Western Cape Government
Environmental Affairs and Development Planning

Request for the relevant Competent Authority to define or adopt a Maintenance Management Plan for a watercourse in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), Environmental Impact Assessment Regulations, 2014 (as amended).

		(For official use only)
File Reference Number:		
Date Received by Department:		
Date Received by Component:		
Form Duly Signed and Dated:		Yes No

PROJECT TITLE

REPAIR OR REPLACEMENT OF BRIDGES AND CULVERT STRUCTURES ON TRUNK ROADS 3305, 3501, 5801, DIVISIONAL ROAD 2307 AND MAIN ROAD 584

1. SCOPE AND IMPORTANT INFORMATION

1) This document is to be used to ensure that the request for adopting or defining a Maintenance Management Plan (MMP) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) is undertaken to the sufficient standard and requirements as defined by the competent authority, the Department of Environmental Affairs and Development Planning of the Western Cape Government (henceforth the Department). It is advised that the determination of applicability regarding the scale of the proposed maintenance/management activity(ies) be undertaken through a pre-application consultation with the Department.

2) The geographical scope of the MMP is limited to watercourses as defined in the EIA Regulations, 2014(as amended). The document does not relate to coastal activities or activities to be undertaken in an estuary.

3) The use of this document for the development of a MMP for a watercourse **will only** be considered when the proposed maintenance activities constitute any one of the following listed activities identified in terms of the NEMA EIA Regulations, 2014 (as amended):

EIA Regulations Listing Notice 1 of 2014 (as amended)

- Activity 19, Listing Notice 1: The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving-

  (a) will occur behind a development setback;

(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;
(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;

(N.B. Points (d) and (e) does not apply as these activities fall within the coastal zone)

- Activity 27, Listing Notice 1: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-

ii. The undertaking of a linear activity; or
iii. Maintenance purposes undertaken in accordance with a MMP.

EIA Regulations Listing Notice 2 of 2014 (as amended)

- Activity 15, Listing Notice 2: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-

I. The undertaking of a linear activity; or
II. Maintenance purposes undertaken in accordance with a MMP.

- Activity 24, Listing Notice 2: The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but excluding where such extraction or removal is for the rehabilitation of wetlands in accordance with a MMP.

EIA Regulations Listing Notice 3 of 2014 (as amended)

- Activity 12, Listing Notice 3: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a MMP.

i. Western Cape

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
ii. Within critical biodiversity areas identified in bioregional plans;
iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or
v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.

(NB. Point iii does not apply as this activity falls within the coastal zone)

4) In deciding the request, the competent authority may define conditions related to auditing compliance with the MMP; monitoring requirements; reporting requirements, review; updating and amending the document and period for which the MMP is defined/adopted.

5) The purpose of the MMP is to maintain both man-made and ecological infrastructure in a manner that either improves the current state of, and/or reduces the negative impacts on a watercourse to ensure that ecosystems services are preserved/improved and to prevent further deterioration of the watercourse.

6) Notwithstanding the MMP possibly being defined or adopted by the Competent Authority, any other applicable statutory requirement must still be complied with (e.g. any obligations under the National Water Act, 1998 (Act 36 of 1998) or the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)).

7) The proponent must note that a MMP for a watercourse **must** be undertaken through consultation with the Department of Water and Sanitation and/or the relevant Catchment Management Agency (responsible water authority). This is to ensure compliance in terms of a Permissible Water Use as set out in the National Water Act, 1998 (Act No. 36 of 1998). It is recommended that this process for authorisation in terms of the National Water Act be clarified prior to the drafting and submission of the MMP.

8) The development of this document has been done in such a way so as to meet the requirements of both this Department as the competent authority in terms of the NEMA EIA Regulations, 2014 (as amended), as well as the requirements of the delegated water authority, regarding general authorisation considerations for sections 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998), to ensure alignment between the two authorities when defining or adopting the MMP.

9) In situations where a Water Use Licence Application (WULA) is required by the water authority regarding the proposed activities within a MMP, this will not prevent the proponent from submitting a request for a MMP to be defined or adopted by the Department.

10) Unless protected by law, all information contained in, and attached to this document, shall become public information on receipt by the competent authority.

11) A duly dated and originally signed copy of this document together with one hard copy and one electronic copy of the MMP must be posted, to the Department at the postal address given below, or delivered to the Registry Office of the Department.

12) A copy of the final defined/adopted MMP and cover letter **must** be submitted to the responsible water authority.

13) **NOTE: Adopting or defining the MMP does not absolve the proponent from complying with any applicable legislation or the general "duty of care" set out in Section 28(1) of the NEMA that states, *"Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*." (Note: When interpreting this "duty of care" responsibility, cognisance must be taken of the national environmental management principles contained in Section 2 of the NEMA.**

14) **NOTE: This document can be used as a template to assist in the information required and is to be filled out in full. The Department reserves the right to request any additional information during the initial development and submission of the draft MMP.**

15) **NOTE: The Department reserves the right to not adopt the MMP and require that an application be submitted to obtain Environmental Authorisation for the respective activities. Furthermore, consideration for the review should also be aligned to the periodic reviews of the General Authorisation for sections 21 (c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) to ensure continued alignment and compliance.**

2. MAINTENANCE MANAGEMENT PRINCIPLES

1) The following are overarching principles to be used by landowners and managers when considering the development and implementation of a MMP:

   a. The anticipation and prevention of negative impacts and risks, then minimisation, rehabilitation or 'repair', where a sequence of possible mitigation measures to avoid, minimize, rehabilitate and/or remedy negative impacts is explicitly considered;
   b. Avoid and reduce unnecessary maintenance;
   c. Maintenance and management of a watercourse must be informed by the condition of the physical and ecological processes that drive and maintain aquatic ecosystems within a catchment, relative to the desired state of the affected system;
   d. Management actions must aim to prevent further deterioration to the condition of affected watercourses and, overall, be guided by a general commitment to improving and maintaining ecological infrastructure for the delivery of ecosystem services;
   e. Managers and organs of state must identify, address and, where feasible, eliminate the factors that necessitate intrusive, environmentally-damaging maintenance; and
   f. A process of continuous management improvement be applied, namely Planning; Implementing; Checking (monitoring, auditing, determine corrective action) and Acting (management review).

2) The following table provides a simple overview for the determination of the need for a MMP:

	Question	**If the answer to any of the questions is YES, then a MMP may be applicable.**
2.1	Is there a watercourse on or adjacent to the property?	x
2.2	Has there been a history of flood damage or vandalism to the existing infrastructure or watercourse – erosion and/or sedimentation?	x
2.3	Is there infrastructure or any community at risk of being damaged by flooding?	x
2.4	Is the design of infrastructure considered inadequate in terms of managing the risk of flooding, erosion and/or sedimentation?	
2.5	Would you consider an improved design to existing infrastructure to reduce maintenance needs?	
2.6	Are there specific incidences where the watercourse is obstructed or blockages occur that alter the flow of the river during floods?	x
2.7	Is there an existing obstruction in the watercourse that has changed the flow of the river under normal conditions?	x
2.8	Is there a marked increase in the rate of erosion/sedimentation being experienced which threatens operations and assets?	x
2.9	Is there a presence of alien or bush encroachment vegetation within the watercourse and/or the presence of woody debris after flooding?	x

3) It is important to consider that the type of maintenance required will impact on the level of assessment needed in terms of the impact the activity will have on the system and how best to mitigate the impact. Types of maintenance can broadly be classified in the following categories, with recognition that maintenance activities vary across the rural and urban context:

Maintenance Category	Types of maintenance activities (examples only)
Category A: Sediment removal as a result of deposition or sediment deposition as a result of erosion	• Clearing sediment or placing sediment at: o Pump hole/trench o Return flow (irrigation) o Off-take weir o Stormwater outfall o Detention/retention ponds o Canalized urban rivers o Bridges, culverts and drifts • Prevent formation of islands in the channel of the river • Dredging of in-stream dams
Category B: Emergency repairs – urgent action required to manage risk and damage to assets	• Repair to erosion of river bank or servicing infrastructure (e.g. pipelines/roads) • Removal of material built up as a result of flooding/sedimentation and increasing risk to infrastructure • Address damage or replacement of infrastructure (e.g. bridge, pipeline, pump house) • Manage the condition of flood protection berms, and existing structures such as gabions, canalized and stormwater systems • Installing temporary gravel approaches at flood-damaged river crossings
Category C: Managing alien invasive and bush encroachment plant species	• Clearing of alien invasive vegetation out of a watercourse to reduce maintenance requirements as they relate to erosion and sedimentation • Management of indigenous species categorized as bush encroachment, to improve hydrological flow and reduce associated flooding impacts
Category D: Rehabilitation and restoration activities for maintaining ecological infrastructure	• Development and maintenance of ecological buffering systems to improve and/or restore functioning (e.g. wetlands and stormwater detention ponds) • Actively rehabilitating riparian zones through planting of locally indigenous species • Bank grading and movement/removal of berms and barriers to flow

4) The development of appropriate method statements to mitigate the impact of the maintenance needs, should be aligned within the framework of these considerations:

a. Watercourses experience a natural process of sedimentation and erosion, with varying rates depending on the geomorphology and the integrity of the land-uses within the catchment;

b. Manipulation of the watercourse results in increased erosion and/or deposition being experienced further downstream, perpetuating greater need for manipulation and more drastic and costly maintenance interventions;

c. Locally indigenous riparian and wetland vegetation assists in the stabilization of river banks through effective root structures, while contributing to improve in-stream habitat and water quality conditions;

d. Invasive alien and bush encroachment vegetation significantly impacts on the functioning of a watercourse, often leading to increased flood associated damage, with further implications and a reduction in water quality and availability;

e. Persons undertaking maintenance activities have a responsibility to ensure a sense of duty of care is applied as prescribed within NEMA Section 28(1).

5) It is recognized that within urban areas, sedimentation and erosion rates are significantly amplified as a result of development in urban areas and thus systems associated with watercourses in such areas can no longer be considered as 'natural'. In such a context, the drivers of such a process are often located outside the control of the landowner or responsible authority (i.e. Municipality). Therefore, the response taken to address the needs of a maintenance management plan for a watercourse within the urban environment may be limited in mitigating the requirement for maintenance to be undertaken.

3. REQUEST FOR THE COMPETENT AUTHORITY TO DEFINE OR ADOPT A MAINTENANCE MANAGEMENT PLAN FOR A WATERCOURSE IN TERMS OF THE NEMA, EIA REGULATIONS 2014 (AS AMENDED).

The following information must be submitted as part of the request for the competent authority to define or adopt the MMP:

4. PERSONAL DETAILS

Highlight the Departmental Sub-Region(s) in which the maintenance is to be undertaken. (mark the appropriate box with an 'X'). For Departmental details see Annexure A.

