

Environmental Management Programme

Upgrade and Expansion of the Ikhethelo Secondary School, eMondlo, Abaqulusi Municipality



January 2021

1. Document information

Project Name:	Ikhethelo Secondary School		
Client:	JG Afrika (Pty) Ltd, on behalf of the Coega Development Corporation		
Report Title:	Ikhethelo Secondary School, Environmental Management Programme		
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Details of the Environmental Assessment Practitioner responsible for preparing this report	
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Years of Experience	13 years'
Report Reference:	02/2006/EMPr
<h3>Purpose of this report</h3> <p>The aim of this Environmental Management Programme is to provide the environmental controls for the upgrade and expansion of the Ikhethelo Secondary School in the Abaqulusi Municipality. The EMPr establishes the acceptable environmental outcomes to be achieved and actions to be implemented.</p> <p>The EMPr has been prepared in accordance with the requirements of Section 24(N) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2014 (as amended).</p>	

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Acronyms and Abbreviations

Amafa	Amafa aKwaZulu-Natali Heritage
DEFF	Department of Environment, Forestry and Fisheries
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Officer
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2003 (Act No 39 of 2003)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
SANS	South African National Standards

1. Introduction

1.1 Background

iNhlaba Consulting has been appointed by JG Afrika (Pty) Ltd, on behalf of the Coega Development Corporation to provide environmental consultancy services for the proposed upgrade and expansion of the Ikhethelo Secondary School in the town of eMondlo in the Abaqulusi Local and Zululand District Municipalities (see Figure 1-1 for the project locality).

This Environmental Management Programme (EMPr) has been prepared to provide due management of the environmental risks associated with the proposed upgrade and expansion. An EMPr can be defined as *"an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced"*. EMPrs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented.

1.2 Details of the Environmental Assessment Practitioner

As noted previously, iNhlaba Consulting has been appointed by JG Afrika to provide environmental consultancy services including, amongst other, prepare this EMPr to be implemented during the execution of the project.

Details of the qualified Environmental Assessment Practitioner (EAP) involved in compiling this EMPr are noted in Table 1-1, along with a Curriculum Vitae attached as Appendix A.

Table 1-1: Details of the EAP

General		
Company:	iNhlaba Consulting	
Postal address:	PO Box 1624, Kloof, 3640	
Tel No.:	Mobile: 084 831 8225	
Fax No.:	Fax: 086 574 1504	
Email:	warren@inhlabaconsulting.com	
Details of the Environmental Assessment Practitioner		
Name	Qualification and affiliation	Years of experience
Warren Hale	BSc; BSc (Hons); IAIAAsa	13 years

iNhlaba Consulting has no vested interest in the proposed project other than fair payment for consulting services rendered and has declared its independence as required by the EIA Regulations, 2014.

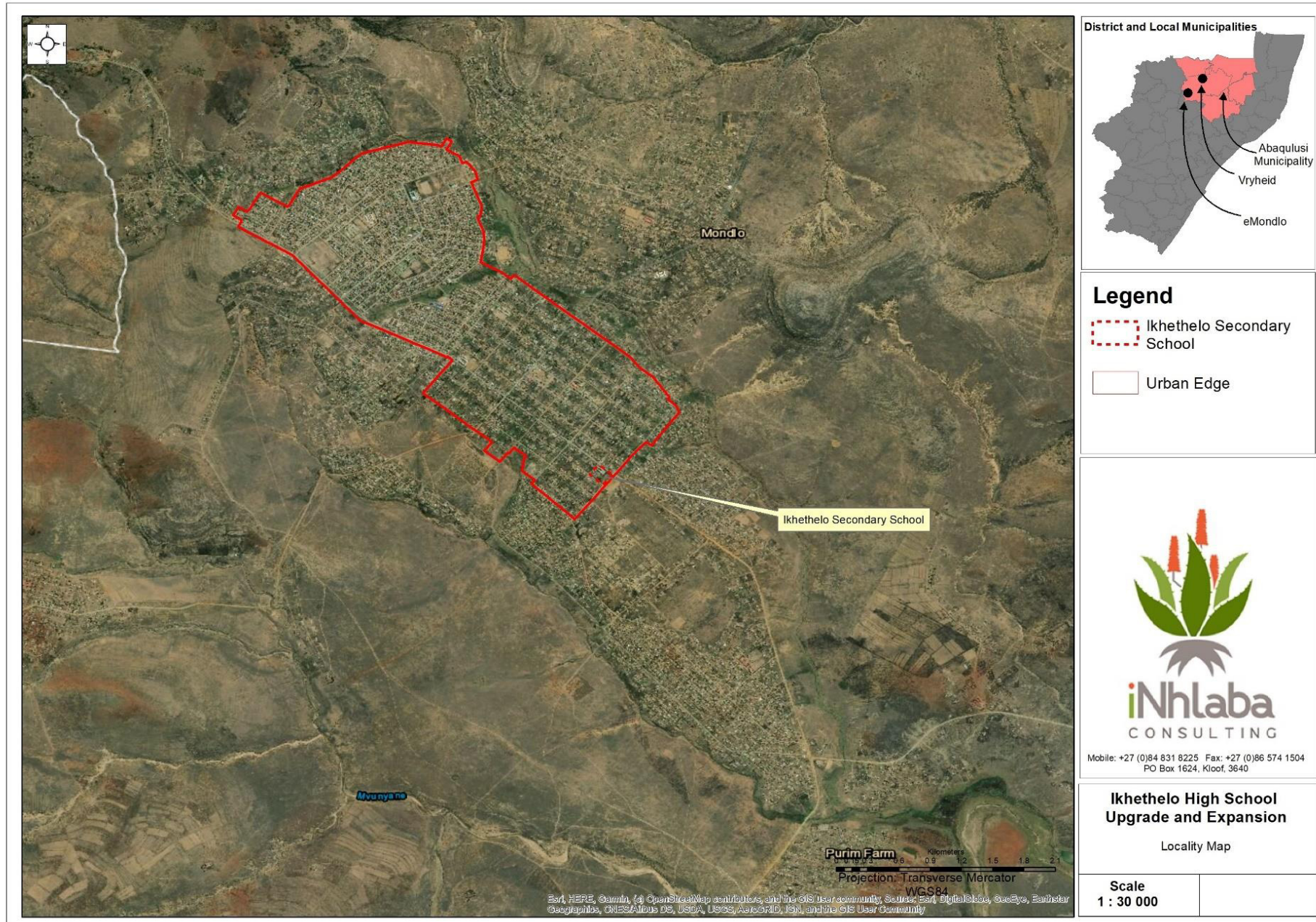


Figure 1-1: Locality of the proposed project

2. Activity description

2.1 Details of the applicant

The applicant for the project is Coega Development Corporation. Details are provided in Table 2-1 below.

Table 2-1: Name and contact details of the applicant

Name:	Coega Development Corporation Durban
Address:	1st Floor, Mayfair on the Lake 19 The High Street, Parkside Umhlanga, 4000
Responsible person:	TBC
Tel.:	031 584 1760
Fax.:	031 821 0011

2.2 Project description

2.2.1 Locational information

The project is in Ward 16 which form part of the Abaqulusi Local and Zululand District Municipalities in the KwaZulu-Natal Province.

