

**PROPOSED UPGRADING OF ROAD DR08035 BETWEEN MJANYANA HOSPITAL AND CLARKEBURY.
CHRIS HANI AND AMATHOLE DISTRICT MUNICIPALITIES, EASTERN CAPE PROVINCE**

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

DEDEAT Reference: EC121&EC137/HO/LN1&3/M/-2-2019

Prepared for:



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February 2020

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1 INTRODUCTION

1.1 Objectives of an EMPr

This EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction and operation of the road upgrade and re-alignment. The objective of the EMPr is also to ensure that all relevant factors are considered to ensure environmentally responsible development (Figure 1). The purpose of the EMPr is to provide specifications for "good environmental practice" for application during these phases.

This EMPr informs all relevant parties, which are in this case, the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by MBSA Consulting Engineers and Eastern Cape Department of Transport (ECDT) at the site as to their duties in the fulfilment of the legal requirements for the construction and operation of the road upgrade with particular reference to the prevention and mitigation of anticipated potential environmental impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation granted by the relevant environmental permitting authority.

The objectives of an EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimize beneficial impacts;
- Create management structures that address the concerns and complaints of I&APs with regards to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate.

1.2 Structure and Function of an EMPr

An EMPr is focused on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies what measures will be in place or will be actioned to manage any incidents and emergencies that may occur during operation of the project.

As such the EMPr provides specifications that must be adhered to in order to minimise adverse environmental impacts associated with the construction and operation of the road and bridge upgrade. The content of the EMPr is consistent with the requirements as set out in Appendix 4 of the EIA regulations stated below, for the construction and operation phases.

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (a) Details of –
 - (i) The EAP who prepared the environmental management programme; and
 - (ii) The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae;
- (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
- (c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;
- (d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
 - (i) Planning and design;
 - (ii) Pre-construction;
 - (iii) construction activities;
 - (iv) Rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
- (e) a description and identification of impact outcomes required for the aspects contemplated in (d).
- (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable include actions to –
 - (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
 - (ii) Comply with any prescribed environmental management standards or practices;
 - (iii) Comply with any applicable provisions of the Act regarding closure, where applicable;
 - (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;
- (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
- (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);
- (i) An indication of the persons who will be responsible for the implementation of the impact management actions;
- (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
- (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);
- (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;
- (m) An environmental awareness plan describing the manner in which –
 - (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
 - (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and
- (n) Any specific information that may be required by the competent authority.

1.3 Legal requirements

Construction must be according to the best industry practices, as identified in the project documents. This EMP, which forms an integral part of the contract documents, informs the Contractor as to his/her duties in

the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The Contractor should note that obligations imposed by the approved EMP are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter must prevail.

The Contractor must identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the construction and operation phases of the project must be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive:-

- Constitution Act (No. 108 of 1996);
- National Environment Management Act (No. 107 of 1998, as amended, NEMA);
- National Environmental Management: Biodiversity Act (No. 10 of 2004; NEMBA) ;
- Environmental Management: Protected Areas Act (Act No. 57 of 2003; NEMPAA);
- National Water Act (No. 36 of 1998; NWA);
- National Environmental Management: Waste Management Act (No. 59 of 2008; NEMWA);
- National Heritage Resources Act (No. 25 of 1999; NHRA);
- Informal Land Rights Act (No. 109 of 1996; ILRA) ; and
- National Forestry Act, 1998 (No. 84 of 1998; NFA)

Municipal policy

- Chris Hani and Amathole District Municipalities Integrated Development Plans (CHDM and ADM IDP's, 2018/2019);
- Mbashe Local Municipality IDP (MLM IDP, 2017/2018);
- Engcobo Local Municipality IDP (ELM IDP, 2017/2018) ;
- Mbashe Local Municipality Spatial Development Framework (SDF 2016).

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT TEAM

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (a) Details of –
 - (i) The EAP who prepared the environmental management programme; and
 - (ii) The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae;

2.1 Environmental Consulting Company:

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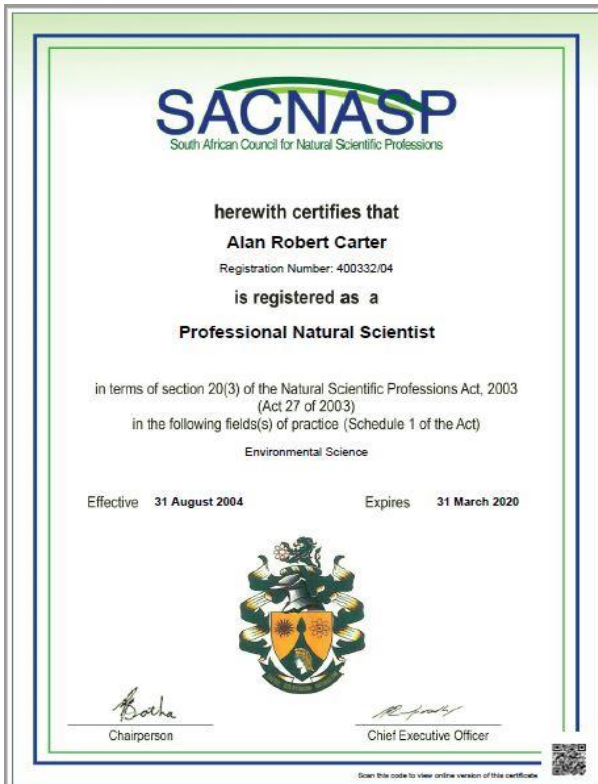
CES was established in 1990 as a specialist environmental consulting company and has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, State of Environment Reporting (SOER), Integrated Waste Management Plans (IWMP), EMPs, Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the EIA and Strategic Environmental Assessment (SEA) processes.

2.2 Project Team:

- Dr Alan Carter
- Ms Caryn Clarke

Dr Alan Carter

Alan is the executive of the CES East London Office. He holds a PhD in Marine Biology and is a certified Public Accountant, with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has 25 years' experience in environmental management and has specialist skills in sanitation, coastal environments and industrial waste. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP). He is also registered as an EAP by the Environmental Assessment Practitioners of South Africa (EAPSA).



Ms Caryn Clarke

Caryn holds a M.Sc. degree in Environmental Science from Rhodes University. Her Master's dissertation investigated climate change adaptation strategies of vulnerable rural households in Willowvale and Lesseyton, Eastern Cape. Her professional interests include climate change policy, renewable energy and various environmental impact assessments. Caryn has worked on numerous basic assessments projects including various linear developments such as roads and pipelines. She has extensive public participation and stakeholder engagement experience. Caryn is a registered Candidate Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP; No: 500022/14).

Refer to Appendix F for curriculum vitae.

3 PROPOSED ACTIVITY

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
- (c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;

3.1 Description of proposed activity

The Eastern Cape Department of Transport proposes to upgrade a 20 km section of the DR08035 road from Clarkebury to the Mjanyana Hospital in the Eastern Cape (Figure 3.1). This will include the upgrade of bridges and culverts along the road. The aim of the road upgrade is to provide easy access to the hospital for villagers along the route of DR08035 from Clarkebury and surrounding areas.

The project falls within the Engcobo Local Municipality within the Chris Hani District Municipality (CHDM) and the Mbashe Local Municipality within the Amathole District Municipality (ADM). The project includes the use of various mining sites associated with the road upgrade, however, these sites have been assessed through a separate Environmental Impact Assessment (EIA) for submission to the Department of Mineral Resources (DMR).

The affected road portion is approximately 20 km long and 6-7m wide and will be upgraded from gravel to black top surface standards. In particular, the project will consist of the following:

Existing roads:

- minimum mass earthworks for the improvement of existing vertical and horizontal alignments where necessary; and
- additional pavement layers and seals.

The upgrading action, in addition to the construction of the road pavement structure, will also include:

- the installation of surface and subsurface drainage;
- traffic calming facilities; and
- upgrades to the bridge structures as well as numerous minor river crossings requiring culverts, as the section of road crosses two major watercourses.

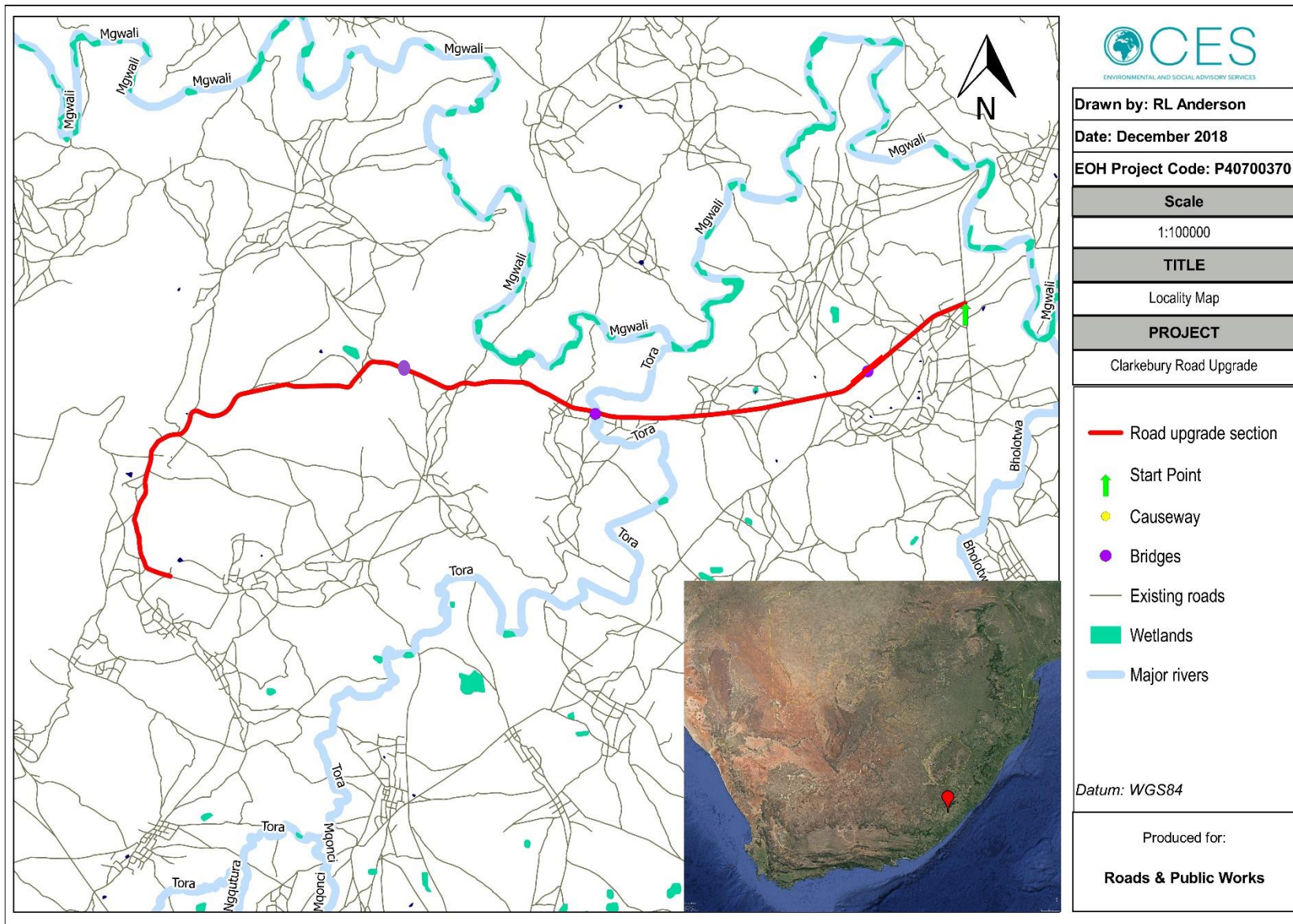


Figure 3.1: Proposed construction of the DR08035 road from Clarkebury to the Mjanyana Hospital.

