Table 6-1: Impact Summary – No-go Option

No Go Alternative		
Activity	**Overall Significance**	**Status of Impact**
Agriculture / Soils		
Should the DR 1797 Road not be upgraded , there will be no loss of agricultural land	Very Low	Positive Impact
Landscape / Visual		
Should the DR 1797 Road not be upgraded, current poor road alignment and visibility may remain.	Low	Negative Impact
Archaeological and Cultural Heritage		
Not Applicable		
Palaeontology		
Not Applicable		
Terrestrial Biodiversity including Plant and Animal Species		
Continuation of infestation of alien invasive vegetation along the DR 1797 Road.	Very Low	Negative Impact
As no agricultural land will be expropriation, no indigenous vegetation will be lost.	Medium	Positive Impact
Aquatic Biodiversity		
Continuation of infestation of alien invasive vegetation along the DR 1797 Road and within channels may disperse and migrate into the water courses .	Very Low	Negative Impact
The drainage throughout the DR 1797 Road has not been maintained, this has compromised the flow of water and may continue to impact on the aquatic biodiversity.	Low	Negative Impact
Noise		
Not Applicable		
Traffic		
Not Applicable		
Geotechnical		
Not Applicable		
Socio-Economic Environment		
Should the DR 1797 Road not be upgraded the current socio-economic status of the area may remain unchanged.	Low	Negative Impact
Should the DR 1797 Road not be upgraded poor road conditions and safety problems may persist.	Very Low	Negative Impact
Air Quality		

No Go Alternative		
Activity	**Overall Significance**	**Status of Impact**
Nuisance dust fallout as result of traffic on the gravel DR 1797 Road will continue should the DR 1797 Road not be upgrade.	Low	Negative Impact
Topography and Climate		
Not Applicable		
Geology		
Not Applicable		

Table 6-2: Impact Summary of Construction Phase

Construction Phase			
Activity	**Significance without Mitigation**	**Significance with Mitigation**	**Status of Impact**
Agriculture / Soils			
Portion of small holding to be expropriated for the upgrade of the DR 1797 Road.	Medium	Low	Negative Impact
Areas with high land capability to be expropriated for the upgrade of the DR 1797 Road.	Medium	Low	Negative Impact
Clearance of vegetation due to the DR 1797 Road upgrade and expropriation of land may lead to soil erosion.	Insignificant	Insignificant	Negative Impact
Indirect – Eroded soil could possibly end up in surrounding surface water features	Very Low	Insignificant	Negative Impact
Soil compaction due to heavy machinery and equipment during construction.	Very Low	Insignificant	Negative Impact
Indirect – Soil compaction resulting poor infiltration and increased runoff to surrounding system	Very Low	Insignificant	Negative Impact
Soil pollution due to hazardous substances spills.	Medium	Insignificant	Negative Impact
Loss of topsoil due to incorrect stockpiling and poor rehabilitation	Very Low	Very Low	Negative Impact
Incorrect disposal of waste aggregate.	Insignificant	Insignificant	Negative Impact
Loss of agricultural land due to poorly demarcate expropriation areas.	Medium	Very Low	Negative Impact
Landscape / Visual			
Litter and bad housekeeping from construction staff.	Very Low	Insignificant	Negative Impact
Clearing of vegetation in expropriation areas.	Medium	Very Low	Negative Impact
Inadequate rehabilitation of the construction footprint.	Medium	Insignificant	Negative Impact
Archaeological and Cultural Heritage			
Archaeological and cultural heritage chance finds during the excavation within the expropriation areas.	Very Low	Insignificant	Negative Impact
Palaeontology			
Paleontological chance finds during the excavation within the expropriation areas.	Very Low	Insignificant	Negative Impact
Terrestrial Biodiversity including Plant and Animal Species			
Loss of Tsitsikamma Sandstone Fynbos.	Low	Very Low	Negative Impact
Potential loss of species of concern (namely *Afrocarpus falcatus* (Outeniqua Yellowwood) and *Pittosporum viridiflorum* (Cheesewood).	Medium	Low	Negative Impact
Potential sedimentation and erosion due to construction activities.	Very Low	Insignificant	Negative Impact
Infestation of alien invasive species within areas where construction activities have occurred.	Low	Insignificant	Negative Impact

Construction Phase			
Activity	**Significance without Mitigation**	**Significance with Mitigation**	**Status of Impact**
Aquatic Biodiversity			
Potential impact on the aquatic habitats adjacent to the proposed work areas.	Medium	Insignificant	Negative Impact
Impairment of the surface water quality could potentially occur during the construction phase.	Very Low	Insignificant	Negative Impact
Potential of longer-term modification of the flow characteristics to downstream watercourse habitats as a result of the proposed activities due to the modification of the stormwater drains and the culvert structures.	Insignificant	Insignificant	Negative Impact
Noise			
Noise from construction vehicles and excavation activities.	Very Low	Insignificant	Negative Impact
Traffic			
Interrupted traffic due to construction activities.	Low	Insignificant	Negative Impact
Increase construction vehicles on the road.	Low	Insignificant	Negative Impact
Geotechnical			
No geotechnical impacts have been identified.			
Socio-Economic Environment			
Job opportunities.	Very Low	Insignificant	Positive Impact
Influx of people to the area seeking employment.	Low	Insignificant	Negative Impact
Safety and security problems.	Very Low	Insignificant	Negative Impact
Air Quality			
Increased nuisance dust fall rates associated with construction activities.	Very Low	Insignificant	Negative Impact
Topography and Climate			
Alteration to topography due to the infilling and raising of the DR 1797 Road at km 0.705.	Medium	Low	Negative Impact
Geology			
Not Applicable			

Table 6-3: Impact Summary of Operational Phase

Operational Phase			
Activity	**Significance without Mitigation**	**Significance with Mitigation**	**Status of Impact**
Agriculture / Soils			
Not Applicable			
Landscape / Visual			
Not Applicable			
Archaeological and Cultural Heritage			
Not Applicable			
Palaeontology			
Not Applicable			
Terrestrial Biodiversity including Plant and Animal Species			
Infestation of alien invasive species.	Very Low	Very Low	Negative Impact
Aquatic Biodiversity			
Potential impact of the aquatic habitats adjacent to the proposed work areas.	Low	Low	Positive Impact
Potential of longer-term modification of the flow characteristics to downstream watercourse habitats as a result of the proposed activities due to the modification of the stormwater drains and the culvert structures.	Very Low	Insignificant	Positive Impact
Noise			
Potential of increased noise levels due to increased use of the road.	Low	Insignificant	Negative Impact
Traffic			
Increased vehicles on the road.	Very Low	Very Low	Negative Impact
Geotechnical			
Not Applicable			
Socio-Economic Environment			
Potential job opportunities in surrounding businesses due to better access to the area as a result of improved road conditions.	Medium	Medium	Positive Impact
Potential increase in tourism of the surrounding areas due to better access to the area as a result of improved road conditions.	Medium	Very Low	Positive Impact
Improved road safety due to the road upgrade (e.g. no blind rises).	High	Medium	Positive Impact

Air Quality			
Reduction in dust due to the upgrade of the road from a Class 4 (gravel) to and Special Class 4 (surfaced).	High	Very Low	Positive Impact
Topography and Climate			
Improved road alignment and gradient due to the road upgrade (e.g. no blind rises).	Medium	Very Low	Positive Impact
Geology			
Not Applicable			

7. Project Environmental Specifications (Management Measures, Responsible Parties and Monitoring Frequency)

The EMPr follows an approach of identifying management actions that are aimed at preventing environmental degradation. The management actions are presented in a table format (Table 7-1) in order to show the links between the management measures as well as responsibilities, monitoring requirements and targets.

Table 7-1 consolidates acceptable standards for environmental management for a range of environmental aspects commonly encountered on construction projects. Methods by which proper environmental controls are to be implemented during the construction period, are also covered.

Table 7-1: Environmental Conditions and Specifications requiring Compliance for the DR 1797 Road Upgrade