The project site is located within the urban edge and town planning scheme of eMondlo on Erf 972 (N0HT0540000097200000) (see Figure 1-1). The central coordinates for the site are provided in Table 2-2.

Table 2-2: Property central coordinates

Coordinates	Latitude	Longitude
Ikhethelo Secondary School	27°59'47.42"S	30°43'35.85"E



Figure 2-1: Existing facility layout

2.2.2 Design or layout of the activity

To ensure that the Ikhethelo Secondary School is able to meet the requirements of the South African Schools Act, 1996 (Act No. 86 of 1996) and the Minimum Uniform Norms and Standards for Public School Infrastructure Regulations (GN. R 920 of 2013), the following expansion and upgrades at the Ikhethelo Secondary School are proposed:

- Administration Block (Block A);
- Lower grade classroom block (Block B);
- All ablution blocks (Block E, G & H) – The removal of asbestos roofing is to be done in accordance with the requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
- Teachers' cottage (Block I);
- Guardhouse – demolition and reconstruction (Block J); and
- Combi court to accommodate multiple sporting codes.

Additionally, the following new facilities are proposed:

- SNP & Team-teaching block;
- Refuse area;
- Covered walkways between the internal blocks; and
- Covered parking.

The following conversions are also proposed:

- Reduce classroom block to six classes & convert one class into a counselling office & HOD (Block B);
- Convert higher grade classrooms to computer room, physical science, media centre, store and HOD (Block F);
- Existing Nutrition block to storerooms (Block C); and,
- Existing multipurpose block to an upgraded multipurpose and hospitality suite (Block D).

The existing layout of Ikhethelo High School is provided in Figure 2-1. The proposed layout of the Ikhethelo High School, including new structures, conversions, upgrades and expansions, is provided in Figure 2-2.



Figure 2-2: Site development plan showing proposed upgrades

3. Legislative Context

3.1 National Environmental Management Act, 1998 (Act No. 107 of 1998)

This EMPr has been compiled to meet the requirements of Section 24(N) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessments (EIA) Regulations 2014 (as amended). These requirements as per Appendix 4 of the EIA Regulations, 2014 are set out in Table 3-1.

Table 3-1: Detailed requirements for an EMPr

Requirement	Reference in this report
(a) details of– (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae	Section 1.2 and Appendix A
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 4.4, Figure 4-1, Figure 4-2
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including– (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 6
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) 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; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 6
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 6
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 6
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 6
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented	Section 6
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 6
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 6
(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	Section 4.2
(n) any specific information that may be required by the competent authority.	TBC

3.2 Other environmental principles

In addition to meeting the regulatory requirements of NEMA and the EIA Regulations, 2014, the EMPr is designed to cater for the principles of the Duty of Care provide for in Section 28 of NEMA and Section 19 of the National Water Act, 1998 (Act No. 36 of 1998), which outlines that despite the provisions of this EMPr, the Developer remains responsible for any environmental degradation, and the Polluter Pays Principles which provides for a financial mechanism to compensate for rehabilitation.

The Duty of Care provides that:

"(1) Every person who causes, has caused or may cause significant pollution or degradation of the environment, must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped, to minimise and rectify such pollution or degradation of the environment."

(Section 28 of NEMA)

Section 19 of the National Water Act, 1998 provides for the Prevention and remedying effects of pollution, requiring that:

(1) An owner of land, a person in control of land or a person who occupies or uses the land on which

(a) any activity or process is or was performed or undertaken; or

(b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

(Section 19 of the National Water Act, 1998)

And the Polluter Pays Principle that:

"the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment."

(Section 2 of NEMA)

4. Administration of the Environmental Management Programme

4.1 Roles and Responsibilities

The implementation of this EMPr requires the involvement of multiple role players, each providing different, but vital roles to ensure that the principles of integrated environmental management are complied with during the construction phase. The role players are discussed below.

4.1.1 Department of Environment, Forestry and Fisheries

The national Department of Environment, Forestry and Fisheries (DEFF) is the designated authority responsible for considering development proposal by state-owned entities such as the Coega Development Corporation. DEFF has overall responsibility for ensuring that the developer does not cause any undue environmental impacts.

4.1.2 Developer: Coega Development Corporation

As the entity to responsible for the implementation of the project, the Coega Development Corporation is accountable for all impact which occur and are responsible for ensuring that all reasonable measures to avoid, manage or mitigate impacts are instituted.

4.1.3 Engineer

The Engineer shall oversee the planning, design and construction phases of the project. The Engineer shall appoint a Resident Engineer or Engineer's Representative (referred to as the RE) to act as the on-site implementing agent.

The Engineer shall address any site problems pertaining to the environment at the request of the RE and / or the ECO.

4.14 Contractor

This refers to the main contractor(s) appointed by the Developer for the project and who will assume responsibility for all sub-contractors. The Contractor will be responsible for ensuring that the requirements of the EMPr and any other legislative obligations are complied with. The Contractor will also be responsible for drafting method statements appropriate to activities under their direct control.

The contractor must ensure that all employees under their appointment receive appropriate training prior to the commencement of construction, taking cognisance of this EMPr.

4.15 Environmental Officer

The Contractor shall nominate a person from among his / her site personnel to fulfil the function of the EO and submit to the Engineer for his / her approval the curriculum vitae of the proposed Environmental Officer (EO).

The EO must be conversant with all legislation pertaining to the environment applicable to the contract and must be appropriately trained in environmental management and possess the skills necessary to impart environmental management skills to all personnel involved in the contract. The Contractor shall appoint, at own cost, a competent individual as its on-site EO to ensure that the EMPr is implemented and that all environmental specifications and EMPr requirements are met at all times. The EO shall be responsible for monitoring, reviewing and verifying the Contractor's compliance with the EMPr.

The EO's duties in this regard shall include, inter alia, the following:

- Daily site inspections;
- Monitoring and verifying that the Environmental Authorisation, EMPr and Method Statements are adhered to at all times and reporting to the RE if specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Submission of regular written reports to the Engineer and ECO (at least once a month);
- Assisting the RE and ECO in finding environmentally responsible solutions to problems;
- Keeping accurate and detailed records of these inspections;
- Reporting any incidents of non-compliance with the EMPr to the RE and / or the ECO.
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Environmental Control Officer

The appointed independent Environmental Control Officer (ECO) will monitor and review the on-site environmental management and implementation of this EMPr by the contractor throughout the project. This will be done by conducting site audits and issuing monthly audit reports to the relevant parties.

DEFF requires that the ECO be at the forefront of all environmental management issues.

4.2 EMPr Administration

Copies of the Environmental Authorisation and this EMPr shall be kept at the construction camp(s) and shall be distributed to the EO and all other senior contract personnel. All senior personnel shall be required to familiarise themselves with the contents of this document.

The Engineer may order the Contractor to suspend part of the works if the Contractor fails to comply with the specifications set out in the Environmental Authorisation, EMPr and Method Statements. Such suspension will be enforced until compliance is achieved.