REGION 1 (City of Cape Town Metropolitan and West Coast District)	REGION 2 (Cape Winelands District, Overberg District)	REGION 3 (Eden & Central Karoo Districts)
☐	☐	☒

Name of person/authority who will undertake responsibility for the activity:	Western Cape Government: Department of Transport and Public Works		
Contact person (if other):	Mr Dirk Immelman		
Postal address:	P O Box 2603 Cape Town		
Telephone:	(021) 483-0580	Postal code:	8000
Fax:	None	Cell:	083 372 7660
Email:	Dirk.Immelman@westerncape.gov.za		
Name of person who has prepared the MMP:	Chameleon Environmental		
Contact Person (if other):	Dr Josephine Bothma		
Postal address:	P O Box 11788 Silver Lakes		
Telephone:	(012) 809-1704	Postal code:	0054
Fax:	086 6855 080	Cell:	082 571 6920
E-mail:	Ce.j@mwebbiz.co.za		
Name of landowner(s) on whose behalf the plan has been developed:*	Western Cape Government: Department of Transport and Public Works		
Contact person(s):	Mr Dirk Immelman		
Postal address:	P O Box 2603 Cape Town		
Telephone:	(021) 483-0580	Postal code:	8000
Fax:	None	Cell:	083 372 7660
E-mail:	Dirk.Immelman@westerncape.gov.za		

Municipality for proposed project:	Beaufort West Local Municipality
Farm name(s), erf(s) and portion number(s) etc*:	The TR3305 (N12), DR2307, MR584, TR3501 (R61) and TR5801 (R381) road reserves.
Magisterial District or Town:	Beaufort West
Municipality for proposed project:	Prince Albert Local Municipality
Farm name(s), erf(s) and portion number(s) etc*:	The TR3305 (N12), DR2307, MR584, TR3501 (R61) and TR5801 (R381) road reserves.
Magisterial District or Town:	Prince Albert
Name(s) of watercourse(s) in question:	The watercourses are mostly semi-perennial and highly season / ephemeral rivers and streams in the region of the study site (crossings).
***In instances where there is more than one landowner, please attach a list of landowners with their full names, contact details, farm name, farm number, portion number, Erf number, coordinates and signed declaration confirming approval for development and responsibility of the MMP**	

5. DECLARATION

THE PERSON THAT WILL BE UNDERTAKING THE MAINTENANCE

I Dirk Immelman, in my ~~**personal capacity**~~ or **duly authorised** (please circle the applicable option) by Western Cape Government, Department of Transport and Public Works (name of legal entity) thereto hereby declare that I/we:

- Request the MMP to be adopted by the Competent Authority;
- Regard the information contained herein to be true and correct for this Maintenance Management Plan;
- Am fully aware of my responsibilities in terms of the National Environmental Management Act of 1998 ("NEMA") (Act No. 107 of 1998) and that, notwithstanding the adoption of this MMP, I/we shall comply with any other statutory requirement applicable, which may include, but not limited to the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the National Water Act, 1998 (Act No. 36 of 1998) and the Environmental Impact Assessment Regulations, 2014 (as amended) ("EIA Regulations"), in terms of NEMA;
- Am fully aware that the proposed maintenance constitutes a listed activity in terms of the NEMA EIA Regulations, 2014 (as amended) and that an environmental assessment for environmental authorisation may be required for any other listed activities not included as part of this MMP;
- Acknowledge that any activity undertaken that does not form part of the defined and adopted MMP, will be subject to the Section 24(F) of NEMA and that appropriate enforcement and compliance requirements will follow;
- Shall undertake only those tasks described in the MMP, failing which environmental authorisation will be required, where applicable;
- Shall provide the competent authorities with access to all information at my disposal that is relevant to this request;
- Shall be responsible for any costs incurred in complying with environmental legislation;
- Hereby indemnify the government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of, inter alia, any loss or damage to property or person as a consequence of undertaking this MMP; and
- Am aware that a false declaration is an offence in terms of Regulation 48(1)(a) GN No. R. 982 of 4 December 2014 (as amended).

1 June 2021

Signature of the proponent: Date:

Western Cape Government, Department of Transport and Public Works

Name of institution/company:

* note all references made to the personal capacity of the signee in the bullet points should read the Western Cape Government Department of Transport and Public Works and its representatives where applicable.

6. BACKGROUND AND INTRODUCTION

The Western Cape Department of Transport and Public Works proposes to undertake repairs or replacements bridge and culvert structures located on the following roads:

- TR3305 (N12),
- DR2307,
- MR584,
- TR3501 (R61), and
- TR5801 (R381).

The structures fall within the TR3305 (N12), DR2307, MR584, TR3501 (R61) and TR5801 (R381) road reserves.

The structures will be subject to structural repair work and reinstatement or improvement of erosion protection.

The main objective for the repair or replacement of the water crossing structure, as identified and determined by engineers, is to limit the impact of overtopping, erosion, and sedimentation. This will be a positive long-term impact arising from the project on the watercourses.

This plan will aim to contribute to furthering sustainable practices and reducing and/or mitigating the need for maintenance by reducing erosion on the river banks and clearing of alien vegetation at the structures.

The repair and replacement of the structures offer several benefits to society in general, including:

- Safer driving conditions for the road users;
- Less traffic accidents and associated loss of lives;
- Improved drainage and other services;
- Less traffic congestion and driver frustration.
- Employment opportunities for the local residents and small businesses during construction and operation.

a. This MMP was prepared by:

(i) Name of the Practitioner

Dr Josephine Bothma, Chameleon Environmental
Tel No.: 012 809-1704 or 082 571 6920
Fax No.: 086 6855 080
e-mail address: ce.j@mwebbiz.co.za

(ii) Expertise of the EAP

(1) **The qualifications of the EAP**

PhD in Environmental Management. Please find proof of qualifications of EAP in Appendix A of the EIA Report.

(2) **Summary of the EAP's past experience**
(Please refer to Appendix 1 for EAP's curriculum vitae).

The EAP that prepared this report is Dr J Bothma from Chameleon Environmental. The Environmental Assessment Practitioner (EAP) has the appropriate skills and experience to undertake the required studies for the proposed project. Dr Bothma has:

- Experience in undertaking environmental studies for linear development projects. The EAP has specific experience in EIAs for National Roads for the South African National Roads Agency Soc Limited and other clients.
- Experience in environmental studies for borrow pits and quarries.
- The EAP is registered as an Environmental Assessment Practitioner with EAPSA with registration number 0082/06.
- Proven ability to timeously produce thorough, readable and informative documents.
- Adequate recording and reporting systems to ensure the preservation of all data gathered.
- A good working knowledge of all relevant and applicable policies, legislation, guidelines, norms and standards.
- The EAP does not have any links to engineering firms, construction companies, or financial institutions, and would be able sign the required declarations of independence to be submitted to the relevant environmental authorities.

Dr Bothma has a PhD in Environmental Management with extensive experience in the environmental field. She was previously the Environmental Manager for the South African National Roads Agency Soc Limited where she was responsible for the management of the environmental section at the Agency and consequently has gained extensive experience in project management and EIAs for major national road projects. Dr Bothma is a founder member of Chameleon Environmental since August 2006, a specialist environmental consulting company based in Pretoria, South Africa but operates nationwide. The company provides a broad range of environmental consulting services to the public and private sectors.

She has:

- Thirty-one (31) years' experience in the environmental field;
- Twenty-one (21) years' experience in Project Management;
- Project management of large environmental assessment and environmental management projects.

Please see CV in Annexure B.

7. IMPLEMENTATION OF THE MMP

Implementation of this MMP requires the involvement of several stakeholders, each fulfilling a different but vital role as outlined herein, to ensure sound environmental management during the construction phase of a project. Copies of this MMP shall be kept at the site office and must be distributed to all senior contract personnel who shall familiarise themselves with its contents.

(a) The Employer

The Employer is the holder of authorisations issued by the relevant environmental regulating authorities responsible for authorising and enforcing environmental compliance. The Employer and anyone acting on the Employer's behalf is accountable for the potential impacts of the activities that are undertaken and is responsible for managing these impacts.

(b) The Engineer

The engineer has been appointed by, and acts for, the Employer as its on-site implementing agent and carries the responsibility to ensure that the contractor undertakes its construction activities in such a way that the Employer's environmental responsibilities are not compromised.

The engineer will, within seven days of receiving a contractor's request for approval of a nominated Designated Environmental Officer (DEO), approve, reject or call for more information on the nomination. The engineer will be responsible for issuing instructions to the DEO where environmental considerations call for action to be taken.

If in the opinion of the engineer the DEO is not fulfilling his/her duties in terms of this EMPr, the engineer may, after discussion and agreement with the Employer, exercise his powers under FIDIC condition of contract clause 6.9 and instruct replacement of the DEO in writing and with stated reasons.

(c) The Contractor

The contractor is responsible for project delivery in accordance with the prescribed specifications, among which this MMP shall be included.

The contractor shall receive and implement any instruction issued by the engineer relating to compliance with the MMP including the removal of personnel or equipment.

Compliance with the provisions contained herein or any condition imposed by the environmental approvals shall become the responsibility of the contractor through an approved Designated Environmental Officer (DEO). The contractor shall nominate a person from among his site personnel to fulfil this function and submit to the engineer for his approval the curriculum vitae of the proposed DEO. This request for approval shall be given, in writing, at least fourteen days before the commencement of any construction activity clearly setting out reasons for the nomination, and with sufficient detail to enable the engineer to make a decision.

(d) The Designated/Dedicated Environmental Officer (DEO)

Once a nominated representative of the contractor has been approved he/she shall become the DEO and shall be the responsible person for ensuring that the provisions of this EMPr are complied with during the life of the contract. The DEO shall submit regular written reports to the engineer, but not less frequently than once a month.

The DEO may undertake other construction duties unless the Appendix to Tender prescribes this position as 'dedicated' as opposed to the standard position being 'designated'. However, the DEO's environmental duties shall hold primacy over other contractual duties and the engineer has the authority to instruct the contractor to reduce the DEO's other duties or to replace the DEO if, in the engineer's opinion, he/she is not fulfilling his/her duties in terms of the requirements of this EMPr. Such instruction will be in writing clearly setting out the reasons why a replacement is required.

As a minimum the DEO shall have an accredited diploma qualification in environmental or natural sciences or equivalent. Alternatively, the DEO shall have a minimum of 2 years' experience in a similar role in construction or other environmental regulatory field.

In addition to the compliance duties relating to MMP the DEO shall also provide full cooperation whenever the contractor is subjected to regular environmental audits.

(e) Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is an independent environmental specialist appointed by the engineer to objectively and regularly monitor the contractor's implementation of this EMPr and the EMPr as may be determined by the sensitivity of the project or by conditions of authorisations. These are 'internal' audits and the regularity determined by the environmental approvals, usually once a month. Other ad hoc or 'external' audits ordered by the Employer may be conducted by other environmental specialists.