4 SCOPE OF THE EMPr

In order to ensure a holistic approach to the management of environmental impacts during the construction and operation of the proposed road upgrade, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved.

The EMPr is a dynamic document subject to influences and changes as are wrought by variations to the provisions of the project specification.

4.1 Layout of the EMPr

The EMPr is divided into three phases of development. Each phase has specific issues unique to that period of the construction and operation. The impacts are identified and given a brief description. The phases of the development are identified as below:

4.1.1 Planning and Design Phase

This section of the EMPr provides management principles for the planning and design phase of the project. Environmental actions, procedures and responsibilities as required from ECDT during the planning and design phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Coordinator and ECO.

4.1.2 Construction Phase

This section of the EMPr provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required during the construction phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Coordinator and ECO.

4.1.3 Operational and Maintenance Phase

This section of the EMPr provides management principles for the operation and maintenance phase of the project. Environmental actions, procedures and responsibilities as required from ECDT during the operation and maintenance phase are specified.

5 MITIGATION AND/OR MANAGEMENT MEASURES

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
- (i) Planning and design;
 - (ii) Pre-construction;
 - (iii) construction activities;
 - (iv) Rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
- (e) a description and identification of impact outcomes required for the aspects contemplated in (d).
- (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable include actions to –
- (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
 - (ii) Comply with any prescribed environmental management standards or practices;
 - (iii) Comply with any applicable provisions of the Act regarding closure, where applicable;
 - (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.

Table 5.1: Planning and design phase mitigation measures

1.	PLANNING AND DESIGN PHASE	
	ISSUE	MITIGATION MEASURES
1.1	Legislation and policy compliance	<ul style="list-style-type: none"> • All relevant legislation and policy must be consulted and the proponent must ensure that the project is compliant with such legislation and policy. • These should include (but are not restricted to): NEMA, Eastern Cape Biodiversity Conservation Plan (ECBCP), Local Municipal bylaws. • All relevant permits and authorisations including Water Use Licenses, Building Plan Approvals and plant removal permits must be in place prior to commencement of construction.
1.2	Site establishment	<ul style="list-style-type: none"> • The design and location of the construction site must ensure minimal impacts to the aquatic environment and residential houses surrounding the site.
1.4	Waste management	<ul style="list-style-type: none"> • An appropriate waste management plan for handling onsite general and hazardous waste during the construction phase must be developed and implemented.
1.5	Stormwater management	<ul style="list-style-type: none"> • Appropriate stormwater structures must be designed to minimise erosion and sedimentation of watercourses. • All road sections situated on slopes must incorporate stormwater diversion. • Stormwater design must be in line with and DWS requirements.
1.6	Changes to fluvial geomorphology and hydrology	<ul style="list-style-type: none"> • Scour countermeasures must be incorporated in the design of all bridges and all culverts in the study areas. • All culverts must be designed in such a manner so as to not impede or divert natural baseflows or increase upstream flood inundation.

1. PLANNING AND DESIGN PHASE		
	ISSUE	MITIGATION MEASURES
		<ul style="list-style-type: none"> • Box culverts should be selected over pipe culverts, as they are less restrictive in terms of flow and also aid in reducing habitat fragmentation. • Bridges should span the entire width of the river if the width of the river is sufficiently narrow. • The number of piers placed within the river should be limited to as much as possible to limit the disturbance to the bed and banks of the river. • All culverts/bridges should be designed to be above the 1:100 year floodline or major flood event.
1.7	Natural vegetation	<ul style="list-style-type: none"> • The design and layout of the road upgrade and associated mining sites must avoid unnecessary loss of natural vegetation.
1.9	Control of alien species	<ul style="list-style-type: none"> • A Rehab and Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project.
1.10	Health, safety and crime	<ul style="list-style-type: none"> • A health and safety plan in terms of the Occupational Health and Safety Act (Act No 85 of 1993) must be drawn up by and HSE officer prior to construction to ensure workers safety.
1.11	On-site fire risk	<ul style="list-style-type: none"> • An Emergency Preparedness Plan must be designed for the construction phase prior to construction commences and
1.13	Inadequate rehabilitation and maintenance	<ul style="list-style-type: none"> • During the planning and design phase, a Rehabilitation Plan must be developed and implemented during and after construction. • Regular monitoring of implementation of this plan for the rehabilitation of disturbed areas must be conducted throughout the duration of the construction phase.

2. CONSTRUCTION PHASE		
	ISSUE	MITIGATION MEASURES
2.1	Legislation and policy compliance	<ul style="list-style-type: none"> • The Applicant must employ an independent Environmental Control Officer (ECO) for the duration of the construction phase to audit the contractors compliance with the specifications in the EA, EMPr and any other permits/authorisations.
2.2	Site establishment	<ul style="list-style-type: none"> • The construction site must be demarcated and communicated with the contractor prior to commencement of construction. All No-Go areas must be clearly demarcated during the planning and design. • Construction must only take place within the demarcated construction footprint. • Any construction outside of the demarcated site must be approved by the ECO before construction in this area takes place.
2.3	Bulk services and infrastructure	<ul style="list-style-type: none"> • Construction works and infrastructure must be kept within the demarcated construction footprint. • Regular monitoring of construction works and placement of the associated infrastructure for the road upgrade must be conducted by a qualified ECO throughout the duration of construction.
2.4	Material stockpiling	<ul style="list-style-type: none"> • Material stockpiles must be located 50m away from any watercourse, and they must be monitored for erosion and alien vegetation. • Material stockpiles locations must be approved by the ECO.

2. CONSTRUCTION PHASE		
	ISSUE	MITIGATION MEASURES
2.5	Stormwater management	<ul style="list-style-type: none"> • A Stormwater Management Plan must be developed in the planning and design phase and must be implemented throughout the duration of construction. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.
2.6	Waste management	<ul style="list-style-type: none"> • A Waste Management Plan for handling onsite waste during the construction phase must be developed and implemented. • All general waste must be disposed of in bins/waste skips labelled “general waste”. • Sufficient waste bins must be provided throughout the construction site for collecting waste. • All general waste collected on site must be disposed of at a licensed general waste disposal site. • Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. • Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages.
2.7	Hazardous substances	<ul style="list-style-type: none"> • Any storage tanks containing hazardous materials (ie fuel, diesel) must be placed in bunded containment areas with sealed surfaces and the capacity of the bunded containment areas must be 110% the volume of the storage tanks within it. • Barrels, bitumen must be stored in a secured area and all used barrels must be properly maintained and secured. • Cement and concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport of pollutants to watercourses is the greatest. • Used cement bags should be collected and stored in containers to prevent wind-blown cement dust and water contamination. • Mixed cement/concrete must not be allowed to flow into any watercourses. • Drip trays must be placed under stationary construction machinery overnight to avoid soil contamination from oil and fuel leaks. • Absorbent materials in the form of a spill kit must be provided on site. • Contaminated soil must either be excavated or treated on-site, depending on the nature and extent of the spill. • The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in suitable containers until appropriate disposal. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider.

2. CONSTRUCTION PHASE		
	ISSUE	MITIGATION MEASURES
		<ul style="list-style-type: none"> • Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site.
2.8	Scheduling of construction	<ul style="list-style-type: none"> • Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc. • When not possible, suitable stream diversion structures must be used to ensure the river is not negatively impacted by construction activity.
2.9	Stormwater management	<ul style="list-style-type: none"> • Stormwater must be managed effectively to minimize the ingress of construction debris and sediment-laden stormwater into surrounding watercourses.
2.10	Material stockpiling	<ul style="list-style-type: none"> • No construction material or stockpiles must be stored within the moderate sensitivity area indicated in the Aquatic and Wetland Assessment Report. • Stockpiles must not be placed within the moderate sensitivity area indicated in the Aquatic and Wetland Assessment Report. • Stockpiles must be monitored for erosion and mobilisation of materials towards watercourses. If this is noted by an ECO, suitable cut-off drains or berms must be placed between the stockpile area and the nearest watercourse. • Stockpiles should not exceed 1.5 m in height. • Stockpiles should be covered during windy periods.
2.11	Invasion of alien species	<ul style="list-style-type: none"> • A Rehabilitation and Alien Vegetation Management Plan must be developed and implemented during to construction activities, to reduce the establishment and spread of undesirable alien plant species. • Construction vehicles and machinery must not encroach into areas outside/surrounding the planned project footprint. • Alien plants must be eradicated from the impacted areas as they appear and the transformed area monitored. • Monitor the project area for any new growth of invasive plants until completion of construction. • Short-term monitoring must take place for alien invasive plant species growth for a period of 12 months after construction has been completed should be conducted. • The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. • Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO.
2.12	Disturbance of aquatic and wetland vegetation and habitat	<ul style="list-style-type: none"> • Removal of any riparian and wetland vegetation must take place under the supervision of an ECO. • Removal of riparian zone alien vegetation should be prioritized. • Banks must be artificially stabilised as soon as possible if riparian vegetation is removed. • Vehicles and machinery must not encroach into riparian zone areas outside/surrounding road upgrade footprint.
2.13	Changes to fluvial geomorphology and hydrology	<ul style="list-style-type: none"> • Damage to bed and banks of the watercourses must be avoided other than to complete specific works within the watercourse.