4.3 Environmental Awareness Training

Before the commencement of any work on site, the Contractor's site management staff shall attend an environmental awareness-training course, presented by the ECO. The Contractor shall liaise with the ECO prior to the commencement date to fix a date and venue for the course. The Contractor shall provide a suitable venue with facilities, and ensure that the specified employees attend the course. No induction or

course should be given until the Engineer has been afforded the opportunity to appraise it and provide comment.

The information presented at the course shall be communicated by the Contractor site management staff to the rest of his employees on the site, to any new employees coming onto site after the initial training course and to his / her suppliers. The presentation shall be conducted, as far as is possible, in the employees' language of choice. As a minimum, training shall include:

- Explanation of the importance of complying with the Environmental Authorisation and EMPr;
- Discussion of the potential environmental impacts of construction activities;
- Explanation of the management structure of individuals responsible for matters pertaining to the EMPr.
- Employees' roles and responsibilities, including emergency preparedness;
- Explanation of the mitigation measures that must be implemented when carrying out their activities;
- Explanation of the requirements of the Environmental Authorisation and EMPr; and
- Explanation of the Environmental Do's and Don'ts.

The Contractor shall keep records of all environmental training sessions, including names of attendees, dates of their attendance and the information presented to them. Records of environmental training sessions shall be submitted to the Engineer and ECO.

4.4 Specialist environmental considerations

As part of the preliminary design phase, the Coega Development Corporation commissioned:

- A watercourse to identify any aquatic ecological features which might be at risk from the proposed expansion and upgrade; and
- A vegetation assessment to develop an understanding of the botanical sensitivity.

The watercourse assessment identified a wetland system located approximately 350 m to the east of the target site (See Figure 4-1). Because of the proximity to the Ikhethelo Secondary School and other environmental aspects (flat site topography, high evaporation, high soil infiltration and reasonable vegetative cover on site), the risks associated with the proposed expansion and upgrade to the wetland system was considered to be minimal, if any.

The anticipated outcome, through the appropriate implementation of actions provided in this EMPr, is that no impact on this wetland system will occur during construction and operation of the Ikhethelo Secondary School.



Figure 4-1: Hillslope seepage wetlands

While the vegetation assessment did record several indigenous plants and tree species, it did not identify any features of particular concern. Additionally, caution was noted regarding the presence of several alien species which, if unmanaged, could be spread as a result of the disturbances associated with the proposed expansion and upgrade (See Table 4-1 and Figure 1-1).

Table 4-1: List of species identified at Ikhethelo Secondary School

Species name	Common name	Growth form	Category
* <i>Agave sisalana</i>	Sisal	Shrub/Tree	2
* <i>Bidens pilosa L.</i>	Black jack	Herb	
* <i>Bougainvillea glabra</i>	Paper flower	Shrub	
<i>Pelargonium luridum</i>	Variable stork's bill	Forb	
<i>Paspalum urvillei</i>	Vasey Grass	Grass	
<i>Ledoboria apertiflora</i>	Desert African hyacinth	Forb (red data)	
<i>Acalypha punctata</i>	Sticky Brooms and Brushes	Forb (red data)	
<i>Melinis repens</i>	Natal Red Top	Grass	
<i>Paspalum notatum</i>	Bahiagrass	Grass	
<i>Bromus pectinatus</i>	Hawergras	Grass (red data)	
<i>Eragrostis curvula</i>	Weeping love grass	Grass	
* <i>Lantana camara L.</i>	Tick berry	Shrub	1b
* <i>Melia azedarach</i>	Syringa	Tree	3
* <i>Acacia longifolia</i>	Long leaved wattle	Tree	1b
* <i>Acacia melanoxylon</i>	Australian Balckwood	Tree	2
<i>Albizia versicolor</i>	Large-leaved False-thorn	Tree	
* <i>Casuarina equisetifolia</i>	Horsetail tree	Tree	2
<i>Chamaecyparis lawsoniana</i>	Lawson cypress	Tree	
<i>Dombeya rotundifolia</i>	Wild pear	Tree	
<i>Erythrina humeana</i>	Coral Tree	Tree	
* <i>Jacaranda mimosifolia</i>	Jacaranda	Tree	1b (in KZN)
* <i>Schinus molle</i>	Peruvian pepper	Tree	
* <i>Schinus terebinthifolius</i>	Brazilian Pepper Tree	Tree	1b (in KZN)
<i>Syagrus romanzoffiana</i>	Queen palm	Tree	
<i>Trema orientalis</i>	Pigeon Wood	Tree	
<i>Vachellia sieberiana</i>	Paperbark thorn	Tree	

*Denotes alien species

Management measures providing a recommended pallet of suitable indigenous species has been included as Appendix B and Appendix C.



Figure 4-2: Species distribution as per the site assessment

5. Environmental Management Programme Requirements

Construction Phase EMP activities are those relating to the preparation of the site prior to commencing the Construction Phase, as well as the construction and rehabilitation activities themselves.

5.1 Preparation of Method Statements / Management Plans

Method Statements and/or Management Plans must be submitted by the Contractor to the ECO and Engineer for approval for the following activities prior to any construction commencing on site:

- Construction camp locality and layout plan;
- Management, use and storage of hazardous goods / substances, including petrochemicals;
- Stormwater management at the construction Camp/s and at the construction work front;
- Traffic, accommodation and construction vehicle movement routes during the Construction Phase;
- Spill Contingency Plan; and
- Emergency Response Procedures.

The Developer and/ or the Engineer must monitor the implementation of the Method Statements and Management Plans during the Construction Phase of the project.

5.2 Permit Requirements

The necessary permits (if any) must be obtained by the Developer prior to the commencement of any activities requiring such a permit. These could include permits for activities such as:

- Building plan approval from the Abaqulusi Municipality, including approval of the storm water management plan and sewage discharge permit; and
- Impacting on water resources - This would constitute a Water Use Licence from the Department of Water and Sanitation.

6. Environmental Management Programme

The following Pre-Construction Phase actions detailed in Section 1.1 must be adhered to at all times. Construction related actions are detailed in Section 6.2. These also require continuous adherence during the Construction Phase. Post-Construction and Rehabilitation Management Actions are detailed in Section 0.