8. DEFINITIONS OF TERMS AND ACRONYMS

a. DEFINITIONS

"Alien Vegetation": undesirable plant growth which includes, but is not limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA), 1983 regulations. Other vegetation deemed to be alien are those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

"Activity" means an activity identified in any notice published by the Minister or MEC in terms of section 24D(1)(a) of the Act as a listed activity or specified activity. Activity in this document refers to the activities as listed in Listing Notice 1, 2 and 3 of the Environmental Impact Assessment Regulations, 2014 (as amended).

"Bush Encroachment" means stands of plants of the kinds specified in column 1 of Table 4 of the Conservation of Agricultural Resources Act (Act No. 43 of 1983) where individual plants are closer to each other than three times the mean crown diameter.

"Diverting" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, cause the instream flow of water to be rerouted temporarily or permanently.

"Environment": the surroundings within which the contract exists and comprises land, water, atmosphere, micro-organisms, plant and animal life (including humans) in any part or combination thereof as well as any physical, chemical, aesthetic or cultural inter-relationship among and between them..

"Environmental Aspect": any component of a contractor's construction activity that is likely to interact with the environment.

"Environmental authorisation": a written statement from the DEADP recording its approval of an application for a planned undertaking that triggers listed activities in the Environmental Impact Assessment (EIA) regulations of the National Environmental Management Act (NEMA).

"Environmental Impact": any change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

"Ecological Infrastructure" refers to naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction.

"Estuary" has the meaning assigned to it in the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008)

"Flood event" is the event where land is inundated by the overflowing of water from a river channel and where this event causes significant damage to infrastructure or results in watercourse erosion and/or sediment deposition.

NOTE that flooding can be a natural phenomenon in many river or wetland systems which, due to encroachment and human modification of the form and function of the affected system, may have evolved into a potential hazard to life or property.

"Flow-altering" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, alter the instream flow route, speed or quantity of water temporarily or permanently.

"General Authorisation" in this document refers to the General Authorisation in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) or Section 21(i) (GN. 509 of 26 August 2016).

"Impeding" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently, but excludes the damming of flow so as to cause storage of water.

"Indigenous vegetation" refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

"Maintenance" means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

"Maintenance Management Plan" means a management plan for maintenance purposes defined or adopted by the competent authority.

"**River Management Plans**" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), any river management plan developed for the purposes of river or storm water management in any municipal/metropolitan area or described river section, river reach, entire river or sub quaternary catchment that considers the river in a catchment context.

"River reach", a length of river characterised by a particular channel pattern and channel morphology, resulting from a uniform set of local constraints on channel form. A river reach is typically hundreds of meters in length.

"Stretch" a section of watercourse, delineated between two or more mapped coordinates, within which proposed maintenance activities are to take place as guided by a MMP.

"Thalweg" refers to the line of lowest elevation within a valley or watercourse.

"Watercourse" means:

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and
a reference to a watercourse includes, where relevant, its bed and banks.

"Wetland" means, land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

b. ACRONYMS

CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
DEADP	Department of Environmental Affairs and Development Planning
DEO	Designated Environmental Officer
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EAP	Environmental Assessment Practitioner
GA	General Authorisation, in terms of the National Water Act, 1998 (Act No. 36 of 1998)
GN	Government Notice

IB	Irrigation Board
IBA	Important Bird Area(s)
MEC	Member of Executive Council
MMP	Maintenance Management Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PDA	Primary Drainage Area
PES	Present Ecological State
QDA	Quaternary Drainage Area
REC	Recommended Ecological Category (or Class)
REMC	Recommended Ecological Management Category (or Class)
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks Authority
SWSA	Strategic Water areas of South Africa
TOPS	Threatened or Protected Species
WMA	Water Management Areas
WUA	Water Users Association
WULA	Water Use Licence Application

9. ENGAGEMENT PROCESS

a. AUTHORITY ENGAGEMENT

Please indicate (with an 'x') which of the following authorities have been consulted to provide input based on the proposed maintenance activities:

X Department of Water and Sanitation
X Catchment Management Agency
⊟ CapeNature
⊟ SANParks
⊟ Western Cape Department of Agriculture, Directorate: Sustainable Resource Management
X District Municipality
X Local Municipality
X Irrigation Board / Water Users Association
X Heritage Western Cape
⊟ Department of Agriculture, Forestry and Fisheries
⊟ Department of Environmental Affairs & Development Planning
X Other (please list):

SAHRA – South African Heritage Resources Agency

For each of the indicated authorities, please provide an explanation as to their required involvement. Details of interactions with each of the respective authorities should be captured by providing an attendance register and minutes of meetings attended with the authority in question. Comments received from the authorities must be submitted and referenced within the final application.

10. PUBLIC PARTICIPATION

You are required to notify any and all potential interested and affected party(ies) of the proposed activity(ies) and allow them the opportunity to comment on the MMP for a watercourse. The detail required is outlined below, however this can be further discussed and determined as part of the pre-consultative meeting with the Department, which would ensure due diligence and good governance principles are applied.

It is noted, that for the development of MMPs for watercourses within the urban area, by Municipalities, public notice can be undertaken through the advertisement of the development of a MMP within local/community newspapers for the respective areas, with the relevant evidence of such an advertisement included in the final submission.

The following public participation recommendations, regarding the different scale or geographical extent of the request, are as follows. If no, then motivation must be given as to why a particular process was not undertaken.

Single property / maintenance and management activities along a watercourse occurring along a stretch of no more than 1 kilometer (≤1000 meters):

(i) Given written notice to the owner or person in control of that land if the person undertaking the maintenance activity is not the owner or person in control of the land.	***Yes / ~~No~~***	***Evidence to be letter from landowner acknowledging development of MMP.***
(ii) Given written notice to adjacent landowners (up to 500m upstream and downstream from furthest upstream and downstream maintenance site and opposite side of the banks) of the development of the MMP.	***Yes / ~~No~~***	***Evidence to be dated letters addressed to landowner and/or manager of adjacent properties.***
(iii) Stakeholder meeting held for adjacent landowners, in which MMP is presented. This must include an opportunity for adjacent landowners to provide comment.	***Yes / ~~No~~***	***Evidence will consist of meeting requests, attendance register of said meeting, minutes / notes of the meeting, and comments provided.***
(iv) Given written notice to any organ of state having jurisdiction in respect of any aspect of the activity(ies) proposed within the development of the MMP.	***Yes / ~~No~~***	***Evidence will include relevant dated letters to the relevant government agencies and departments.***
(v) Provided written notice and confirmation to the relevant Water Users Association (WUA) or Irrigation Board (IB) of the development of the MMP, if applicable.	***Yes / ~~No~~***	***Evidence to be dated letter(s) to management body (secretary and chairperson) for the WUA/IB.***

Single or Multiple properties / WUA / IB / local authority applying for a single MMP to cover a stretch of a watercourse <u>longer than 1 kilometer (>1000 meters) OR</u> a catchment or sub-catchment area

(i)	Given written notice to the owner(s) or person(s) in control of the land if the person(s) undertaking the maintenance activity(ies) is not the owner or person in control of the land.	***Yes / ~~No~~***	***Evidence to be letter from landowner acknowledging development of MMP.***
(ii)	Given written notice to non-participating adjacent landowners (up to 1km upstream and downstream from furthest upstream and downstream maintenance site and opposite side of the river banks) of the development of the MMP. This must also include general notice to adjacent WUA or IB of the proposed MMP development if application is made by a WUA or IB.	***Yes / ~~No~~***	***Evidence to be dated letters addressed to landowner and/or manager of adjacent properties.***
(iii)	Stakeholder meeting held for all participating and non-participating landowners, in which details and methodology of MMP is presented. A minimum of two meetings are required, to present on the development of the plan and a final draft version of the plan.	***Yes / ~~No~~***	***Evidence will consist of meeting requests, attendance register of said meeting, minutes/ notes of the meeting, and comments provided.***
(iv)	Given written notice to any organ of state having jurisdiction in respect of any aspect of the activity(ies) proposed within the development of the MMP.	***Yes / ~~No~~***	***Evidence will include dated letters to the relevant government agencies and departments.***
(v)	Provide written notice and confirmation to the relevant Water Users Association (WUA) or Irrigation Board (IB), of the development of the MMP (if a MMP is not requested and managed through a WUA/IB).	***Yes / ~~No~~***	***Evidence to be dated letter(s) to management body (secretary and chairperson) for the WUA/IB.***
(vi)	Describe any other measures taken to inform the public about this MMP. A complete list of measures that are in place to deal with interactions with the public, if it becomes necessary and required by the competent authority during implementation of the project, must be provided for.	***Yes / ~~No~~***	***Evidence to be referenced accordingly based on the measures taken and/or developed.***

Kindly note, the Department may request further or allow reduced requirements for public participation, noting the specific circumstances applied to each request to define or adopt an MMP. Please include or delete the respective sections as agreed to with the Department in the pre-consultative meeting, with supporting evidence of this agreement included.

Please circle the appropriate answer above to indicate the public participation process that has been followed to give notice of this request to potential interested and affected parties and attach any comments and/or objections received, with evidence provided and referenced.

11. DATA COLLECTION AND ASSESSMENT

***Note**: Information relating to the specifications and Terms of Reference used for the appointment of all specialist inputs must be provided.*

Information required for *maintenance and management activities for a single/ multiple owner along a watercourse.*

11.1 Provide a map (at an appropriate scale) of the watercourse or stretch of watercourse being applied for within the stretch where maintenance activities will take place being clearly defined – consideration must be made to mapped features relating to Critical Biodiversity Areas (CBAs) and National Freshwater Ecosystem Priority Areas (NFEPAs).

Please find a map attached as Annexure C.

11.2 GPS coordinates must be provided for all site(s) at which maintenance activities will take place and included on the map which defines the stretch of watercourse. Coordinates must be provided in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 co-ordinate system. Where numerous properties/sites are involved (e.g. linear activities), you may attach a list of property descriptions and co-ordinates to this form.

Please find a list of coordinates attached as Annexure D.

11.3 Specialist assessment to be undertaken to determine (NOTE: information relating to the specifications and Terms of Reference used for the appointment of all specialist inputs must be provided):

a. Hydrological (incl. flood hydrological data etc.) and geomorphological assessment of watercourse functioning;

Hydrological data was not collected on all the structures but just the most important ones. Please find the hydrological data for the main structures included in Annexure E.

11.4 The relevant Present Ecological Status (PES) of the stretch of watercourse in question, if not available an assessment is to be done to determine PES in accordance with the Department of Water and Sanitation (DWS) guidelines;

Specialist studies were undertaken by Flori Scientific Services (Aquatic and Ecological), Dr J van Schalkwyk (heritage) and Dr H Fourie (Paleontological). Please find the terms of reference included as **Annexure I**.