2. CONSTRUCTION PHASE	
ISSUE	MITIGATION MEASURES
	<ul style="list-style-type: none"> • No material, sediment or debris from bridge/culvert construction must be left or allowed to build up in the watercourse. • Cofferdams and any temporary diversions should not be in place for more than 30 days if possible. • Construction activities within watercourses should take place within the dry season, when the flows are at their lowest, where possible.
2.14	<p>Erosion and sedimentation</p> <ul style="list-style-type: none"> • Vegetation clearing during construction must be kept a minimum and only to the site footprint. • Erosion controls and sediment trapping measures must be put in place. • All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and revegetated. • Disturbed areas must be constantly monitored for erosion channels and these must be rehabilitated immediately.
2.15	<p>Water quality</p> <ul style="list-style-type: none"> • No concrete mixing must take place within 32m of any watercourse. • No machinery must be parked overnight within 50 m of the rivers/wetlands. • All stationary machinery must be equipped with a drip tray to retain any oil leaks. • Chemicals used for construction must be stored safely on bunded surfaces in the construction site camp. • Emergency plans must be in place in case of spillages onto road surfaces or within water courses. • No ablution facilities must be located within 50 m of any river or wetland system. • Chemical toilets must be regularly maintained/ serviced to prevent ground or surface water pollution. • Any hazardous substances/waste must be stored in impermeable bunded areas or secondary containers 110% the volume of the contents within it. • All general waste and refuse must be removed from site and disposed and windproof temporary storage area before being disposed of at a registered landfill site.
2.16	<p>Natural vegetation</p> <ul style="list-style-type: none"> • The construction footprint and other adjacent areas that require clearing of vegetation, must be surveyed and demarcated prior to construction commencing. • No construction or vegetation clearing activities must occur outside the demarcated footprint. • Construction activities must be preferred in areas where degraded natural vegetation is found. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilization and vegetation must be undertaken. • Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. • The contractor's staff must not harvest any natural vegetation.

2. CONSTRUCTION PHASE		
	ISSUE	MITIGATION MEASURES
2.17	Species of Conservation Concern (SCC)	<ul style="list-style-type: none"> • A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. • All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. • The relevant permits must be obtained from the competent authority in order to remove any SCC.
2.18	Animal disturbances and mortalities	<ul style="list-style-type: none"> • All staff must be trained on site regarding the proper management and response should animals be encountered. • If deemed necessary, a specialist must be appointed to search and relocate animals in the construction region prior to work commencing, • No hunting, baiting or trapping of animals must be allowed on site or surrounding areas.
2.19	Loss/ Fragmentation of habitats	<ul style="list-style-type: none"> • Vegetation clearance and aquatic habitats must be avoided as far as possible.
2.20	Establishments of alien plant species	<ul style="list-style-type: none"> • The approved Rehab Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Rehabilitation Erosion and Alien Vegetation Management Plans.
2.21	Job creation	<ul style="list-style-type: none"> • Where possible construction resources must be purchased from local companies.
2.22	Traffic flow	<ul style="list-style-type: none"> • A traffic management plan must be implemented • The contractor must properly mark all access roads. Markers must show the direction of travel to which the road leads. Roads not to be used must be marked with a "NO ENTRY" sign. Where required, speed limits must be indicated on the roads. All speed limits must be strictly adhered to at all time.
2.23	Health and safety	<ul style="list-style-type: none"> • Environmental and safety inductions must be provided to all staff before they are permitted on the construction site. • Dangerous sites (e.g. open excavations) must be cordoned off and no public access allowed. • Contractors must have emergency telephone numbers on site. • A health and safety file is to be kept on site and all incidents must be recorded and reported to the designated safety officer by the contractor.
		<ul style="list-style-type: none"> • Speed limit and other road signage must be instituted as required. • Traffic calming measures must be implemented throughout the duration of the construction phase.

2. CONSTRUCTION PHASE		
	ISSUE	MITIGATION MEASURES
2.24	Air quality and dust control	<ul style="list-style-type: none"> • During windy periods un-surfaced and un-vegetated areas must be stabilized or dampened down. • Vegetation must be retained where possible as this will reduce dust travel. • Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register.
2.25	Visual	<ul style="list-style-type: none"> • All construction activity should take place during daylight working hours (i.e. 7 – 5pm). • All construction activity and equipment must be limited to the demarcated areas. • Good housekeeping must be maintained throughout the construction work areas to limit the visual intrusion of the construction activities.
2.26	Noise	<ul style="list-style-type: none"> • Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). • There must be a complaint register on site for nearby residents to make complaints. These must be addressed and recorded.
2.27	On-site fire risk	<ul style="list-style-type: none"> • In order to reduce the risk of fires: • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • Smoking must not be permitted near flammable substances. • No open fires must be allowed on site. • Fire extinguishers must be available onsite.
2.28	Heritage and paleontological resources	<p>Impacts to Iron Age site located within the project area:</p> <ul style="list-style-type: none"> ○ All previously undetected heritage remains / graves must be located as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work. ○ A conservation buffer of at least 20m around the site should be implemented and the area should be monitored on a frequent basis by an informed ECO in order to avoid the destruction of existing and previously undetected heritage remains. <p>Historical Period heritage structures or features located within the project area:</p> <ul style="list-style-type: none"> • Implement a heritage conservation buffer of at least 20m around the heritage resource, and/or redesign the proposed road alignment to avoid the heritage resource if possible. • These sites must be frequently monitored by the ECO. • The necessary alteration and/or destruction permits should be obtained from the relevant Heritage Resources Authorities prior to site sampling and destruction, should it be required. Destruction of these sites may be permitted if, and when required. <p>Impacts to burial sites:</p> <ul style="list-style-type: none"> • Human burials occurring in close vicinity of the proposed road upgrade alignment must be fenced off and conserved and a conservation buffer of at least 50m be maintained around the heritage receptors. Where 50m buffer is not possible due to the existing alignment of the road, a 10m conservation buffer around burial sites should be implemented on the condition that a temporary

2. CONSTRUCTION PHASE		
	ISSUE	MITIGATION MEASURES
		<p>construction barricade is erected around (but no closer than 3m) from affected graves.</p> <ul style="list-style-type: none"> • Grave site BP-12 (S31.83082044; E28.19396672, See page 62 of the Archaeological Impact Assessment Report) must be relocated as it will fall within 3m from the proposed toe of the embankment cut. • Burial sites affected in such a way should be monitored on a bi-weekly basis by an informed ECO or by the heritage specialist in order to detect any impact on the resource at the earliest opportunity. • Site management (Fencing, access control), as well as strict monitoring by the ECO must be implemented. • Should impact on any human burial prove inevitable, full grave relocations are recommended for these burial grounds. This measure must be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process must occur in conjunction with the mitigation of cemeteries and burials.
2.29	Inadequate rehabilitation	<ul style="list-style-type: none"> • The rehabilitation plan must be implemented during and after the construction has been completed. • All temporarily disturbed areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction as phases have been completed. • All impacted areas must be restored as per the EMPr requirements.

3 OPERATIONAL PHASE		
	ISSUE	MITIGATION MEASURES
3.1	Legal and policy compliance	<ul style="list-style-type: none"> • All relevant legislation and policy must be consulted and the proponent must ensure that the project is compliant with such legislation and policy. The operational conditions outlined in the EA must be adhered to.
3.3	Stormwater management	<ul style="list-style-type: none"> • Regular maintenance of the stormwater structures associated with the road realignments must continue throughout the entire duration of the operational phase. • Stormwater infrastructure must be maintained and monitored for effectiveness with respect to controlling and minimising erosion and sedimentation of watercourses.
3.4	Invasion of alien species	<ul style="list-style-type: none"> • An alien vegetation removal and rehabilitation plan must be implemented post-construction. • The effectiveness of this plan should be monitored on a biannually for the first year following construction or until such time as the ECO deems the rehabilitation sufficient.
3.5	Maintenance	<ul style="list-style-type: none"> • All infrastructures such as culverts, bridges etc. must be maintained and monitored on a regular basis to check for failure of infrastructure.
3.6	Establishment of alien vegetation	<ul style="list-style-type: none"> • The approved Alien Vegetation Management Plan must be implemented biannually for a year after construction, to reduce the establishment and spread of undesirable alien plant species post construction.

3	OPERATIONAL PHASE	
	ISSUE	MITIGATION MEASURES
		<ul style="list-style-type: none"> • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.
3.7	Traffic flow	<ul style="list-style-type: none"> • Measures to accommodate pedestrians should be in place and continually enforced. • Traffic calming measures should be in place along approaching roads.
3.8	Inadequate rehabilitation and maintenance	<ul style="list-style-type: none"> • Rehabilitation Plan must be implemented post- construction.

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6 ENVIRONMENTAL MONITORING

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
- (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);

A monitoring programme must be implemented for the duration of the construction and operation of the road upgrade. This programme should include:

- Establishing a baseline of pre-construction site conditions validated with photographic evidence.
- Monthly audits will be conducted by an independent ECO for the construction phase to ensure compliance with the conditions stipulated in this EMPr and, where necessary, make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Coordinator.
- Compilation of an audit report with a rating of compliance with the EMPr. The ECO must keep a photographic record of the demarcated site and construction area. The Contractor must be held liable for all unnecessary damage to the environment. A register must be kept of all complaints from the community. All complaints / claims must be handled immediately to ensure timeous rectification / payment by the responsible party.

7 ROLES AND RESPONSIBILITIES

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (i) An indication of the persons who will be responsible for the implementation of the impact management actions;

7.1 Project Coordinator

The Project Coordinator is responsible for overall management of the project and the implementation of the EMPr. The following tasks fall within his / her responsibilities:

- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
- Monitor site activities on a daily basis for compliance;
- Conduct internal audits of the construction site against the EMPr;
- Confine the construction site to the demarcated areas; and
- Rectify transgressions through the implementation of corrective action.

7.2 Contractor

The Contractor is responsible for the overall execution of the activities envisioned in the construction phase, including the implementation and compliance with recommendations and conditions of the EMPr. The Contractor must therefore ensure compliance with the EMPr at all times during construction activities and maintain an environmental register which keeps a record of all environmental incidents that occur on the site during construction and rehabilitation of the Clarkbury Road. These incidents may include:

- Public involvement / complaints;
- Health and safety incidents;
- Incidents involving Hazardous materials stored on site; and
- Non-compliance incidents.

The Contractor is also responsible for the implementation of corrective actions issued by the ECO and Project Coordinator within a reasonable or agreed upon period of time.

7.3 Environmental Control Officer

For the purposes of implementing the conditions contained herein, the Developer must appoint an ECO for the contract. The ECO must be the responsible person for ensuring that the provisions of the EMPr and that any necessary environmental authorisations are complied with during the construction period. The ECO's duties in this regard will include, *but are not limited to*, the following:

- Conduct regular site visits to be able to report on and respond to any environmental issues;
- Report compliance and non-compliance issues to the competent authority;
- Advise the Contractor on environmental issues within the defined work areas;
- Review access and incident records that may pertain to the environment and reconcile the entries with the observations made during site inspection, monitoring and auditing;
- Recommend corrective action when required for aspects of non-compliance within the EMPr;
- Take immediate action on site where clearly defined and agreed upon "no-go" areas are violated or in danger of being violated, inform a MBSA representative of the occurrence immediately and take action; and

- Be contactable by the public regarding matters of environmental concern as they relate to the operation of the works.

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8 COMPLIANCE WITH THE EMPr

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
- (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);

A copy of the EMPr must be kept on site at all times during the construction period. The EMPr will be binding on all contractors operating on the site and must be included within the Contractual Clauses.

It should be noted that in terms of Section 28 of the National Environmental Management Act (No. 107 of 1998): those responsible for environmental damage must pay the repair costs both to the environment, human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The 'polluter pays' principle).