6.1 Pre-construction Phase

Table 6-1: Pre-Construction Management Actions and Outcomes

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
Prevent soil contamination	<ul style="list-style-type: none"> Hazardous materials/dangerous goods must be stored in a clearly marked, lockable, designated storage area; Hazardous materials/ dangerous goods must be stored within a bunded area which has the capacity to store 110% of the volume of the materials stored; and Chemical toilets must be placed at least 25 m outside any watercourse. A registered chemical waste company is to be used to remove waste from the chemical toilets on site. Proof of servicing of chemical toilets must be kept by the contractor, in the on-site environmental file, for review purposes by the ECO if needed. 	Avoidance of soil loss Re-use of viable soils in rehabilitation. Avoidance of disposal of hazardous waste	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent soil loss	<ul style="list-style-type: none"> Soil should be stockpiled in such a way as to minimize erosion; Topsoil should be stockpiled such that re-use in rehabilitation is feasible The exposed soil surfaces should be protected from wind derived fugitive dust generation, if to be exposed for a period exceeding 2 months or in high wind conditions Where exposed surfaces will be exposed to surface run-off, diversion of surface run-off must be implemented to ensure erosion is avoided The re-use of soil and stockpiles must be prioritised in the construction phase, where geotechnically appropriate; and No Soil stockpiles are to be established within 25 m of the wetland boundary 	Soil resources are protected from loss and retained for re-application during rehabilitation	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Preservation of flora	<ul style="list-style-type: none"> All construction areas must be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse); All areas outside of Erf 972 must be regarded as No-go areas and demarcated as such; All alien invasive species within the construction and development footprint must be removed and follow up monitoring and removal programmes should be initiated once construction is complete. A survey of indigenous trees is to be undertaken (See Figure 4-2). If trees are to be removed they are to be replaced during rehabilitation. 	Remaining natural flora is protected especially in neighboring wetland	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Preservation of fauna	<ul style="list-style-type: none"> Hunting and/or fishing activities on site and in the surrounds is prohibited. No animal, reptile or bird of any sort found on site may be killed. This specifically includes snakes or other animals considered potentially dangerous discovered on site. If such an animal is discovered on site an appropriately skilled person should be consulted to remove the animal from the site. Consideration should be given to selection and nomination of 	Remaining natural fauna is protected especially in neighboring wetland	Implementation: Contractor Inspection: EO	Implementation: Ongoing Inspection: Ad hoc

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
	<p>such a person prior to site establishment. If no-one is available, training should be provided to at least two site staff members; and</p> <ul style="list-style-type: none"> • Environmental training must be conducted by the responsible ECO. 		Verification: ECO	Verification: Monthly
Prevent increased surface runoff	<ul style="list-style-type: none"> • A stormwater management plan is to be compiled detailing specific measures to be implemented to manage storm water during construction. • Care must be taken to ensure that in removing vegetation adequate erosion control measures are implemented 	Storm water discharge does not result in degradation of the neighboring environments	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Preserve air quality	<ul style="list-style-type: none"> • Heavy vehicles and machinery should be serviced regularly to minimise exhaust fume pollution; • Soil stockpiles must be located in areas to limit the erosive effects of the wind, which will limit dust; • Removal of vegetation must be avoided until such time as soil stripping is required, which will limit dust; • Limit vehicle speeds on unpaved roads to 20 km/h to limit the amount of dust generated; • Haulage distances must be at a minimum; • Dust control measures should be implemented when warranted. The use of water as a dust suppression measure is not preferred, and alternative measures should be utilised; • Environmentally friendly soil stabilisers may be used as additional measures to control dust on gravel roads and construction areas; • All equipment must be kept in good working order; • Equipment must be operated within its specifications and capacity and must not be overloaded; and • All machinery/plant must be serviced and lubricated regularly to ensure good working order. 	Emissions from the site remain within the regulatory limits and do not create nuisance	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent noise pollution	<ul style="list-style-type: none"> • Potential disturbance to the resident's adjacent to the construction site; • The noise sources must conform to, SANS Code 10103:2008, so that it will not produce excessive or undesirable noise when it is released; and • All of the Contractors' vehicles must be fitted with effective exhaust silencers and must comply with Road Traffic Act (Act 29 of 1989) when any such vehicle is operated on a public road. 	Emissions from the site remain within the limitations imposed by the National Environmental Management Air Quality Act, 2003 (Act No. 39 of 2003) and its Regulations	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent unnecessary impedance of traffic	<ul style="list-style-type: none"> • Minimise possible lane closures, traffic delays and congestion during the pre-construction phase; • Appropriate flagmen and signage must be provided on the roadside in compliance with the requirements of relevant road department authority; 	Construction related traffic does not have an adverse impact on traffic management	Implementation: Contractor	Implementation: Ongoing

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
	<ul style="list-style-type: none"> Sufficient area for the storage of heavy vehicles within the construction site must be provided; Vehicle traffic which may obstruct traffic flow must be scheduled outside of peak travelling times; Heavy / large load traffic must be appropriately routed and appropriate safety precautions must be taken to prohibit road collisions and traffic incidences; All vehicle operators must be suitably licensed, must have had appropriate environmental and safety induction, must be aware of specific site procedures, and must be well rested and cognisant when operating heavy or unsafe vehicles / machinery. 		Inspection: EO Verification: ECO	Inspection: Ad hoc Verification: Monthly
Prevent the spread of waste	<ul style="list-style-type: none"> Minimise accumulation of construction and general waste; Demarcated areas where waste can be securely contained and stored on a temporary basis during the construction phase must be established. When adequate volumes (not more than 1 month) have accumulated all waste is to be removed from site and disposed of at a licensed facility; Litter must be removed from all construction areas prior to construction commencement; Should skips be used for the storage and transportation of waste, these must be emptied once full and must be covered to prevent wind blown litter; Waste is not to be buried or burned on site; All waste must be recycled where possible or disposed of at a registered landfill, proof of which must be provided and kept in the on-site environmental file; All hazardous materials including paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment; and Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur. 	Waste generation is minimised and managed to prevent impacts on the environment.	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent unnecessary loss of heritage artefacts	<ul style="list-style-type: none"> In the event of a cultural or heritage artefact being found all work must stop until the matter is resolved. Amafa aKwaZulu-Natali (Amafa) is to be contacted immediately and direction from the Amafa representative must be taken and adhered to; The importance of heritage finds and the correct mitigation measures must be included in the environmental awareness training. 	No impact on heritage artefacts or resources is incurred	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Protection of water resources	<ul style="list-style-type: none"> Implement a construction storm water management plan; The allocation of spoil areas is to be undertaken in consultation with the ECO; and 	Impacts on wetland functionality is protected against	Implementation: Contractor Inspection: EO	Implementation: Ongoing Inspection: Ad hoc

Management Objectives (A thing aimed at or sought, a goal)	Actions (The process of doing something, typically to achieve an aim)	Management Outcomes (The way a thing turns out; a consequence)	Responsibility	Frequency/Timing
	<ul style="list-style-type: none"> Planned storm water controls are to prevent direct discharge into the wetland during construction phase. 		Verification: ECO	Verification: Monthly

