APPENDIX F: OTHER

ANNEXURE A: Draft Environmental Management Programme

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2006, as amended 2014

August 2016

Prepared by:
Henwood Environmental Solutions

Prepared for:
Friends of Emoyeni Children's Village.

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE CONSTRUCTION OF A CHRISTIAN COMMUNITY CENTER FOR THE PURPOSES OF COMMUNITY UPLIFTMENT ON PLOT 34 OF THE FARM AVONTUUR 725 JT.

TABLE CONTENTS

LIST OF ABBREVIATIONS/DEFINITIONS

EMPr	-	Environmental Management Programme
EIA	-	Environmental Impact Assessment
EIR	-	Environmental Impact Report
CLO	-	Community/Client Liaison Officer
DARDLEA		Department of Agriculture, Rural Development, Land and Environmental Affairs
DWA	-	Department of Water Affairs
DME	-	Department of Minerals and Energy
SABS	-	South African Bureau of Standards
SAHRA	-	South African Heritage Resources Agency
ECO	-	Environmental Control Officer
ROD	-	Record of Decision

A person appointed by the project manager, developer, engineer or contractor to oversee compliance to the EMPr. This person can be an internal appointment or an external consultant / specialist depending on the authorities' requirements.

Project Manager / Engineer

- Designated project manager / engineer for the construction project

Proponent / Client / Developer

- Person or company responsible for proposing the project

Contractor

- Person and/or company appointed to complete project

SECTION A: DETAILS AND CREDENTIALS OF AUTHOR

Steven Henwood, as an Independent Environmental Consultant and Impact Assessor, has been appointed by Friends of Emoyeni Children's Village to facilitate the Integrated Environmental Management (IEM) procedure, for the proposed Construction of a Christian Community Center for the purposes of Community Upliftment on Plot 34 of the Farm Avontuur 725 JT.

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SECTION B: BACKGROUND AND ACTIVITIES COVERED BY THE EMPr

Steven Henwood, as an Independent Environmental Consultant and Impact Assessor, has been appointed by Friends of Emoyeni Children's Village to facilitate the Integrated Environmental Management (IEM) procedure, for the proposed Construction of a Christian Community Center for the purposes of Community Upliftment on Plot 34 of the Farm Avontuur 725 JT.

This document forms part and is appended to the Draft BA report and will be submitted to as part of the Final BAR to be approved by the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs,

The proposed development is situated on Portion 34 of the farm Avontuur 725 JT, approximately 5 km west of the town of Badplaas, Gert Sibande District, Mpumalanga. The study boundary forms a square of land around open grassland and a central developed area containing houses, sheds and orchards. The study area is approximately 22 hectares in size, of which 15 ha is either currently under macadamia orchards, timber plantations or buildings. The remaining 7 ha comprises natural vegetation in varying degrees of disturbance or degradation. Surrounding land uses include small-scale agricultural and residential developments. The study area is situated within the quarter-degree grid 2530 DC at an altitude of approximately 1200 mamsl.

GPS Coordinates:

Latitude (S):			**Longitude (E):**		
25°	57'	34.22"	30°	30'	46.76"

The Christian Community Center would consist of:

- Orphan Housing
- Mission Guest Housing
- Food Prep, cold storage and general storage
- Sheds
- Tunnel gardens
- Classrooms
- Dorms ablution
- Orchard expansion

KEY ENVIRONMENTAL ISSUES RAISED

The assessed impacts were identified prior to the drafting of the DBAR and have been subjected to detailed investigation and assessment. These impacts include potential biophysical and social impacts that may arise during the operational phase of the proposed activities (i.e. long-term impacts) and construction phase impacts (i.e. short-term impacts).

The methodology was developed by Henwood Environmental Solutions) and has been continually refined and improved based on our experience in applying it to numerous EIA processes. The methodology is broadly consistent to that described in the NEMA EIA Regulations and in the DEAT Guideline Document for these regulations (DEAT, 2006b). The methodology was outlined in the Plan of Study for EIA, and in accepting this DARDLEA has ratified this approach.

Each issue identified for the proposed study area was taken into consideration in order to ascertain the most suitable layout that has the least possible impacts, or the most manageable impacts, on the environment.

Any layout chosen for the proposed development area has the potential to impact on the site and its adjoining land users.

RECOMMENDED MANAGEMENT ACTIONS

A variety of mitigation measures have been identified that could mitigate the scale, intensity, duration or significance of the impacts. These measures, which have been informed by the various specialist studies conducted, are included in this DBAR.

PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) was undertaken according to Regulation 54 of the EIA Regulations, 2010, and took into consideration the Public Participation 2010 Guideline Document (DEA, 2010).

The level of public participation was determined by taking into account the scale of the anticipated impacts of the proposed project, the sensitivity of the affected environment and the degree of controversy of the project, and the characteristics of the potentially affected parties. Based on the findings of the aforementioned consideration, there was no reason to elaborate on the minimum requirements of the public participation process outlined in the EIA Regulations, 2010 or use reasonable alternative methods for people desiring of but unable to participate in the process due to illiteracy, disability or any other disadvantage.

Potentially interested and affected parties were notified of the proposed application by –

Potentially interested and affected parties were notified of the proposed application and site meeting by –

- Fixing a notice board at a place conspicuous to the public, specifically at the access road and tar road junction as well as at the site entrance.

- Giving written notice to owners and occupiers of land adjacent to Plot 34 and organs of state having jurisdiction in respect of the proposed activity. The applicant, Friends of Emoyeni Children's Village organization, is the owner of the land and occupies the property where the activity is to be undertaken. No reasonable alternative site. Consequently, a Background Information Document (BID) was prepared and distributed via email.:

- Placing an advertisement in a local newspaper, the Lowvelder, on the on Tuesday 21st June 2016. No official Gazette existed at the time of the application. The proposed activity shall not have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it will be undertaken.

SECTION C: ROLE PLAYERS

1 RESPONSIBILITIES OF THE ROLE PLAYERS

1.1 Developer

The developer remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr. Although the developer appoints specific role players to perform functions on his/her behalf, this responsibility is delegated. The developer is responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g. the ECO, ELO and contractor) to efficiently perform their tasks in terms of the EMPr. The developer is liable for restoring the environment in the event of negligence leading to damage to the environment.

The developer must ensure that the EMPr is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMPr. The developer must appoint an independent Environmental Control Officer (ECO) during the planning phase to oversee all the environmental aspects relating to the development.

Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement includes site preparation. The notice must include a date on which it is anticipated that the activity will commence, and must include the name and contact details of the appointed ECO.

Any changes to, or deviations from, the project description set out in the RoD must be approved, in writing, by the Department before such changes o deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes o deviations and it may be necessary for the holder of the RoD to apply for further authorisation in terms of the regulations.

Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/or telephonic details, the applicant must notify the Department (DARDLEA) as soon as the new details become known to the applicant.

The holder of the authorisation (RoD) must submit an environmental compliance audit report to the Department within 30 days of completion of the construction phase. The environmental audit report must be compiled by an independent auditor, and must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the conditions of the RoD as well as this EMPr.

The holder of the RoD is responsible for compliance with the provisions for Duty of Care and Remediation of Environmental Damage contained in Section 28 of the National Environmental Management Act, 1998 (Act 107 of 1998).

A copy of the Record of Decision must be kept at the property where the activity will be undertaken. The authorization must be

produced to any authorised official of the department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorization who works or undertakes work at the property.

1.2 Contractor

The contractor, as the developer's agent on site, is bound to the EMPr conditions through his/her contract with the developer, and is responsible for ensuring that she/he adheres to all the conditions of the EMPr. The contractor must thoroughly familiarise him/herself with the EMPr requirements before coming onto site and must request clarification on any aspect of these documents, should they be unclear. The contractor must ensure that he/she has provided sufficient budget for complying with all EMPr conditions at the tender stage. The contractor must comply with all orders (whether verbal or written) given by the ECO, project manager or site engineer in terms of the EMPr.

1.3 Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is appointed by the developer as an independent monitor of the implementation of the EMPr. He/she must form part of the project team, appointed prior to commencement of construction (including construction camp selection and site clearing) and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the EMPr and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:

- Liaison with relevant authorities;
- Liaison with contractors regarding environmental management; and
- Undertaking routine monitoring and appointing a competent person/institution to be responsible for specialist monitoring, if necessary.

The ECO has the right to enter the site and undertake monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (e.g. wearing of safety boots and protective head gear).

(a) Liaison with Authorities

Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)

The Authority is responsible for:

- Appraising the EMPr in the light of the Basic Assessment Report findings and other relevant information.
- Calling for modifications, extensions or further information if required.
- Issuing an Environmental Authorization on the Basic Assessment Report, which includes approval (or otherwise) of the EMPr.

The ECO will be responsible for liaising with the Department. The ECO must submit monthly environmental compliance reports to the authorities. These reports must contain information on the

contractor and developer's levels of compliance with the EMP; a description of all activities on site, problems identified, transgressions noted and remedial action implemented. All reports must reflect the Department's reference number on the cover. The ECO is to suggest corrective action measures to eliminate the occurrence of the non-compliance incidents. In order to keep a record of any impacts, the ECO must keep on-site: an Environmental Site Diary (which needs to be kept up-to-date), copies of all reports submitted to the Department, a complaints register of all public complaints and the remedies applied to such complaints. The ECO must remain employed until all rehabilitation measures as well as site clean-up are completed and the site is handed over to the applicant by the contractor for operation.

(b) Liaison with Contractors

The ECO is responsible for informing the contractors of any decisions that are taken concerning environmental management during the construction phase. This would also include informing the contractors of the necessary corrective action to be taken.

1.4 The Authorities

The Department (DARDLEA) retains the right to monitor and/or inspect the proposed project during both construction and operational phases.

SECTION D: PLANNING AND DESIGN PHASE

Issue/Activity	*Action Required*	*Responsible person*	*Frequency*
1. ***All planning and design aspects of the Christian Community Center***	1.1 a) Planning and design of all elements of the application to be in accordance with acceptable and approved standards as required by the relevant authorities. Planning and design to take cognisance of localised conditions and circumstances, particularly in terms of control of building operations, appropriate approved and registered contractors, access to the site, source of labour and transportation.	Project planning team	Throughput planning phases, before construction commences
2. ***Contractual Issues***	2.1 a) The appointed contractors will be contractually bound to these conditions as well as the provisions of the proposed EMPr. b) The appointed contractors will undertake an induction process with all staff and workers on site and issue a written schedule of rules and work conditions specific to the site	Project planning team and contractor	As required
3. ***EMPr***	**3.1** a) An approved ECO must be appointed before any construction activities commence. It is recommended that for the initial commencement phase the ECO is on site once a week as a minimum, thereafter the frequency can be negotiated between the ECO and the contractor as required. This EMPr must be made binding to the main contractors as well as individual contractors and should be included in tender documentation for the construction contract. The contractors must also ensure that the construction crew is aware of the requirements set out in the EMPr for this development prior to commencing activities on site.	Developer	**Prior to construction starting.**

4.	**4.1**		
Site Preparation-	a) Erect a barrier demarcating the proposed site.	Contractor/ECO	**Once-off prior to construction starting**
Sound environmental principles need to be adopted in the preparation of the site.	b) A temporary boundary (rope) must be installed along the wetland boundary to prevent any movement into this area by contractors	Contractor	**Prior to construction and maintained Daily**
	c) Clearly demarcate all material lay down areas.	Contractor	**Once-off prior to construction starting**
	d) Ensure that perimeter marking is kept and maintained in good working order for the total duration of the construction project.	Contractor	**Continuous**
	e) The area outside of the development footprint (no development) needs to be appropriately demarcated and staff need to be instructed to only conduct approved activities within these areas (i.e. alien invasive species removal). The proposed barrier needs to be checked by the ECO for efficacy.	ECO Contractor/ECO	**Prior to construction commencing** **Prior to construction commencing**
	f) Do not use the site for any other purpose other than for the proper carrying out of the Works under the Contract.	Contractor	**Construction duration**
	g) Marking for surveying and other purposes must be done using pegs, beacons or rope and droppers.	Contractor	**Continuous**
	h) That all protected trees be identified before the development takes place to ensure that they are not damaged.	ECO/Specialist	**Once off prior to construction starting**
	i) An ECO needs to be appointed to oversee construction, including the identification and relocation of plants of conservation concern prior to clearing and site preparation.	Contractor	**Once off at least 14 days prior to construction starting**