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
General Conditions							
To ensure compliance with various approved plans.	Various plans and procedures are in place which will require compliance by the Contractor and any Sub-Contractors.	All construction activities must be carried out according to the EA, GA, EMPr and CEMP.	X	X	X	X	Throughout Construction
		Identify key environmental aspects requiring management prior to the commencement of construction.			X	X	Once-Off Inspection prior to commencement of construction
		The Contractor shall submit to the EO/Construction Manager for their approval, an Environmental Site Establishment and Layout Method Statement with plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the Contractor proposes to put in place.		X approval	X approval	X	• Method Statements to be check prior to commencement of activity • Weekly Inspections of activities to ensure compliance
		Landowner to be compensated for expropriated land.	X				Once-Off Inspection prior to commencement of construction
Site Establishment							
To ensure that environmental issues are taken into account in the establishment of the site offices and all other facilities at the central site camp, as well as satellite camps / storage areas. A primary goal is to limit the space or land taken for site establishment.	Management measures apply to all activities relating to the planning of the site camp(s) and site establishment.	The Contractor shall establish his laydown area, offices, workshops and any other facilities on site in a manner that does not adversely affect the environment.	X approval	X	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		All laydown area as well as associated activities (storage, washing and maintained of equipment, storage of construction materials or chemicals as well as and sanitation and waste management facilities) must be located outside the 1:100 year flood line or delineated area of the wetland and must be removed within 30 days after the completion of the works.		X approval		X	• Prior to commencement of construction as well as inspected 30 days after demobilisation • Monthly monitoring
		The laydown area and main construction site for the road upgrade should be located away at least 30 m from the indicated freshwater constraints and should be placed within existing disturbed areas.		X approval		X	Once-Off Inspection prior to commencement of construction
		Site notices at the construction site informing persons of restricted access, the nature and timeframes of the construction activities, and appropriate contact details shall be erected.			X	X	• Monthly monitoring • Inspected as part of weekly checklist
		Temporary ablution facilities shall be provided. All temporary ablutions shall be secured to the ground to prevent them from toppling over due to wind or any other cause. The entrances to the ablution facilities shall be adequately screened from public view. Ablution facilities shall be maintained in a hygienic state and regularly serviced. A licensed service provider shall remove the contents of the temporary ablution facilities from site. Disposal of the contents of the temporary/portable toilets waste shall be disposed of at a licenced sewage works.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Physical footprint of road reserve and expropriation areas are to be physically demarcated. Demarcation shall be maintained for the duration of construction activities,		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Activities, materials, equipment and persons shall be restricted to the area/s demarcated.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		Upon commencement of construction, a survey must be undertaken taken, by a trained specialist, and a photographic record kept of alien invasive plant species present in the physical footprint of road reserve and expropriation areas. An alien invasive plant species removal action plan must be compiled and implemented.	X		X support		Once-Off Inspection prior to commencement of construction
		Cleared unwanted vegetation shall be disposed of at an approved / licensed landfill site.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Vegetation removal shall be limited to the physical footprint of road reserve and expropriation areas.		X approval	X support	X	Once-Off Inspection prior to commencement of construction
		A photographic record shall be kept of all spoil sites for record purposes. This includes before the site is used and after rehabilitation.		X	X		Once-Off Inspection prior to commencement of construction
Vegetation Management							
Ensure the natural and indigenous vegetation along the DR 1797 Road is maintained and alien invasive vegetation does not invade the area	All areas along the DR 1797 Road as well as within the watercourses	Vegetation removal shall be limited to the physical footprint of road reserve and expropriation areas.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Physical footprint of road reserve and expropriation areas are to be physically demarcated. Demarcation shall be maintained for the duration of construction activities,		X approval	X support	X	Once-Off Inspection prior to commencement of construction
		Prior to the commencement of vegetation clearing, search and rescue for fynbos bulb populations must be undertaken by a trained specialist.		X approval		X	Once-Off Inspection prior to commencement of construction
		Where possible, the fynbos bulbs should be stored in a nursery and used as part of rehabilitation.				X	Once-Off Inspection prior to commencement of construction
		Sections where fynbos vegetation occur should be scanned for bulb populations by a trained specialist and the geophytes (bulbous plants) should be removed and replanted at a safe site prior to any roadworks. The safe site will be determined by the trained specialist.		X approval	X support	X	Once-Off Inspection prior to commencement of construction
		Where possible, aloes planted within the road reserve, should be removed and stored in a nursery and used as part of rehabilitation.			X support	X	Once-Off Inspection prior to commencement of construction
		Where *Dovyalis caffra* (Kei Apple) has been planted on private property to form security hedges, the plants should be removed and, where possible, kept in a nursery for later replanting. This must be negotiated with the respective landowners.	X approval		X support	X	Once-Off Inspection prior to commencement of construction
		If avoidance is not possible, impacted protected tree species are to be replaced (like-for-like where possible), in a suitable nearby location. The location shall be determined by a trained specialist.			X support	X	Once-Off Inspection prior to commencement of construction
		Protected species permits shall be obtained from the DEFF prior to the disturbance (cutting or removal) of the Protected trees.	X				Once-Off Inspection prior to commencement of construction
		Where possible, indigenous vegetation, removed from construction areas, shall be stored in a nursery and used as part of rehabilitation.	X		X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Quarterly survey must be undertaken taken, by a trained specialist, and a photographic record kept of alien invasive plant species present in the physical footprint of road reserve and expropriation areas. An alien invasive plant species removal action plan must compiled.			X		Quarterly surveys
		A monitoring program should be put into place to remove alien vegetation and maintain areas free from alien invasions during construction.			X	X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		Care must be taken when removing alien invasive plant species from site, so as to not to leave any part of the plant behind. When removing alien invasive plant species, soil disturbance must be minimised to prevent as little germination as possible as alien invasive plants can spread their seeds when disturbed.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		All felled or cut alien invasive plants must be removed from site and appropriately disposed of.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building material, fill material or dirty earth-moving equipment. Stockpiles should be checked regularly and any alien invasive plant species emerging from material stockpiles must be removed.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
Topsoil, Soil and Subsoil Management							
Ensure no topsoil, subsoil or soil is lost due to poor management and is retained for rehabilitation	Management measures apply to all topsoil, subsoil and soil removal.	Topsoil stockpile shall be physically demarcated.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Topsoil from construction areas and expropriation areas shall be removed and stockpile in a demarcated area.		X approval	X support	X	• During dry season inspected monthly • During wet season inspected weekly
		Topsoil, soil and subsoil stockpiles must not be deposited / stored within riparian areas (watercourses and their banks).		X approval	X support	X	Prior to clearing of any area, EO to approve areas to be cleared
		Topsoil, soil and subsoil must be stockpiled separately, for rehabilitation purposes.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Topsoil, soil and subsoil stockpiles may not be higher than 2 m.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Topsoil, soil and subsoil stockpiles are to be maintained to avoid erosion and growth of alien invasion vegetation.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		In the case of dust fallout due to the topsoil stockpiled, water or an appropriate dust suppressant must be sprayed onto topsoil stockpiles until such time as the topsoil stockpiles natural seedbank has been restored. Water may not be used from any borehole or watercourse without a WUL.				X	• Monitoring weekly until vegetation has been established, as well as all alien invasive plant species removed.
Visual Impact Control							
To ensure that the visual impact of construction is minimised.	Management measures apply to all activities relating to the road upgrade.	Vegetation removal shall be limited to the physical footprint of road reserve and expropriation areas.		X approval	X support	X	Once-Off Inspection prior to commencement of construction
		Stockpiles should be positioned and sloped to create the least negative visual impact.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Storage facilities, elevated tanks and other temporary structures are located such that they have as little visual impact on the community as possible.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Special attention is given to the screening of highly reflective materials on site.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Lighting on site is set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance.				X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		Lighting installed on site does not interfere with road traffic or lead to unacceptable light pollution to the surrounding community.				X	• Monthly monitoring • Inspected as part of weekly checklist
Hazardous Substance Handling and Storage							
To ensure the correct handling and storage of hazardous substances so that the substances do not have an adverse impact on the users and environment.	The management of hazardous substances	Hazardous substances/materials shall be stored in designated and appropriately designed and constructed areas within a secured area on site.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Storage areas shall have a roof and be well ventilated and marked with appropriate signage (volume of bunded areas, volume of hazardous substances within in bund).			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		The substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time to accommodate any spillage or overflow from these substances.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Material Safety Data Sheet (MSDS) must be available on site for all hazardous substances.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		The necessary materials, equipment and chemicals (spill kits) shall be available on the site to deal with spills of any of the hazardous substances/materials present			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Relevant persons on site shall are trained to carry out a spill contingency plan should such an event occur.			X support	X	Once-Off Inspection prior to commencement of construction
		If a spillage of a hazardous substance occurs, the spill must be stopped, minimized and the resultant hazardous waste must be cleaned up using absorbent material provided in spill kits on site and disposed of in a designated hazardous waste bin.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Any incidents must be reported as soon as possible. Measures must be put in place to prevent similar incidences from occurring. If necessary, remediation of any contamination must be carried out.		X	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Used oil, lubricants and cleaning materials from the maintenance of vehicles and machinery must be disposed of at an approved waste disposal site for toxic / hazardous materials. Water and oil should be separated in an oil trap.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		All hazardous waste must be stored in designated, lined and bunded areas (for no longer than 90 days).			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
Waste Management and Pollution Control							
To ensure that all waste generated during construction is properly handled, stored and disposed of in accordance with this EMPr.	The management measures apply to all construction activities that may lead to the generation of waste and pollution to water and soils.	Waste avoidance and minimisation – the Waste Management Hierarchy Approach shall be implemented			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		The classification of waste streams needs to be determined to identify the correct handling and storage methods and the ultimate disposal of the material.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Information on each hazardous substance shall be available to all persons on site with the Safety Officer. Training and education about the proper use, handling, and disposal of the material will be available to all personnel who will be handling the material. The EO must be informed of all activities that involve the use of hazardous substances to facilitate prompt response in the event of a spill or release.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		All construction staff will be made aware of the waste management conditions in the EMPr			X support	X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		Mass waste containers shall be provided in sufficient numbers and capacity to store solid waste produced.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Waste is placed in designated mass waste containers located within demarcated areas designed to prevent waste from being blown out by wind.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		The Contractor is responsible for the removal from site of all waste generated through the Contractor's activities; however, personnel shall be instructed to dispose of all waste in the proper manner.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Disposal of waste shall be at an approved / licensed landfill site.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Mass waste containers are covered at all times during transport.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Records of all waste being taken off site must be kept.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		No burying/dumping of waste materials, vegetation, litter, builders' rubble or refuse shall occur on site			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Burning of waste shall not occur.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		No littering by construction workers shall be allowed. During the construction period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. At all work areas the Contractor shall provide litter bins, containers and refuse collection facilities for later safe disposal at an approved /licensed landfill site.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Daily site walk throughs must be undertaken by the contractors before the shift ends to clean the site.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
Dust and Emission Management							
To ensure that dust and emissions are minimised during construction.	The management measures apply to all construction activities that may lead to the generation of dust and emissions	Minimise the extent of open areas (areas cleared of vegetation); natural vegetation encountered on site is to be conserved and left as intact as possible.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Limit vehicle speeds to 40 km/h on all site roads to avoid creating excessive dust.		X approval		X	• Monthly monitoring • Inspected as part of weekly checklist
		Excavation, handling and transport of topsoil, subsoil or soil shall be avoided during periods of excessive wind.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Ensure dust suppression is carried out to prevent excessive fugitive dust			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Transportation of material must be loaded in such a way as to prevent any spillage onto the roads and the creation of dust clouds.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Vehicles and machinery shall be kept in good working order and meet manufacturer's specifications for safety, fuel consumption etc. Should excessive emissions be observed, the equipment is to be repaired as soon as possible.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Operational protocol shall be implemented to reduce idling time for vehicles and machinery.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
Stormwater Management and Erosion Control							
Increased sedimentation or turbidity at each of the construction works should be mitigated as far as possible by making use of sandbags, settling ponds or screens to minimize the load of sediment being washed downstream of the sites.		Stormwater management on site must be in line with the DEA&DP Maintenance Management Plan (MMP) Guidelines (DEA&DP, 2017) to prevent soil erosion.	X		X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		The topsoil stockpiles shall be stored and shaped in such a way that they do not interfere with the flow of water which may lead to damming or erosion.					• Monthly monitoring • Inspected as part of weekly checklist
		Soil stockpiles must not be deposited / stored within riparian areas (watercourses and their banks).					• Monthly monitoring • Inspected as part of weekly checklist
		Ablution facilities, aggregate stockpiles, waste areas and hazardous waste should be located as far away as possible from any water course					• Monthly monitoring • Inspected as part of weekly checklist
		Contractors must ensure good housekeeping in their areas to prevent contamination.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		No water source shall be polluted as a result of direct or indirect spillage of pollutants.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Contaminated runoff from the construction site(s) should contained and prevented from entering the watercourses and wetland areas.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Work within the watercourses and wetland areas must be limited as far as possible to remain within the physical footprint of road reserve and expropriation areas.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Where possible, the construction within watercourses should take place during the drier months of the year.	X	X			• Monthly monitoring • Inspected as part of weekly checklist
		Both structural and non-structural (vegetative) erosion control measures must be designed, implemented, and properly maintained in accordance with best management practices				X	• Monthly monitoring • Inspected as part of weekly checklist
		To reduce sediment entering the watercourses, silt fences, geo-textiles, temporary rip-rap, soil stabilisation with gravel, diversionary berms or swales or small sedimentation basins shall be implemented.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		The Contractor shall be responsible for checking and maintaining all erosion and sedimentation controls.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Accumulation of water within the laydown area boundaries must be collection, management, contained and appropriately disposed.				X	• Monthly monitoring • Inspected as part of weekly checklist
Noise Management							
To maintain construction noise at the site within legal limits.	Construction noise at the construction site.	Cognisance will be taken of exposure to the community and heavy construction related activities will not take place between 18:00 and 06:00		X approval	X support	X	Monthly Monitoring
		No amplified music is allowed on the site.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Vehicles and machinery shall be kept in good working order and meet manufacturer's specifications for safety, fuel consumption etc. Should excessive emissions be observed, the equipment is to be repaired as soon as possible.				X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		Operational protocol shall be implemented to reduce idling time for vehicles and machinery.		X		X	• Monthly monitoring • Inspected as part of weekly checklist
Protection of Heritage Resources							
To ensure the protection of archaeological, historical artefacts, or heritage resources discovered during construction activities.	Archaeological, historical artefacts, or heritage resources discovered on or near work areas.	A "Chance Find Procedure" shall be developed and implemented.		X approval	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
		If an artefact on site is uncovered, work in the vicinity shall immediately be stop and the Contractor shall inform the ECO.		X	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
		An archaeological site shall be marked and fenced off and reasonable precaution taken to prevent any person from removing or damaging any such article.			X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
		The South African Heritage Resources Agency (SAHRA) / Heritage Western Cape shall be notified of the find and they will appoint an archaeological consultant to investigate the site. Under no circumstances shall any artefact be destroyed.		X	X support		• Ad hoc – Contractor • ECO to be notified if this occurs
		All work in the area is to be ceased and may only resume once clearance is given in writing by the archaeologist.		X	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
		If a grave or midden is uncovered on site, or discovered before the commencement of work, all work in the immediate vicinity of the graves / middens shall stop and the area should be cordoned off.		X	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
		If these appear to be human remains, the South African Police Service must also be contacted.		X	X support		• Ad hoc – Contractor • ECO to be notified if this occurs
		The SAHRA shall be contacted and in the case of a grave or midden discovery. Thereafter the prescribed arrangements shall be made for the exhumation and reburial.		X	X support		• Ad hoc – Contractor • ECO to be notified if this occurs
Fire Prevention							
To minimise the risk of uncontrolled fires.	All activities on or near the site that could initiate an uncontrolled fire.	Fires shall only be allowed, for cooking purposes, in facilities or equipment specially constructed for this purpose.				X	Ad hoc – Contractor • ECO to be notified if this occurs
		No naked fires shall be permitted on site.				X	Ad hoc – Contractor • ECO to be notified if this occurs
		Firefighting equipment shall be supplied by the Contractor at suitable locations and be made available on site. This firefighting equipment is to be suitably maintained. All personnel on site are to be made aware of the firefighting equipment and how such is operated.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Smoking shall not be permitted in areas where it may pose a fire hazard. These areas must be identifiable by the appropriate signage.		X	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
Vehicle and Equipment Refuelling and Management							
To eliminate / control fuel and oil spillage at refuelling facilities.	This applies to all refuelling, lubrication and oil changing requirements on all vehicles and machinery.	Vehicles and machinery are kept in good working order and meet manufacturer's specifications for safety, fuel consumption etc.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Vehicles or machines shall be serviced or refuelled at designated servicing or refuelling locations, and no oil or lubricant changes may be made except at designated locations, or in case of breakdown or emergency repair.		X	X support	X	• Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		All emergency repairs shall be conduct on an impervious surface to prevent soil contamination.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		When parked, earth moving vehicles and equipment shall have the relevant drip trays (geyser drip trays are not acceptable) strategically placed underneath to prevent any soil contamination. In particular, drip trays are to be closely monitored during rain events to ensure that they do not overflow. The contents of the dip trays shall be disposed of according to the waste management measures.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
Handling and Batching of Cement and Concrete							
To control cement and concrete batching activities so as to prevent the spillage of cement wastewater and potential contamination of groundwater and aquatic environments.	Cement and concrete batching activities produce contaminated run-off which is alkaline and contains high levels of chromium which may ultimately influence groundwater quality. This procedure applies to all cement and concrete batching activities, delivery of ready-mix concrete and small-scale mechanical and hand-mixing of concrete and cement, as well as the washing of equipment used in these activities.	Cement bags shall be stored in suitable containers which protect them from the elements and prevent unintended pollution.				X	• Monthly monitoring • Inspected as part of weekly checklist
		Concrete shall not be mixed directly on the ground or any other permeable surface.				X	• Monthly monitoring • Inspected as part of weekly checklist
		In terms of housekeeping activities involving concrete (batching plant or smaller site-specific mixing operations): • The batching/mixing area shall be kept neat and clean at all times. • Runoff from such areas shall be strictly controlled, with contaminated water collected, stored/contained and disposed of at a licensed /approved landfill site. • Unused cement bags shall be stored so as not to be affected by rain/runoff. • Used cement bags shall be stored so as to prevent windblown dust and potential water contamination. • Concrete transportation shall not result in spillage. • Cleaning of equipment and flushing of mixers shall not result in pollution, with contaminated wash water being collected, stored / contained and disposed of at a licensed / approved landfill site. • Spillage onto roads from ready mix trucks shall be prevented by rinsing off the delivery shoot into a containment facility prior to leaving the site.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Suitable screening and containment shall be put in place to prevent windblown contamination from cement storage, mixing, loading and batching operations.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Visible remains of excess concrete shall be physically removed on completion of the concrete pouring and disposed of at a licensed / approved landfill site.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Used cement bags shall be considered hazardous and shall be stored, handled and disposed of according to the waste management measures.			X support	X	• Monthly monitoring • Inspected as part of weekly checklist
Protection of Livestock and / or Game							
To prevent illegal activities potentially perpetrated by site staff and to prevent the	Managing the activities of site staff during and after hours.	On no account shall any hunting or fishing activity of any kind be allowed. This includes the setting of traps, or the killing of any animal caught in construction works.		X	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
killing of any animals trapped in construction works or discovered on the construction site or surroundings.		On no account shall any animal, reptile or bird of any sort be killed. This specifically includes snakes or other creatures considered potentially dangerous discovered on site.		X	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
		If an animal is discovered on site an appropriately skilled person must be contacted to remove the creature from the site. Consideration should be given to selection and nomination of such a person prior to site establishment.		X approval	X support	X	• Ad hoc – Contractor • ECO to be notified if this occurs
Socio-economic Environment & Safety							
Allow for socio-economic upliftment of the local community	Local labour to be employed by the Contractor	Should labour be required during the construction phase, this should be sourced from the local communities.	X	X approval		X	Prior to the commencement of construction. Project manager to check contract
		Where fencing shall be removed as part of the construction activities, such must be replaced.		X approval		X	• Monthly monitoring • Inspected as part of weekly checklist
Traffic Management							
Reduce the overall impact the construction activities have on road users	Limited to the DR 12797 Road	Movement of construction vehicles and machinery on the site shall be controlled so that vehicles and machinery remain on designated roads.		X approval	X support	X	• Monthly monitoring • Inspected as part of weekly checklist
		Temporary traffic control measures shall be implemented for the duration of the construction activities.		X support		X	• Monthly monitoring • Inspected as part of weekly checklist
		Traffic shall be controlled by means of a stop-and-go system during the day and a traffic light signalling system at night.		X support		X	• Monthly monitoring • Inspected as part of weekly checklist
		During construction of the culvert traffic flow must be accommodated, this may be sought via a two phased construction approach or an alternative.		X support		X	• Monthly monitoring • Inspected as part of weekly checklist
Rehabilitation							
To ensure that all areas affected by construction are appropriately rehabilitated and re-vegetated in a manner congruent with the surrounding biophysical environment and the prevention of the spread of alien invasive species.	Rehabilitation of areas affected by construction activities.	All structures comprising the site establishment are removed from the site and surrounding areas.		X support	X support	X	Once-off inspection at the end of construction
		Fences, barriers and demarcations associated with the construction phase are removed from the site.		X support	X support	X	Once-off inspection at the end of construction
		Stockpiles created during the construction phase must not remain in the operation phase of the project.		X support	X support	X	Once-off inspection at the end of construction
		Leftover building materials shall be removed from the site.		X support	X support	X	Once-off inspection at the end of construction
		The areas shall be inspected for spills of substances such as oil, paint, diesel, etc. and these shall be remediated.			X support	X	Once-off inspection at the end of construction
		Rubble shall be removed from the site to an approved authorised / approved landfill site.			X support	X	Once-off inspection at the end of construction
		The site and surrounding areas shall be cleared of all waste.			X support	X	Once-off inspection at the end of construction
		Once construction activities have been completed, work areas should be progressively rehabilitated resemble that of the surrounding landscape to ensure that the flow in the watercourses and to the more natural wetland areas is not modified by the activities.			X approval	X	• Throughout construction • Monthly monitoring • Inspected as part of weekly checklist