6.2 Construction Phase

Table 6-2: Construction Management Actions and Outcomes

Management Objectives (A thing aimed at or sought, a goal)	Actions (The process of doing something, typically to achieve an aim)	Management Outcomes (The way a thing turns out; a consequence)	Responsibility	Frequency/Timing
Prevent soil contamination	<ul style="list-style-type: none"> Hazardous materials/dangerous goods must be stored in a clearly marked, lockable, designated storage area; Safety Data Sheet (SDS's) must be kept on site for all hazardous materials used on site; SDS's must be easily accessible to staff; Hazardous materials/dangerous goods must be stored within a bunded area which has the capacity to store 110% of the volume of the materials stored, and in accordance with the relevant SDS's; When decanting hazardous substances, drip trays must be used; Should a spillage occur, an absorbent material e.g. sawdust / Oilcap must be spread on areas where oil spills have occurred. The resultant contaminated soil and sawdust must be lifted and placed within a high-density plastic bag for storage / disposal; Oil-contaminated soils are to be removed to a contained storage area and disposed of at a licensed facility. Disposal slips are to be retained in the environmental file as proof of safe disposal; and Chemical toilets must be placed at least 32 m outside of any watercourse. A registered chemical waste company is to be used to remove waste from the chemical toilets on site. Proof of servicing of chemical toilets must be kept by the contractor, in the on-site environmental file, for review purposes by the ECO if needed. 	Loss of soil resources through contamination is prevented	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent soil loss	<ul style="list-style-type: none"> Soil must be stockpiled in such a way as to minimize erosion; Topsoil must be stockpiled such that re-use in rehabilitation is feasible; The exposed soil surfaces must be protected from wind derived fugitive dust generation, if to be exposed for a period exceeding 2 months or in high wind conditions; Where exposed surfaces will be exposed to surface run-off, diversion of surface run-off must be implemented to ensure erosion is avoided; and The re-use of soil and stockpiles must be prioritised in the construction phase, where geotechnically appropriate. 	Loss of soil resources is avoided	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
Preservation of flora	<ul style="list-style-type: none"> All construction areas must be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse); All alien invasive species within the construction and development footprint must be removed and follow up monitoring and removal programmes must be initiated once construction is complete (See Appendix B); and Reseed cleared areas with an indigenous seed mix to prevent soil erosion and enable rehabilitation. 	Existing floral diversity is maintained and protected against encroachment from invasive plants.	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Preservation of fauna	<ul style="list-style-type: none"> Hunting and/or fishing activities on site and in the surrounding areas is prohibited. This includes the setting of traps, or the killing of any animal caught in construction works; and No animal, reptile or bird of any sort found on site may be killed. This specifically includes snakes or other animals considered potentially dangerous discovered on site. If such an animal is discovered on site, an appropriately skilled person should be summoned to remove the animal from the site. Consideration should be given to selection and nomination of such a person prior to site establishment. If no-one is available, training should be provided to at least two site staff members. 	Existing faunal diversity is maintained	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent increased surface runoff	<ul style="list-style-type: none"> Care must be taken to ensure that in removing vegetation adequate erosion control measures are implemented; A construction storm water management plan is implemented. The propagation of low-growing dense vegetation suitable for the habitat such as grasses, sedges or reeds is the best natural method to reduce erosion potential in sensitive areas and therefore must be implemented. 	Storm water run-off from the site does not impact negatively on the neighboring environments	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Preserve air quality	<ul style="list-style-type: none"> Heavy vehicles and machinery must be serviced regularly to minimise exhaust fume pollution; Soil stockpiles must be located in areas to limit the erosive effects of the wind, which will limit dust; Removal of vegetation must be avoided until such time as soil stripping is required, which will limit dust; Limit vehicle speeds on unpaved roads must be set at 20 km/h to limit the amount of dust generated; Haulage distances must be at a minimum; Environmentally friendly soil stabilisers may be used to control dust on gravel roads and construction areas; All equipment must be kept in good working order; Equipment must be operated within its specifications and capacity and must not be overloaded; All machinery/plant must be serviced and lubricated regularly to ensure a good working order; and 	Impacts on ambient air quality remain within the limits set by the National Environmental Management: Air Quality Act, 2003 (Act No. 39 of 2003)	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
	<ul style="list-style-type: none"> The entire Contractors' vehicles must be fitted with effective exhaust silencers and shall comply with Road Traffic Act (Act 29 of 1989) when any such vehicle is operated on a public road. 			
Prevent noise pollution	<ul style="list-style-type: none"> Noise sources must conform to the SANS Code 10103:2008; and All the Contractors' equipment must be fitted with effective exhaust silencers and shall comply with the SANS Code 10103:2008, for construction plant noise generation. 	Impacts on ambient noise levels remain within the SANS 10103: 2008 at the boundary of the site.	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent unnecessary impedance of traffic	<ul style="list-style-type: none"> Minimise possible lane closures, traffic delays and congestion during the pre-construction phase; Appropriate flagmen and signage must be provided on the roadside in compliance with the requirements of relevant road department authority; Sufficient area for the storage of heavy vehicles within the construction site must be provided; Vehicle traffic which may obstruct traffic flow must be scheduled outside of peak travelling times; Heavy / large load traffic must be appropriately routed and appropriate safety precautions must be taken to prohibit road collisions and traffic incidences; All vehicle operators must be suitably licensed, must have had appropriate environmental and safety induction, must aware of specific site procedures, and must be well rested and cognisant when operating heavy or unsafe vehicles / machinery; and Public consultation informing residents of alternative routes prior to the commencement of construction activities, or duration of construction activities must occur. Proof is to be provided to the ECO. 	Disruption to traffic users is limited	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Prevent the spread of waste	<ul style="list-style-type: none"> Demarcated areas must be established where waste can be securely contained and stored on a temporary basis during the construction phase. When adequate volumes (not more than 1 month) have accumulated all waste must be removed from site and disposed of at a licensed facility. Proof of safe disposal slips must be maintained in the on-site environmental file; Litter must be removed from all construction areas prior to construction commencing; Should skips be used for the storage and transportation of waste, these must be emptied once full and covered to prevent waste from being blown away; Waste is not to be buried or burned on site; All waste must be recycled where possible or disposed of at a registered landfill, proof of which must be provided. 	Waste generated during construction is prevented on impacting on neighbouring land uses	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
	<ul style="list-style-type: none"> All hazardous materials including paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment; and Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur. 			
Prevent unnecessary loss of heritage artefacts	<ul style="list-style-type: none"> In the event of a cultural or heritage artefact being found all work must stop until the matter is resolved. Amafa is to be contacted immediately and direction from the Amafa representative must be taken and adhered to; The importance of heritage finds and the correct mitigation measures must be included in the environmental awareness training. 	No impact on heritage artefacts or resources is incurred	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Employee training and skills development	<ul style="list-style-type: none"> Environmentally focused toolbox talks must be undertaken at least once a week. Content must include matters included in this EMPr e.g. alien vegetation control, littering, erosion control etc.; and A register of attendance at each toolbox talk must be maintained in the environmental file. 	Educate staff regarding environmental protection	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly
Protection of water resources	<ul style="list-style-type: none"> Construction is limited to the delineated boundary of the site. No stockpiling of materials is permitted within 32 m of the wetland boundary (See Figure 4-1 Error! Reference source not found.). Storage of hazardous goods is not permitted within 32 m of the wetland boundary; Chemical toilets are to be placed further than 100 m from the wetland boundary. 	Impacts on wetland functionality is protected against	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly

6.3 Post Construction and Rehabilitation Phase

Table 6-3: Post Construction and Rehabilitation Management Actions and Outcomes

Management Objectives <i>(A thing aimed at or sought, a goal)</i>	Actions <i>(The process of doing something, typically to achieve an aim)</i>	Management Outcomes <i>(The way a thing turns out; a consequence)</i>	Responsibility	Frequency/Timing
Rehabilitation	<ul style="list-style-type: none"> • On completion of the project, the appointed contractor must ensure that all structures, equipment, materials, waste, rubble, notice boards and temporary fences used during construction are removed; • All construction waste / debris must be removed from within the construction footprint and disposed off-site at an approved landfill site; • Progressive rehabilitation must be undertaken throughout the construction phase of the project where areas have been impacted upon. Rehabilitation should commence as soon as construction is completed in a specific area and not at the end of the entire project; • Post construction, any areas disturbed outside of the construction footprint due to construction activities must be rehabilitated by appropriate landscaping, topsoil dressing, alien plant eradication and vegetation establishment; • Post construction, all disturbed and open surfaces must be planted with indigenous grasses; and • Where necessary, topsoil must be imported to the site in question, prior to regrassing of the site. It is preferred that the topsoil used is excess topsoil from another portion of the site. • Indigenous trees removed are to be replaced at a ratio of 1:5 (five trees to be replaced for every five removed). 	Ensure environmental degradation associated with construction is remediated	Implementation: Contractor Inspection: EO Verification: ECO	Implementation: Ongoing Inspection: Ad hoc Verification: Monthly

7. Acknowledgement

Record of signatures providing acknowledgment of being aware of, and committed to complying with the contents of this Environmental Management Programme (EMPr), which relates to the environmental management, mitigation and rehabilitation measures for the project outlined above, and the environmental conditions contained in the civil and other construction contract documents.

DEVELOPER:

Name:

Signature

Date:

CONTRACTOR:

Name:

Signature

Date:

Appendix A: Curriculum Vitae

WARREN HALE



Profession	<i>Environmental Consultant</i>
Position	<i>Business Owner (Sole Proprietor)</i>
Area of Specialisation	<i>Environmental</i>
Qualifications	<i>BSc (Hons) (Env Sci), BSc (Biol Sci)</i>
Years of Experience	<i>13 Years</i>

SUMMARY OF EXPERIENCE

Warren Hale has thirteen years of experience in the field of Environmental Management. He has gained extensive experience in Environmental Assessments, having coordinated Basic and Full Environmental Impact Assessments (EIA) and managed teams of specialists. He has been incorporated into teams for diverse projects within the broader 'Environmental and Earth Sciences' Field, where he has contributed in the technical and public participation processes. Warren has significant experience in Environmental Compliance and Monitoring.

In the field, Warren has successfully planned and orchestrated public meetings and open days. He has also undertaken numerous wetland delineations within the Province of KwaZulu-Natal. Work has taken him beyond the borders of South Africa into other developing nations, including Botswana and Swaziland.

In terms of report writing, Warren has compiled high-level Screening Reports, Scoping Reports, Basic Assessment Reports, Environmental Impact Reports, Environmental Management Programmes and Environmental Audit Reports.

He has been involved in projects in the Climate Change and the Water Licensing fields, and, as a result, has been exposed to various modelling and data management techniques. Warren has acquired significant knowledge in the field of Geographic Information Systems (GIS).

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

IAIAsa - Member of the International Association of Impact Assessors, South Africa – Membership No 2194

EDUCATION

2002 - Matric – St Henry's, Marist Brothers College, Durban

2005 - BSc Biological Science – University of KwaZulu-Natal

2006 - BSc (Hons) Environmental Science – University of KwaZulu-Natal

SPECIFIC EXPERIENCE

1) Environmental Compliance and Monitoring (ECO & EO)

Environmental Control Officer for the Dannhauser Bulk Water Supply Scheme, Dannhauser - Durnacol, Kwazulu-Natal, Client: Amajuba District Municipality

Environmental Control Officer for the St John's Village Estate, Howick, KwaZulu-Natal, Client: Cedar Falls Properties 25 (Pty) Ltd

Environmental Control Officer for the Bhekuzulu Community Water Supply Scheme, Epangweni, KwaZulu-Natal, Client: Sukuma Consulting Engineers (Pty) Ltd:

Environmental Control Officer for the Ntuzuma D (Phase 2 & 3) Housing Project, Durban, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Environmental Control Officer for the Emberton Estate Development, Gillitts, KwaZulu-Natal, Client: Business Venture Investments 1268 (Pty) Ltd

Environmental Control Officer for the Ufafa Water Supply Project (Phase 2), Ufafa, KwaZulu-Natal, Client: Nathoo, Mbenyane Engineers (Pty) Ltd

Environmental Control Officer for the Construction of Windspur Estate, Nottingham Road, KwaZulu-Natal: Private Client

Environmental Control Officer for the Construction of an Overload Control Facility and Interchange, N2, Section 29, Teza, KwaZulu-Natal, Client: Worley Parsons RSA

Environmental Control Officer for the Mathondwane-Zaaifontein 88kV Wolf Line Establishment Project, Ladysmith, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

Environmental Control Officer for the Construction of the Qudeni Link Road, Nquthu and Msinga Local Municipalities, KwaZulu-Natal, Client: Royal HaskoningDHV

Environmental Control Officer for the Construction of the Mlambomunye River Bridge Crossing, Qudeni, KwaZulu-Natal, Client: Royal HaskoningDHV

Environmental Control Officer for the Upgrading of the P373 and P280 Roads, Muden, KwaZulu-Natal, Client: Royal HaskoningDHV

Environmental Control Officer for the Upgrading of the P435 'Ndumo Access Road', Ndumo, Northern KwaZulu-Natal, Client: Royal HaskoningDHV

Environmental Control Officer for the Upgrading of the Nsuze River Bridge, Nkandla, KwaZulu-Natal, Client: Royal HaskoningDHV

Environmental Control Officer for the Construction of the Umgeni Road Interchange, Durban, KwaZulu-Natal, Client: Hatch Goba (Pty) Ltd

Environmental Control Officer for the Construction of the Mount Edgecombe Interchange, Durban, KwaZulu-Natal, Client: SMEC (Pty) Ltd

Environmental Control Officer for the Upgrading of the N2, Section 26, Durban, KwaZulu-Natal, Client: SMEC (Pty) Ltd

Environmental Control Officer for the Construction of a Compulsory Truck Stop on N2, Section 21 between km 26 and km 32, Kokstad, KwaZulu-Natal, Client: Mott MacDonald PDNA

Environmental Control Officer for the Construction of Edgemount Estate, Erf 2657, Mount Edgecombe, KwaZulu-Natal, Client: Canboria Investments cc:

Environmental Officer for the Ferromanganese Clean Up Project, Pier 1, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Reconstruction and Deepening of Berth 2, Cutler Complex, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Causeway Canal Wall Repair Project, Pier 1, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Abadan Road Canal Wall Maintenance Project, Cutler Complex, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Island View West Retaining Wall Project, Island View, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Fynnland Yard Flow Drain Construction Project, Fynnland, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Maydon Wharf Yard Flow Drain Construction Project, Maydon Wharf, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Steel Platform Construction Project at Berth 7, Cutler Complex, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Divider Block Casting Operation at Berth 9, Pier 1, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for Allen Dalton Substation Building Refurbishment Project, Pier 1, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Construction of the Central Foam Induction Pump House at Berth 9, Pier 1, Port of Durban, Client: Transnet Freight Rail (RME)