	j) The surveyor and contractor must clearly demarcate the centre or boundary of a servitude or footprint prior to clearing (for construction or surveying) so that the ECO can search for plants of conservation concern, mark them with danger tape and record protected plants that are going to be disturbed or destroyed. Searches also need to be carried out on temporary access roads and stockpile sites.	Contractor/ECO	**Once off prior to construction starting**
	k) The Developer must obtain a permit from the DARDLEA or a licence from the DWAF, to disturb or destroy protected plants before any clearing takes place.	Contractor/ECO	**When necessary**
	l) The developer must allocate a sufficient budget for rescuing and nursing plants of conservation concern, including translocation or transplanting, training, supervision, labour, black bags, compost, watering, maintenance and a nursery.	Contractor/ECO	**Once-off**
	m) The ECO must induct, and train (at least 2 full days) the contractor's labourers and supervisor how to successfully translocate and transplant local plants.	ECO	**Once-off, When necessary**
	n) All plants of conservation concern, excluding large trees that exceed the capabilities of the contractor's excavator, must be either transplanted into a nursery, i.e. Aloe and bulbous sp. or translocated outside the working servitude, i.e. seedlings, saplings & mature trees. Translocated trees will need to be watered. Rescued plants are to be used in landscaping and rehabilitation.	Contractor/ECO	**When necessary**
	o) The contractor may not dump cleared vegetation onto living plants unless it is on a site that has been searched for plants of conservation concern and approved by the ECO for stockpiling cleared vegetation.	Contractor/ECO	**Construction duration**
	p) All areas, other than the construction areas (camp, roads and defined servitudes or footprints) are "no-go" areas. Demarcate (& maintain) walking & working areas with danger tape.	ECO/Contractor Contractor	**Prior to construction and Continuous**
	q) Utilise the method of debushing most appropriate for the environment and species in question. Favour mechanical	Contractor	**Continuous**

	rather that chemical methods wherever possible.		
	r) No vegetation on neighbouring properties may be damaged or utilised	Contractor	**Continuous**
	s) Exotic (invasive) flora – to be removed from the site; a weed control program implemented and spread of exotic invasive species to be controlled	Contractor/ECO	**Continuous**
	t) Before any construction, borrowing and/or quarrying, the entire available topsoil layer (except in the area designated "no development") has to be stripped. Ensure that it is stockpiled separately from subsoil and rocky material.	Contractor	**Once-off, prior to construction**
	u) In the absence of a recognisable topsoil layer, strip the upper most 300mm of soil.	Contractor	**Once-off**
	v) Co-ordinate excavation to limit unnecessarily prolonged exposure of stripped areas and stockpiles. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.	Contractor	**Once-off**
	w) Strip and stockpile herbaceous vegetation, overlying grass and other fine organic matter along with the topsoil.	Contractor	**Once-off, monitor regularly**
	x) Do not strip topsoil when it is wet.	Contractor	**Once-off, monitor regularly**
	y) Store stripped topsoil in an approved location and in an approved manner for later re-use in the rehabilitation process.		
	z) Establish marker pegs along the boundaries of working areas, access roads, haul roads before commencement of work.	Contractor	**Once-off, monitor regularly**

5. ***Construction site*** *Careful planning of the Construction site can ensure that time and costs associated with environmental management and rehabilitation are reduced.* *With regards to the establishment of the campsite, mitigation measures as detailed in the section to the right will only be applicable should the workforce of the appointed contractors stay overnight. This aspect will, therefore, have to be confirmed first, on site prior to commencement of* any activities.	***5.1*** ***Structures and accommodation*** a) Erect all temporary buildings and structures; including offices, workshops, and stores, within predetermined zones as per the approved site plan. b) Erect all temporary and permanent labour housing within predetermined zones off the construction site as per the approved site plan and / or relevant Sketch Plans. c) Ensure that essential services (including showers, appropriate sanitation and drinking water facilities) are provided for all housing and/or campsites. d) Maintain essential services in a functional state. These may not be overloaded. Defects and inadequacies must be rectified immediately. e) Scavenger and weather proof bins will be provided in a suitable waste storage area for temporary storage. These bins will be emptied and transported to an appropriate facility once a week. f) Provide a designated place for food storage, preparation and consumption. Food storage must be separate from sleeping quarters and waste storage areas. g) Ensure that cooking facilities, as approved by the Project Manager is made available - preferably gas or electricity. Ensure regular checks of the mentioned facilities as per OSH Act and/or site safety plan by the relevant appointed personnel. h) Allow for household amenities, such as washing and drying of clothes, as well as areas for social interaction. i) The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. ***Storage areas*** *a)* A suitable and safe area for storage of the construction material is to be provided: choice of location for storage areas	Contractor Contractor Contractor/ Project manager Contractor/ Project manager Contractor Contractor/ Project manager Contractor/ Project manager Contractor/ Project manager Contractor Contractor	**Initial set-up period** **Initial set-up period** **Initial set-up period** **Initial set-up period** **Continuous** **Initial set-up period** **Initial set-up period** **Initial set-up period** **Continuous** **Initial set-up period**

	must take into account prevailing winds, distance to water bodies (no storage within 100 m of the river and riparian zone) and general on-site topography.		
	b) Storage areas must be designated, demarcated and fenced if necessary	Contractor/ Project manager	**Initial set-up period**
	c) Storage areas should be secure so as to minimise the risk of crime. They should also be safe from access by children/ animals etc.	Contractor	**Initial set-up period** **Continuous**
	d) Hazardous materials such as fuel, oil, paint, herbicide and insecticides shall be stored in bermed areas or under lock and key, as appropriate, in well ventilated areas.	Contractor	**Continuous**
	e) Definitions of hazardous substances / materials are those that are potentially: poisonous, flammable, carcinogenic or toxic.	Contractor	**Continuous**
	f) Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.	Contractor	**Continuous** **Continuous**
	g) Fire prevention facilities must be present at all storage facilities.	Contractor	**Initial set-up period**
	h) Sufficient care must be taken when handling these materials to prevent pollution.	Contractor	**Initial set-up period**
	5.2 ***Roads and Access***		
	a) Choice of access routes should take into account minimum disturbance to public and neighbours in close proximity to the site.	Contractor	**Initial set-up period**
	b) Wherever possible existing roads should be used to avoid the disturbance of additional land or natural veld.	Contractor	**Initial set-up period**
	c) Runoff from roads must be managed to avoid erosion and pollution problems.	Contractor	**Initial set-up period**