Information from Aquatic study:

All watercourses identified and delineated within the study area were assessed to determine their Present Ecological State (PES) (Table 1 and Table 2, below). The assessment criteria and structure are based on the modified Habitat Integrity approach of Kleynhans (1996, 1999). The PES is calculated by looking at the hydrology, geomorphology, water quality and biota of each watercourse. Of importance is the overall PES of the system.

The watercourses assessed have little to no impacts (on the watercourse) and are just within a Category A (Un-modified, natural condition). Most of the watercourses were not in or near any settlements. Except potentially for grazing (no animals were seen) the only impacts are from road itself and the crossings. The impact of the structures at the crossing were taken into consideration in the determination of the PES, but these impacts basically were only seen immediately around the structure (bridge, major culvert, or culvert itself).

The only watercourse of concern with a lower PES was the Kuis. The Kuis flows through a dam on the East side of Beaufort West, and then flows through Beaufort West. The Kuis was classified (separately) with a PES of a C.

Table 1: PES of Watercourses Along the TR3305 (N12)

Criteria	Identified Watercourses					
	Gamka	**Boeteka**	**Plaatjies & Ongeluks**	**Amos**	**Kapteins-kraal**	**Groot**
HYDROLOGY						
Flow modification	4	4	4	4	4	4
Permanent inundation	4	4	4	4	4	4
WATER QUALITY						
Water Quality Modification	4	4	4	4	4	4
Sediment Load Modification	4	4	4	4	4	4
GEOMORPHOLOGY						
Canalisation	4	4	4	4	4	4
Topographic Alteration	5	5	5	5	5	5
BIOTA						
Terrestrial Encroachment	5	5	5	5	5	5
Indigenous Vegetation Removal	5	5	5	5	5	5
Invasive Plant Encroachment	5	5	5	5	5	5
Alien Fauna	4	4	4	4	4	4
Over utilisation of Biota	4	4	4	4	4	4
Total:	48	48	48	48	48	48
Average:	4.4	4.4	4.4	4.4	4.4	4.4
Category:	**A**	**A**	**A**	**A**	**A**	**A**
Description	**Un-modified, natural condition**	**Un-modified, natural condition**	**Un-modified, natural condition**	**Un-modified, natural condition**	**Un-modified, natural condition**	**Un-modified, natural condition**
Recommended EMC	**A**	**A**	**A**	**A**	**A**	**A**

Table 2: PES of Watercourses Along the R407, Blythe Street, R381, R61 & Unnamed Road

Criteria	Identified Watercourses				
	Gamka	**Gamka (Source)**	**Groot**	**Steyns**	**Kuis**
HYDROLOGY					
Flow modification	4	4	4	4	3
Permanent inundation	4	4	4	4	3
WATER QUALITY					
Water Quality Modification	4	4	4	4	3
Sediment Load Modification	4	4	4	4	3
GEOMORPHOLOGY					
Canalisation	4	4	4	4	2
Topographic Alteration	5	5	5	5	2
BIOTA					
Terrestrial Encroachment	5	5	5	5	2
Indigenous Vegetation Removal	5	5	5	5	2
Invasive Plant Encroachment	5	5	5	5	3
Alien Fauna	4	4	4	4	4
Over utilisation of Biota	4	4	4	4	4
Total:	48	48	48	48	31
Average:	4.4	4.4	4.4	4.4	2,8
Category:	**A**	**A**	**A**	**A**	**C**
Description	**Un-modified, natural condition**	**Un-modified, natural condition**	**Un-modified, natural condition**	**Un-modified, natural condition**	**Moderately modified**
Recommended EMC	**A**	**A**	**A**	**A**	**C**

(Source: Flori Scientific Services, 2021)

11.5 What is the reason/cause for the maintenance activities based on an ecological and hydrological assessment of the watercourse within the context of the larger catchment;

The main objective for the repair replacement of the water crossing structure, as identified and determined by engineers, is to limit the impact of overtopping, erosion, and sedimentation.

11.6 What are the drivers of system functioning within the watercourse and what is the ecological objective – based on historical condition and PES;

The drivers on the watercourses are twofold. Firstly, the ecological drivers that create the present ecosystem of the watercourse, which are: hydrology; water quality, geomorphology, habitat, and biota. Secondly the drivers that can be seen as those impacts (many of which can be anthropogenic in nature) that change the watercourse and determine or set the present ecological state (PES) of the watercourse.

The watercourses are mostly in a fairly natural state (PES Category A), except for Kruis River, which is in a moderate state (PES Category C). However, due to the very dry and aridness of

the region, with very low rainfall, the main driver is the occasional rainfall in the form of surface water run-off (the hydrology). Even so, for the most part even during rainfall the small streams and rivers hardly flow and almost never end-to-end. Only a little ponding here and there. Water quality, when water is present, is fairly good due to low the levels of urbanisation and agricultural cultivation along watercourses. Due to the low precipitation and high evaporation rates, small saltpans are common which also lead to the present characteristics of the watercourses in the region. Biota is not a dominant driver, due to the fact that the watercourses are not perennial, or even semi-perennial, in nature. There are therefore low levels and richness of aquatic biota.

Geomorphology is an important driver in the mountainous areas north of Beaufort West and the Swartberg Mountain Range. It is in these regions that there are the Strategic Water Source Areas in terms of surface water run-off.

Habitat, in terms of riparian vegetation / zones and in-stream aquatic habitats are both not important drivers. There are no distinctive riparian zones, and the vegetation present is mostly made up of slightly denser terrestrial species.

Drivers of ecological change

Most of the drivers of ecological change on rivers in South Africa are high levels of urban encroachment on watercourse edges; encroachment of cultivated farmlands and also resulting fertilizer enrichment into rivers; and siltation due to denuding and destruction of riparian vegetation and adjacent terrestrial vegetation. In the case of the watercourses in the study site, most of these negative impacts and drivers are low, due to lack of urbanisation and cultivation agriculture. The main areas where these drivers are present are in and around Beaufort West.
(Source: Flori Scientific Services, 2021)

11.7 What is the management objective given the ecological status of the watercourse based on historical and PES data; as set out in agreement with the person(s) responsible for undertaking the maintenance activities;

The main objective for the repair or replacement of the water crossing structure, as identified and determined by engineers, is to limit the impact of overtopping, erosion, and sedimentation.

11.8 What is the impact on the watercourse/river system (resource quality characteristics: flow regime, geomorphology, water quality, habitat and biota) for a minimum of 500m both up and downstream of the proposed maintenance activities, with the mitigation measures included;

Please find a table included in Annexure F.

11.9 An appropriate assessment for risk for each of the proposed types of maintenance activities and linked management actions in terms of the risk matrix for General Authorisations (GA) of Section 21 (c) and (i) by the DWS (GN 509 of 2016) or where applicable.

Please find the risk assessment included in Annexure G.

11.10 Mapped biodiversity features such as Critical Biodiversity Area, Ecological Support Area, National Freshwater Ecosystem Priority Area (NFEPA), and the National list of Ecosystems that are threatened and in need of protection (2011) gazetted in terms of Section 52 of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), the Western Cape Biodiversity Spatial Plan 2017, as well as relevant provincial specific plans and classifications etc. Please consult the website www.bgis.sanbi.org.za to determine mapped features.

The Western Cape Biodiversity Spatial Plan (2017) was taken into consideration. All watercourses in the area are delineated as ecological support areas (ESAs). There are no critical biodiversity areas (CBAs) directly within the footprint of the study site. That is, the actual crossings earmarked for upgrade. There are sensitive areas that contractors still need to be aware (even if only working on the road or within the road reserve). These include roads close to or within the Karoo National Park and roads in the south along the lower N12 and R407. Please refer to Annexure C for the map.

11.11 Include a description of existing or previous protection measures or reinforcements (eg. gabions or groynes etc.) and infrastructure. Describe any evidence of erosion and/or siltation at the various sites and outlining possible causal factors and maintenance practices.

Evidence of erosion, siltation and alien vegetation is present at the structures. Gabion baskets will be constructed at some of the structures to curb possible erosion in future.

11.12 Provide historical maps and data (images/flow/water quality/land use) of the river channel (if available) in order to assess the natural to changing flow patterns of the watercourse to determine cause of maintenance and possible impact of the maintenance activities, to inform mitigation measures.

There are no historical data available.

11.13 Provide a photographic record for the condition of the riparian habitat around maintenance sites, with the presence of important and/or sensitive habitat/species noted.

Please find photographs of the structure in Annexure H.

11.14 For sites prone to flood damage, a description regarding the history and effect of past floods and include dates of most recent events must be provided. This must inform the process to understand what actions are required along the stretch of the watercourse to reduce such impacts to the resource quality characteristics.

Some of the structures are prone to flood damage that causes the roads to flood with associated traffic accidents. However, there are no dates of recent events available. The main objective for the repair or replacement of the water crossing structure, as identified and determined by engineers, is to limit the impact of overtopping, erosion, and sedimentation. This will be a positive long-term impact arising from the project on the watercourses.

11.15 Explain the risks associated with the no-go option for the MMP i.e. the risk of not undertaking the maintenance activities as stated in the MMP.

Should the structures not be repaired and cleaned, they will deteriorate further and the road users on the roads could experience increasingly unsafe driving conditions as it is anticipated that the roads could be flooded regularly during the rainy season.

The repair of the culverts will also accommodate the predicted increase in traffic volume and avoid high driver frustration. The current high volumes of heavy vehicle traffic are a major safety and capacity concern. The volume of heavy vehicles are expected to increase significantly over the next 20 years. If the culverts are not repaired and cleaned, it is anticipated that accidents on this road will increase in future. This could result in an increase in injury and death of the travelling public and an increase in health care costs.

11.16 Reference must be made to any strategic plan where available, for example, a Catchment Management Strategy, with the objectives of the MMP shown to be in alignment with such plans.

The Study area is situated within the Primary Drainage Area (PDA) of J (five QDA) and L (one QDA). The Study area covered the Quaternary Drainage Areas (QDA) of J21A, J21B, J21C, J32A, J33C and L12A. The Study area is within the Mzimvubu-Tsitsikamma Water Management Areas (WMA), WMA 7, with the Major rivers which include the Mzimvubu, Mtata, Mbashe, Buffalo, Nahoon, Groot Kei and Keiskamma, Fish, Kowie, Boesmans, Sundays, Gamtoos, Kromme, Groot and Tsitsikamma. The proto-Mzimvubu-Tsitsikamma Catchment Management Agency (CMA) will manage the WMA.

Table 3, below, gives a summary of the catchment / drainage area information for the study site.