8.1 Non-compliance

The contractors must act immediately when notice of non-compliance is received and take corrective action. Complaints received regarding activities on the construction site pertaining to the environment must be recorded in a dedicated register and the response(s) noted with the date and action taken. The ECO should be made aware of any complaints.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause must be reported to the competent authority for them to deal with the transgression, as it deems fit.

The Contractor is deemed not to have complied with the EMPr if, *inter alia*:

- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site and site extensions;
- There is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site;
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued within a specific time period.

It is recommended that the Contractors institute penalties for the following less serious violations and any others determined during the course of work, as detailed below:

- Littering on site.
- Lighting of illegal fires on site.
- Persistent or unrepaired fuel and oil leaks.
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "no-go" areas.
- Excess dust or excess noise emanating from site.
- Possession or use of intoxicating substances on site.
- Any vehicles being driven in excess of designated speed limits.
- Removal and/or damage to fauna, flora, cultural or heritage objects on site.
- Urination and defecation anywhere except at designated facilities.

8.2 Emergency preparedness

The Contractor must compile and maintain environmental emergency procedures to ensure that there will be appropriate responses to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include, *inter alia*:

- Accidental waste water discharges to water and land.
- Accidental fires.
- Accidental spillage of hazardous substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability and liability.
- A list of key personnel and contact details.
- Details of emergency services available (e.g. the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The Contractor must comply with the emergency preparedness and incident- and accident-reporting requirements, as required by the Occupational Health and Safety Act (No. 85 of 1993), the NEMA (No. 107 of 1998) and the National Water Act (No. 36 of 1998) as amended and/or any other relevant legislation.

8.3 Incident reporting and remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident. The following information must be provided:

- the location;
- the nature of the load;
- the extent of the impact; and
- the status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

8.4 Penalties

Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMPr, the Developer and/or the Contractor will be liable.

The following violations, and any others determined during the course of work, should be penalised:

- Hazardous chemical/oil spill and/or dumping in non-approved sites.
- Damage to sensitive environments.
- Damage to cultural and historical sites.

- Unauthorised removal/damage to indigenous trees and other vegetation, particularly in identified sensitive areas.
- Uncontrolled/unmanaged erosion.
- Unauthorised blasting activities (*if applicable*).
- Pollution of water sources.
- Unnecessary removal or damage to trees.

The following steps will be followed by the ECO, on behalf of the Developer, when observing a transgression:

1. **Transgression observed:** Give a warning to the Contractor, with time to remedy the situation. Report transgression and agreed remedial action to the developer.
2. **Transgression not remedied:** Report the Contractor directly to the Developer and issue a financial penalty to the Contractor with an agreed time period to remedy the situation with the assistance of ECDT (*if necessary*).
3. **Failure to remediate:** Depending on the severity and impact significance of the transgression, which must be assessed and discussed with the Developer prior to reporting to the competent authority, the ECO may report directly to DEA (Compliance) recommending that for:
 - HIGH impact: DEA to issue a notice to cease construction;
 - MEDIUM impact: DEA to issue a notice instructing the Developer to implement recommended remedial action; and/or
 - LOW impact: ECO to notify, but up to discretion of DEA to apply sanction.

In all cases, however, non-compliance must be reported to DEA in the monthly audit reports. However, the ECO will also report on corrective actions proposed and implemented.

The following schedule of fines for environmental damage or EMPr transgressions have been adapted from the City of Cape Town: Standard Environmental Specifications (which can be used as a guide).

Table 9.1. List of fines for transgressions or resultant environmental damage

TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	Min. fine	Max. fine
Failure to comply with prescriptions regarding ECO appointment and monitoring of EMPr	R1 000	R2 000
Failure to comply with prescriptions regarding environmental awareness training	R2000	R10 000
Failure to comply with prescriptions regarding method statements	R2 000	R10 000
Failure to report environmental damage or EMPr transgressions to the ECO	R1 000	R2 000
Failure to carry out instructions of the DEO/ECO regarding the environment of the EMPr	R1 000	R2 000
Failure to comply with prescriptions posting of emergency numbers	R2 000	R10 000
Failure to comply with prescriptions regarding information boards	R1 000	R2 000
Failure to comply with prescriptions regarding a complaints register	R1 000	R2 000
Failure to comply with prescriptions regarding site demarcation and enforcement of “no go” areas	R2 000	R10 000
Failure to comply with prescriptions regarding site clearing	R2 000	R10 000
Failure to comply with prescriptions for the storage of imported materials within a designated Contractors yard	R1 000	R2 000
Failure to comply with prescribed administration, storage or handling of hazardous substances	R1 000	R2 000
Failure to comply with prescriptions regarding equipment maintenance and storage	R1 000	R2 000
Failure to comply with fuel storage, refuelling, or clean-up prescriptions	R1 000	R2 000

Failure to comply with prescriptions regarding procedures for emergencies (spillages and fires)	R2 000	R10 000
Failure to comply with prescriptions regarding construction camp	R2 000	R10 000
Failure to comply with prescriptions for the use of ablution facilities	R1 000	R2 000
Failure to comply with prescriptions regarding water provision	R1 000	R2 000
Failure to comply with prescriptions for the use of designated eating areas, heating source for cooking or presence of fire extinguishers	R1 000	R2 000
Failure to comply with prescriptions regarding fire control	R2 000	R10 000
Failure to comply with prescriptions for solid waste management	R2 000	R10 000
Failure to comply with prescriptions to prevent water pollution and sedimentation	R2 000	R10 000
Failure to comply with prescriptions to the protection of natural features, flora, fauna and archaeology	R2 000	R10 000
Failure to comply with prescriptions regarding speed limits	R1 000	R2 000
Failure to comply with prescriptions regarding noise levels of construction activity	R2 000	R10 000
Failure to comply with prescriptions regarding working hours	R2 000	R10 000
Failure to comply with prescriptions regarding aesthetics	R1 000	R2 000
Failure to comply with prescriptions regarding dust control	R1 000	R2 000
Failure to comply with prescriptions regarding security and access onto private property	R1 000	R2 000
Failure to comply with prescriptions regarding cement and concrete batching	R2 000	R10 000

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9 REPORTING

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;

9.1 Administration

Before the construction activities commence, the Contractor must provide the ECO and the Developer with a written method statement setting out the following:

- Details of the construction activities;
- Location where the activity will take place;
- Identification of impacts that might result from the activity;
- Identification of activities that may cause impacts;
- Methodology and/or specifications for impact prevention for each activity or aspect;
- Methodology and/or specifications for impact containment for each activity or aspect;
- Emergency/disaster incident and reaction procedures; and the
- Treatment and continued maintenance of the impacted environment.

The Contractor should provide such information in advance of any or all construction activities provided that new submissions are given to the ECO whenever there is a change or variation to the original.

The ECO should provide comment on the methodology and procedures proposed by the Contractor but he/she will not be responsible for the Contractor's chosen measures of impact mitigation and emergency/disaster management systems.

9.2 Good housekeeping

The Contractor must undertake "good housekeeping" practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods to include the care for and preservation of the environment within which the construction is situated.

9.3 Record keeping

The ECO must continuously monitor the Contractor's adherence to the approved impact prevention procedures and the ECO must issue the Contractor with a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance should be documented and reported to the Developer in the monthly report. These reports must be made available to DEA when requested.

9.4 Document control

The Contractor is responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person.

- Every document should identify the personnel and their position(s), who drafted and compiled the document(s), who reviewed and recommended approval, and who finally approved the document for distribution.
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor must ensure that documents are periodically reviewed and revised, *where necessary*, and that current versions are available at all locations where operations essential to the functioning of the EMP are performed. All documents must be made available to the ECO and other independent external auditors.

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10 ENVIRONMENTAL AWARENESS

According to APPENDIX 4 of GN R 326, an environmental management programme must include:

- (m) An environmental awareness plan describing the manner in which –
- (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
 - (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and

The Contractors must ensure that their employees and any third party, who carries out all or part of the Contractors' obligations, are adequately trained with regard to the implementation of the EMPr and the general environmental legal requirements and obligations. Training should be conducted by the ECO where necessary.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. Environmental awareness training programmes should contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course; and
- A schedule for the presentation of the training courses.

The ECO must ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records must verify each of the targeted personnel's training experience.

The Developer must ensure that adequate environmental training takes place. All employees must be given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training must, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of approach roads or construction camps;
- The importance of not littering;
- The importance of using supplied ablution facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible; and the
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

Recommended Environmental Education Material is provided in Appendix 1.

10.1 Monitoring of environmental training

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended

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11 CLOSURE PLANNING

Final site cleaning - the contractor must clear and clean the site and ensure that all equipment and residual materials not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

Rehabilitation - the contractor (landscape architect/horticulturist) must be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for conservation during construction to the satisfaction of the engineer and ECO.

11.1 Post-construction audit

A post-construction audit must be carried out and submitted to DEA at the expense of the Developer. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

11.2 General review of EMPr

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexures of this nature must be distributed to all relevant parties.

12 CONCLUSIONS

The EMPr should be seen as a day-to-day management document in which all foreseeable actions and potential mitigations and/or management actions are contained. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the construction activities. The EMPr could thus change daily, and if managed correctly lead to a successful construction and operation phases.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

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APPENDIX A: ENVIRONMENTAL EDUCATION COURSE

PROPOSED ENVIRONMENTAL EDUCATION COURSE

WHAT IS THE ENVIRONMENT?

- Soil
- Water
- Plants
- People
- Animals
- Air we breathe
- Buildings, cars and houses



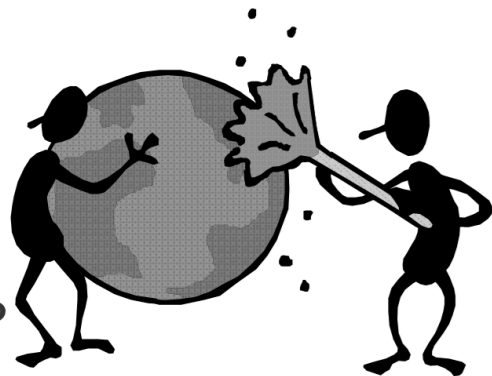
DK

WHY MUST WE LOOK AFTER THE ENVIRONMENT?

- It affects us all as well as future generations
- We have a right to a healthy environment
- A contract has been signed
- Disciplinary action (e.g. construction could stop or fines issued)

HOW DO WE LOOK AFTER THE ENVIRONMENT?