6. ***<u>Alien Invasive Species</u>*** *It is important at the outset of a project to establish a program for the eradication and control of alien invasive vegetation*	**6.1** a. Areas such as watercourses, wetlands, riparian and pristine areas must be prioritised. b. Alien vegetation need only be eradicated on sites where the entire site is not cleared. c. The ECO is responsible for the identification of alien invasive species. The specie-specific method of control and eradication should be implemented. d. The ECO is responsible to provide the specific training required to implement the required control method. Only personnel who have been appropriately trained is allowed to engage in this activity. e. All personnel tasked to engage in the process of alien invasive vegetation control needs to receive proper training in the following: - Methods and control measures. - Equipment and techniques - Types of herbicide (selective and non-selective) - Health and safety issues - Safety gear f. Prior to the actual eradication process the ECO or contractor must ensure the following: - All personnel have adequate training required - All personnel have essential safety equipment - Only identified alien species are targeted - Ensure correct application of herbicides g. Team supervisors must receive training in the following: - Herbicide awareness. Basic training on the mode of action of herbicides. - Operator safety. Handling of concentrates and spray mixtures, personal hygiene and protective clothing. - Safe storage of products at depots and operational sites and spray mixtures at operational sites. - Mixing. Handling of concentrates and mixing techniques.	Contractor / ECO Contractor / ECO ECO ECO ECO / Contractor ECO / Contractor ECO / Contractor	**Prior to site clearing and construction** **To be determined prior to site clearing** **Prior to site clearing** **Prior to site clearing** **Prior to site clearing** **Prior to site clearing** **Prior to site clearing**

	- Safety procedures to be observed during transportation of product spray mixtures, equipment and personnel. - Care and maintenance of application equipment, saws etc. - Record keeping in respect of quantities of product/spray mixtures used, area treated, person hours per area/operation, stock control - Planning. Advanced planning for follow-up operations, transportation, equipment and spares requirements, product procurement and availability. Team management - First aid. Actions to be taken in case of accidental contamination, suspected and actual poisoning, chronic poisoning, eye contamination and other physical injuries. - Health of operators. Persons unsuitable for use as application operators would include e.g. chronically ill, disabled, pregnant women. Awareness of possible allergic reactions. Wearing of protective apparel. - Managing major and minor spills, accident sites. h. Spill kits must be available on site in case of any accidental contamination or spillages.	Contractor	**Initial set-up period**

7. ***Fire Management*** *The National Veld and Forest Fire Act (No. 101 of 1998) provides requirements in terms of fire management and responsibilities of land owners in terms of fire breaks and management.*	**7.1** a) Adhere to requirements and guidelines of the National Veld and Forest Fire Act (No. 101 of 1998). b) Veld and Forest Fire Act (No. 101 of 1998) – "prepare and maintain a fire break on his or her side of the boundary between his or her land and the adjoining land". Therefore it is the responsibility of the landowner. c) Have available such equipment, protective clothing and trained personnel required to extinguish such fire as may occur as prescribed in the FPA regulations d) Have in place a properly equipped and trained fire crew to assist in the suppression or containment of wildfires and to maintain fire mitigation measures. e) Ensure that staff are trained and capable of fighting fires. f) Identify areas of high fire risk/hazards. g) Ensure sufficient firebreaks around perimeter of property. h) Maintain firebreaks – area needs to be cleared and checked.	Contractor / ECO Landowner Contractor Contractor Contractor Contractor Contractor / ECO Contractor	**Initial set-up period** **Initial set-up period** **Initial set-up period** **Initial set-up period** **Initial set-up period** **Initial set-up period** **Initial set-up period** **Ongoing**

SECTION E: CONSTRUCTION PHASE			
1. ***Maintenance of Construction site*** *Conscientious maintenance of the Construction site can ensure that time and costs associated with environmental management and rehabilitation are reduced.*	***1.1*** ***Maintenance of Access***		
	a) Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damage as soon as these develop.	Contractor	**Weekly inspection**
	b) If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt.	Contractor	**When necessary**
	1.2 ***Surfaces***		
	a) The Contractor must monitor and manage drainage of the camp site to avoid standing water and soil erosion.	Contractor	**Continuous**
	b) The construction site must be fenced off and demarcation of material lay down areas must precede all activities on site.	Contractor	**Initial set-up period**
	c) Run-off from the camp site must not discharge into neighbouring properties or adjacent river/riparian belt.	Contractor	**Initial set-up period**
	1.3 ***Ablutions***		
	a) An adequate number of portable/ chemical toilets shall be supplied (1 toilet per 15 users is the norm). The use of septic tanks, soak ways or pit latrines is strictly prohibited.	Contractor Contractor	**Initial set-up period** **Initial set-up**
	b) Do not locate any site toilet, sanitary convenience, within a horizontal distance of 100m of the identified river or riparian zone.	Contractor	**Weekly**
	c) The Contractor is to ensure that open areas or the surrounding bush are not being used as a toilet facility.	Contractor	**Weekly**
	d) Regular inspections shall be carried out to ensure toilets are kept in a hygienic state.	Contractor	**Weekly**
	e) Chemical toilets are to be cleaned regularly and effluent disposed of off-site at an approved municipal sewage system.	Contractor	**Once-off, monitor daily**

	f) Toilet paper shall be supplied to all toilets. Combine drinking water facilities with hand washing facilities near site toilets.	Contractor	**Initial set-up period**
	g) Toilet facilities will be screened and put as far away from the neighbours and roads as possible	Contractor/ Project manager	**Once-off, monitor daily**
	1.4 ***Camp/site Waste Disposal***		
	a) Refuse generated from the campsite, construction area, storage area or any other area shall be collected and placed in suitable covered refuse bins on a daily basis. A litter patrol around the construction camp is to take place every day to collect any litter that may have been strewn around.	Contractor/ Project manager Contractor	**Weekly**
	b) Bins and/or skips should be emptied regularly and waste should be disposed of at a registered landfill site.	Contractor	**As required**
	c) All refuse containers are to be covered at all times.	Contractor	**Daily**
	1.5 ***Provision of Water***		
	a) Sufficient potable water shall be provided for drinking, cooking and ablutions.	Contractor	**Initial set-up period**
	b) Great care is to be taken that the water supply is not contaminated in any way.	Contractor	**Daily**
	1.6 ***Provision of Food preparation and eating areas***		
	a) Provide a designated place for food storage, preparation and consumption. Food storage must be separate from waste storage areas.	Contractor	**Daily**
	b) Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	Contractor	**Initial set-up period**
	c) All litter throughout the site should be picked up and placed in the bins provided	Contractor	**Initial set-up period**
	d) Open fires should not be allowed. Fires for cooking should be limited to fire places designed for the purpose. Gas is more	Contractor	**Initial set-up period**