Objective	Scope	Management and Mitigation Measure	Responsible Party (denoted by X)				Monitoring Frequency
			Project Manager	Construction Manager	Environmental Officer	Contractor	
		Upon completion of the construction phase all areas are to be rehabilitated and reseeded with indigenous vegetation species. The topsoil layer is to be replaced on top during reinstatement.		X support	X approval	X	Once-off inspection at the end of construction
		Where paths may cause erosion, these paths should be relocated and rehabilitated to reduce further erosion.			X support	X	• Throughout construction • Monthly monitoring • Inspected as part of weekly checklist
		Where soil compaction has occurred in areas to be rehabilitated, these areas are to be ripped and seeded with indigenous vegetation mix.			X support	X	• Throughout construction • Monthly monitoring • Inspected as part of weekly checklist
		Any alien species that propagates during the construction phase shall be cleared by hand before rehabilitation occurs.			X support	X	• Throughout construction • Monthly monitoring • Inspected as part of weekly checklist
		Where possible, the fynbos bulbs stored from vegetation clearing should be used as part of rehabilitation.			X support	X	Once-off inspection at the end of construction
		All vegetation stored in the nursery as part of the vegetation clearing measures need to be reinstated			X support	X	Once-off inspection at the end of construction
		A close out audit of rehabilitation areas shall be carried out and a report shall be compiled. Any remedial actions identified must be actioned and closed out.	X approval	X approval	X approval	X	Once-off inspection at the end of construction
Operations							
Ensure the upgraded areas remain in good working order	The entire DR 1797 Road and the associated culverts	Maintenance must be carried out in accordance with the approved Maintenance Management Plan (MMP) (Refer to Appendix E for the Draft MMP)	X				Annual inspections

Appendix A: Property Information

Property information for the expropriation areas

Property type	Farm Name	Parcel Number	Farm	Ptn	Long	Lat
Farm portion	Buffels Rivier 288	17/288	288	17	23.471871	-33.953244
Farm portion	FARM NO_290	7/290	290	7	23.470721	-33.952108
Farm portion	FARM NO_291	22/290	290	22	23.46904	-33.950454
Farm portion	BUFFELS RIVIER_288	28/288	288	28	23.470402	-33.949508
Farm portion	BUFFELS RIVIER_288	34/288	288	34	23.465105	-33.945487
Farm portion	FARM NO_290	27/290	290	27	23.463338	-33.946616
Farm portion	FARM NO_232	1/232	232	1	23.460941	-33.9435
Farm portion	FARM NO_232	5/232	232	5	23.456968	-33.940734
Farm portion	FARM NO_232	43/232	232	43	23.455843	-33.938028
Farm portion	FARM NO_232	42/232	232	42	23.449499	-33.934206
Farm portion	FARM NO_233	3/233	233	3	23.449639	-33.931678
Farm portion	FARM NO_233	7/233	233	7	23.448723	-33.930607

Appendix B: Locality and Expropriation Maps

LEGEND

- Town
- Chainage
- Road alignment: DR1797

Chainage: DR1797

CHAINAGE	LONG	LAT
0 KM	23° 28' 29.0593" E	33° 57' 16.9604" S
0.5 KM	23° 28' 15.5327" E	33° 57' 05.1141" S
1 KM	23° 28' 03.0082" E	33° 56' 52.6916" S
1.5 KM	23° 27' 47.3214" E	33° 56' 43.3716" S
2 KM	23° 27' 32.6262" E	33° 56' 33.0536" S
2.5 KM	23° 27' 21.2991" E	33° 56' 19.9031" S
3 KM	23° 27' 08.7277" E	33° 56' 07.9876" S
3.5 KM	23° 26' 57.4723" E	33° 55' 55.9246" S
4 KM	23° 26' 41.2315" E	33° 55' 50.2424" S
4.5 KM	23° 26' 22.8907" E	33° 55' 44.8548" S
4.854 KM	23° 26' 11.1616" E	33° 55' 38.8414" S

Distance to Kurkland:
Chainage 0 Km to Kurkland town
2 Km

Western Cape Government

CONSULTANTS:

HATCH

MAP TITLE:

TR2_21 Periodic Maintenance

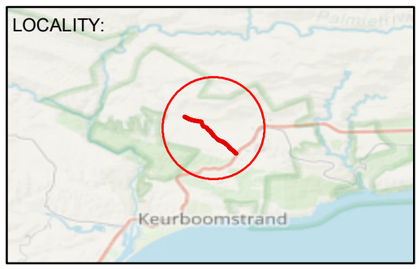
LOCALITY MAP

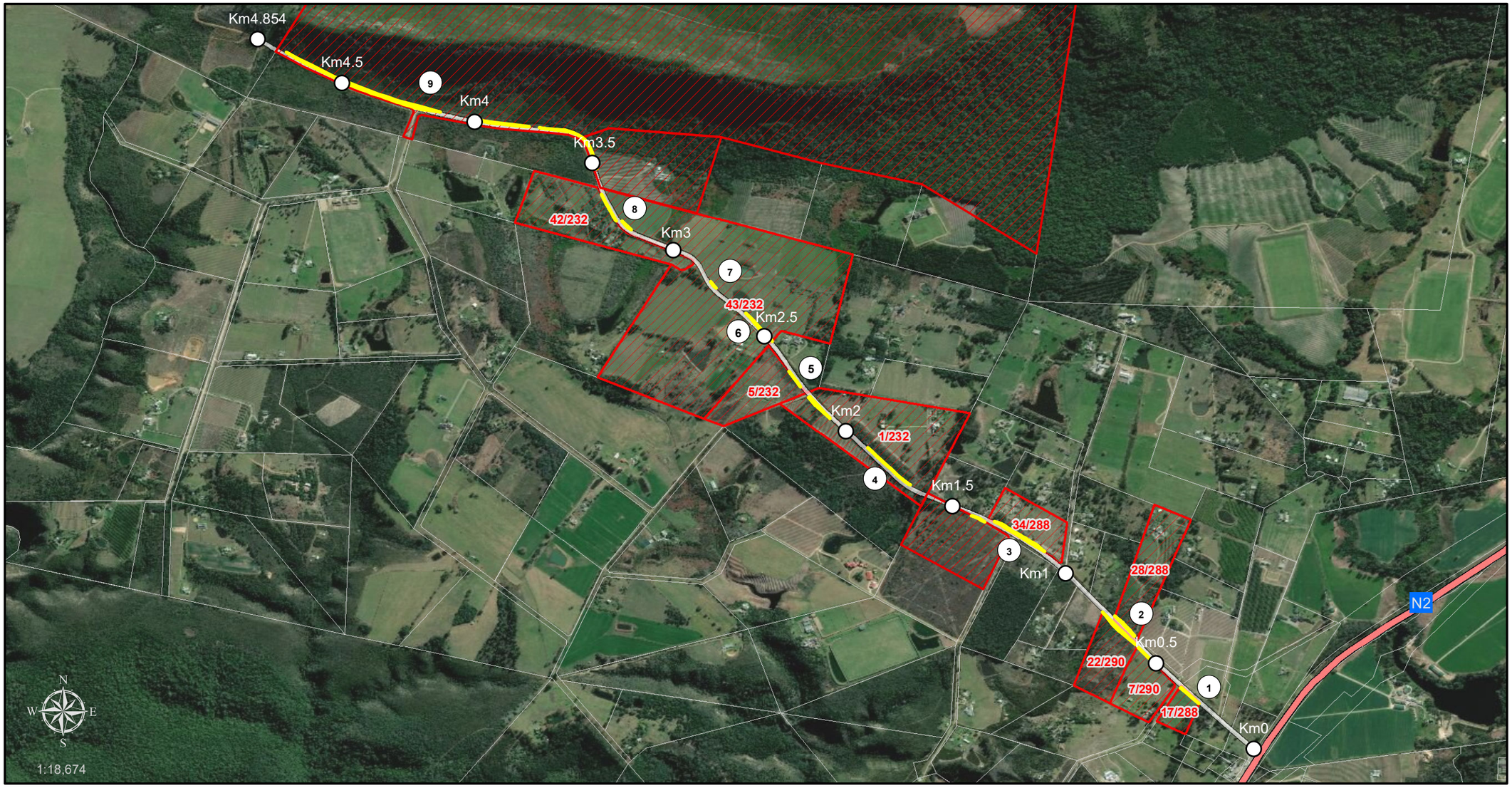
DATE COMPLETED:

MARCH 2020

DISCLAIMER

LOCALITY:





LEGEND

- Town
- Chainage
- Road alignment
- Farm Portion
- Expropriation properties identified
- Expropriation regions

Road Expropriation Property Description:

Parcel Number	Long	Lat
17/288	23.471871	-33.953244
7/290	23.470721	-33.952108
22/290	23.46904	-33.950454
28/288	23.470402	-33.949508
34/288	23.465105	-33.945487
27/290	23.463338	-33.946616
1/232	23.460941	-33.9435
5/232	23.456968	-33.940734
43/232	23.455843	-33.938028
42/232	23.449499	-33.934206
3/233	23.449639	-33.931678
7/233	23.448723	-33.930607

CLIENT: Western Cape Government

CONSULTANTS: HATCH

MAP TITLE:

TR2_21 Periodic Maintenance

EXPROPRIATION AREAS DR1797

DATE COMPLETED:

SEPTEMBER 2020

DISCLAIMER

THE INFORMATION PRESENTED ON THIS PAGE HAS BEEN COLLATED FROM INFORMATION COLLECTED FROM VARIOUS SOURCES,AS THE BEST INFORMATION, MADE AVAILABLE. NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION.