- Report problems to your supervisor/ foreman
- Team work
- Follow the rules in the EMP



WORKING AREAS

Workers & equipment must stay inside the site boundaries at all times



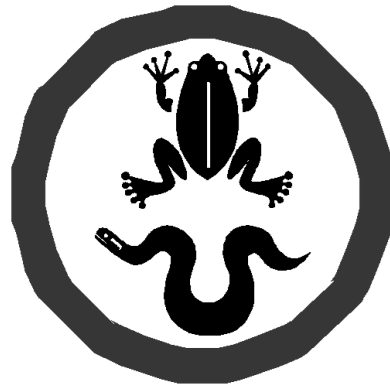
RIVERS & STREAMS

- Do not swim in or drink from streams
- Do not throw oil, petrol, diesel, concrete or rubbish in the stream
- Do not work in the stream without direct instruction
- Do not damage the banks or vegetation of the stream



ANIMALS

- Do not injure or kill any animals on the site
- Ask your supervisor or Contract's Manager to remove animals found on site



TREES AND FLOWERS

- Do not damage or cut down any trees or plants without permission
- Do not pick flowers



SMOKING AND FIRE

- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Do not light any fires without permission
- Know the positions of fire fighting equipment
- Report all fires
- Do not burn rubbish or vegetation without permission



PETROL, OIL AND DIESEL

- Work with petrol, oil & diesel in marked areas
- Report any petrol, oil & diesel leaks or spills to your supervisor
- Use a drip tray under vehicles & machinery
- Empty drip trays after rain & throw away where instructed



DUST

Try to avoid producing dust –
Use water to make ground &
soil wet



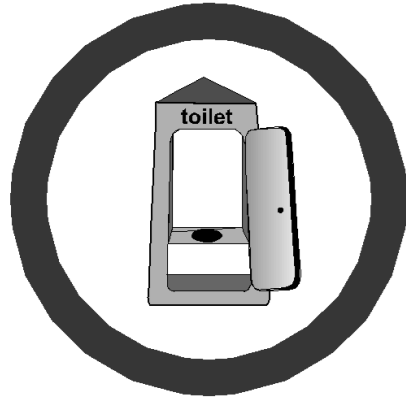
NOISE

- Do not make loud noises around the site, especially near schools and homes
- Report or repair noisy vehicles



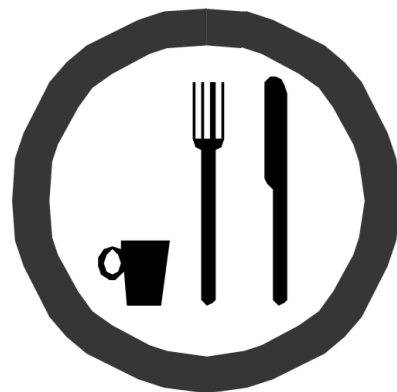
TOILETS

- Use the toilets provided
- Report full or leaking toilets



EATING

- Only eat in demarcated eating areas
- Never eat near a river or stream
- Put packaging & leftover food into rubbish bins



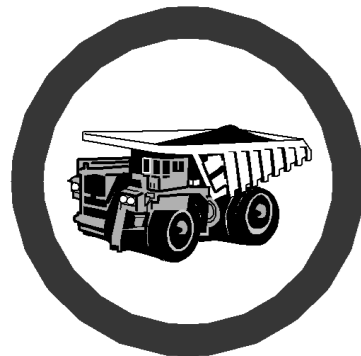
RUBBISH

- Do not litter – put all rubbish (especially cement bags) into the bins provided
- Report full bins to your supervisor
- The responsible person should empty bins regularly



TRUCKS AND DRIVING

- Always keep to the speed limit
- Drivers – check & report leaks and vehicles that belch smoke
- Ensure loads are secure & do not spill



EMERGENCY PHONE NUMBERS

Know all the emergency phone numbers:

- Local Municipality:
- Ambulance:
- Fire:
- Police:

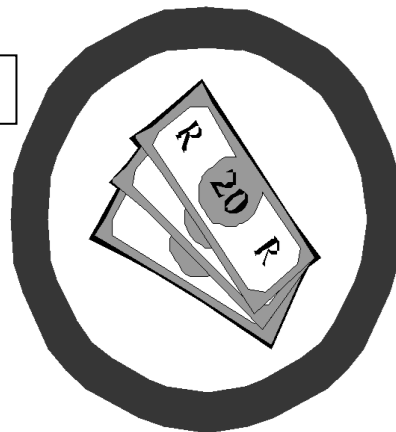


FINES AND PENALTIES

- Spot fines of between

To be confirmed by the Engineer

- Your company may be fined
- Removal from site
- Construction may be stopped



PROBLEMS - WHAT TO DO!

- Report any breaks, floods, fires, leaks and injuries to your supervisor
- Ask questions!



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APPENDIX B: ENVIRONMENTAL AUTHORISATION

ENVIRONMENTAL AUTHORISATION

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APPENDIX C: PRO-FORMA

PRO-FORMA: PROTECTION OF THE ENVIRONMENT

To be signed by Contractors

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PRO FORMA

Employer _____
Contract No _____
Contract title _____

PROTECTION OF THE ENVIRONMENT

The Contractor will not be given right of access to the site until this form has been signed.

I/ we _____ (Contractor) record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities must be carried out with due regard to their impact on the environment.
2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in so far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.
3. I/ we acknowledge and accept the right of _____ to deduct, should they so wish, from any amounts due to me/us, such amounts (hereinafter referred to as fines) as the Resident Engineer and Environmental Site Officer must certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:
 - 3.1 The Resident Engineer and Environmental Officer, in determining the amount of such fine, must take into account *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences.
 - 3.2 The Resident Engineer and Environmental Officer must, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Resident Engineer and Environmental Officer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed _____
CONTRACTOR