Table 3: Summary of Catchment Area information

Level	Category
Primary Drainage Area (PDA)	J & L
Quaternary Drainage Area (QDA)	J21A, J21B, J21C, J32A, J33C and L12A
Water Management Area (WMA) – New (as of Sept. 2016)	Mzimvubu-Tsitsikamma (WMA 7)
Sub-Water Management Area	Gamka (J3) & Sout (L1)
Catchment Management Agency (CMA)	Mzimvubu-Tsitsikamma (CMA 7)
Wetland Vegetation Ecoregion	Lower Nama Karoo & Rainshadow Valley Karoo
RAMSAR Site	No
Wetland FEPA	No
Fish FEPA	No
Fish FSA	No
Fish Corridor	No
Fish Migratory	No
Priority Quaternary Catchment	No
National Strategic Water Source Area (SWSA)	No
Provincial important Water Source Area (WSA)	No
Priority Quaternary Catchment	No

(Source: Flori Scientific Services, 2021)

12. METHOD STATEMENT

12.1 Culverts Repairs

The method statement for the repair of the culverts is the following:

- Provide for erosion protection behind wingwalls where erosion has occurred, in the form of stone pitching (subject to the requirements of COLTO 5100):
  - Delineate area subject to the stone-pithing,
  - Clear of vegetation,
  - Compact excavation floor,
  - Stone shall be prepared and packed according to the methods described in COLTO standard specifications.
- Provide scour protection to damaged foundations founded on rock, in the form of mass concrete and dowels:
  - Clear the affected area an install formwork,
  - Drill holes to insert dowel bars,
  - Cast concrete in-situ.
  - Remove formwork and finish area.
- Provide scour protection to foundations in the form of riprap:
  - Delineate area subject to the riprap
  - Clear of vegetation,
  - Compact excavation floor,
  - Rip rap shall be prepared and packed according to the methods described in COLTO standard specifications.
- Repair damaged headwalls:
  - Delineate area subject to repair
  - Demolish concrete or stone work,
  - Prepare are subject to repair for additional reinforcement if necessary,
  - Cast in-situ concrete to reinstated demolished area.
- Provide concrete side drains where required and erosion is taking place (subject to the requirements of COLTO Section 2300):
  - Excavate where side drain is to be located,
  - Compact the excavations floor,
  - Install formwork and mesh reinforcement,
  - Cast concrete in alternating panels,
  - Cut joints and seal with silicone sealant,
- Clear vegetation within cell, inlets, outlets and cells.
  - Clearing of vegetation by means of hand and mechanical equipment.
- Clear siltation within cell, inlets, outlets and cells.
  - Clearing of vegetation by means of hand and mechanical equipment.
- Repair spall concrete where required as per project specifications:
  - Mechanically remove spalled material from structure using abrasive nozzle up to depth where the structural integrity of the concrete is sufficient and exposed reinforcement is clear.
  - Cleaned reinforcement steel with an anti-corrosive coating.
  - Apply epoxy mortar of shrinkage compensated cementitious repair grout.
- Crack injection to decks, cell walls and wingwalls:
  - Repair crack to COLTO Section F124000 F-Series Repair system 1 or alternative approved by Engineer.

- Reshape and protect waterway embankment with gabion boxes at outlets:
    - Clear vegetation and perform necessary excavations to prepare area for gabion boxes.
    - Construct gabion boxes in terms of the Western Cape Government Standards and as per the requirements of COLTO Section 5200.
    - Reshape watercourse to provide effective drainage and limit future erosion.

12.2 Bridge Repairs

The method statement for the repair to the bridges is the following:

- Provide for erosion protection behind wingwalls where erosion has occurred, in the form of stone pitching (subject to the requirements of COLTO 5100):
    - Delineate area subject to the stone-pithing,
    - Clear of vegetation,
    - Compact excavation floor,
    - Stone shall be prepared and packed according to the methods described in COLTO standard specifications.
- Provide concrete chutes or downpipes where excess roadway runoff needs to be drained to the watercourse:
    - Concrete chutes or downpipes to be constructed according to the Western Cape Government standard.
- Reshape and protect waterway embankment with gabion boxes at outlets:
    - Clear vegetation and perform necessary excavations to prepare area for gabion boxes.
    - Construct gabion boxes in terms of the Western Cape Government Standards and as per the requirements of COLTO Section 5200.
    - Reshape watercourse to provide effective drainage and limit future erosion.
- Repair damaged wingwalls:
    - Delineate area subject to repair
    - Demolish concrete or stone work,
    - Prepare are subject to repair for additional reinforcement if necessary,
    - Cast in-situ concrete to reinstated demolished area.
- Provide scour protection to damaged foundations founded on rock, in the form of mass concrete and dowels:
    - Clear the affected area an install formwork,
    - Drill holes to insert dowel bars,
    - Cast concrete in-situ.
    - Remove formwork and finish area.
- Crack injection to wingwalls, deck soffits and abutment walls:
    - Repair crack to COLTO Section F124000 F-Series Repair system 1 or alternative approved by Engineer.
- Fill scoured areas and reinstate damaged invert slabs:
    - Remove vegetation and box cut area to allow backfilling in layers of 150mm thick.
    - Add gabion, stone pitching or rip rap to address future scouring.
- Clear siltation within cell, inlets, outlets and cells.
    - Clearing of vegetation by means of hand and mechanical equipment.
- Provide scour protection to foundations in the form of riprap:
    - Delineate area subject to the riprap
    - Clear of vegetation,
    - Compact excavation floor,

    - Rip rap shall be prepared and packed according to the methods described in COLTO standard specifications.
- Repair spall concrete where required as per project specifications:
    - Mechanically remove spalled material from structure using abrasive nozzle up to depth where the structural integrity of the concrete is sufficient and exposed reinforcement is clear.
    - Cleaned reinforcement steel with an anti-corrosive coating.
    - Apply epoxy mortar of shrinkage compensated cementitious repair grout.
- Clear vegetation within cell, inlets, outlets and underneath deck.
    - Clearing of vegetation by means of hand and mechanical equipment.

12.3 Replacement of Culverts

The method statement for the replacement of culverts is the following:

- Temporary diversion of water course.
- Demolition of existing structure.
- Excavation to required founding depth.
- Remove and replace unsuitable founding material with compacted G6 material; OR prepare surface of rock to be founded on.
- Cast blinding layer on compacted G6 material or exposed rock.
- Placement of reinforcement and formwork for foundations and slabs.
- Cast concrete for foundations and slabs, and allow for suitable curing time and procedures.
- Placement of reinforcement and formwork for walls.
- Cast concrete for walls, and allow for suitable curing time and procedures.
- Placement of staging, formwork and reinforcement for top slabs.
- Cast concrete for slabs, and allow for suitable curing time and procedures.
- Filling behind structure using fill from excavations and/or imported fill.
- Complete road layer works behind and over structure top slabs.
- Complete road surfacing.
- Construct flood protection (stone pitching, gabions) where necessary.
- Shaping the natural ground around the new structure.

13. TIME PERIOD

The maintenance of the structures will be undertaken annually before the winter season. However, if there is a major flood event, debris will be removed from the structures.

14. IMPACT MANAGEMENT

14.1 Culvert and Bridge Structures

The following management measures shall be implemented for culvert and bridge structures:

- Bridge structures and culverts shall be regularly cleaned and cleared of all debris to maintain flood clearance (to avoid blockages) as well as flood width (to minimise backwater effects).
- Where required the culvert/bridge's bed shall be reshaped and trimmed to allow for proper water movement and to ensure that no ponding takes place.

- Where cleaning and clearing of bridge and culvert structures and their beds and surroundings areas extend beyond the road reserve, the approval of the applicable landowners shall be obtained.
- Any silt build-up inside and around culvers and bridges shall be removed to the required level and removed from site. The removed silt shall not be placed within the floodplain area from where it can re-enter the drainage channel.
- All vegetation growth around bridges and culverts established in silted areas shall be removed during the removal of silt. The removed vegetation shall not be placed within the floodplain areas where it can re-enter the drainage channel.
- Overgrown vegetation and silt inside the area of flow that might cause blockage or a reduction in the flow of the water shall regularly be removed to ensure a free flow of water.
- Vegetation establishment around watercourses shall be encouraged to ensure proper growth and coverage in order to stabilise the banks.
- Attention shall be paid to ensure no informal pathways are created linking the top of the structures with the ground level at all bridges.
- Only indigenous grass shall be planted at and close to all river and stream crossings – no kikuyu grass.
- Except for normal maintenance activities, no unauthorised activities shall be allowed within the 1:100 year flood line at any river or stream crossing.
- Potential erosive water discharge from bridges shall be managed to ensure stability of all river and stream crossings.
- Structures shall be regularly inspected at all river and stream crossings to ensure no damming takes place that could impact on the flow of the water.

The following serves as a general guide required to minimise the spatial impact of the maintenance activity:

- Repairs and maintenance should be undertaken within the dry season, except for emergency maintenance works.
- Where at all possible, existing access routes should be used. In cases where none exist, a route should be created through the most degraded area avoiding sensitive/indigenous vegetation areas.
- Responsible management of pollutants through ensuring handling and storage of any pollutants is away from the watercourse. When machinery is involved, ensure effective operation with no leaking parts and refuel outside of the riparian area, at a safe distance from the watercourse to manage any accidental spillages and pose no threat of pollution.
- At no time should the flow of the watercourse be blocked (temporary diversions may be allowed) nor should the movement of aquatic and riparian biota (noting breeding periods) be prevented during maintenance actions.
- No new berms can be created.
- In circumstances which require the removal of any top soil, this must be sufficiently restored through sustainable measures and practices.
- Concerted effort must be made to actively rehabilitate repaired or reshaped banks with indigenous local vegetation.
- No deepening of the watercourse beyond the original, pre-damage determined thalweg, unless such deepening is directly related to the natural improved functioning and condition of such a watercourse.

- Where at all possible, limit the disturbance to the zone of the thalweg. This is due to the ecological importance of the low flow channel and respective habitat being allowed to re-establish improving the ecological condition.
- The build-up of debris/sediment removed from a maintenance site may:
    - be utilised for the purpose of in-filling or other related maintenance actions related to managing erosion, which form part of an adopted MMP;
    - not be used to enlarge the height, width or any extent of existing berms;
    - not be deposited anywhere within the watercourse or anywhere along the banks of a river where such action is not part of the proposed maintenance activity (ies). Material that cannot be used for maintenance purposes must be removed out of the riparian area to a suitable stockpile location or disposal site. Further action and consideration may be required where the possibility of contaminated material may occur, such as in urban watercourses.
- The use of foreign material, such as concrete, rubble, woody debris and/or dry land based soil, is strictly prohibited from being used in maintenance actions, unless for the specific purpose of repairs to existing infrastructure, coupled with appropriate mitigation measures.
- On completion of the maintenance action, the condition of the site in terms of relative topography should be similar to the pre-damaged state (i.e. the shape of the river bank should be similar or in a state which is improved to manage future damage). This ultimately dictates that the channel, banks and bed cannot be made narrower, higher or deepened respectively. Exceptions are considered for systems involved with the management of stormwater and improvements for water quality within the urban context.