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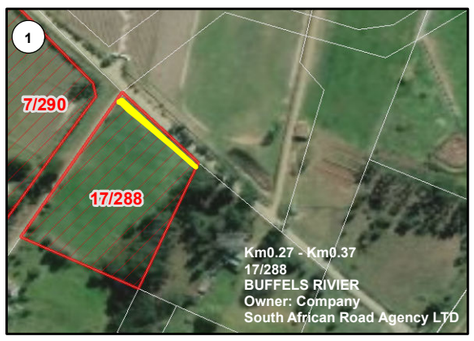
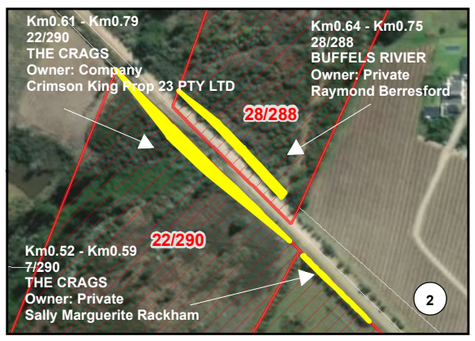
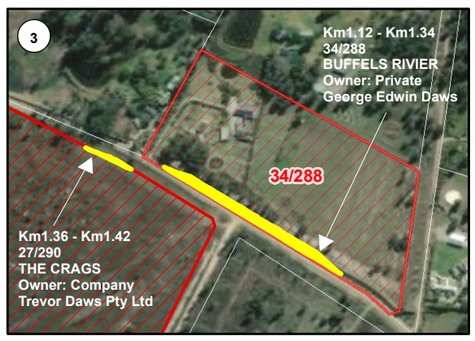
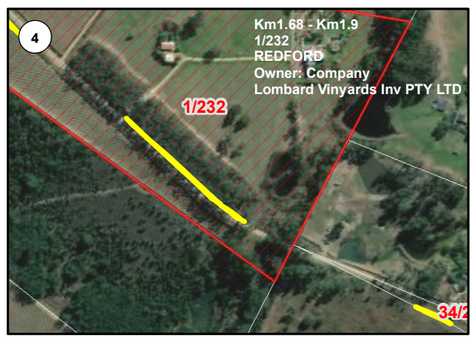
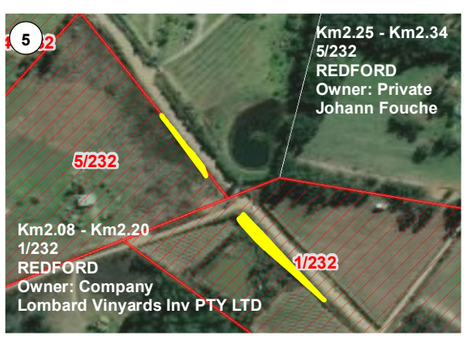
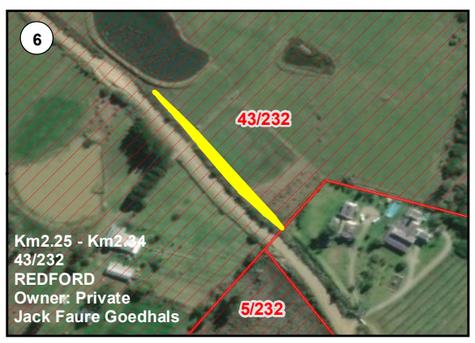


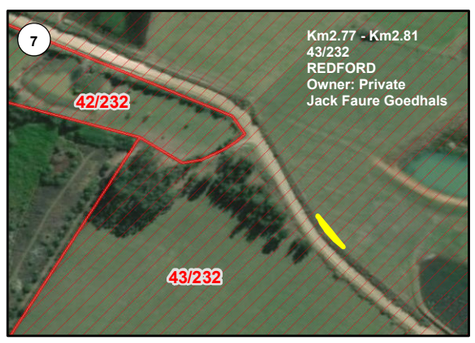


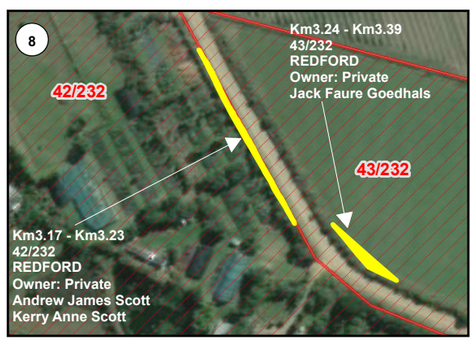


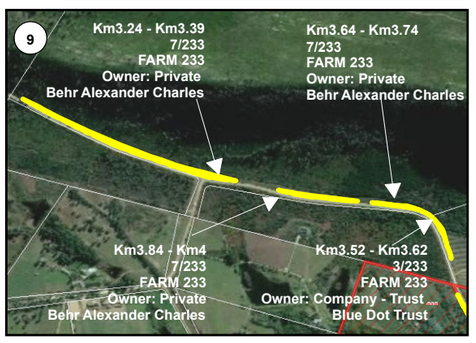












Appendix C: Curriculum Vitaes

Michelle Miles

Junior Environmental Advisor

Education

Honours, Environmental Management, Rhodes University, Grahamstown, South Africa, 2014

BSc, Environmental Science, Rhodes University, Grahamstown, South Africa, 2013

Professional Affiliations

Registered EAP (EAPASA) - Member

Summary of Experience

Michelle has 4 years' experience in the environmental field in South Africa. She has been involved in projects within various phases of the project lifecycle, ranging from conceptual studies all the way through to execution.

Michelle has gained experience in various environmental authorisation processes such as Environmental and Social Impact Assessments, Basic Assessments, Water Use License Applications, and General Authorisations. She has also been involved in the development of environmental management programmes (EMPr's), undertaken impact assessments, and conducted public participation processes. Furthermore, she has developed environmental permitting strategies, environmental design criteria and undertaken environmental compliance auditing and water monitoring.

Michelle has a good understanding of South African environmental legislation and the legislated environmental permitting process, and understands how to execute this process within budget and regulated timeframes.

Relevant Experience

Western Cape Government, Periodic Maintenance of TR2/12 – Kurland to Eastern Cape Border (Bloukranspas), Western Cape, South Africa, Environmental Assistant. Hatch was appointed by the Western Cape Government to conduct the engineering as well as the environmental for the periodic maintenance of the TR2/12 as well as some small roads around it. Michelle

Assisted with the compilation of a permitting strategy as well as a the compilation of a Minimum Applicability Checklist which was sent to the Department of Environmental Affairs and Development Planning to confirm the listed activities.

Anglo American Platinum, SO2 Abatement Project , Polokwane, South Africa, En vironmental Control Officer. Anglo American Platinum (AAP) operates the Polokwane Metallurgical Complex within the province of Limpopo. According to the National Environment Management : Air Quality Act (NEM:AQA) all companies within South Africa need to comply with more stringent air emissions regulations. Due to this AAP has designed and construction an SO2 Abatement Plant to convert the SO2 into H2SO4.

The project received environmental authorisation which required an Environmental Control Officer to ensure compliance of all contractors. Michelle conducts weekly audits of the construction site as well as reviews all Environmental Management Plans and Method statements to ensure these are in accordance with the EA and EIA.

Richards Bay Minerals (Rio Tinto), Zulti South Project, Richards Bay, South Africa, Environmental Assistant. Hatch is the lead in the EPCM Contractor to RBM for the development of the Zulti South mining lease area development. The two major components of the Project are (1) mining the lease area, and (2) constructing a services corridor including water supply, electrical supply and slurry pipeline between the Zulti South lease area and RBM's plant about 40 kilometres south near the town of Richards Bay.

Michelle assisted with the incorporation of all legal, approved permits into environmental management specifications; to establish environmental management criteria for tender adjudication; to assist in adjudicating tenders; and to advise on environmental management matters throughout the feasibility and implementation phase. Michelle has also assisted with the compilation of the environmental documentation and well as management of contractors for the construction phase of the project.

Sasol Group Technology, Pre-Feasibility Study for the Coarse As Disposal Project, Secunda, South Africa, Environmental Lead. Secunda Synfuels Operations (SSO) estimated that the current electrical and mechanical infrastructure for the depositing of the coarse ash will be insufficient in the next 2 years.

Hatch was appointed to provide a Short-Term Solution (STS), a Short Term Critical Solution (STC) as well as a Long-Term Phase (LTP). Michelle conducted the environmental component of this project. This included reviewing all current and available permits and licenses and compiling an environmental design criteria as well as a permitting strategy.

Western Cape Government, Flood Damage Repairs to Structure on the MR309 in Seweweekspoort Pass, Western Cape, South Africa, Environmental Assistant. Hatch Environmental Services Group was appointed to conduct the Environmental Authorisation Process for the flood damage repairs of road MR309 within the Seweweekspoort Pass within the Western Cape. A Basic Assessment was required for the repairs to be conducted due to several triggers. The following was conducted as part of the Basic Assessment process:

- Public Participation Process
- Interaction with all Interested and Affected Parties
- Compilation of the Environmental Management Programme for the construction and operation phase
- Management of Specialist (Botanical, Freshwater and Heritage)
- Assessment of the impacts of the repairs on the environment
- Compilation of the draft and final Basic Assessment Report

Department of Water and Sanitation, Jericho Pump Station Refurbishment Project, South Africa, Environmental Assistant. Hatch ESG was appointed by the Department of Water and Sanitation to conduct the Environmental Authorisation Process(Basic Assessment) for the activities associated with the refurbishment of the Jericho Pump Station. The Jericho Pump Station is a National Key Point as is provides water to the surrounding key industries. Michelle assisted with the compilation of the Draft and Final Basic Assessment which included:

- Baseline of the affected area
- Identification of Interested and Affected Parties
- Public Participation Process
- Assessment of the potential impacts the construction and operation phase have on the surround environment
- Compilation of the Environmental Management Programme
- Liaison with competent and commenting authorities

Matjhabeng Local Municipality, Nyakallong, Virginia and Theronia Waste Water Treatment Works Upgrade, Free State, South Africa, Junior Environmental Advisor . Hatch was appointed as the environmental consultants to do three Environmental Impacts Assessments to for the refurbishment of the Nyakallong, Virginia and Theronia Waste Water Treatment Works(WWTW). Michelle assisted with the compilation of the Scoping Report and the Environmental Impact Assessment Report for the three WWTW. This included outlining the baseline of the area, assessing the impacts according to the methodology adopted and compiling an Environmental Management Programme to be implement as part of construction and operation of the WWTW's.

Keben and Associates, African Renaissance LNG Pipeline Project, Mozambique, Environmental Assistant . This project involved a pre-feasibility study review of a 2000 km LNG pipeline from the Gas filed sin Northern Mozambique to Gauteng in South Africa. Evert provided expert ecological and environmental input into the route alignment options and was also in charge of project management for the South African portion of the project. The project formed part of a multicounty (Mozambique and South Africa) review and included a social and environmental sensitivity analysis, heritage review, social review, ecological review and legal and permitting analysis op the pipeline route alignment proposed.

Altech Chemicals Ltd, Integrated Environmental and Social Report, South Africa, Environmental Assistant . Hatch was appointed to conduct an integrated environmental and social report which included looking at various locations which complies with IFC standards as well as Malaysian Legislation and Australian Legislation.

Eskom Holdings SOC Limited, Majuba Rail Project , Mpumalanga, South Africa, Environmental Assistant . Eskom required a Health, Safety and Environmental Consultant for the construction of a 68 km Railway line from the Majuba Power station to the town of Ermelo. Hatch is responsible for Health and Safety as well as Environmental compliance for the duration of the construction of the railway line.

Gauteng Province, Office of the Premier, Gauteng Integrated Infrastructure Management Plan, Gauteng , South Africa, Environmental Assistant . Hatch was appointed to create a master plan of all infrastructure within Gauteng. Hatch provided engineering as well as geographical information system (GIS) services to the Office of the Premier.

Career History

2017 - 2018 Hatch Africa (Pty) Ltd, South Africa. Junior Environmental Advisor

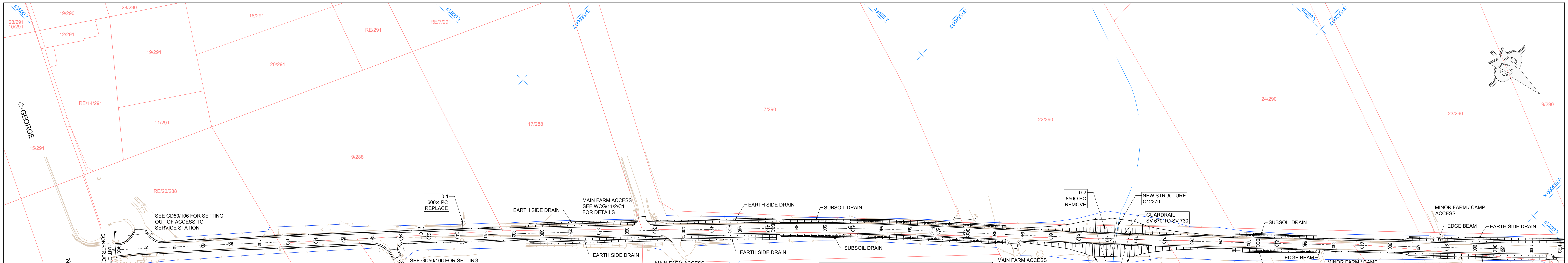
2016 - 2017 Hatch Africa (Pty) Ltd, South Africa. Environmental Intern

Languages

English

Appendix D: Hatch Drawings

GD50/093



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BCC1 PI1 ECC1	0.166 432.401	-43 880.191 -43 729.032 -43 583.718	3 758 736.531 3 758 582.037 3 758 422.033	R 11630.000m DA 2°07'50" TL 216.142m AL 432.235m
BCC 1 PI 1 ECC 1	0.166 432.401	-43 880.191 -43 729.032 -43 583.718	3 758 736.531 3 758 582.037 3 758 422.033	R 11630.000m DA 2°07'50" TL 216.142m AL 432.235m
BCC 2 PI 2 ECC 2	463.177 575.949	-43 563.027 -43 525.106 -43 489.873	3 758 399.251 3 758 357.496 3 758 313.449	R 1800.000m DA 3°35'20" TL 56.405m AL 112.773m
BCC 3 PI 3 ECC 3	600.901 806.207	-43 474.287 -43 410.163 -43 344.167	3 758 293.963 3 758 213.797 3 758 135.164	R 8710.000m DA 1°21'00" TL 102.657m AL 205.305m

NOTES

1. LEFT AND RIGHT HAND SIDE NOTATION APPLIES IN DIRECTION OF INCREASING STAKE VALUES.
2. ALL CONSTRUCTION LEVELS ARE TO BE CONFIRMED BY THE EMPLOYERS AGENT ON SITE PRIOR TO CONSTRUCTION.