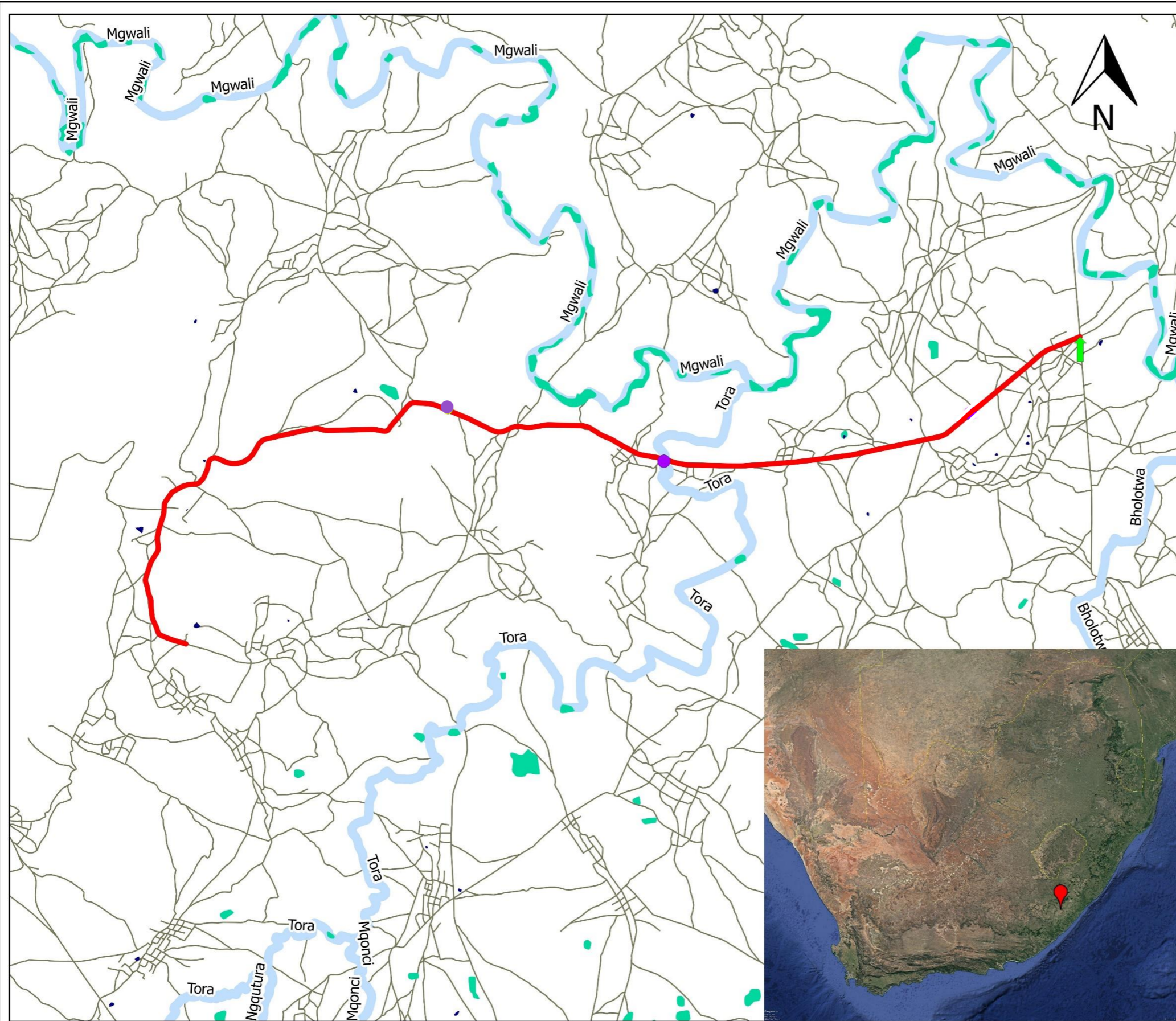
Date _____

APPENDIX D: MAPS

D1 – LOCALITY MAP

D2 – SENSITIVITY MAP

DRAFT

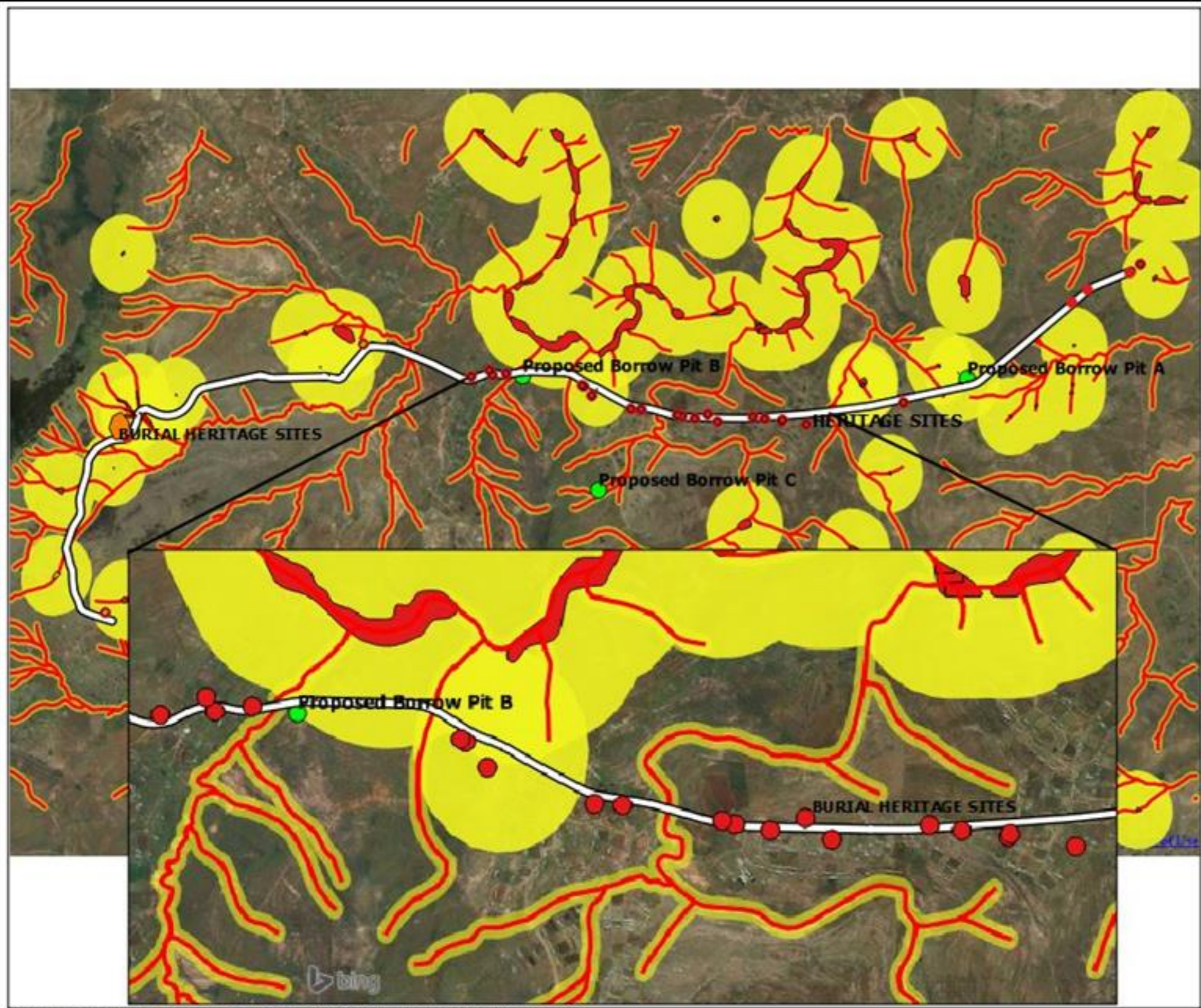


Drawn by: RL Anderson
Date: December 2018
EOH Project Code: P40700370
Scale
1:100000
TITLE
Locality Map
PROJECT
Clarkebury Road Upgrade

-  Road upgrade section
-  Start Point
-  Causeway
-  Bridges
-  Existing roads
-  Wetlands
-  Major rivers

Datum: WGS84

Produced for:
Roads & Public Works



Drawn by: Jaclyn Smith

Date: August 2019

CES Project Code: P40700370

1:88 856

TITLE

Sensitivity Map

PROJECT

MBSA Clarkebury Road Upgrade

Legend

- Road route.kml
- Borrow Pits
- Quarry Sites
- Low Sensitivity
- Moderate Sensitivity
- High Sensitivity



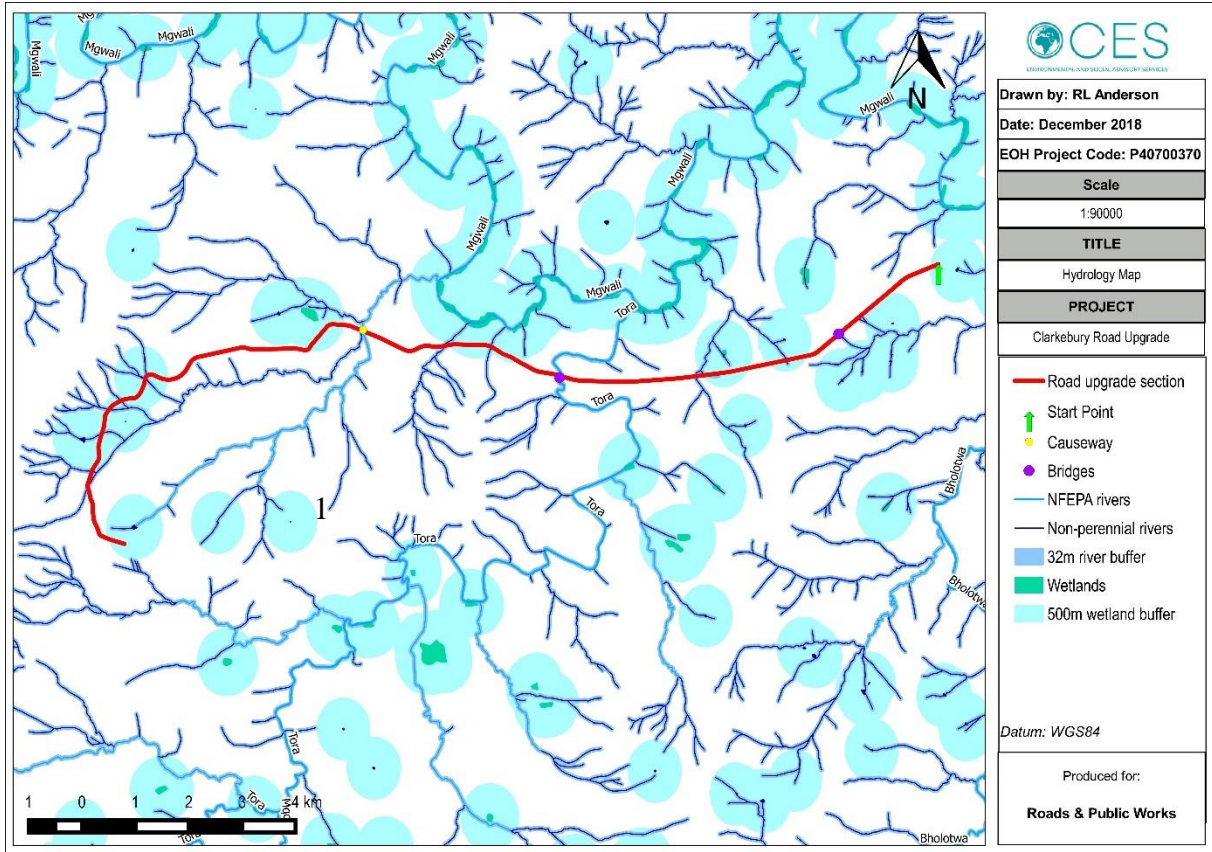
Produced for:

MBSA

I:\Serverz\Data\FTP Shared\PROJECTS\ELC\CURRENT PROJECTS 2012\MBSA Clarkebury Road\pics & Maps\Aquatic maps

APPENDIX E: WETLAND REHABILITATION PLAN

Should construction activities and/or vehicles and machinery encroach into the wetland areas (and their buffers) causing disturbance to the wetlands, and rehabilitation is required, then the principles below can be applied to the wetlands, where relevant.



Rehabilitation will aid the recovery of the ecosystems and can be seen as critical in preventing further impacts to the wetlands including those associated with alien plant infestations, soil erosion and sedimentation. Wetland rehabilitation work must be conducted during low rainfall seasons and the use of heavy machinery must be prohibited to avoid soil compaction.

1. Rehabilitation guidelines for a disturbed wetland

1.1. Stabilise unstable and eroded areas

- Any erosion features immediately upslope and/or within the wetland habitat that is created during the construction phase needs to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed. Compacted soil infill, rock plugs, gabions or any other suitable measures can be used for this purpose.

1.2. Remove any waste products

- All foreign sediment washed into the wetland from upslope erosion must be removed taking care not to remove or disturb the natural soil profile.
- Any foreign material or waste (spoil, construction materials, hazardous substances and general litter) must be removed from the wetlands and disposed of in proper waste facilities.
- Additional disturbance must be prevented by limiting the use of heavy vehicles and personnel during clean-up operations.

1.3. Remove alien plants from wetlands

- All exotic/alien plants and weeds that colonise the wetlands and buffer must be removed and properly disposed of prior to the implementation of rehabilitation measures.
- Alien invasive plant species in and around wetland areas must be removed in terms of the Conservation of Agricultural Resources Act (CARA) and National Environmental Management Biodiversity Act (NEMBA) and follow up actions for at least five years need to take place.

1.4. Restore natural topography and re-vegetation

- The natural topography of the wetland areas must be re-instated as close as practically possible to preconstruction conditions to ensure natural drainage patterns.
- In the case of unstable steep banks these may be reshaped to a stable angle of repose to avoid slumping.
- If significant soil compaction has occurred, the soil may need to be ripped to reduce the bulk density of the soil such that vegetation can become established at the site.
- If topsoil is lost during construction as a result of erosion, topsoil will need to be imported to the site and re-established. This topsoil must be sourced locally, responsibly and legally.
- For areas that are re-seeded via “broadcasting”, the soil must be prepared to optimise germination. Such preparation can be done by hand hoeing.
- Where re-vegetation is not sufficient on its own to stabilise areas, “soft” stabilisation interventions should be installed where necessary and applicable. “Soft” stabilisation interventions should be favoured over “hard” interventions wherever possible to ensure that wetlands retain habitat.
- The following soft interventions (in addition to re-vegetation) should be investigated, if required:
 - Fibre mats / blankets/ mattresses / nets.
 - Fibre rolls.
 - Fibre bags.
 - Brush or vegetation mattresses (mats).
 - Terracing.
- A trained rehabilitation expert should be contracted to oversee the rehabilitation of wetland areas (in the event that they are inadvertently impacted).
- Once alien vegetation and waste products have been removed and soils are prepared for planting, vegetation must be reinstated as soon as weather conditions allow for plant growth.
- For wetland and riparian habitat, the disturbed and bare areas must be re-vegetated using indigenous plants with active planting using plugs and/or sprigs of indigenous locally occurring riparian vegetation similar/identical to that existing prior to disturbance or transplants of local vegetation that can only be sourced under the guidance of the ECO/re-vegetation specialist and must not be sourced from freshwater habitats. A qualified re-vegetation specialist must inform the selection of plug species as well as plug densities and spacing.
- Rapidly germinating indigenous species (e.g. fast growing, deep rooting, rhizomatous, stoloniferous) known to bind soils in terrestrial, riparian and/or wetland areas must be utilised where there is a strong motivation for stabilisation over reinstating similar plant communities to that being disturbed. Again, this should be informed by a qualified re-vegetation specialist.
- Wetland rehabilitation work must be conducted during low rainfall seasons and the use of heavy machinery must be prohibited to avoid soil compaction.
- Do not use fertilizer, lime, or mulch unless absolutely required.
- Alien plant species are not to be used for re-vegetation, particularly those with invasive potential (Conservation of Agricultural Resources Act (Act 43 of 1983), as well as the Alien & Invasive Species list (2014) of the National Environmental Management: Biodiversity Act (Act 10 of 2004).

- When sourcing plants from nurseries, it is important to consider the genetic origin of the plants. It is considered best to use small regional nurseries that breed plants from the region, instead of large commercial nurseries that are likely to obtain stock from large regional suppliers.
- Temporary erosion protection measures must only be removed once good vegetation cover has been established.
- Should the replanting area be invaded by weeds prior to planting, these must be hand pulled, hoed or killed with an appropriate environmentally friendly herbicide. Care must be taken, however, to not clear all weeds indiscriminately as the weeds may be performing a useful soil covering and binding function.