	preferable		

2. ***<u>Staff conduct</u>***	***2.1*** ***Environmental Education and Awareness*** a) Ensure that all site personnel have a basic level of environmental awareness training. b) It is essential that construction personnel be made aware of the sensitivity of the "no development" zones (the pristine areas surrounding the site and river and its associated riparian zone) and that their movements be limited to the construction areas only, which needs to be enforced. c) It is the Contractor's responsibility to provide the site foreman with no less that 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. d) Translators are to be used where necessary. e) The need for a "clean site" policy also needs to be explained to the construction workers. **2.2** ***Worker conduct on site*** a) A general regard for the social and ecological well-being of the site and adjacent areas (especially the untransformed areas), is expected of the site staff. b) Workers need to be made aware of the following general rules: i.) No alcohol / drugs to be present on site. *ii.)* No firearms allowed on site or in vehicles transporting staff to / from site, (unless used by security personnel). *iii.)* Prevent excessive noise. *iv.)* Prevent unsocial behaviour. *v.)* Bringing pets onto the site is forbidden *vi.)* No harvesting of firewood from the site or from the areas adjacent to it *vii.)* Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives.	Project manager / ECO **Contractor / ECO** Contractor Contractor Contractor Project manager /ECO Project manager	**During staff induction & ongoing** **During staff induction, to be monitored continuously** **Prior to moving onsite** **Continuous** **Continuous** **During staff induction & ongoing** **During staff induction & monitored on an ongoing basis**

	(e.g.: fires for cooking; the use of surrounding bush as a toilet facility; are forbidden). *viii.)* Trespassing on private / commercial properties adjoining the site is forbidden *ix.)* Driving under the influence of alcohol is prohibited. **2.3** **Fauna and Flora** a) Capture/snaring of fauna is strictly prohibited b) Anyone found doing the above-mentioned will be prosecuted or disciplined c) Faunal species found should be translocated d) No vegetation on neighbouring properties (or in the untransformed "no development" zone) is to be used for firewood. e) Permits are required for removal, relocation and pruning of protected species (permits can be obtained from MPTA or DWAF)	 Contractor/ ECO Contractor ECO Contractor/ ECO Contractor/ ECO	 **Continuous** **As necessary** **As necessary** **Continuous** **As necessary**

3. ***Dust/Air pollution*** *Main causes of air pollution is dust from vehicle movements and stockpiles, vehicle emissions and fires.*	**3.1** a) Phasing of operations will avoid the exposure of soil and sand for prolonged periods. b) If necessary, the construction site shall be watered (or an appropriate alternative method used) to control possible dust fallout. c) Vehicles travelling to and from the construction site must adhere to speed limits (40 km/h) so as to avoid producing excessive dust. d) Vehicles and machinery are to be kept in good working order and to meet manufacturer's specifications for safety, fuel consumption etc. e) No fires are allowed on site unless first cleared with the ECO and Project Manager. f) Stockpiles may cause dust and so must be managed in accordance with the guidelines in Materials Management in section 8.	Contractor Contractor Contractor Contractor Contractor / ECO Contractor	**Monitor daily** **Monitor daily** **Continuous** **Weekly** **As necessary** **Daily**

4. ***Soil Erosion***	***4.1*** ***Topsoil stripping and stockpiling*** a) Once an area has been cleared of vegetation, the top layer (nominally 150mm) of soil should be removed and stockpiled in a designated area. Topsoil is to be handled twice only – once to strip and stockpile, and once to replace and level. b) Should there be a need to stockpile soil; those stockpiles must be covered in excessively windy conditions c) No stockpiles or construction materials may be stored or placed within any drainage line and its riparian zone on site or in close proximity to stormwater drains. d) Position topsoil stockpiles on the higher side of a disturbed area. e) Ensure that all topsoil is stored in such a way and in such a place that it will not cause the damming up of water, erosion gullies, or wash away itself.	Contractor Contractor Contractor Contractor Contractor	**Once-off, monitor regularly** **As required** **Once-off, monitor regularly** **Once-off, monitor regularly**

	f) Do not stockpile topsoil in heaps exceeding **2m** in height.		
	g) Protect topsoil stockpiles from erosion.		
	h) Fencing may not cause erosion and may not impede the flow of any watercourse or natural drainage. Fencing must be monitored throughout the construction phase, and any signs of erosion resulting from it must be remedied immediately.	Contractor Contractor Contractor / ECO	**Once-off, monitor regularly** **Continuous**
	i) Remove exotic / invasive plants and broad leaf weeds that emerge on topsoil stockpiles		
	j) Ensure that topsoil is at no time buried, mixed with spoil (excavated subsoil), rubble or building material, or subjected to compaction or contamination by vehicles or machinery. This will render the topsoil unsuitable for use during rehabilitation.	Contractor Contractor	**Continuous** **Continuous**
	k) The Contractor will be held liable for the replacement of any topsoil rendered unsuitable for use during rehabilitation, for reasons due to his negligence or mismanagement on site.	Contractor	**Continuous**
	4.2 ***Exposed surfaces***		
	a) The time that stripped areas are exposed shall be minimised wherever possible.	Contractor	**Continuous**
	b) Top soiling and revegetation shall commence immediately after the completion of an activity and at an agreed distance behind any particular work front.	Contractor	**Monitor regularly**
	c) Stormwater control (See 5) and wind screening should be undertaken to prevent soil loss from the site.	Contractor	**Monitor regularly**
	d) Side tipping of spoil and excavated materials shall not be permitted – all spoil material shall be disposed of as directed by the contractor.	Contractor	**As each activity is completed**
	e) Soils that become compacted through the activities of the development must be loosened to an appropriate depth to allow seed germination.	Contractor	**Continuous**
	f) Structures to prevent erosion must be built in areas that are prone to erosion (especially steep roads)	Contractor	**Continuous**