   FINAL ROAD LEVELS GIVEN ON DRAWINGS ARE AT TOP OF BASE LAYER
3. FOR CONSTRUCTION DETAILS OF FARM ACCESSES AND INTERSECTIONS OF SURFACED ROADS WITH GRAVEL SHOULDERS REFER TO STANDARD PLAN WCS/11/2/C1.
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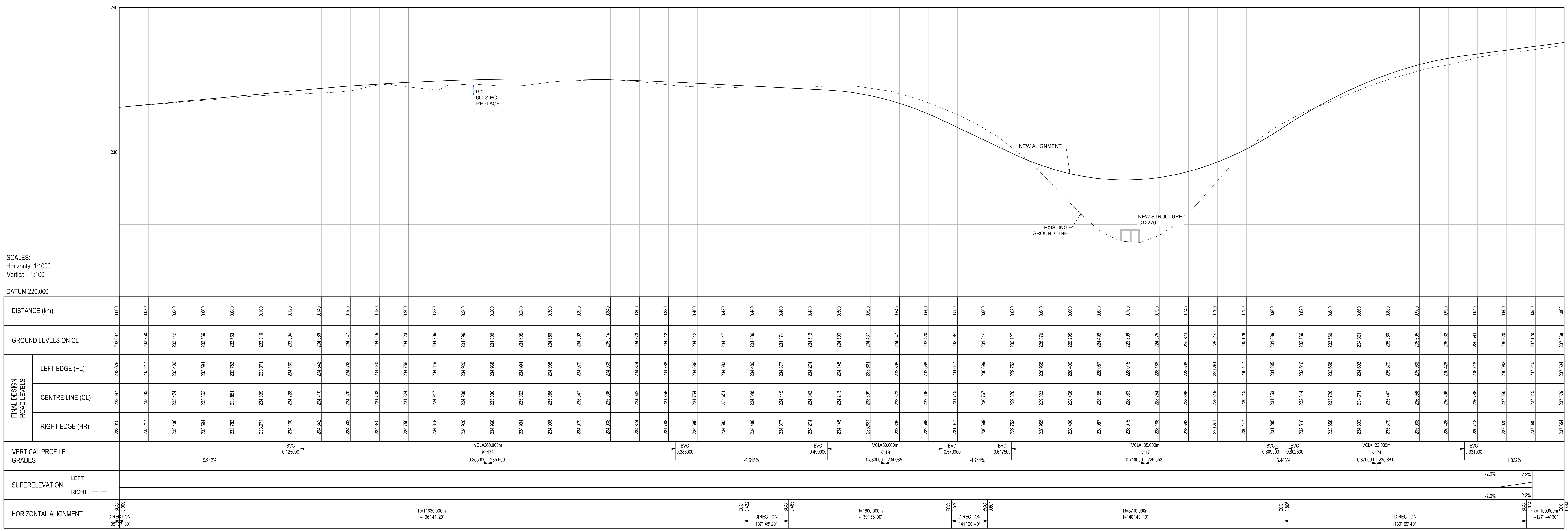
7. THE NECESSITY AS WELL AS EXTENT OF ANY SCOUR PROTECTION TO BE CONFIRMED BY THE EMPLOYERS AGENT ON SITE. SEE STANDARD PLAN WCS/22/5/D1
8. DANGER PLATES TO BE PLACED AT ALL CULVERT CROSSINGS. SEE STANDARD PLAN WCS/56/1/C6.
9. FOR DETAILS OF WORK TO BE CARRIED OUT ON NEW ROAD SIGNS, REFER TO DRAWING GD50/100 TO GD50/102 AND THE ROAD SIGN SCHEDULE GD50/103.
10. ALIEN VEGETATION THAT IS TO BE REMOVED MUST BE CONFIRMED ON SITE BY THE EMPLOYERS AGENT.
11. FOR FARM ACCESS DETAILS REFER TO STANDARD DRAWING WCS/11/2/C1.

LEGEND

- CADASTRAL
- EXISTING FENCE
- NEW FENCE
- SUBSOIL DRAIN WITH CONCRETE LINED DRAIN
- EARTH SIDE DRAIN
- DAMS
- EXISTING PIPE CULVERT
- NEW PIPE CULVERT



LONGSECTION DR1797
FROM 0.000 TO 1000.000

0m 50m 100m
1cm = 10m for A0 size

NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED CONS.	APPROVED PRE
A	2020/02/28	TENDER		

DESIGNED BY: E. M. HENNING
CHECKED BY: G. LLEWELLYN
DRAWN BY: S. L. STRANACK
CHECKED BY: G. LLEWELLYN

HATCH
False Bay Building
Tygerberg Park
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Plattekloof, 7500
+27 21 9115823
www.hatch.com

CONSULTING ENGINEERS
DATE: 2020/02/28

WESTERN CAPE GOVERNMENT
DEPARTMENT OF TRANSPORT AND PUBLIC WORKS

APPROVED
THIS APPROVAL IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OF ANY KIND FROM WHATSOEVER OR HOWEVER ARISING
PROVINCIAL ROADS ENGINEER
DATE: _ _ _ _ _ _ _

PERIODIC MAINTENANCE OF TR2/12
KURLAND KM 14.14 TO EASTERN CAPE BORDER KM 37.245
(BLOUKRANSPAS)

DR1797 PLAN AND PROFILE - km 0 to km 1.0

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SCALE.: 1 : 1000
CONTRACT No.: C1103
WCG STRUCTURES PLAN No.
CONSULTANT'S PLAN No.: H357403-11000-220-271-0005-0001
WCG INDEX No.: GD50/ 093

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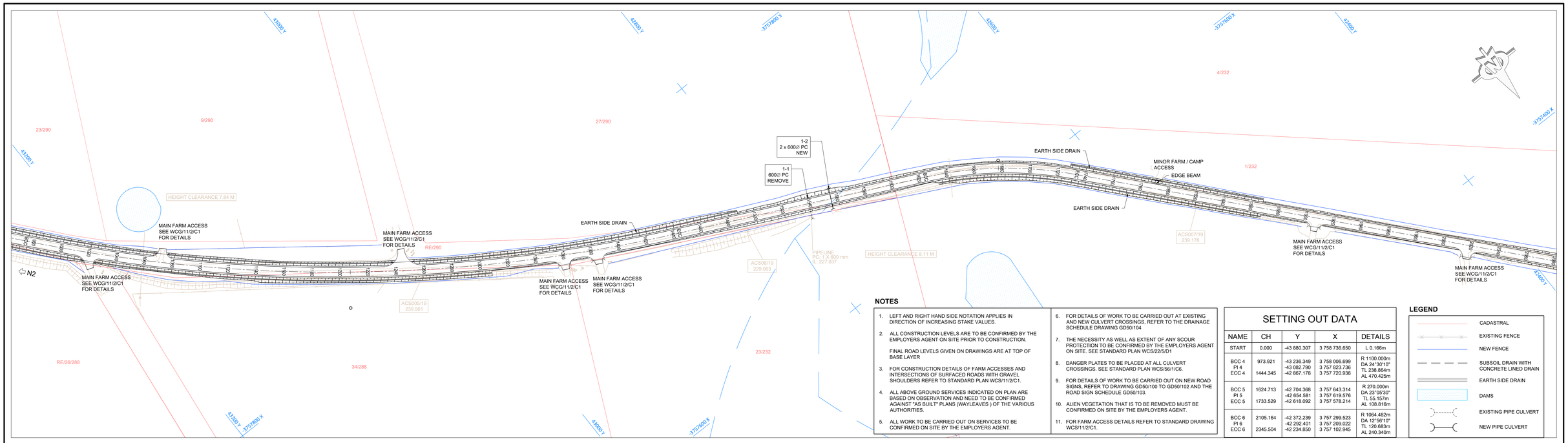
GD50/094



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7. THE NECESSITY AS WELL AS EXTENT OF ANY SCOUR PROTECTION TO BE CONFIRMED BY THE EMPLOYERS AGENT ON SITE. SEE STANDARD PLAN WCS/22/5/D1
8. DANGER PLATES TO BE PLACED AT ALL CULVERT CROSSINGS. SEE STANDARD PLAN WCS/56/1/C6.
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SETTING OUT DATA

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BCC 5 PI 5 ECC 5	1624.713 1733.529	-42 704.368 -42 654.581 -42 618.092	3 757 643.314 3 757 619.576 3 757 578.214	R 270.000m DA 23°05'30" TL 55.157m AL 108.816m
BCC 6 PI 6 ECC 6	2105.164 2345.504	-42 372.239 -42 292.401 -42 234.850	3 757 299.523 3 757 209.022 3 757 102.945	R 1064.482m DA 12°56'10" TL 120.683m AL 240.340m

LEGEND

- CADASTRAL
- EXISTING FENCE
- NEW FENCE
- SUBSOIL DRAIN WITH CONCRETE LINED DRAIN
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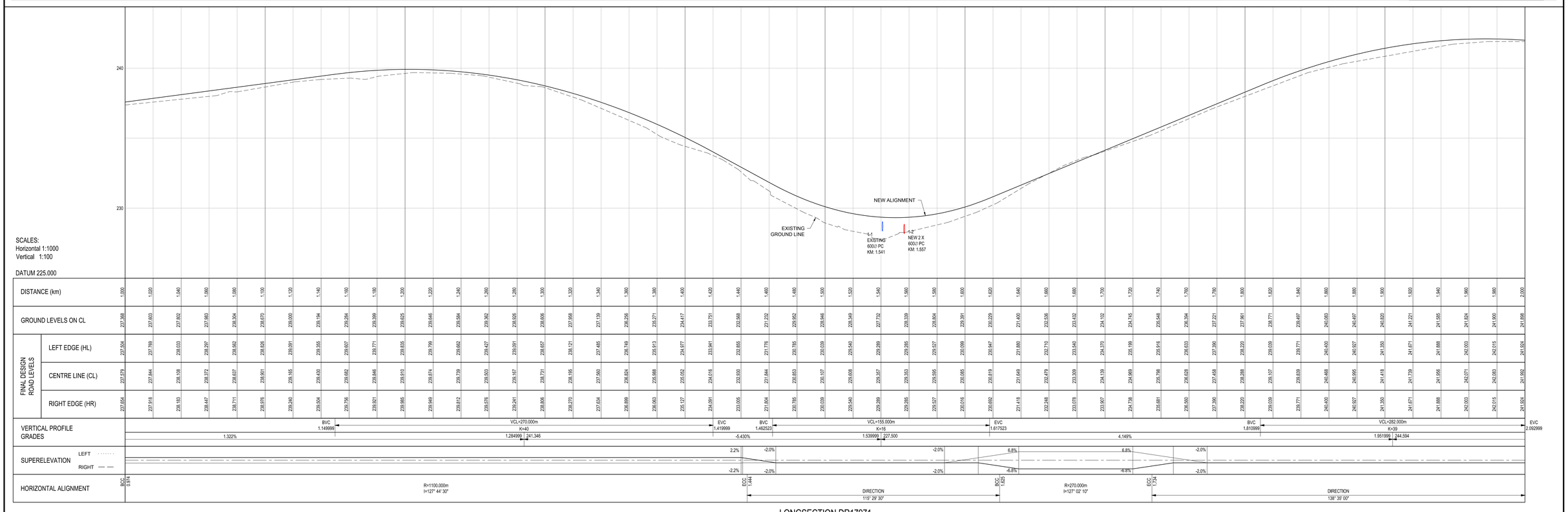

LONGSECTION DR17971
FROM 1000.000 TO 2000.000

0m 50m 100m
1cm = 10m for A0 size

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CONSULTING ENGINEERS
DATE: 2020/02/28

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DEPARTMENT OF TRANSPORT AND PUBLIC WORKS

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PERIODIC MAINTENANCE OF TR2/12
KURLAND KM 14.14 TO EASTERN CAPE BORDER KM 37.245
(BLOUKRANSPAS)

DR1797 PLAN AND PROFILE - km 1.0 to km 2.0

P.R.E.'s FILE No.	SCALE:
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CONTRACT No. C1103	WCG STRUCTURES PLAN No.
CONSULTANT'S PLAN No. H357403-11000-220-271-0005-0002	WCG INDEX No. GD50/094

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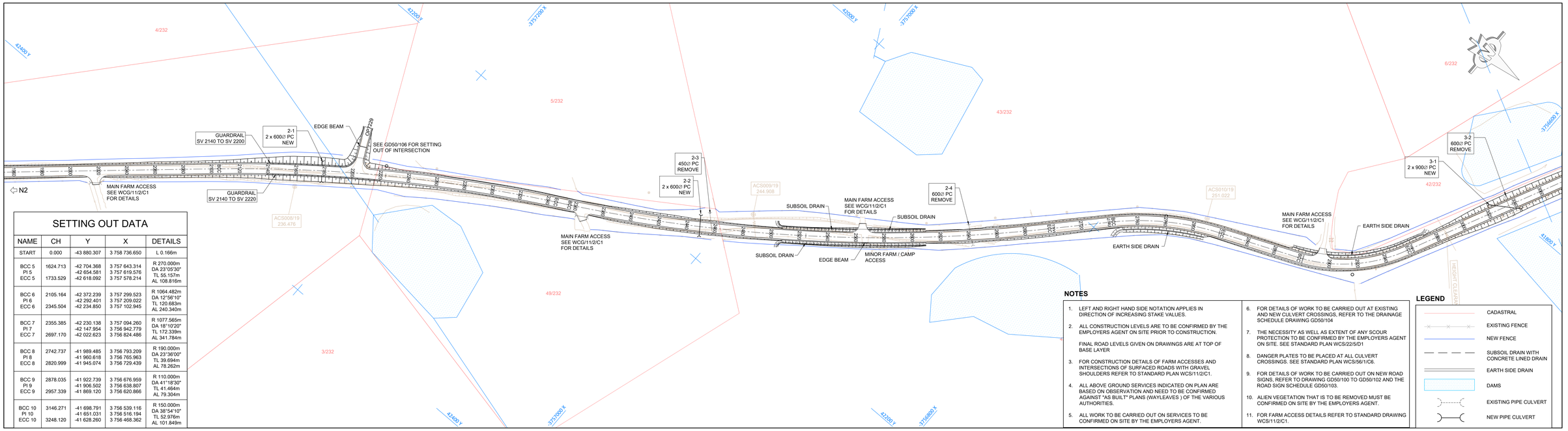
GD50/095