14.2 Erosion Control

The following management measures shall be implemented for erosion protection:

- Identified areas where erosion could occur and that have been appropriately protected by drainage works shall be maintained.
- Unpolluted storm water runoff shall under no circumstances be used to dilute seepage, effluent or water containing waste resulting from the Operations and Maintenance phase.
- Identified areas where erosion could occur shall be appropriately protected by installing temporary protection measures and followed with permanent protection measures to prevent water from being concentrated in sensitive areas and from scouring slopes, banks or other areas.
- Additional gabions or storm water control structures shall be used to disperse storm water flows and/or prevent and control erosion where necessary along rivers or streams.
- The following storm water control measures could be considered if erosion has been identified:
    - use of silt screens;
    - use of straw bales as filters, which are placed across the flow of overland storm water flows;
    - channelling storm water run-off through natural grassland buffer areas (at least 20m);
    - gabions or storm water control structures should be used to disperse storm water flows and/or prevent and control erosion where necessary along rivers or streams;
    - regular inspections by competent personnel need to be undertaken at especially:
        - inlet and outlet points of drainage structures
        - storm water release points and

        - along sections where drainage structures are buried on steep slopes.
    - New storm water channels entering rivers or streams shall be angled in line with the flow of water and no perpendicular connections shall be allowed.

14.3 Mowing of Grass and Trimming of Trees

The following management measures shall be implemented for moving of grass and trimming of trees:

- No indigenous trees/shrubs/bulbous plants or wild orchids shall be removed from the road reserve without the consent of the Environmental Authority.
- Grass shall be mowed at least once per year.
    - Mowing shall be at a height of approximately 150 mm above ground level.
    - The best period for mowing is in mid-May.
    - Mowed grass should be removed as soon as practical from the road reserve.
    - All grass cuttings, which are unsuitable for bailing, shall be collected and disposed of at appropriate sites. Such grass may be used to protect bare areas from erosion. It could also be used to fill dongas and erosion gullies to collect sediment and accelerate re-establishment of vegetation.
    - Under no circumstance shall the grass cuttings be burned in or away from the road reserve.
- Trees and shrubs in the road reserve may be trimmed when such trimming enhances the maintenance operations, the appearance of the tree/shrub or is in the interest of public safety. Indigenous tree saplings may also be removed if it poses a maintenance or safety risk.
- Trees and shrubs within fences or in positions, which inhibits visibility for the road user, shall be removed.
- All material collected from the trimming of trees and shrubs shall be disposed at an approved disposal site. Alternatively, the wood could be made available to local communities in a controlled way for utilisation.
- Care shall be taken that drains and side drains are clean from material generated by the mowing of grass or trimming of trees, to prevent blockages and ensure free water movement.

14.4 Fire Management

The following management measures shall be implemented for fire management:

- Where established and active, the Appointed Contractor should form part of the regional Fire committee appointed in terms of the Fire Act.
- The Contractor shall regularly undertake grass cutting of the road reserve as part of its fire management approach.
- It firebreaks are done it is recommended that the firebreak should be alternated as follows:
    - Making a firebreak immediately next to the road for a distance of 5 meters from the edge of road,
    - Making a firebreak on the fence line, five meters wide,
    - Making a firebreak on the property adjacent to the road reserve (with the landowner's approval),
    - Utilising a herbicide on the fence line to make a fire break.

- When firebreaks are undertaken it should be undertaken as described above on a four-year cycle.
- Any fire noticed should immediately be reported and controlled.

14.5 Heritage and Paleontological Finds

The following management measures shall be implemented for chance heritage finds:

- All operational works shall be carried out with sensitivity to the possible unearthing of heritage materials or objects, artefacts / graves.
- In the event of the discovery of heritage materials or objects, artefacts or graves, relevant activities in the specific area of the find shall cease pending further investigation.
- Nothing may be moved or removed from site and a heritage practitioner shall be notified immediately to consult with the relevant Heritage Authority.
- A Heritage Practitioner shall assess the site to establish its status and to categorise it as either:
  - (A): Heritage sites, structures older than 60 years and archaeological or paleontological sites or
  - (B): Grave(s) or human remains.
- If graves are discovered and needs to be re-located the required exhumation and re-interment permits should be obtained prior to any disturbance of the area.
- Threats to the National Heritage are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, clearing, and human disturbance.
- Special care must be taken during the clearing, digging, drilling, blasting and excavating of foundations, trenches, channels and footings and removal of overburden not to intrude fossiliferous layers.

14.6 Noise

The following management measures shall be implemented for noise management:

- Having due regard for the proximity to the road of local communities and dwellings, the Appointed Contractor shall restrict all of its operation and maintenance operations in noise sensitive areas which result in undue noise disturbance to the hours of 06:00 to 18:00.
- In noise sensitive areas sub-contractors shall equip noisy machinery with standard silencers and take care not to increase ambient noise levels unreasonably bearing in mind the construction action and the machinery required.
- Modern low noise emission vehicles and equipment should be favoured in noise sensitive areas.
- Night time maintenance in noise sensitive areas shall be avoided as far as possible.
- During the operation of the road, the Contractor shall ensure that the road infrastructure is maintained such that noise levels in identified noise sensitive areas associated with road traffic do not exceed the legally acceptable level specified for affected communities or households.

14.7 Fencing

The following management measures shall be implemented for fencing:

- The clearing of vegetation for fencing shall be limited to the removal of trees and shrubs within 1m of the fence line. Where possible, the fence line must be aligned to retain trees or tree groups. There shall be no removal of the grass cover or topsoil within this width.
- Any fences damaged during the operation and maintenance period shall be repaired as soon as practicable.
- Any waste materials from fence repairs must be collected and removed to the identified collection points. Under no circumstances must pieces of wire or metal be left in the road reserve, since it could interfere with grass mowing or pose a danger to vehicles which may drive in the road reserve.
- Suitable sub-contractors shall be appointed to ensure that damaged fencing is promptly and affectively repaired.
- Suitable sub-contractors shall be appointed to ensure that stolen fencing is promptly and affectively replaced.
- If replacement fencing material is not available the fence shall be temporary barricaded to prevent entry into the road reserve.

15. MONITORING AND REPORTING

It is important to note that any and all activities undertaken outside the scope of the adopted MMP, in terms of the action outlined within the given method statement, the responsible person(s) will be subject to Section 24(F) of NEMA and that appropriate enforcement and compliance requirements will follow.

The specific reporting information required by the competent authority should be discussed during the consultation phase between the proponent and the Department. The relevant information required should be considered on a case-by-case basis.

The following Forms A and B are to be considered as a guideline in terms of the type of information required. It is proposed that Form A below must be completed by the relevant person(s) before maintenance activities are undertaken and Form B after a maintenance activity has been completed. A copy of each completed Form A & B must be sent to the relevant WUA/IB/local authority management if they have undertaken the development of the MMP. For any individual landowner applications, the landowner is responsible to ensure a record of all maintenance activities is recorded as per Form A & B below. Form A and B must also be sent to the Provincial Department of Agriculture, Directorate: Sustainable Resource Management.

The Department may, within a reasonable notice period, request to evaluate the maintenance activities and assess the maintenance sites as per the adopted MMP.

Form A should be completed at least 7 working days before the commencement of any maintenance activity and Form B at least 3 working days following the completion of the maintenance activity(ies). At least two photographs are required from two different points of perspective (A and B) looking at the site (coordinates of these points are required). When listing the type and reference code, this must be done by specifically listing the relevant detail within the adopted MMP.

REPORTING FOR INTENT TO UNDERTAKE MAINTENANCE ACTIVITIES – FORM A				
Section A: Landowner Details				
Name	**Surname**	**Farm No.**	**Erf No.**	**Today's Date**
Section B: Details of proposed maintenance activity				
WUA/GA reference number and DEA&DP reference number for MMP.	**Activity Type:**	**Reference code (*make reference to MMP*)**	**Footprint area (m^2)**	**Volume of material (m^3)**
Equipment to be used:	**Description of method for planned activity:**			**Date when work will commence:**
Date of last flood event for site:	**Note any further damage and comments regarding the state of the site**			
Section C: Photographs of activity location before maintenance				
Before A **Coordinates:** **S** **E**				
Before B **Coordinates:** **S** **E** **Date of photos taken:**				

REPORTING FOR COMPLETION OF MAINTENANCE ACTIVITIES – FORM B				
Section A: Landowner Details				
Name	**Surname**	**Farm No.**	**Erf No.**	**Today's Date**
Section B: Details of proposed maintenance activity				
WUA/GA reference number and DEA&DP reference number for MMP.	**Activity Type:**	**Reference code (*make reference to MMP*)**	**Footprint area (m^2)**	**Volume of material (m^3)**
Equipment that was used:	**Description of method for completed activity and if commence date changed**			**Date activity completed**
Date of last flood event for site:	**Note any challenges or difficulties experienced in following the MMP method statement**			
Section C: Photographs of activity location after maintenance				
After A **Coordinates:** **S** **E**				
After B **Coordinates:** **S** **E** **Date of photos taken:**				

REFERENCE GUIDE FOR DRAFTING MMPs FOR A WATERCOURSE

Ecosystem Guidelines for Environmental Assessment in the Western Cape, Edition 2, 2016. Available at: www.bgis.org.za
Wetland offsets: A best practice guideline for South Africa, 2016. Available at: http://www.wrc.org.za
Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries, 2014. Available at: http://www.wrc.org.za
National Water Act, 1998 (Act No. 36 of 1998). Available at: http://www.gov.za/documents/national-water-act
General Authorisation, in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or Section 21(i).

ANNEXURE A

DEPARTMENTAL DETAILS

CAPE TOWN OFFICE: REGION 1 (City of Cape Town & West Coast District)	CAPE TOWN OFFICE: REGION 2 (Cape Winelands District & Overberg District)	GEORGE OFFICE: REGION 3 (Central Karoo District & Eden District)
Requests for competent authority to adopt an MMP must be sent to the following details: Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 1) Private Bag X 9086 Cape Town, 8000 Registry Office 1st Floor Utilitas Building 1 Dorp Street, Cape Town Queries should be directed to the Directorate: Development Management (Region 1) at: Tel: (021) 483-5829 Fax (021) 483-4372	Requests for competent authority to adopt an MMP must be sent to the following details: Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 2) Private Bag X 9086 Cape Town, 8000 Registry Office 1st Floor Utilitas Building 1 Dorp Street, Cape Town Queries should be directed to the Directorate: Development Management (Region 2) at: Tel: (021) 483-5842 Fax (021) 483-3633	Requests for competent authority to adopt an MMP must be sent to the following details: Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 3) Private Bag X 6509 George, 6530 Registry Office 4th Floor, York Park Building 93 York Street George Queries should be directed to the Directorate: Development Management (Region 3) at: Tel: (044) 805-8600 Fax (044) 8058650

WESTERN CAPE DEPARTMENT OF AGRICULTURE DETAILS

Francis Steyn
Director: Sustainable Resource Management, LandCare Programme
Western Cape Department of Agriculture
Private Bag X1
Elsenburg
7607
Main Building, Elsenburg, Muldersvlei Road
Tel: 021 808 5090
Email: franciss@elsenburg.com

ANNEXURE B – CV OF EAP

CURRICULUM VITAE

1. **Family name**: Bothma
2. **First Name**: Josephine
3. **Date of Birth**: 15 September 1967
4. **Nationality:** South African

5. **Education:**

Institution (Date from – Date to)	Degree(s) or Diploma(s) obtained
University of Pretoria (1985 - 1988)	BSc
Free State University (1994 -1997)	MSc (Environmental Management)
Free State University (1999 - 2002)	PhD (Environmental Management)

6. **Membership of Professional Bodies:**
Registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA) - EAP number 2019/246.