	4.3		
	Surface water management		
	a) No water may be abstracted from any surface water body without necessary permission from DWAF for the purpose of construction unless permitted in terms of the Contract.	Project manager	**As required**
	b) Monitor water consumption and ensure that all possible use is accounted for and areas of waste are identified (i.e. water used for surface wetting, for potable supply etc.).	Contractor	**Where identified**
	c) Repair identified leaks and address issues of water wastage as soon as these are identified.	Contractor	**Prior to construction starting**
	d) Where possible, recycle water on the construction site.	Contractor	**Monitor daily**
	e) Avoid over-wetting, saturation and unnecessary runoff during dust control activities and irrigation.	Contractor	**Whenever identified**
	f) Ensure that water abstraction points, if permitted, (i.e. from rivers, dams, etc.) do not degrade or erode as a result of leaking pipes, spills, muddy conditions or wash-aways. Rectify problems as soon as they arise.	Contractor	**Whenever identified** **Monitor daily**

5. ***Stormwater***	***5.1*** ***General Principles***		
Construction activities frequently result in diversions of natural water flow resulting in concentration of flow and an increase in the erosive potential of the water. Measures in this section are aimed at reducing the erosive potential of stormwater.	a) Do not drain, fill or alter in any way, any river and riparian zone.	**Project manager** **Contractor**	**Monitor weekly** **Monitor daily**
	b) Do not allow surface water or stormwater to be concentrated, or to flow down, cut or fill slopes without erosion protection measures being in place.	**Contractor**	
	c) Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water pathways over the site. i.e.: these materials must not be placed in stormwater channels, drainage lines.	**Contractor**	**Continuous**
	d) Line overflow and scour channels with stone pitching along their length and at their points of discharge to prevent soil erosion. The point of discharge must be at a point where there is dense natural grass cover.	Contractor	**Continuous**
	e) Ensure that channels do not discharge straight down the contours. These must be aligned at such an angle to the contours that they have the least possible gradient.	**Contractor**	**When the need arises**
	f) Locate any point of overland discharge at least 50m away from the drainage line. No surface stormwater generated as a result of the development may be directed directly into any watercourse.	**Contractor**	**Whenever the need arises**
	g) Surface water rich in sediments and other pollutants must be prevented from entering any watercourse, and all mechanisms for dissipating water energy must be implemented at the inception of the construction phase.	Contractor	**Continuous.** **Prior to construction**

6. ***Water Quality (Surface and groundwater)*** *Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment is also detrimental to water quality. Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to* water quality.	***6.1*** ***General Principles*** a) Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these should then be disposed of to a suitable waste site. b) The storage and handling of fuel, lubricants and other chemicals must be in especially demarcated impervious and bunded areas c) Every effort should be made to ensure that any chemicals or hazardous substances do not contaminate the soil or groundwater on site. It is the holder of the RoD's responsibility to rectify any source of pollution from the development and to take appropriate measures to prevent any pollution of surface as well as groundwater. d) Care must be taken to ensure that run-off from vehicle or plant washing does not enter the ground water. e) All personal washing operations will take place at a location where waste water can be disposed of in an acceptable manner. Facilities not feeding into a formal drain should ensure that biodegradable soaps are used. Wash water must pass through a French drain system before entering the environment. f) Dry chemical toilets must be made available at the construction camp and must be cleaned and serviced regularly. All chemical toilets must be placed above the 1:100 year flood line or at least 100 m away from any water course. g) Ensure that no stormwater is allowed to enter any drainage installation for the reception, conveyance, storage and / or treatment of sewage. **h)** No natural watercourse is to be used for the cleaning of tools or any other apparatus. This includes for purposes of bathing, or the washing of clothes etc. All washing operations will take place at a location where waste water can be disposed of in an acceptable manner.	Contractor Contractor Contractor / Developer Contractor **Contractor** **Contractor** **Contractor** **Contractor**	**Construction duration - Regular Monitoring.** **Prior to start of construction – monitor regularly** **Regular Monitoring.** **Regular Monitoring** **Regular Monitoring** **Regular Monitoring** **Regular Monitoring** **Whenever the need arises**

	i) The contractor must maintain good housekeeping practices that ensure that all work sites are kept tidy and litter free, ensuring no runoff of refuse into surrounding watercourses.	**Contractor**	**During rainy periods**
	j) No spills may be hosed down into a storm water drain or sewer, or into the surrounding natural environment. All contaminated soil is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an appropriate landfill site.	Contractor	**Regular monitoring**
	k) The ground under the servicing and refuelling areas must be protected against pollution caused by spills and/or tank overfills.	Contractor	**Regular monitoring**
	l) In the event of a breakdown or emergency repair, any accidental spillage must be cleaned up or removed immediately.	Contractor	**Whenever the need arises**
	m) Ensure that water passing through vehicle wash bays and workshops pass through oil baffles / oil traps / oils separators before passing into conservancy tanks.	Contractor	**Regular Monitoring**
	n) Treat all oil sludge collected in the said traps, including sump liners, as hazardous waste	Contractor	**Regular Monitoring**
	o) Take special care during rainy periods to prevent the contents of sumps and drip trays from overflowing.	Contractor	**Regular Monitoring**
	p) If water will be sourced from the on-site boreholes, the water needs to be properly treated prior to human consumption. Untreated water can be used for all other activities such as washing of equipment, dust suppression, concrete mixing, compacting etc.	Contractor	**Regular Monitoring**
	q) Deflect any unpolluted water / runoff away from any dirty area		
	r) Emergency contact numbers should be referred to in order to deal with spillages and contamination of aquatic environments.	Contractor Contractor	**Regular Monitoring**