1.5. Monitor re-vegetation progress and administer alien plant control

- Recovery of disturbed areas should be assessed for the first 6 months to assess the success of rehabilitation actions. Any areas that are not progressing satisfactorily must be identified (e.g. on a map) and action must be taken to actively re-vegetate these areas. If natural recovery is progressing well, no further intervention may be required.
- The ECO should assess the need / desirability for further monitoring and control after the first 12 months and include any recommendations for further action.
- The use of herbicides in invasive alien plant control will require an investigation into the necessity, type to be used, effectiveness and impacts of the agent on aquatic biota (manual removal of alien vegetation should be sufficient).
- Any soil erosion in rehabilitated areas must also be addressed through appropriate actions.

APPENDIX F: CURRICULUM VITAE

CURRICULUM VITAE OF EAP AND PROJECT TEAM

DRAFT

CONTACT DETAILS

Name of Company	CES – Environmental and Social Advisory Services
Designation	East London Branch
Profession	Executive
Years with firm	17 (Seventeen) Years
E-mail	a.carter@cesnet.co.za
Office number	+27 (0)43 7267809 / 8313
Nationality	South African
Professional Body	SACNASP: South African Council for Natural Scientific Profession EAPSA: Environmental Assessment Practitioners Southern Africa IWMSA: Institute Waste Management Southern Africa TSBPA: Texas State Board of Public Accountancy (USA)
Key areas of expertise	<ul style="list-style-type: none">➤ Marine Ecology➤ Environmental and coastal management➤ Waste management➤ Financial accounting and project feasibility studies➤ Environmental management systems, auditing and due-diligence

PROFILE

Alan has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants (licensed in Texas) and holds a PhD in Plant Sciences. He is also a certified ISO14001 EMS auditor with the American National Standards Institute. Alan has been responsible for leading and managing numerous and varied consulting projects over the past 25 years.

**EMPLOYMENT
EXPERIENCE**

- October 2013 – Present: Executive (EOH Coastal & Environmental Services, East London, South Africa)
- January 2002 – September 2013: Director (Coastal & Environmental Services, East London, South Africa)
- January 1999 – December 2001: Manager (Arthur Andersen LLP, Public Accounting Firm, Chicago, Illinois USA)
- December 1996 – December 1998: Senior Accountant/Auditor (Ernst & Young LLP, Public Accounting Firm, Austin, Texas, USA.)
- January 1994 – December 1996: Senior Accountant/Auditor (Ernst & Young, Charteris & Barnes, Chartered Accountants, East London, South Africa)
- July 1991 – December 1994: Associate Consultant (Coastal & Environmental Services, East London, South Africa)
- March 1989 – June 1990: Data Investigator (London Stock Exchange, London, England, United Kingdom)

**ACADEMIC
QUALIFICATIONS**

- Ph.D. Plant Science (Marine) Rhodes University 1987
- B. Compt. Hons. Accounting Science University of South Africa 1997
- B. Com. Financial Accounting Rhodes University 1995
- B.Sc. Hons. Plant Science Rhodes University 1983
- B.Sc. Plant Science & Zoology Rhodes University 1982

COURSES

- *Environmental Management Systems Lead Auditor Training Course - American National Standards Institute and British Standards Institute (2000)*
- *ISO 14001:2015 Implementing Changes - British Standards Institute (2015)*
- *Numerous other workshops and training courses*

**CONSULTING
EXPERIENCE**

Environmental Impact Assessment, Feasibility and Pre-feasibility Assessments

- Managed numerous projects and prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc. (2002 – present).
- Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining licence /permit applications.
- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.
- Managed project for the East London Industrial Development Zone (ELIDZ) to develop a Conceptual Framework for a Mariculture Zone within the ELIDZ (2009).
- Managed pre-feasibility study to establish a Mariculture Zone within the Coega Industrial Development Zone (2014).
- Assisted City of Johannesburg in the process to proclaim four nature reserves in terms of relevant legislation (2015-2016).

- Acted as Environmental Control Officer (ECO) for numerous projects including solar and wind farms, roads, industrial processes, etc.

Strategic Environmental Assessment

- Managed Strategic Environmental Assessment (SEA) project toward the development of a Biofuel Industry in the Eastern Cape Province of South Africa (2014-2016)
- Managed Strategic Environmental Assessment (SEA) projects for two South African ports (2006 – 2007).
- Managed Strategic Environmental Assessment (SEA) projects for five (5) local municipalities in the Eastern Cape as part of the municipal Spatial Development Framework plans (2004 – 2005).
- Involved in the financial assessment of various land-use options and carbon credit potential as part of a larger Strategic Environmental Assessment (SEA) for assessing forestry potential in Water Catchment Area 12 in the Eastern Cape of South Africa (2006).

Climate change, emissions trading and renewable energy

- Provided specialist peer review services for National Department of Environmental Affairs relating to climate change impact assessments for large infrastructure projects (2017-2018).
- Conducted climate change impact assessment for a proposed coal-fired power station in Africa (2017-2018).
- Participated in the development of a web-based Monitoring & Evaluation (M&E) system for climate change Mitigation and Adaptation in South Africa for National Department of Environmental Affairs (DEA) (2015-2016).
- Managed project to develop a Climate Change Strategy for Buffalo City Metro Municipality (2013).
- Managed projects to develop climate change strategies for two district municipalities in the Eastern Cape Province (2011).
- Conducted specialist carbon stock and greenhouse gas emissions impact and life cycle assessment as part of the Environmental, Social and Health Impact Assessment for a proposed sugarcane to ethanol project in Sierra Leone (2009 - 2010) and a proposed Jatropha bio-diesel project in Mozambique (2009 - 2010).
- Managed project to develop the Eastern Cape Province Climate Change Strategy (2010).
- Managed project to develop a Transnet National Ports Authority Climate Change Risk Strategy (2009)
- Participated in a project to develop a Renewable Energy roadmap for the East London Industrial Development Zone (ELIDZ) (2013).
- Participated in a project for the East London Industrial Development Zone (ELIDZ) and Eastern Cape Government to prepare a Renewable Energy Strategy (2009).
- Contributed to the development of Arthur Andersen LLP's International Climate Change and Emissions Trading Services (2001).
- Conducted carbon credit (Clean Development Mechanism - CDM) feasibility assessment for a variety of renewable energy projects ranging from biogas to solar PV.
- Participated in the preparation of CDM applications for two solar PV projects

in the Eastern Cape.

Waste Management

- Managed project to develop Integrated Waste Management Plans for six local municipalities on behalf of the Sarah Baartman District Municipality in the Eastern Cape Province (2016).
- Managed project to develop Integrated Waste Management Plans for four local municipalities on behalf of Alfred Nzo District Municipality in the Eastern Cape Province (2015).
- Managed project to develop Integrated Waste Management Plans for eight local municipalities on behalf of Chris Hani District Municipality in the Eastern Cape Province (2011).
- Managed a project to develop a zero-waste strategy for a community development in the Eastern Cape Province (2010).
- Managed waste management status quo analysis for a District Municipality in the Eastern Cape Province (2003).
- For three consecutive years, managed elements of the evaluation of the environmental financial reserves of the three largest solid waste companies (Waste Management, Inc., Republic Services, Inc., Allied Waste, Inc.) and number of smaller waste companies in the USA as part of the annual financial audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.
- Managed elements of the evaluation of the environmental financial reserves of the largest hazardous waste company in the USA (Safety-Kleen, Inc.), as part of the audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.

Environmental Due Diligence and Business Risk

- Conducted environmental due diligence projects on behalf of the German Development Bank for a forestry pulp and paper operation in Swaziland (2010) and for a large diversified South African agricultural/agro-processing company (2011)
- Managed project for the Transnet National Ports Authority to identify the environmental risks and liabilities associated with the operations of the Port of Durban as part of a broader National initiative to assess business and financial risks relating to environmental management (2006).
- Managed project to determine the financial feasibility of various proposed tourism developments for the Kouga Development Agency in the Eastern Cape Province (2006)
- Contributed significantly to a study to determine the financial and environmental feasibility of three proposed tourism development projects at Coffee Bay on the Wild Coast (2004).
- Conducted sustainability and cost/benefit analysis of various waste water treatment options (including a marine pipeline at Hood Point) for the West Bank of East London (2004).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).
- Involved in the determination of the historical cost element of environmental remediation insurance claims for a number of multinational

- companies, including Dow Chemicals, Inc. and International Paper, Inc.
- Evaluated the environmental budgeting process of the US Army and provided best practice guidance for improving the process.

Policy and Guidelines

- Development of Administration / Application Fee Structure for the Reclamation of Land, Coastal Use Permits, Coastal Waters
- Discharge Permits, Dumping Of Waste at Sea, Off-Road Vehicle Regulations Promulgated in Terms of the National Environmental Management Act: Integrated Coastal Management Act (Act No. 24 Of 2008) (2017).
- Managed project to develop an Estuarine Management Plan for the Buffalo River Estuary for the National Department of Environmental Affairs (2017).
- Managed project to develop a Coastal Management Programme for Amathole District Municipality, Eastern Cape (2015 – 2016).
- Managed project to develop a sustainability diagnostic report as part of the development of the Eastern Cape Development Plan and Vision 2030 (2013).
- Managed project for the Department of Environmental Affairs and Tourism, Marine & Coastal Management to determine the cost implications associated with the implementation of the Integrated Coastal Management Act (2007).
- Managed project to develop a Conservation Plan and Municipal Open Space System (MOSS) for Buffalo City Municipality (2007)
- Managed project to develop a Sanitation Policy and Strategy for Buffalo City Municipality, Eastern Cape (2004 – 2006).
- Managed project to develop an Integrated Environmental Management Plan and Integrated Coastal Zone Management Plan for Buffalo City Municipality, Eastern Cape (2004 – 2005).
- Managed projects to develop and implement an Environmental Management System (EMS) for the Chris Hani and Joe Gqabi (formerly Ukhahlamba) District Municipalities in the Eastern Cape generally in line with ISO14001 EMS standards (2004 – 2005).
- Managed project to develop a State of the Environment Report and Environmental Implementation Plans for Amathole, Chris Hani, OR Tambo and Joe Gqabi District Municipalities in the Eastern Cape Province (2005 – 20010).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).

Environmental auditing and compliance

- Conducted environmental legal compliance audit for various large Transnet Freight Rail facilities (2018).
- Managed projects to develop Environmental & Social Management Systems (ESMS) in line with IFC Performance Standards for three (3) wind farms in South Africa (2015-2018).
- Managed project to develop an Environmental & Social Management System (ESMS) in line with IFC Performance Standards for a telecoms company in Zimbabwe on behalf of the German Development Bank (2013)
- Participated in numerous ISO14001 Environmental Management System (EMS) audits for large South African corporations including SAPPI, BHP

Billiton, SAB Miller, Western Platinum Refinery, Dorbyl Group and others (2002 – present).