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BCC 6 PI 6 ECC 6	2105.164 2345.504	-42 372.239 -42 292.401 -42 234.850	3 757 299.523 3 757 209.022 3 757 102.945	R 1064.482m DA 12°56'10" TL 120.683m AL 240.340m
BCC 7 PI 7 ECC 7	2355.385 2697.170	-42 230.138 -42 147.954 -42 022.623	3 757 094.260 3 756 942.779 3 756 824.486	R 1077.565m DA 18°10'20" TL 172.339m AL 341.784m
BCC 8 PI 8 ECC 8	2742.737 2820.999	-41 989.485 -41 960.618 -41 945.074	3 756 793.209 3 756 765.963 3 756 729.439	R 190.000m DA 23°36'00" TL 39.694m AL 78.262m
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BCC 10 PI 10 ECC 10	3146.271 3248.120	-41 698.791 -41 651.031 -41 628.260	3 756 539.116 3 756 516.194 3 756 468.362	R 150.000m DA 38°54'10" TL 52.976m AL 101.849m

NOTES

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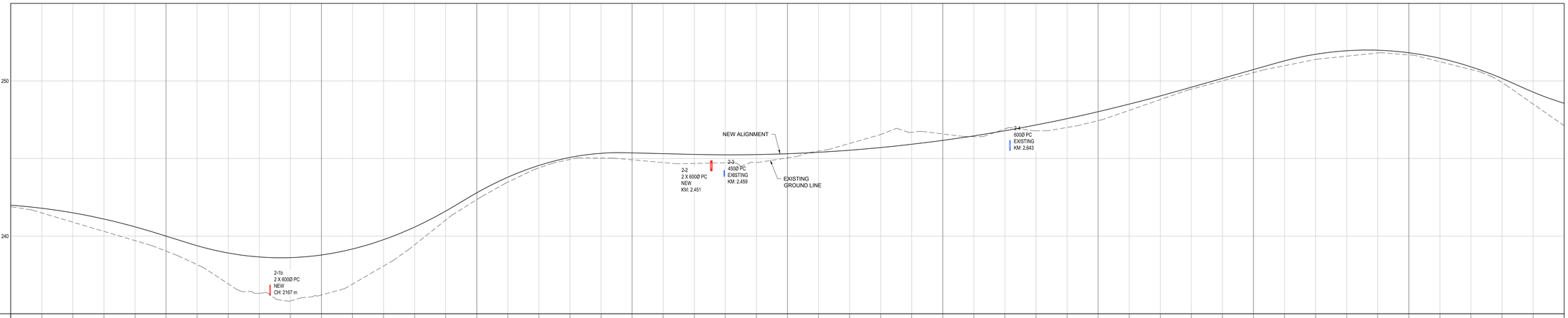
11. FOR FARM ACCESS DETAILS REFER TO STANDARD DRAWING WCS/11/2/C1.

LEGEND

- CADASTRAL
- EXISTING FENCE
- NEW FENCE
- SUBSOIL DRAIN WITH CONCRETE LINED DRAIN
- EARTH SIDE DRAIN
- DAMS
- EXISTING PIPE CULVERT
- NEW PIPE CULVERT



LONGSECTION DR1797
FROM 2000.000 TO 3000.000

0m 50m 100m
1cm = 10m for A0 size

NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED CONS.	APPROVED PRE
A	2020/02/28	TENDER		

DESIGNED BY: E. M. HENNING
CHECKED BY: G. LLEWELLYN
DRAWN BY: S. L. STRANACK
CHECKED BY: G. LLEWELLYN

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www.hatch.com

CONSULTING ENGINEERS
DATE: 2020/02/28

WESTERN CAPE GOVERNMENT

DEPARTMENT OF TRANSPORT AND PUBLIC WORKS

APPROVED
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PROVINCIAL ROADS ENGINEER
DATE:

PERIODIC MAINTENANCE OF TR2/12
KURLAND KM 14.14 TO EASTERN CAPE BORDER KM 37.245
(BLOUKRANSPAS)

DR1797 PLAN AND PROFILE - km 2.0 to km 3.0

P.R.E.'s FILE No.	SCALE.
TPW16/6/4/1/1-TR00212-C1103	1 : 1000
CONTRACT No.	WCG STRUCTURES PLAN No.
C1103	
CONSULTANT'S PLAN No.	WCG INDEX No.
H357403-11000-220-271-0005-0003	GD50/095

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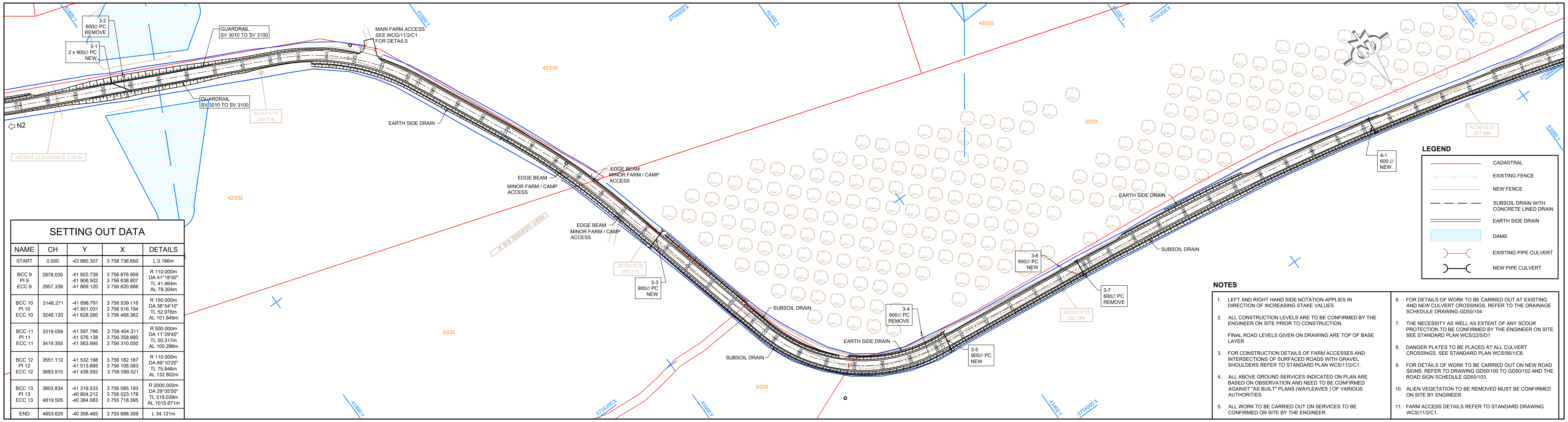
GD50/096



SETTING OUT DATA

NAME	CH	Y	X	DETAILS
START	0.000	-43 880.307	3 758 736.650	L 0.166m
BCC 9 PI 9 ECC 9	2878.035 2957.339	-41 922.739 -41 906.502 -41 869.120	3 756 676.959 3 756 638.807 3 756 620.866	R 110.000m DA 41°18'30" TL 41.464m AL 79.304m
BCC 10 PI 10 ECC 10	3146.271 3248.120	-41 698.791 -41 651.031 -41 628.260	3 756 539.116 3 756 516.194 3 756 468.362	R 150.000m DA 38°54'10" TL 52.976m AL 101.849m
BCC 11 PI 11 ECC 11	3319.059 3419.355	-41 597.766 -41 576.138 -41 563.995	3 756 404.311 3 756 358.880 3 756 310.050	R 500.000m DA 11°29'40" TL 50.317m AL 100.296m
BCC 12 PI 12 ECC 12	3551.112 3683.915	-41 532.198 -41 513.895 -41 438.592	3 756 182.187 3 756 108.583 3 756 099.521	R 110.000m DA 69°10'20" TL 75.846m AL 132.802m
BCC 13 PI 13 ECC 13	3803.834 4819.505	-41 319.533 -40 804.212 -40 384.083	3 756 085.193 3 756 023.178 3 755 718.395	R 2000.000m DA 29°05'50" TL 519.039m AL 1015.671m
END	4853.625	-40 356.465	3 755 698.359	L 34.121m

LEGEND

- CADASTRAL
- EXISTING FENCE
- NEW FENCE
- SUBSOIL DRAIN WITH CONCRETE LINED DRAIN
- EARTH SIDE DRAIN
- DAMS
- EXISTING PIPE CULVERT
- NEW PIPE CULVERT

NOTES

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   FINAL ROAD LEVELS GIVEN ON DRAWING ARE TOP OF BASE LAYER
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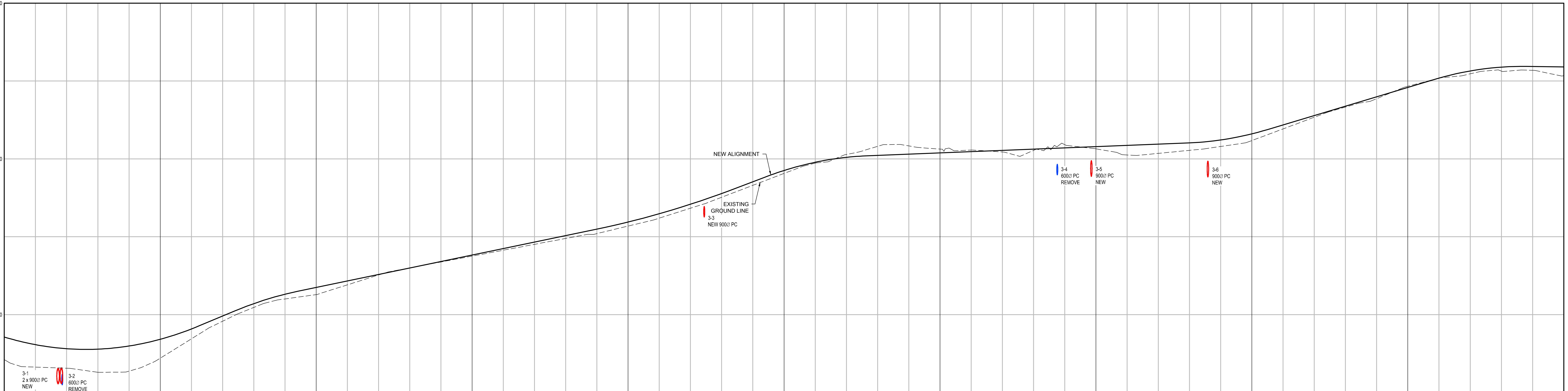

SCALES:
Horizontal 1:1000
Vertical 1:100

DATUM 245.000

DISTANCE (km)	GROUND LEVELS ON CL	FINAL DESIGN ROAD LEVELS: LEFT EDGE (HL)	CENTRE LINE (CL)	RIGHT EDGE (HR)
3.000	247.117	248.494	248.562	248.547
3.020	246.607	248.005	248.073	248.005
3.040	246.570	247.745	247.813	247.745
3.060	246.294	247.716	247.784	247.716
3.080	246.371	247.918	247.986	247.918
3.100	247.190	248.363	248.418	248.350
3.120	248.465	249.139	249.080	249.012
3.140	249.581	250.081	249.908	249.735
3.160	250.473	250.992	250.706	250.419
3.180	251.015	251.623	251.310	250.998
3.200	251.286	252.056	251.743	251.431
3.220	251.902	252.472	252.160	251.847
3.240	252.544	252.871	252.576	252.281
3.260	253.000	253.252	252.992	252.732
3.280	253.359	253.633	253.408	253.183
3.300	253.719	254.015	253.824	253.634
3.320	254.099	254.396	254.240	254.085
3.340	254.518	254.795	254.656	254.510
3.360	254.882	255.215	255.073	254.929
3.380	255.227	255.631	255.489	255.345
3.400	255.702	256.088	255.945	255.802
3.420	256.188	256.570	256.478	256.387
3.440	256.811	257.065	257.088	257.020
3.460	257.518	257.707	257.775	257.707
3.480	258.305	258.461	258.529	258.461
3.500	259.080	259.185	259.253	259.190
3.520	259.726	259.713	259.781	259.832
3.540	260.282	259.935	260.099	260.263
3.560	260.830	259.944	260.221	260.498
3.580	260.851	259.961	260.301	260.641
3.600	260.587	260.042	260.382	260.722
3.620	260.558	260.123	260.463	260.803
3.640	260.438	260.204	260.544	260.884
3.660	260.501	260.284	260.624	260.964
3.680	260.916	260.456	260.705	260.954
3.700	260.642	260.650	260.786	260.921
3.720	260.268	260.798	260.866	260.889
3.740	260.356	260.879	260.947	260.879
3.760	260.560	260.960	261.028	260.960
3.780	260.769	261.145	261.213	261.145
3.800	261.154	261.538	261.606	261.538
3.820	261.914	262.114	262.183	262.114
3.840	262.687	262.717	262.785	262.717
3.860	263.319	263.319	263.387	263.319
3.880	263.869	263.921	263.989	263.921
3.900	264.662	264.523	264.591	264.523
3.920	265.186	265.121	265.190	265.121
3.940	265.439	265.577	265.645	265.577
3.960	265.632	265.821	265.889	265.821
3.980	265.685	265.860	265.928	265.860
4.000	265.345	265.831	265.899	265.831

VERTICAL PROFILE GRADES
BVC 2.975000 — VCL=150.000m K=17 — EVC 3.125000; 3.050000 | 246.150; 4.176%
BVC 3.148007 — VCL=40.000m K=19 — EVC 3.188007; 3.168000 | 251.078; 2.081%
BVC 3.379436 — VCL=91.104m K=52 — EVC 3.470; 3.425000 | 256.425; 3.826%
BVC 3.487 — VCL=65.000m K=19 — EVC 3.552500; 3.520000 | 260.059; 0.403%
BVC 3.760000 — VCL=50.000m K=19 — EVC 3.810000; 3.785000 | 261.129; 3.011%
BVC 3.916007 — VCL=60.000m K=19 — EVC 3.976007; 3.946000 | 265.977; -0.143%