7. ***River/Wetland Protection*** *All requirements of the National Water Act, 1998 (Act 36 of 1998) must be complied with as prescribed by the Department of Water Affairs and Forestry (DWAF).*	**7.1** a) No construction activities or construction personnel will be allowed in the dry river bed bordering the main camp. b) No activity such as construction camps, temporary housing, temporary ablution, stockpiling of topsoil, storing of equipment and material, disturbance of natural habitat, temporary access haul roads, impermeable surfacing, any other activity c) A temporary boundary (rope) must be installed along the riparian edge to prevent any movement into the dry river bed or in to the riparian vegetation. d) It is further recommended that no roads be constructed through the river and adjacent riparian zone. e) No stormwater or runoff from the roads and camp site is allowed straight into the river without first slowing the flow and where possible filtering litter, etc. f) Alien vegetation should be removed from the river and riparian zone. g) An Emergency Preparedness Plan should detail potential risks and anticipate where and when incidents could occur, and what steps should be taken in the event that a spill occurs.	**Contractor/ECO** **Contractor / ECO** **Contractor / ECO** **Contractor / ECO** **Contractor / ECO** **Contractor / ECO**	**Daily** **Continuous** **Initial site preparation** **Initial site preparation** **Weekly monitoring** **Initial site preparation** **Initial site preparation**
8. ***Fauna and Flora***	***8.1*** ***Plant harvesting - pressure on vegetation*** a) Prior to construction, the borders of the areas to be developed should be demarcated with danger tape in order to prohibit access by the construction team into ecologically sensitive vegetation communities. This danger tape must be removed once construction is completed. b) An Environmental Control Officer should be appointed during this phase and one of this person's roles during the construction phase should be monitoring of illegal plant harvesting. c) Construction teams must, as a contractual obligation, not be allowed to collect any medicinal plant resources from surrounding vegetation. However, collection of firewood from	Contractor / ECO Contractor / ECO Contractor / ECO	**Initial site preparation** **Weekly monitoring** **Initial site preparation**

	plantations of invasive exotics should be allowed.		
	d) The Environmental Control Officer should spend time in the ecologically sensitive habitats during construction and search for any evidence of harvesting of plant resources (bark removal, digging for tubers, etc.).	Contractor / ECO	**Weekly monitoring**
	8.2		
	Alien invasive plants		
	a) In order to comply with the Conservation of Agricultural Resources Act, all listed invasive exotic plants as indicated in the specialist report should be targeted and controlled.	Contractor / ECO	**Initial site preparation** **Weekly monitoring**
	8.3		
	Solid waste management –		
	b) Building contractors should be made aware of the necessity to dump any building rubble at approved off-site facilities.		
	c) The Environmental Control Officer should search surrounding ecologically sensitive vegetation to check whether building contractors are dumping any building rubble on site, and if they are, then immediate steps must be taken to clean the area and prevent future dumping.	Contractor / ECO Contractor / ECO	**Initial site preparation** **Continuous**
	d) Penalties should be levied on any contractor who does not comply.	Contractor / ECO	**Initial site preparation**
	8.4		
	Fauna		
	a) Construction teams must, as a contractual obligation, not be allowed to enter surrounding untransformed vegetation.		
	b) Any evidence of poaching must be followed up by the Environmental Control Officer, and where possible, perpetrators should be prosecuted under the relevant Nature Conservation Act	Contractor / ECO Contractor / ECO	**Weekly monitoring** **Weekly monitoring**

	8.5 ***Soil erosion -*** a) All topsoil removed during clearing of roads and housing footprints should be stockpiled for later use such as landscaping gardens and / or rehabiliting disturbed areas. Stockpiling must not take place within any drainage lines. b) Any steep road surfaces should have water-traps and drainage furrows constructed in order to direct water off the road as quickly as possible c) Cut-off drains diverting storm water around the perimeter of the development should be professionally designed to handle expected run-off and prevent erosion d) Outflow from cut-off drains and storm water diversions should be attenuated sufficiently to prevent erosion of receiving environment	Contractor / ECO Contractor / ECO Contractor / ECO Contractor / ECO	**Weekly monitoring**

9. ***<u>Materials Management</u>***	**9.1** ***Borrow material*** a) The use of gravel and / or sand from borrow / gravel pits must adhere to all applicable legislation in terms of authorisation and permits	Contractor / Engineer	**Prior to construction**
	9.2 ***Stockpiling*** a) Stockpiles should not be situated such that they obstruct natural water pathways.	Contractor	**As necessary**
	b) Stockpiles should not exceed **2m** in height unless otherwise permitted by the Contractor (in consultation with the ECO).	Contractor / ECO	**Monitor daily**
	c) If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth, depending on the duration of the project.	Contractor	**As necessary**
	d) Stockpiles may further be protected by the construction of berms or low brick walls around their bases.	Contractor	**As necessary**
	e) Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.	Contractor	**Monthly checks**
	9.3 ***Handling Hazardous Materials*** a) All concrete mixing must take place on a designated, impermeable surface.	Contractor	**Continuous**
	b) No vehicles transporting concrete to the site may be washed on site.	Contractor	**Continuous**
	c) Lime and other powders must not be mixed during excessively windy conditions.	Contractor	**As necessary**
	d) All substances required for vehicle maintenance and repair must be stored in sealed containers until they can be disposed of / removed from the site.	Contractor	**Continuous**
	e) Hazardous substances / materials are to be transported in sealed containers or bags.	Contractor	**Continuous**
	f) Spraying of herbicides / pesticides should not take place under	Contractor	**Initial set-up /**

	windy conditions and must comply with OHSA specs and other chemical handling laws. g) The emergency numbers should be consulted should any accidents / spillages of hazardous substances and / or materials take place. The Project Manager is to outline an emergency plan for dealing with accidents / spillages of hazardous materials. This statement must be handed to the Contractor.	 Project manager and Contractor	**As necessary** **Initial set-up/ As necessary**
10. ***<u>Waste Management</u>*** *Definition:* *"Refuse" refers to all construction waste (such as rubble, asphalt millings, cement bags, waste cement, timber, cans, other containers, wire and nails), household and* office waste.	***10.1*** ***General waste management*** a) Refuse must be placed in the designated skips / bins which must be regularly emptied. These should remain within demarcated areas and should be designed to prevent refuse from being blown out by wind. b) In addition to the waste facilities within the construction site, provision must be made for waste receptacles to be placed at intervals along the work front. c) Littering on site is forbidden and the site shall be cleared of litter at the end of each working day. d) Recycling is to be encouraged by providing separate receptacles for different types of waste and making sure that staff are aware of their uses. ***10.2*** ***Waste Disposal*** **a) Solid** i.) Where necessary, dedicate a storage area on site for the collection of construction waste. ii.) Unless otherwise specified by the Project Manager, remove stored domestic waste to the nearest registered solid waste disposal facility. iii.) Ensure that solid waste is transported properly, avoiding waste spills en-route. *iv.)* No solid waste may be burned on site	 Contractor Contractor Contractor Contractor Contractor	 **Continuous** **Continuous** **Daily** **Continuous** **Before construction begins** **On a weekly basis**