- Reviewed the SHE data reporting system of International Paper, Inc. (IP) for three successive years as part of the verification of the IP SHE Annual Report, which included environmental assessments of 12 IP pulp and paper mills located throughout the USA.
- Conducted Environmental Management System (EMS) reviews for a number of large US corporations, including Gulfstream Aerospace Corporation

Public financial accounting

- While with Ernst & Young LLP, (USA), functioned as lead financial auditor for various public and private companies, mostly in the technology business segment of up to \$200 million in annual sales. Client experience included assistance in a \$100 million debt offering, a \$100 million IPO and SEC annual and quarterly reporting requirements.
- Completed three years of articles (training contract) in fulfilment of the certification requirements of the South African Institute of Chartered Accountants which included auditing, accounting and preparation of tax returns for many small to medium sized commercial entities.

PUBLICATIONS

Refereed Publications

- Carter, A.R. 1985. Reproductive morphology and phenology, and culture studies of *Gelidium pristoides* (Rhodophyta) from Port Alfred in South Africa. *Botanica Marina* 28: 303-311.
- Carter, A.R. 1993. Chromosome observations relating to bispore production in *Gelidium pristoides* (Gelidiales, Rhodophyta). *Botanica Marina* 36: 253-256.
- Carter, A.R. and R.J. Anderson. 1985. Regrowth after experimental harvesting of the agarophyte *Gelidium pristoides* (Gelidiales: Rhodophyta) in the eastern Cape Province. *South African Journal of Marine Science* 3: 111-118.
- Carter, A.R. and R.J. Anderson. 1986. Seasonal growth and agar contents in *Gelidium pristoides* (Gelidiales, Rhodophyta) from Port Alfred, South Africa. *Botanica Marina* 29: 117-123.
- Carter, A.R. and R.H. Simons. 1987. Regrowth and production capacity of *Gelidium pristoides* (Gelidiales, Rhodophyta) under various harvesting regimes at Port Alfred, South Africa. *Botanica Marina* 30: 227-231.
- Carter, A.R. and R.J. Anderson. 1991. Biological and physical factors controlling the spatial distribution of the intertidal alga *Gelidium pristoides* in the eastern Cape Province, South Africa. *Journal of the Marine Biological Association of the United Kingdom* 71: 555-568.

Published reports

- Water Research Commission. 2006. Profiling Estuary Management in Integrated Development Planning in South Africa with Particular Reference to the Eastern Cape. Project No. K5/1485.
- Turpie J., N. Sihlophe, A. Carter, T. Maswime and S. Hosking. 2006. Maximising the socio-economic benefits of estuaries through integrated planning and management: A rationale and protocol for incorporating and

enhancing estuary values in planning and management. Un-published
Water Research Commission Report No. K5/1485

Conference Proceedings

- Carter, A.R. 2002. Climate change and emission inventories in South Africa. Invited plenary paper at the 5th International System Auditors Convention, Pretoria. Held under the auspices of the South African Auditor & Training Certification Association Conference (SAATCA).
- Carter, A.R. 2003. Accounting for environmental closure costs and remediation liabilities in the South African mining industry. Proceedings of the Mining and Sustainable Development Conference. Chamber of Mines of South Africa, Vol. 2: 6B1-5
- Carter, A.R. and S. Fergus. 2004. Sustainability analysis of wastewater treatment options on the West Bank of East London, Buffalo City. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate: Pages 295-301.
- Carter, A., L. Greyling, M. Parramon and K. Whittington-Jones. 2007. A methodology for assessing the risk of incurring environmental costs associated with port activities. Proceedings of the 1st Global Conference of the Environmental Management Accounting Network.
- Hawley, GL, McMaster AR and Carter AR. 2009, Carbon, carbon stock and life-cycle assessment in assessing cumulative climate change impacts in the environmental impact process. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate.
- Hawley, GL, McMaster AR and Carter AR. 2010. The Environmental and Social Impact Assessment and associated issues and challenges. African, Caribbean and Pacific Group of States (ACP), Science and Technology Programme, Sustainable Crop Biofuels in Africa.
- Carter, A.R. 2011. A case study in the use of Life Cycle Assessment (LCA) in the assessment of greenhouse gas impacts and emissions in biofuel projects. 2nd Environmental Management Accounting Network- Africa Conference on Sustainability Accounting for Emerging Economies. Abstracts: Pages 69-70.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

ALAN ROBERT CARTER

Date: January 2019



herewith certifies that

Alan Robert Carter

Registration Number: 400332/04

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science

Effective **31 August 2004**

Expires **31 March 2020**



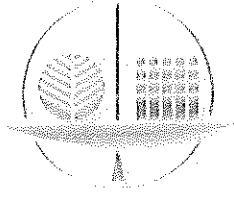
A handwritten signature in black ink, appearing to read 'Botha', written over a horizontal line.

Chairperson

A handwritten signature in black ink, appearing to read 'M. ...', written over a horizontal line.

Chief Executive Officer





The Interim Certification Board
for
Environmental Assessment Practitioners
of
South Africa

Alan Robert Carter

was certified as an

**ENVIRONMENTAL ASSESSMENT
PRACTITIONER**

on this 1st day of March 2012


.....
Chairperson


.....
Secretary

CONTACT DETAILS

Name of Company	CES – Environmental and Social Advisory Services
Designation	East London Branch
Profession	Senior Environmental Consultant
Years with firm	1 (One) Year
E-mail	c.clarke@cesnet.co.za
Office number	+27 (0)43 7267809 / 8313
Nationality	South African
Professional Body	South African Council for Scientific Natural Professionals (SACNASP): Candidate Natural Scientist (500022/14)
Key areas of expertise	<ul style="list-style-type: none">➤ Climate Change➤ Environmental Authorisations (including MPRDA applications)➤ Environmental Management Plans➤ Environmental Compliance Monitoring➤ Geographic Information Systems➤ Licensing and Permit Applications➤ Feasibility Assessments➤ Public Participation Process

PROFILE

Caryn holds a M.Sc. Environmental Science (2012), B.Sc. Hon. Environmental Science (2010), and a B.Sc. Environmental Science and Economics (2009) from Rhodes University. Her M.Sc. thesis was titled “Responses to the linked stressors of Climate Change and HIV/AIDS amongst vulnerable rural households in the Eastern Cape, South Africa”. Her B.Sc. Hon. thesis investigated climate change perceptions, drought responses and views on carbon farming amongst commercial livestock and game farmers within the Great Fish River Valley, Eastern Cape, from which a paper was published in the African Journal of Range and Forage Science 2012, 29(1):13-23. Caryn has further completed a Carbon Footprint Analysis Course (2013).

Caryn’s expertise includes project management, environmental impact assessments including public participation, MPRDA applications, environmental compliance monitoring, various licensing and permit applications, feasibility assessments and GIS mapping. Caryn is a registered Candidate Natural Scientist under the South African Council for Natural Scientific Professions.

**EMPLOYMENT
EXPERIENCE**

- Environmental Consultant, Coastal and Environmental Services
August 2018 – current
- Environmental Consultant, Environmental Impact Management Services (EIMS)
March 2013 – September 2015

**ACADEMIC
QUALIFICATIONS**

- Rhodes University, 2012: M.Sc. (Environmental Science) with distinction
- Rhodes University, 2010: B.Sc. Hon. (Environmental Science) with distinction
- Rhodes University, 2009: B.Sc. (Environmental Science and Economics) with distinctions

COURSES

- *Terra Firma Academy, Johannesburg:*
“Carbon Footprint Analysis Course” (2013)

**CONSULTING
EXPERIENCE**

- Water Use Licensing for the Olivewood Gold Estate, Eastern Cape.
- Water Use Licensing for the Northern Cape Economic Development, Trade and Investment Promotion Agency (NCEDA) SEZ, Upington, Northern Cape.
- Environmental Sensitivity Assessment for the Lesotho Electricity Company 132 kV Mahlasela - Letseng Powerline, Lesotho.
- EIA, Water Use Licensing, and Coastal Discharge Permit for the Wild Coast Abalone Expansion, Eastern Cape.
- Conservation Management Plan for the CDC Wild Coast Mthatha SEZ, Eastern Cape.
- Basic Assessment and Mining License for the SANRAL Heidelberg to Lizmore road upgrade, Western Cape.
- Feasibility Assessment for the DAFF Multispecies Hatchery Development within the Eastern Cape.
- EIA for the proposed WildCoast SEZ Upper Ncise Aquaponics development, Mthatha Dam.
- Market Analysis for the DAFF Richards Bay Marine Cage Culture Aquaculture Feasibility Assessment.
- Basic Assessment for the proposed Eskom Lesokwana substation and associated powerlines, Gauteng.
- Basic Assessment and Water Use Licensing for the proposed SANRAL V3 Ndabakazi and R409 Interchange upgrade;
- Basic Assessment and Water Use Licensing for the proposed Kei Mouth Eco Estate.
- Public Participation for the Silver Wave Energy Exploration Rights;
- Integrated Water Use Licensing for Leiden Coal Mine;
- Integrated Water and Waste Management Plan for Vlakvarkfontein Coal Mine Consolidation;
- Environmental Impact Assessment for AOE Oil Production Right, Nanaga;
- Environmental Management Plan and compliance monitoring for the Noblesfontein Wind Energy Facility;
- Section 24G for the Tankatara Level Crossing to Coega Station service road

upgrade;

- Environmental Impact Assessment for BCMM Sunny South Housing Development;
- Environmental Impact Assessment for the AES Photovoltaic Solar Energy Facility near Aggeneys, Northern Cape;
- Vincent-Berea Local Spatial Development Framework (LSDF);
- Participatory Planning for Informal Settlements: National Upgrading Support Programme (NUSP);
- Basic Assessment for the formalisation of Mdantsane informal settlements;
- Water use License Applications for the formalisation of Mdantsane informal settlements;
- Basic Assessments for the Sidwadeni and Mngazi River Bridge and Access Road;
- Environmental Compliance Monitoring (ECO work) for Lusikisiki Waste Water Treatment Works;
- Environmental Compliance Monitoring for the East London Industrial Development Zone (ELIDZ) 1B West Infrastructure Services
- Environmental Compliance Monitoring for the reconstruction of Fleet Street, East London.
- Environmental Compliance Monitoring for the Sunny South Housing Development, East London.
- Numerous proposals, for example: Nelson Mandela Bay Metro Municipality's request for Environmental Consultant Services, Camdeboo Local Municipality's Integrated Waste Management Plan, Port St John's Environmental Management Plan, and the ELIDZ upgrade of Kemba electrical substation, Berlin, Eastern Cape; ELIDZ request for information; Transnet S24G Rectification process; Nyandeni Local Municipality's request for an Environmental Impact Assessment for the Ndayini Access Road.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

CARYN CLARKE

Date: January 2019

herewith certifies that

Caryn Lee Clarke

Registration Number: 500022/14

is registered as a

Candidate Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science

Effective 23 July 2014

Expires 31 March 2020



Chairperson

Chief Executive Officer