SUPERELEVATION (LEFT ······· RIGHT — —)
LEFT: -2.0% | -2.0% | 9.2% | 9.2% | 4.2% | 4.2% | -2.0% | -2.0% | 10.0% | 10.0% | -2.0%
RIGHT: -2.0% | -2.0% | -9.2% | -9.2% | -4.2% | -4.2% | -2.0% | -2.0% | -10.0% | -10.0% | -2.0%

HORIZONTAL ALIGNMENT
DIRECTION 115° 38' 20" — BCC 3.146 — R=150.000m I=135° 05' 30" — ECC 3.248 — DIRECTION 154° 32' 30" — BCC 3.319 — R=500.000m I=160° 17' 20" — ECC 3.419 — DIRECTION 166° 02' 10" — BCC 3.551 — R=110.000m I=131° 27' 00" — ECC 3.684 — DIRECTION 96° 51' 40" — BCC 3.804 — R=2000.000m I=111° 24' 40" — ECC 4.820

LONGSECTION DR1797
FROM 3000.000 TO 4000.000

0m 50m 100m
1cm = 10m for A0 size

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CONSULTING ENGINEERS
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PERIODIC MAINTENANCE OF TR2/12
KURLAND KM 14.14 TO EASTERN CAPE BORDER KM 37.245
(BLOUKRANSPAS)

DR1797 PLAN AND PROFILE - km 3.0 to km 4.0

P.R.E.'s FILE No.: TPW16/6/4/1/1-TR00212-C1103
SCALE: 1 : 1000
CONTRACT No.: C1103
WCG STRUCTURES PLAN No.:
CONSULTANT'S PLAN No.: H357403-11000-220-271-0005-0004
WCG INDEX No.: GD50/ 096

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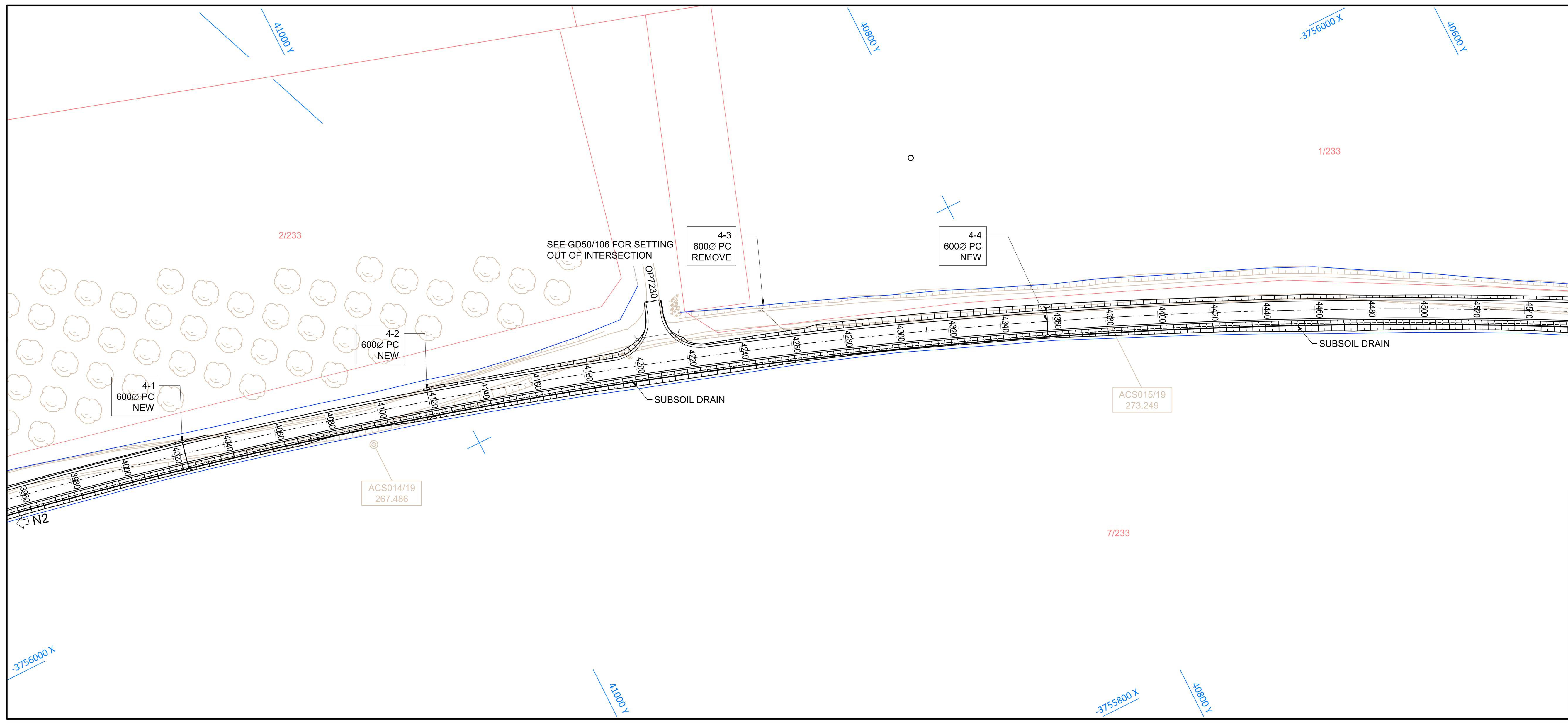
GD50/097



LEGEND

(line)	CADASTRAL
(line)	EXISTING FENCE
(line)	NEW FENCE
(line)	SUBSOIL DRAIN WITH CONCRETE LINED DRAIN
(line)	EARTH SIDE DRAIN
(box)	DAMS
(symbol)	EXISTING PIPE CULVERT
(symbol)	NEW PIPE CULVERT

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NAME	CH	Y	X	DETAILS
START	0.000	-43 880.307	3 758 736.650	L 0.166m
BCC 9 PI 9 ECC 9	2878.035 2957.339	-41 922.739 -41 906.502 -41 869.120	3 756 676.959 3 756 638.807 3 756 620.866	R 110.000m DA 41°18'30" TL 41.464m AL 79.304m
BCC 10 PI 10 ECC 10	3146.271 3248.120	-41 698.791 -41 651.031 -41 628.260	3 756 539.116 3 756 516.194 3 756 468.362	R 150.000m DA 38°54'10" TL 52.976m AL 101.849m
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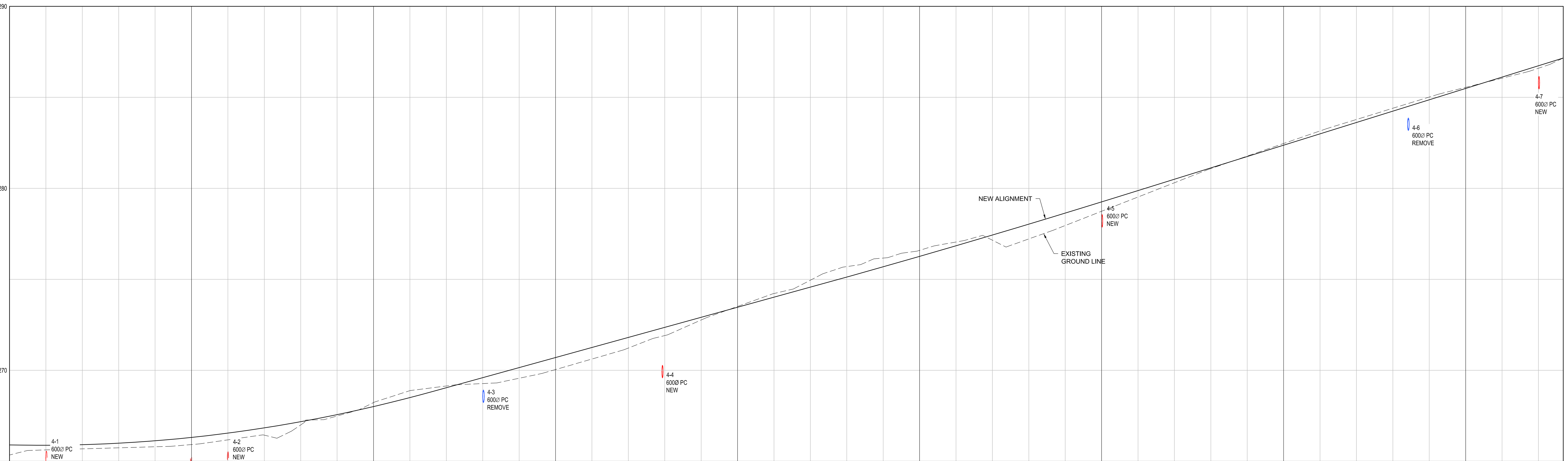
END	4853.625	-40 356.465	3 755 698.359	L 34.121m



SCALES:
Horizontal 1:1000
Vertical 1:100

DATUM 265.000

	4.000	4.020	4.040	4.060	4.080	4.100	4.120	4.140	4.160	4.180	4.200
DISTANCE (km)	4.000	4.020	4.040	4.060	4.080	4.100	4.120	4.140	4.160	4.180	4.200
GROUND LEVELS ON CL	265.345	265.623	265.651	265.704	265.774	265.925	266.182	266.436	267.002	267.523	268.214
FINAL DESIGN ROAD LEVELS – LEFT EDGE (HL)	265.831	265.814	265.844	265.926	266.060	266.244	266.481	266.768	267.108	267.498	267.940
FINAL DESIGN ROAD LEVELS – CENTRE LINE (CL)	265.899	265.882	265.912	265.994	266.128	266.312	266.549	266.836	267.176	267.566	268.008
FINAL DESIGN ROAD LEVELS – RIGHT EDGE (HR)	265.831	265.814	265.844	265.926	266.060	266.244	266.481	266.768	267.108	267.498	267.940

	4.220	4.240	4.260	4.280	4.300	4.320	4.340	4.360	4.380	4.400	4.420
DISTANCE (km)	4.220	4.240	4.260	4.280	4.300	4.320	4.340	4.360	4.380	4.400	4.420
GROUND LEVELS ON CL	268.882	269.149	269.240	269.555	270.029	270.614	271.216	271.917	272.757	273.478	274.223
FINAL DESIGN ROAD LEVELS – LEFT EDGE (HL)	268.434	268.976	269.528	270.081	270.634	271.186	271.739	272.292	272.844	273.397	273.950
FINAL DESIGN ROAD LEVELS – CENTRE LINE (CL)	268.502	269.044	269.596	270.149	270.702	271.254	271.807	272.360	272.912	273.465	274.018
FINAL DESIGN ROAD LEVELS – RIGHT EDGE (HR)	268.434	268.976	269.528	270.081	270.634	271.186	271.739	272.292	272.844	273.397	273.950

	4.440	4.460	4.480	4.500	4.520	4.540	4.560	4.580	4.600	4.620	4.640
DISTANCE (km)	4.440	4.460	4.480	4.500	4.520	4.540	4.560	4.580	4.600	4.620	4.640
GROUND LEVELS ON CL	274.968	275.719	276.172	276.581	277.047	277.165	277.250	277.981	278.746	279.494	280.314
FINAL DESIGN ROAD LEVELS – LEFT EDGE (HL)	274.502	275.058	275.622	276.194	276.776	277.365	277.964	278.571	279.187	279.810	280.433
FINAL DESIGN ROAD LEVELS – CENTRE LINE (CL)	274.571	275.126	275.690	276.262	276.844	277.434	278.032	278.639	279.255	279.878	280.501
FINAL DESIGN ROAD LEVELS – RIGHT EDGE (HR)	274.502	275.058	275.622	276.194	276.776	277.365	277.964	278.571	279.187	279.810	280.433

	4.660	4.680	4.700	4.720	4.740	4.760	4.780	4.800	4.820	4.840	4.854
DISTANCE (km)	4.660	4.680	4.700	4.720	4.740	4.760	4.780	4.800	4.820	4.840	4.854
GROUND LEVELS ON CL	281.087	281.776	282.440	283.145	283.791	284.397	285.011	285.563	286.012	286.588	287.162
FINAL DESIGN ROAD LEVELS – LEFT EDGE (HL)	281.057	281.680	282.304	282.928	283.551	284.175	284.798	285.422	286.045	286.669	287.094
FINAL DESIGN ROAD LEVELS – CENTRE LINE (CL)	281.125	281.749	282.372	282.996	283.619	284.243	284.867	285.490	286.114	286.737	287.162
FINAL DESIGN ROAD LEVELS – RIGHT EDGE (HR)	281.057	281.680	282.304	282.928	283.551	284.175	284.798	285.422	286.045	286.669	287.094

VERTICAL PROFILE GRADES: BVC 4.006976 – VCL=226.004m, K=78 – EVC 4.232981; -0.143%; 4.120000 265.728; 2.763%; BVC 4.443982 – VCL=164.028m, K=463 – EVC 4.608010; 4.526000 276.947; 3.118%

SUPERELEVATION: LEFT · · · · · · ; RIGHT — —

HORIZONTAL ALIGNMENT: BCC 3.804; R=2000.000m, I=111° 24' 40"; ECC 4.820; DIRECTION 125° 57' 30"

LONGSECTION DR1797
FROM 4000.000 TO 4853.625

0m 50m 100m
1cm = 10m for A0 size

NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED CONS.	APPROVED PRE
A	2020/02/28	TENDER		

DESIGNED BY: E. M. HENNING
CHECKED BY: G. LLEWELLYN
DRAWN BY: S. L. STRANACK
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CONSULTING ENGINEERS
DATE: 2020/02/28

WESTERN CAPE GOVERNMENT
DEPARTMENT OF TRANSPORT AND PUBLIC WORKS

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PROVINCIAL ROADS ENGINEER
DATE:

PERIODIC MAINTENANCE OF TR2/12
KURLAND KM 14.14 TO EASTERN CAPE BORDER KM 37.245
(BLOUKRANSPAS)

DR1797 PLAN AND PROFILE - km 4.0 to km 4.858

P.R.E.'s FILE No. TPW16/6/4/1/1-TR00212-C1103
SCALE. 1 : 1000
CONTRACT No. C1103
WCG STRUCTURES PLAN No.
CONSULTANT'S PLAN No. H357403-11000-220-271-0005-0005
WCG INDEX No. GD50/097

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Appendix E: Draft Maintenance Management Plan

Western Cape Government: Department of Transport and Public Works

DR 1797 Road Upgrade

September 2020

Draft Maintenance Management Plan

1. Introduction

1.1 Background

The Western Cape Government objectives are to upgrade, rehabilitate and maintain provincial roads within the Western Cape Province, provide Expanded Public Works Programme (EPWP) work opportunities, develop emerging Construction Industry Development Board (CIDB) contractors and contribute towards black economic empowerment within the local communities.