Environmental Officer for the Construction of Electrical Infrastructure at the RORO Terminal, Port of Durban, Client: Transnet Freight Rail (RME)

2) Environmental Impact Assessment

Basic Assessment for the Proposed Madiba Community Hall in Ward 34 of Msunduzi Municipality, KwaZulu-Natal, Client: Mariswe (Pty) Ltd on behalf of Msunduzi Local Municipality

EIA for Umgano Agricultural Venture, Southern KwaZulu-Natal, Private Client

Basic Assessment for the Proposed Smozomeni Road Upgrade Project, KwaZulu-Natal, Client: Richmond Local Municipality

Basic Assessment for the Proposed Umqeku River Low-Level Bridge Crossing, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the Proposed KwaCele and Surrounds Bulk Sewer Infrastructure Project, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the Stabilization of the South Coast Rail Line Embankment, Amanzimtoti, KwaZulu-Natal South Coast, Client: Metrorail

EIA for the Construction of a Secondary Steel Foundry, Cato Ridge, KwaZulu-Natal, Client: DAS Steel (Pty) Ltd

Environmental Authorization Amendment for the Proposed Bulk Water Supply and Reticulation to the Kwahlokhloko Sub-supply area 1. Near Eshowe, KwaZulu-Natal, Client: uThungulu District Municipality

Basic Assessment for the Proposed Petroleum Filling Station Development, Harding, KwaZulu-Natal, Client: Zeranza 311 (Pty) Ltd

Basic Assessment for the Proposed Compulsory Truck Stop and Road Widening to accommodate a Truck Crawler Lane on National Route 2. Kokstad, KwaZulu-Natal, Client: SANRAL

Basic Assessment for Zaaifontein-Mathondwane 88kV Wolf Line Establishment, Ladysmith / Emnambithi KwaZulu-Natal, Client: Eskom

Landfill Site Selection and Solid Waste Management Plan, South western KwaZulu-Natal, Client: Umzimkhulu Local Municipality

EIA for Harrison Flats Power Supply Upgrade, Cato Ridge, KwaZulu-Natal, Client: Eskom

Basic Assessment for the Ebony Drive Rezoning Application, KwaZulu-Natal, Client: Private Client

EIA for the proposed Mpofana Bulk Water Supply Scheme, KwaZulu-Natal Midlands, Client: Umgeni Water

EMP for the proposed Rega Place Access Road, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the proposed Mandeni Cemetery, KwaZulu-Natal, Client: Mandeni Local Municipality

Basic Assessment for the proposed Low-level Vehicle and Pedestrian Bridge across the Kloof Stream in the Clermont / KwaDabeka Ward 22 area of eThekweni Municipality, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the proposed Pedestrian Bridge crossing over the Kloof Stream in the Clermont / KwaDabeka Ward 22 area of eThekweni Municipality, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the proposed Pedestrian Crossing across the Umhlangane River in the Mount Moriah / Mount Royal Area (Ward 34) of eThekweni Municipality, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the proposed Pedestrian Bridge Crossing over the Golokodo (Folweni) River in Umlazi (Ward 95) within eThekweni Municipality, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

Basic Assessment for the proposed Danish Centre Development on Portions 17 and 52 of the Farm Stockville, 1382, in the Outer West of the eThekweni Municipality, KwaZulu-Natal, Client: Gillitts Hardware:

Basic Assessment for the proposed Apartments situated at 76 South Beach Road on Portion 10A (of Erf 662), Tongaat 335 within the North Administrative Unit of eThekweni Municipality, KwaZulu-Natal, Client: Louville Properties cc

Basic Assessment for the proposed Nordic Park Development on Portion 414 of the Farm Uitkomst and Doornrug No. 852, Cato Ridge, KwaZulu-Natal, Private Client

Basic Assessment for the proposed Additions and Alterations to Residential Unit at 30 Newsel Road, Umdloti, Kwazulu-Natal, Private Client

EIA for proposed New Multi-Product Pipeline (NMPP) Project, KwaZulu-Natal and Gauteng, South Africa Client: Transnet Pipelines

EIA for proposed Ilmenite Smelter at Beluluane Industrial Park, Maputo/Matola, Mozambique, Client: Corridor Sands Ltd

EIA for Upgrade of Bayhead Road and Construction of a Link Road, KwaZulu-Natal, Client: Transnet

EIA for Vopak Terminals Durban Efficiency Project, KwaZulu-Natal, Client: Vopak Terminals Durban

Urban Integrated Assessment Framework for Climate Change, KwaZulu-Natal, Client: eThekweni Metropolitan Municipality

High-level Environmental and Social Impact Study for various Pipeline Routing Options to move Aviation Fuel from Island View to King Shaka Airport, Client: Transnet Pipelines

3) Water Licensing

Compulsory Water Licensing in the Mhlathuze Catchment, Northern KwaZulu-Natal, Client: Department of Water Affairs.

4) Botanical Assessments

Botanical Assessment for the Interconnecting Line between Kwambonambi NB 14 and Reserve 4 NB 75, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

Botanical Assessment for the Interconnecting Line between Kwambonambi NB 3 And Reserve 4 NB 75, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

Botanical Assessment for the BR Zikhali Electrification Project, Ndumo, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

Botanical Assessment for the Ulundi Stepdown Transformer Project, Ulundi, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

Botanical Assessment for the Star of the Sea School Electrification Project, Manguzi, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

Botanical Assessment for the St Joseph's Link Line, Umkomaas, KwaZulu-Natal, Client: Eskom Holdings SOC Ltd

5) Geographic Information Systems

GIS Mapping for Mining Permit Applications at Various Sites, KwaZulu-Natal, Private Client

GIS Mapping for Water Quality Projects, Eastern Cape, Private Client

6) Wetland Delineation

Wetland Delineation on Sub 30 of Lot 37 Marburg Settlement, 6238, Southern KwaZulu-Natal, Private Client

Wetland Delineation on Remainder of Erf 1023 & Portion 7 of 1023, Port Edward Township, Southern KwaZulu-Natal, Client: Udidi Project Development

Wetland Delineation on Erf 814 and Erf 816 of the Farm Glenmore, Hibiscus Coast Local Municipality, Private Client

Wetland Delineation on Portion 1 of the Farm Eureka, 15166, Izotsha, Hibiscus Coast Local Municipality, Client: Architectural Associates Inc.