7. **Other Skills:**
Short courses:
» ISO 14001 Environmental Auditor Course: Crystal Clear Consulting Water

8. **Present Position:**
Member – Chameleon Environmental, Founder member

9. **Years' experience:**
31 years

10. **Key Qualifications (relevant to project):**
» Thirty-one (31) years' experience in the environmental field;
» Twenty-one (21) years' experience in Project Management;
» Project management of large environmental assessment and environmental management projects;
» Experience in conducting environmental impact assessments for both linear developments and nodal developments ;
» Experience in compiling Environmental Impact Assessment (EIA) reports and Environmental Management Programme reports (EMPr);
» Experience in conducting public participation processes and stakeholder involvement;
» Experienced in conducting basic assessments for both linear developments and nodal developments;
» Experience in EMPRs for borrow pits and quarries;
» Experience in ECO work for large construction projects;
» Experience in conducting Environmental audits;
» Peer review of reports and EIA process;
» Experienced in the identification and assessment of potential negative environmental impacts and benefits through the review and integration of data;

- » Experienced in the identification of practical and achievable mitigation and management measures and the development of appropriate management plans, as well as the evaluation of risk;
- » Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation.

11. **Professional Experience:**

Date	Since August 2006
Organisation	Chameleon Environmental
Location	Pretoria, Gauteng
Position	Member
Description of duties	Specialist environmental consultant, Project management, identification and assessment of potential negative environmental impacts and benefits, identification of mitigation measures, and compilation of environmental reports in accordance with relevant environmental legislation.

Date	January 2006 to August 2006
Organisation	Enviro-Namic Environmental Consultants
Location	Pretoria, Gauteng
Position	Member
Description of duties	Specialist environmental consultant, Project management, identification and assessment of potential negative environmental impacts and benefits, identification of mitigation measures, and compilation of environmental reports in accordance with relevant environmental legislation.

Date (from – to) (mm/yy)	1999 - 2005
Organisation	South African National Roads Agency Limited
Location	Head Office, Pretoria
Position	Environmental Manager
Description of duties	Project management of Environmental Impact Assessments (EIAs) and Public Participation Process (PPPs) on large roads projects in South Africa

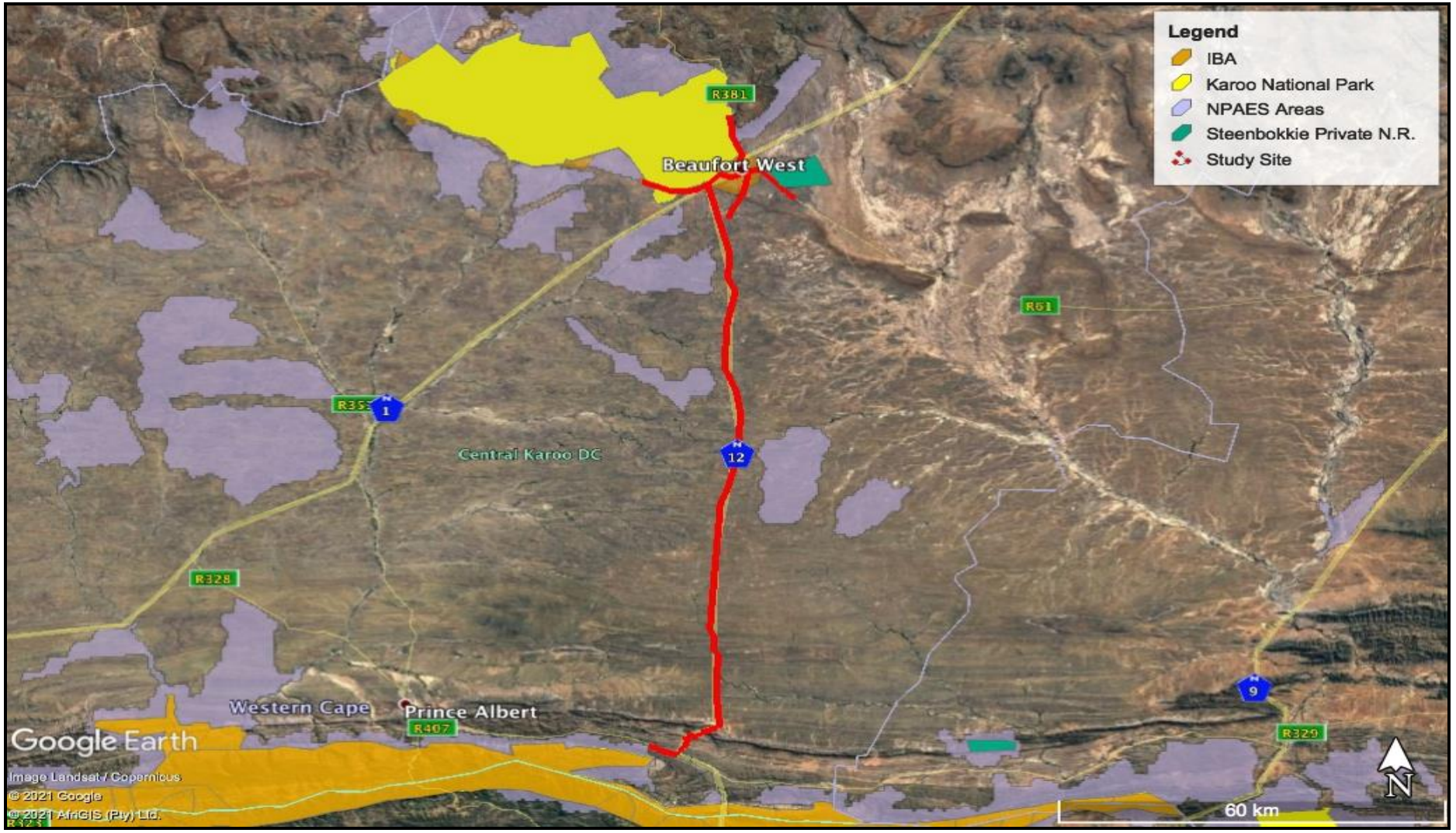
Date (from – to) (mm/yy)	1989 - 1998
Organisation	Department of Environmental Affairs and Tourism
Location	National Department , Pretoria
Position	Pollution Control Officer
Description of duties	Acquired extensive skills and exposure relevant to the management and organisation of government departments. Gained experience regarding the management of hazardous materials and -waste in South Africa including the transportation of hazardous materials

	and –waste.

12. Other relevant information:

- Environmental audits undertaken for the Gautrain Project.
- Training of Environmental Officers for the Gautrain Project.

ANNEXURE C - PRIORITY AREAS



ANNEXURE D – LIST OF COORDINATES

NO	ROAD NO.	LOCAL MUNICIPALITY	KM	STRUCTURE NUMBER	COORDINATES	
					LATITUDE	LONGITUDE
1	TR3305	Prince Albert	1.00	B4374	33°17'58.33"S	22°28'48.95"E
2	TR3305	Prince Albert	3.51	B4332	33°16'56.15"S	22°29'40.91"E
3	TR3305	Prince Albert	3.77	B4331	33°16'49.08"S	22°29'34.98"E
4	TR3305	Prince Albert	4.78	B4329	33°16'27.25"S	22°29'45.75"E
5	TR3305	Prince Albert	6.08	C11603	33°16'33.92"S	22°30'35.68"E
6	TR3305	Prince Albert	10.10	C12303	33°15'34.34"S	22°32'46.67"E
7	TR3305	Prince Albert	10.29	C12304	33°15'28.75"S	22°32'49.11"E
8	TR3305	Prince Albert	10.34	B4035	33°15'26.93"S	22°32'49.48"E
9	TR3305	Prince Albert	17.51	C12305	33°11'34.11"S	22°32'32.13"E
10	TR3305	Prince Albert	18.71	C12306	33°11'11.46"S	22°32'31.69"E
11	TR3305	Prince Albert	21.14	B4033	33° 9'36.26"S	22°32'40.27"E
12	TR3305	Prince Albert	21.61	C12307	33° 9'21.28"S	22°32'40.24"E
13	TR3305	Prince Albert	22.43	C12308	33° 8'55.24"S	22°32'41.32"E
14	TR3305	Prince Albert	22.78	B4048	33° 8'44.29"S	22°32'47.50"E
15	TR3305	Prince Albert	23.08	C12309	33° 8'35.44"S	22°32'44.14"E
16	TR3305	Prince Albert	43.39	B4040	32°57'50.30"S	22°32'32.95"E
17	TR3305	Beaufort West	54.97	C11607	32°51'43.31"S	22°33'49.99"E
18	TR3305	Beaufort West	55.56	C11608	32°51'24.65"S	22°33'56.14"E
19	TR3305	Beaufort West	57.54	C11609	32°50'22.21"S	22°34'16.71"E
20	TR3305	Beaufort West	59.79	C11610	32°49'11.14"S	22°34'32.76"E
21	TR3305	Beaufort West	59.79	C11611	32°49'10.80"S	22°34'32.80"E
22	TR3305	Beaufort West	64.16	C11613	32°46'48.77"S	22°34'45.37"E
23	TR3305	Beaufort West	69.51	C11614	32°43'55.47"S	22°34'40.05"E
24	TR3305	Beaufort West	72.12	C11615	32°42'32.71"S	22°34'19.44"E

NO	ROAD NO.	LOCAL MUNICIPALITY	KM	STRUCTURE NUMBER	COORDINATES	
					LATITUDE	LONGITUDE
25	TR3305	Beaufort West	74.33	C11617	32°41'26.47"S	22°33'47.48"E
26	TR3305	Beaufort West	76.86	C12315	32°40'16.19"S	22°33'21.19"E
27	TR3305	Beaufort West	79.22	C11619	32°38'51.76"S	22°33'25.57"E
28	TR3305	Beaufort West	80.09	C11620	32°38'23.30"S	22°33'27.15"E
29	TR3305	Beaufort West	91.18	C11623	32°32'29.75"S	22°34'3.36"E
30	TR3305	Beaufort West	95.75	B4145	32°30'4.99"S	22°33'45.98"E
31	TR3305	Beaufort West	97.98	C12316	32°28'53.83"S	22°33'39.45"E
32	TR3305	Beaufort West	101.78	C11624	32°26'54.73"S	22°33'0.93"E
33	TR3305	Beaufort West	104.86	B4131A	32°25'18.07"S	22°32'29.76"E
34	DR02307	Beaufort West	3.75	C11343	32°25'53.24"S	22°33'41.81"E
35	DR02307	Beaufort West	6.83	C11348	32°24'22.72"S	22°34'29.01"E
36	MR00584	Beaufort West	4.59	C11404	32°22'39.01"S	22°26'17.39"E
37	TR03501	Beaufort West	3.29	C11301	32°21'12.74"S	22°37'1.73"E
38	TR03501	Beaufort West	7.06	C11302	32°22'44.49"S	22°38'38.12"E
39	TR05801	Beaufort West	6.80	C11408	32°16'28.23"S	22°33'52.29"E
40	TR05801	Beaufort West	7.74	C11409	32°16'1.31"S	22°33'38.66"E