The specific objectives of this project are to upgrade the DR 1797 (Redford Road) from km 0.00 to km 4.87. The DR 1797 is currently a gravel road. The main purpose of this project is to upgrade the road from a gravel road (Class 4) to a surfaced road (Special Class 4).

The DR 1797 Road upgrade will require vertical and horizontal realignment to allow for a 60 km/hr design speed. Due to this, there are small areas along the DR 1797 Road which will require expropriation (Appendix B).

The landowners which will be affected by the expropriation, have already been contacted and are currently in discussions with the WCG.

1.2 Expropriation areas

The DR 1797 Road upgrade will require vertical and horizontal realignment to allow for a 60 km/hr design speed. Due to this, there are small areas along the DR 1797 Road which falls outside of the existing road reserve and therefore require expropriation (Appendix B1).

The landowners which will be affected by the expropriation, have already been contacted and are currently in discussions with the WCG.

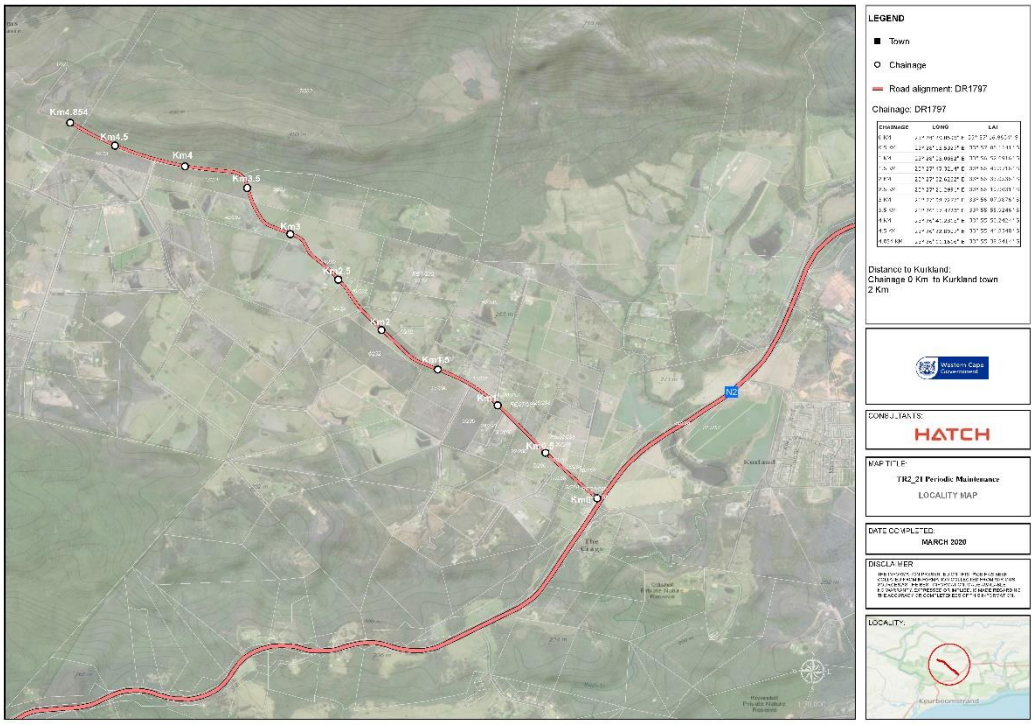

Figure 1-1: Locality map of the DR 1797 Road

1.3 Objectives of an Maintenance Management Plan

The main objective of a Maintenance Management Plan is to ensure that the existing DR 1797 Road, expropriation areas, the replacement of minor culverts and the constructed major culvert are maintained and remain in good condition during construction and post-construction. This MMP is to ensure that the environmental impacts of the activities listed below are managed, mitigated and kept to a minimum during the operations of the DR 1797 Road.

The Purpose of this MMP is to permit the Applicant to:

- Periodically clear sediment and other blockages that may diminish the hydraulic capacity and functioning of the repaired and refurbished low water crossings and causeways for which environmental authorisation has been obtained; and/or
- Provide for post-maintenance monitoring and remedial actions.

2. Legislative requirements

The following activities will be triggered under Listing Notice 1 (GNR 983) and the project will thus trigger the need for EA to be obtained through a BA process. All relevant procedures need to be followed in accordance with legislation, and if maintenance activities triggers any other listed activity besides these activities, those activities need to be approved by the appropriate authority

GNR 983: Listing Notice 1

Activity No.	Relevant BA Listed Activities as set out in GNR 983	Description of project activity
12	The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs (a) within a watercourse.	This activity will be triggered due to the development of the major culvert at km 0.705 over a tributary of the Whiskey Creek. The culvert structure will be 5 m wide X 3 m high X 19.5 m long (I.e. ±850 m2), with the culvert extension outside the Road Reserve.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	This activity will be triggered as more than 10 m3 of soil, sand, shells, shell grit, pebbles or rock will be infilled at the tributary of the Whiskey Creek, for the development of the major culvert at km 0.705. In addition, the vertical and horizontal realignment between km 0.00 and km 4.87 will entail cut and fill operations, which may entail the infilling of soil, etc. from water courses along the route.

3. Environmental Impacts due to Operations

Impacts that may arise from the maintenance of the road and culvert structures are similar to those associated with the construction of the low water crossings and causeways.

Removal of flood debris and sediment deposits impact on:

- Flow dynamics and water quality;
- Erosion and sedimentation;
- In-stream and riparian habitat;
- Public use and enjoyment of roads.

During maintenance operations a maintenance team will work along the DR 1797 Road and may use earth moving machinery, such as a front end loader, a truck and a grader.

4. Conditions required during Maintenance

4.1 Various types of maintenance to the DR 1797 Road

The following maintenance requirements will be implemented for the duration of the operational period. The conditions below indicate what must be done post-construction to maintain the condition of the DR 1797 Road. The mitigation and preservation measures in the below table need to be applied during maintenance. The below Maintenance conditions will be done by the client and the maintenance contractor.

4.1.1 *Machinery Requirements during Maintenance*

Maintenance Requirements	Monitoring
• All maintenance machinery and equipment must be regularly serviced and maintained to reduce the contamination of soils through oil, etc.	As and when maintenance occurs
• In the event of any spills of fuel, oils, solvents, paints or other hazardous materials occurring during the maintenance activities, these spills need to be cleaned up	As and when maintenance occurs
• The construction camp, storage, washing and maintenance of equipment, storage of construction materials, or chemicals, as well as any sanitation and waste management facilities must be located outside the 1 in 100 year flood line or riparian habitat of a river. spring, lake, dam or outside any drainage feeding any wetland or pan, and is removed within 30 days after the completion of any works (*General Authorisation Condition*)	As and when maintenance occurs
• It must be ensured that equipment and machinery used as part of the maintenance of the DR 1797 Road is only operated within the delineated impact footprint *(General Authorisation Condition).*	As and when maintenance occurs
• It must be ensured that the footprint which may be impacted due to maintenance is clearly demarcated and that no vegetation is cleared or damaged beyond this demarcation	As and when maintenance occurs
• All machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum.	As and when maintenance occurs
• Precautions should be taken to avoid litter from maintenance crew from entering drainage lines and potentially causing blockages of the new culverts. Litter must be disposed of in a container marked for waste disposal such as a dustbin	As and when maintenance occurs
• Only conduct maintenance activities when necessary otherwise minimise the frequency of maintenance activities.	As and when maintenance occurs

4.1.2 *Sediment and Watercourse Maintenance*

Maintenance Requirements	Monitoring
• Under no circumstances may fill material to be used as construction material be excavated from watercourses or other local sources along the DR 1797 Road if these have not been approved officially (General Authorisation Condition).	As and when maintenance occurs
• Removed sediment must be disposed at an approved spoil site and must not be dumped along the DR 1797 Road.	As and when maintenance occurs
• If the new culverts are blocked by sediment buildup it must be removed without damaging the river banks and it is advised that an ecologist be consulted.	As and when maintenance occurs
• Trees must be pruned to prevent unnecessary damage to the overall health of each tree	Ad hoc monitoring
• No vegetation is cleared or damaged beyond demarcation points when maintenance is being done.	Ad hoc monitoring As and when maintenance occurs
• It must be ensured that adequate erosion control measures are implemented at and near all alterations, including existing structures or activities with particular attention to erosion control at steep slopes and drainage lines (General Authorisation Condition).	Ad hoc monitoring to ensure that effective regrowth of vegetation is occurring on rehabilitated areas and no erosion is occurring
• Limited work should occur within a river channel or a wetland and the disturbed area must be rehabilitated immediately if any disturbance has occurred due to the activity.	At all times during maintenance
• All alien invasive plants must be monitored and removed on a ongoing basis.	As and when maintenance occurs
• All reasonable measures should be undertaken to ensure that river maintenance activities minimise erosion. River banks must be kept clear of alien plants that concentrate flow and contribute to erosion, sediment release and channel blockages.	As and when maintenance occurs
• Remove debris causing the blocking of drainage openings.	As and when maintenance occurs

4.1.3 *Reinstatement of gravel approaches*

Maintenance Requirements	Monitoring
• Obtain input from a freshwater ecologist before finalising the method statement for reinstating gravel approaches damaged by flood action.	As and when maintenance occurs
• Reinstated gravel approaches must be confined to the authorised alignment and foot print.	As and when maintenance occurs
• Fill can be sourced from sediments stockpiled in the course of maintenance. Otherwise, fill must be brought in from approved sources. Under no circumstances may fill material be excavated from watercourses or other local sources if these have not been approved officially.	As and when maintenance occurs
• Consult a freshwater ecologist about adding additional venting (e.g. pipes, culverts) to repaired approaches. Venting must be confined to the physical 'footprint' of the replaced repaired approaches	As and when maintenance occurs

4.1.4 *Stockpiling of Sediment and Biota Maintenance Requirements*

Maintenance Requirements	Monitoring
• Fill material for maintenance activities can be sourced from sediments stockpiled in the course of maintenance. Otherwise, fill must be brought in from approved sources(General Authorisation Condition).	As and when maintenance occurs See Erosion Management Plan
• It must be ensured that measures are implemented to prevent the transfer of biota to a site, which biota is not Indigenous to the environment at that site (General Authorisation Condition).	Ad hoc monitoring
• Trees must be pruned to prevent unnecessary damage to the overall health of each tree	Ad hoc monitoring

4.1.5 *Monitoring of Maintenance*

Maintenance Requirements	Monitoring
• Monitoring must be done to identify areas where degradation of the aquatic and terrestrial environments in the immediate vicinity of the culverts has occurred to prevent further degradation.	As and when maintenance occurs
• Monitoring of each site must be carried out to ensure that disturbed areas are successfully rehabilitated to	Ad hoc monitoring to ensure that effective

an acceptable level in line with the Rehabilitation and Re-vegetation Management Plan	regrowth of vegetation is occurring on rehabilitated areas and no erosion is occurring
• Eradication and monitoring of alien plants must be done on an ongoing basis according to the Alien Invasive Management Plan	Ad hoc monitoring to ensure that alien vegetation does not infest construction areas.
• Upon completion of construction activities related to the water use, an Environmental Audit must be undertaken annually for three years to ensure that the rehabilitation is stable, failing which, remedial action must be taken to rectify any impacts (General Authorisation Condition)	Ad hoc monitoring to ensure that effective regrowth of vegetation is occurring on rehabilitated areas and no erosion is occurring

4.1.6 Noise Maintenance Requirements

Maintenance Requirements	Monitoring
• Maintenance personnel shall not make unnecessary noise such as hooting and shouting	As and when maintenance occurs
• Operational Hours: No works shall be executed between sunset and sunrise.	As and when maintenance occurs

4.1.7 Heritage Maintenance Requirements

Maintenance Requirements	Monitoring
• If any of the maintenance activities are within areas where archaeological resources have been identified the disturbance made by the maintenance must be kept to a minimum.	As and when maintenance occurs

5. Monitoring Post-construction

5.1 Environmental management objectives to inform monitoring

After the construction of the new culverts has been completed monitoring and environmental management must be done to identify when maintenance needs to be done to maintain the integrity of the culvert structures. The main objective of monitoring is to::

- Detect, advise and prevent further degradation of the aquatic and terrestrial environments in the immediate vicinity of the culvert structures;
- Re-establish the ecosystem through rehabilitation and ensure the rehabilitation has been done correctly.
- Report on the effectiveness of the rehabilitation to inform future projects of a similar nature.

6. Consultation with Government

CapeNature and the Department of Environmental Affairs will been consulted with as part of the Basic Assessment. The requirements indicated by the DEA&DP and Cape Nature need to be considered as part of the monitoring of the operations of the DR 1797 Road .

7. Conclusion

This Maintenance Management Plan will be for the duration of the operation phase of the project. It is advised that the maintenance manager for the road's department liaise with the ecologist of Cape Nature when maintenance activities are performed.