Wetland Delineation on Portions 1, 2, 3, 4, & 5 of Erf 171, of the Farm Botha's Hill, 0031, Situated at 61, 63, 65, 67 & 67A Old Main Road, Outer West of the eThekweni Metropolitan Municipality, Private Client

Wetland Delineations on the Consolidated Portion 80 and on the Remainder of Portion 26 (of 3) of the Farm Hooper, 14147, Hibberdene, Client: Blue Nightingale Trading 720 (Pty) Ltd

Wetland Delineation on Portion 310 of the Farm Roode Krans, 828, Verulam, eThekweni Metropolitan Municipality, Client: Afzelia Environmental Consults

Wetland Investigation on Remainder of Umnini Location, 1788, South Coast, Kwazulu-Natal, Client: Mathson Property Developments cc

Wetland Delineation on Portion 7 of the Farm Ocean View, Kelso, South Coast, Kwazulu-Natal, Client: Plankonsult

7) Screening Assessment

Screening Assessment for planned upgrades to 'The Bermudas' apartment block, Umhlanga, KwaZulu-Natal, Private Client

8) Environmental Monitoring

Environmental Monitoring at Jwaneng Diamond Mine, Kweneng Province, Botswana, Client: De Beers Group

9) Occupational Hygiene

Occupational Hygiene Assessment at Various Sugar Mills; Swaziland, Client: Royal Swazi Sugar Company

Numerous occupational hygiene assessments for a variety of clients from the industrial, commercial, health and education sectors.

PERSONAL DETAILS

Nationality – South African

Date of Birth – 1985/01/08

Domicile – Durban, South Africa

Languages:

English – Excellent

Afrikaans – Good

Zulu – Basic Communication

Appendix B: Alien Plant Management

Alien Plant Control

Best practice measures that must be undertaken during site clearing include the following:

- i. Cut plants as low to ground as possible.
- ii. All alien plants must be removed carefully and exposed soil should be covered with cut vegetation or leaf litter that is free of weed seeds to ensure that regrowth will not occur.
- iii. Press any loosened soil down carefully and firmly and mulch with plant material where possible.
- iv. All alien seeds, fruit bulbs, tubers and stems must be collected and placed in a sealable container/plastic bag for disposal at a landfill site.
- v. The roots system of mature trees including alien invasive play an important role in stabilising soil and therefore the up-rooting of large mature specimen of trees is not advocated. It is better to fell the trees and paint the stump with the relevant herbicides.

Alien plant control methods are provided in Table 1.

Table 1: Invasive plant management methodology

Method	Description
Hand pulling/ hoeing	<ul style="list-style-type: none"> • Hand pulling is most effective with small (30cm), immature or shallow rooted plants. • Shake the excess sandy material from the plant, this makes the plant easier to stockpile and lighter to transport. • However, make sure there is no seed on the plant first to eliminate the spread of seed while shaking.
Chopping/ cutting/ slashing	<ul style="list-style-type: none"> • This method is most effective for plants in the immature stage, or for plants that have relatively woody stems/ trunks. • This is an effective method for non-re-sprouters or in the case of re-sprouts (coppicing) it must be done in conjunction with chemical treatment of the cut stumps. <p>Note</p> <ul style="list-style-type: none"> • Cut/slash the stem of the plant as near as possible to ground level. • Paint re-sprouting plants (i.e. Black Wattle, Lantana and Chromolaena) with an appropriate herbicide immediately after they have been cut. • Stockpile removed material into piles as prescribed and treat as general waste
Felling	<ul style="list-style-type: none"> • De-branch trees and where possible remove all material. • Where possible large trees that are to be felled such that they fall uphill. • Cut the tree down as low as possible to the ground. • Apply herbicide immediately (no later than 30mins) to the cambium layer. • Ensure all the cuts in the cambium layer are treated.
Ring barking	<ul style="list-style-type: none"> • Remove bark in a 30-40cm centimetre band and leave the tree to die. • Can be used with or without chemicals but is more successful when herbicide is used

Appendix C: Revegetation Guidelines

Re-establishment of Vegetation Assemblage

It is important to prepare the soil for vegetation rehabilitation. Once the soil has been prepared, appropriate seeds or rescued plants should be used for the rehabilitation process. This is only relevant if the new building breaks grassland or tree habitats.

There are several other methods / techniques available for employment in re-establishing the site. Through understanding the site, options have been identified as the correct methods to employ re-establishment. The planting methods are expanded upon below. Please note that re-vegetation planting must be undertaken in spring if possible to ensure that establishment is successful.

Table 1: Grass Species selected for the baseline Graminoid assemblage, proportions and position in the landscape

Grass species	Proportions	Kgs/hectare
<i>Alloteropsis semialata</i>	7.50%	2.25
<i>Bothriochloa insculpta</i>	10%	3
<i>Brachiaria serrata</i>	5%	1.5
<i>Eragrostis capensis</i>	10.00%	3
<i>Melinis repens</i>	12.50%	4.5
<i>Melinis nerviglumis</i>	10.00%	3
<i>Paspalum notatum</i>	10%	3
<i>Monocymbium ceresiiforme</i>	7.50%	2.25
<i>Bromus pectinatus</i>	5%	1.5
<i>Sporobolus pyramidalis</i>	10%	3
<i>Themeda triandra</i>	20.00%	6
<i>Tristachya leucothrix</i>	5%	1.5
<i>Total</i>	100%	30

If the above seed mix stated is not available, the following species may be included, as they are commercially available:

- Eragrostis tef 3kg/ha
- Digitaria eriantha 6kg/ha
- Panicum maximum 4 kg/ha
- Chloris gayana 6kg/ha
- Cynodon dactylon 6kg/ha

To properly implement the re-vegetation component, the following general planting guidelines have been adopted to drive the rehabilitation process:

- Non-woody portions must be returned to graminoid assemblages which favour relevant specific habitats.
- Wherever alien woody vegetation is removed, indigenous trees can be planted back at a density equal to that of the surrounding indigenous areas.
- Removal of existing alien species must be consistently undertaken.
- Rehabilitation of disturbed areas after the construction of the proposed expansion must be done as soon as possible after construction is completed.
- If it is necessary to import soil onto the site, the material; must be checked to ensure that it is not contaminated by weeds or invasive plants.

Hydraulic Seeding/Hydro Seeding

This method of seeding is quick and effective especially on steep, critical slopes and inaccessible areas that cannot practically be seeded by other methods. Hydro-seeding includes seed, water, fertilizer and a small amount of mulch in a slurry transported in a tank, either truck or trailer mounted and sprayed over prepared ground in a uniform layer.

Although hydraulic planting is more expensive than manual seeding and mulching, it has many benefits. With hydraulic planting, the seed blend can be distributed uniformly, the added mass increases accuracy

and throw distance, especially in exposed, windy areas, while pre-soaking and water accelerates germination and enhances the chance of survival.

Use of Plugs

Plugs should be applied where immediate cover is required for stabilisation. Particular areas would be drainage channels and very steep banks. Plugs should be:

- Planted at 10 cm centres;
- Over a pegged artificial mesh (e.g. a light polypropylene, UV stabilised mesh with about 20 mm openings) in areas of very high water velocity;
- Watered immediately to enhance establishment; and,
- Watered regularly for the first seven days or as required to effect establishment.

In areas where steep slopes require stabilisation a requirement may arise for the soils to be stabilised through the use of Geotextiles. Ideally, vegetation is the best form of erosion control, with Geotextiles only used for temporary stabilization purposes until this can establish. In coastal areas, Geotextiles are only superior to hydro-mulching in the following situations:

- When the growing season is short or unfavourable and plants cannot stabilize a slope quickly; and,
- When surfaces are so unstable or contours so channelled that a heavy rain could result in significant and costly erosion damage.