ANNEXURE E – HYDROLOGICAL DATA

CULVERT	ROAD NR	km	FLOW	UNIT
C11304	TR3501	10.36	1.91	m^3/s
C11348	DR2307	6.83	6.32	m^3/s
C11349	DR2307	8.03	1.14	m^3/s
C11617	TR3305	74.33	-	m^3/s
C11623	TR3305	91.18	20.18	m^3/s
B4048	TR3305	22.78	14.67	m^3/s

ANNEXURE F - ASSESSMENT OF POTENTIAL IMPACTS

Potential Impacts arising from Project	**Phase of Project**	**Impact Rating**					
		Extent	Duration	Magnitude	Probability	Total	Significance
Total Impact of Proposed Project (the collective impact on the crossings on the watercourses crossed)	**Construction Phase: Pre-mitigation**	**Local (2)**	**Shot-term (2)**	**Moderate (6)**	**Medium (3)**	**30**	**Moderate**
	Construction Phase: Post mitigation	**Site (1)**	**Shot-term (2)**	**Minor (2)**	**Low (2)**	**10**	**Low**
	Operational Phase	**Site (1)**	**Immediate (1)**	**Minor (2)**	**Improbable (1)**	**4**	**Low**
Mitigating Measures	i. Impacts on the existing natural environment related to the project are '**LOW**' Isolated areas of Karoo shrubland will be transformed and lost. No RDL faunal or floral species will be lost or impacted. In other words, the project footprint is very small in terms of loss of natural vegetation and natural environment. ii. Any temporary storage, lay-down areas or accommodation facilities to be setup in existing built-up areas or disturbed areas where possible. iii. Ensure small footprint during construction phase. iv. Proposed buffer areas (no-go zones) along the watercourse must be implemented and strictly controlled. v. Regulated area to be strictly controlled in terms of development and movement of people and vehicles in and through it. Only low levels of development allowed. vi. All hazardous materials must be stored appropriately to prevent these contaminants from entering the water environment; vii. All excess materials brought onto site for construction to be removed after construction. viii. No open trenches or mounds of soils to be left. ix. Rehabilitation plan for disturbed areas to be compiled and implemented as part of the construction phase. x. No construction vehicles may drive through any watercourses. Existing roads to be used. xii. No concrete or mounds of building sand may be stored temporary during the construction phase within 100 m of the delineated watercourses. xiii. If possible, only existing access roads may be used to and from construction site (study area).						

Potential Impacts arising from Project	Phase of Project	Impact Rating					
		Extent	Duration	Magnitude	Probability	Total	Significance
	xiv. Temporary access roads to be rehabilitated after the construction phase.						
Cumulative Effect of Project on Terrestrial Ecology	After construction and during operational phase	Local (2)	Short-term (2)	Minor (2)	Low (2)	12	**Low**

Potential Impacts arising from Project	**Phase of Project**	**Impact Rating**					
		Extent	Duration	Magnitude	Probability	Total	Significance
Cumulative Effect of Project on Aquatic ecology	After construction and during operational phase	Local (2)	Short (1)	Minor (2)	Low (2)	10	**Low**
Individual Impacts (potentially impact of each of the crossings on the watercourse) including: • Erosion • Sedimentation		Extent	Duration	Magnitude	Probability	Total	Significance
1. Loss of natural vegetation	**Construction Phase: Pre-mitigation**	**Site (1)**	**Shot-term (2)**	**Low (4)**	**Medium (3)**	**21**	**Low**
	Construction Phase: Post mitigation	**Site (1)**	**Shot-term (2)**	**Minor (2)**	**Low (2)**	**10**	**Low**
	Operational Phase	**None (0)**	**Immediate (1)**	**Minor (2)**	**Improbable (1)**	**3**	**Low**
Mitigating Measures	i. No protected trees are within the study site. Therefore, no protected trees will be lost or destroyed. ii. Some Karoo shrubland will be lost, but the veldtype is not a threatened ecosystem. iii. Any priority species encountered must be identified and rescue prior to any excavation or construction activities.						
2. Loss or impact on wildlife	**Construction Phase: Pre-mitigation**	**Site (1)**	**Shot-term (2)**	**Moderate (6)**	**Medium (3)**	**27**	**Low**
	Construction Phase: Post mitigation	**Site (1)**	**Shot-term (2)**	**Minor (2)**	**Low (2)**	**10**	**Low**
	Operational Phase	**Site (1)**	**Immediate (1)**	**Minor (2)**	**Improbable (1)**	**4**	**Low**
Mitigating Measures	i. Care must be taken not to interact directly with any wild life encountered. ii. Any bird nests encountered in the vegetation or in the watercourses must not be interfered with. If encountered must first be discussed with specialist.						
3. Fringe impacts arising from construction phase	**Construction Phase: Pre-mitigation**	**Site (1)**	**Shot-term (2)**	**Moderate (6)**	**Medium (3)**	**27**	**Low**

	Construction Phase: Post mitigation	**Site (1)**	**Shot-term (2)**	**Minor (2)**	**Low (2)**	**10**	**Low**
	Operational Phase	**Site (1)**	**Immediate (1)**	**Minor (2)**	**Improbable (1)**	**4**	**Low**
Mitigating Measures	i. Due to the nature of the project the potential for any significant fringe impacts is low. ii. Care must be taken with heavy machinery used on the project. All access roads and farm roads used must be monitored and maintained. iii. Soils and stones excavated may be used in the immediate vicinity and farms as backfill, fixing of roads, filling of dongas, etc. iv. Excavated soils and rocks may not be simply dumped in any pristine bushveld, or within 100 m of the edge of watercourses or dams.						

ANNEXURE G – RISK ASSESSMENT

ANNEXURE H – PHOTOGRAPHS

Photo 1: Culvert C11404

Photo 2: Culvert C11409

Photo 3: Culvert C11408

Photo 4: Culvert

Photo 5: Culvert C11302

Photo 6: Culvert C11343

Photo 7: Culvert C11348

Photo 8: Bridge B4131A

Photo 9: Culvert C11624

Photo 6: Culvert

Photo 10: C12316

Photo 11: Bridge B4145

Photo 12: Culvert C11623

Photo 13: Culvert C11620

Photo 14: Culvert C11619

Photo 15: Bridge B4374

Photo 16: Culvert C12315

Photo 17: Culvert C11617

Photo 18: Culvert C11615

Photo 19: Culvert C11614

Photo 20: Culvert C11613

Photo 21: Culvert C11611

Photo 22: Culvert C11610

Photo 23: Culvert C11609

Photo 24: Culvert C11608

Photo 25: Culvert C11607

Photo 26: Bridge B4040

Photo 27: Culvert C12309

Photo 28: Bridge B4048

Photo 29: Culvert C12308

Photo 30: Culvert C12307

Photo 31: Bridge B4033

Photo 32: Culvert C12306

Photo 33: Culvert C12305

Photo 34: Bridge B4035

Photo 35: Culvert C12304

Photo 36: Culvert C12303

Photo 37: Culvert C11603

Photo 38: Bridge B4329

Photo 39: Bridge B4331

Photo 40: Bridge B4332

ANNEXURE I – TERMS OF REFERENCE SPECIALIST STUDIES

a. Aquatic Study

Deliverables from this study will include:

- An assessment of the potential impacts on aquatic systems associated with the proposed project;
- Production of a sensitivity map indicating sensitive aquatic systems including wetlands;
- Permits to be acquired;

Recommendations regarding appropriate mitigation measures for each phase of the project.

b. Ecological Including Flora and Fauna Study

The study will include the following:

- Identification of sensitive habitats and plant communities on the site based on the conservation value of these at national and provincial level;
- A description of the vegetation communities of the study area using standard field-based vegetation survey techniques;
- A floristic (plant) survey conducted during the summer season;
- A list of potential Threatened Plant Species (Red Data Listed) that occur in the study area on the basis of MTPA records. For those species not found in the field, an assessment of the potential for threatened plant and animal species to occur in habitats within the study area will be provided. Recommendations for follow-up surveys will be made where the flowering period of the affected plant species does not co-incide with the floristic survey;
- A list of all plant taxa encountered during the survey, including threatened species (Red Data listed), medicinal species, protected species and endemic taxa;
- A list of naturalized plant species, indicating which are declared weeds or alien invasive species, according to the Conservation of Agricultural Resources Act (Act No. 43 of 1983) as amended in 2001.
- A list of all potential vertebrate species (mammals, birds, reptiles, amphibians) highlighting Threatened (Red Data) species;
- A list of all the vertebrate and invertebrate animal species recorded during the survey ;
- Maps indicating areas of sensitivity for animals, including the location of important species as well as roosting and hibernation sites e.g. caves of ecological importance, in relation to the proposed development;
- A list of threatened animal species that occur on the potential list, but not found during site visits or surveys. In respect of each such species, an opinion of the likelihood of that species occurring in the study area will be provided;
- A list of exotic / introduced vertebrate species occurring in the study area;
- Indication of whether the study area falls within an Important Birding Area (IBA), as indicated in literature on The Important Bird Areas of Southern Africa (Barnes 1998);
- Identification of potential impacts of the proposed development on terrestrial vegetation and habitats of threatened species and recommendation on management measures for remaining natural habitats and possible mitigation of impacts
- Permits to be acquired.

c. Heritage Study

To assess the impact on any building older than 60 years or graves impacted on by the proposed development.

The scope of work will consist conducting a Phase 1 heritage survey of the site in accordance with the requirements of Section 38(3) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999). This will include:

- Conducting a desk-top investigation of the area;
- A visit to the proposed development site.

The objectives of the study are to:

- Identify possible heritage, cultural and historic sites within the proposed development areas;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Permits to be acquired;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

d. Paleontological Study

To assess the impact on any paleontological feature impacted on by the proposed development. This will include:

- Conducting a desk-top investigation of the area;
- A visit to the proposed development site.

The objectives of the study are to:

- Identify possible paleontological features sites within the proposed development areas;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on resources;
- Permits to be acquired;
- Recommend mitigation measures to ameliorate any negative impacts on areas of paleontological importance.