	b) Liquid i.) Any chemical toilets used on site shall be cleaned regularly and waste disposed of by a registered waste contractor. **c) Hazardous** i.) Hazardous waste disposal must be carried out by an approved waste Contractor. Waybills for this should be provided. ii.) A sump (earth or other) must be created for concrete waste. This is to be de-sludged regularly and the cement waste is to be removed to a tip site as approved by the local municipality. iii.) Collect any hazardous waste in receptacles located on a drip tray on site pending disposal. iv.) Retain waste oils and batteries for recycling by the supplier wherever possible. v.) Regularly dispose of all hazardous waste not earmarked for reuse, recycling or resale at a registered hazardous waste disposal site. vi.) Contain chemical spills, and arrange for cleanup / control by the supplier, or by professional pollution control personnel.	Contractor Contractor	**Continuous** **Monitor weekly** **Continuous** **Monitor weekly**
11. ***<u>Social Impacts</u>*** *Regular communication between the Contractor and Interested and Affected Parties (I&AP's) – especially the relevant neighbours and downstream users is important for the duration of the* contract.	**11.1** a) Contractor's activities and movement of staff to be restricted to designated construction areas. b) Construction must be limited to normal working hours and hours outside of game drive time. (07h00 – 17h00). c) Should the construction staff be approached by members of the public or other stakeholders, they should assist them in locating the Contractor, or provide a number on which they may contact the Contractor. d) Appropriate notification signs must be erected to warn the public of the dangers of the construction site. e) The conduct of the construction staff when dealing with the public or other stakeholders shall be in a manner that is polite and courteous at all times. f) Disruption of access for local tenants of adjacent businesses	Contractor Contractor Contractor Contractor Contractor Contractor	**Continuous** **Continuous** **Continuous** **Prior to construction** **Continuous** **Continuous**

	must be minimised and must have the Engineer's/Project Manager's permission		
	g) The Contractor is to inform neighbours in writing of disruptive activities at least 24 hours beforehand. This can take place by away approved of by the I&AP's (especially the adjacent homes) and the Contractor.	Contractor	**At least 24 hours prior to the activity taking place**
	h) Any complaints received from the public during the construction period must be attended to as soon as possible and addressed to the satisfaction of all concerned.	Contractor	**As the need arises**
	i) Contractor must take measures to discourage labourers from loitering.	Contractor	**Continuous**
12. ***<u>Crime, safety and security</u>***	**12.1**		
	a) The implementation of adequate and appropriate fencing and/or barriers between the site and adjoining properties and developments must be undertaken, to ensure sensitivity to adjoining businesses and their properties, particularly during construction phases. The barriers, once erected have to be checked and maintained.	Contractor / Project manager	**Once-off and monitored weekly**
	b) The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations.	Contractor	**Daily**
	c) The contractor must supply his own security arrangements for the construction site.	Contractor	**Once-off; continuous monitoring**
	d) Ensure the contact details of the police or security company and ambulance services are available on the site.	Contractor	**Continuous**
	e) Ensure that the handling of equipment and materials is supervised and adequately instructed.	Contractor	**Daily**
	f) Limit access to the construction site only to the workforce.	Contractor	
	g) Do not allow the movement of public within the development site by posting notices at the entrance gates.	Contractor	**Daily** **Weekly**
13. ***<u>Noise Pollution</u>***	**13.1**		
	a) Unless otherwise specified by the Project Manager, normal work hours will apply (i.e. from 07h00 to 17h00, Mondays to Saturdays).	Contractor/ Project Manager	**Continuous**

	b) No loud music is permitted on site.	Contractor	**Continuous**
	c) Noise from labourers to be controlled	Contractor	**As necessary**
	d) Noise suppression should be applied to all construction equipment	Contractor	**As necessary**
	e) **If noise levels at the boundaries of the site exceed 7dB** above ambient levels, then the local health authorities are to be informed.	Contractor	**As necessary**
	f) Notify adjacent landowners of after-hours construction work and of any other activity that could cause a nuisance.	Contractor	**As necessary**
	g) Respond to community complaints with regard to noise generation, taking reasonable action to eliminate and/or minimise the impact.	Contractor	**As necessary**
	h) Where complaints cannot be addressed to the satisfaction of all parties, then the Contractor will, upon instruction by the Project Manager, provide an independent and registered Noise Monitor to undertake a survey of the noise output levels. Recommendations to reduce noise to legislated levels must be implemented.	Contractor/ Project manager	**As necessary**
14.	**14.1**		
Visual Impacts	a) Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill.	Contractor	**Bi-weekly or as necessary**
	b) Lighting on the construction site should be pointed downwards and away from oncoming traffic.	Contractor	**Continuous**
	c) Cluster construction activities on site	Contractor	**As necessary**
	d) Cordon off construction site with shade cloth if necessary	Contractor	**As necessary**

15. ***Archaeological Artefacts***	**15.1** a) Construction personnel must be sensitised to the requirements of the South African Heritage Resources Act (SAHRA). b) Should any material of cultural or archaeological significance be encountered during construction, all activities must cease immediately and SAHRA must be informed accordingly. c) Artefacts can only be moved once a permit is obtained from SAHRA. d) Should any activity be planned for the historical buildings on-site (those older than 60 years), the relevant permits and authorisation needs to be applied for according to SAHRA.	Contractor/ ECO Contractor/ ECO Specialist Contractor/ ECO	**As necessary** **Prior to construction** **As necessary** **As necessary**
16. ***Site Clean-up and rehabilitation***	**16.1** a) All structures are to be removed from site. b) The area that previously housed the construction site is to be checked for spills of substances such as oil, paint etc. and these should be cleaned up. c) All hardened surfaces within the construction site area should be ripped, all imported materials removed, and the area shall be top soiled and regressed d) The Contractor must arrange the cancellation of all temporary services.	Contractor Contractor Contractor Contractor	**Project completion** **Project completion** **Project completion** **Project completion**
17. ***Traffic***	**17.1** a) Construction vehicles would have to make use of public roads. These roads are utilised by general public for ingress and egress. It is important that any potential impacts associated with traffic generated by the project's construction traffic are minimised. b) Measures to mitigate impacts on traffic flow, and potential damage that heavy trucks may have on these roads during construction include ensuring that all regulations relating to traffic management are observed. c) In addition to this, construction vehicles must be made fully	Contractor Contractor	**Daily** **Daily**

	aware that the development is situated within a rural environment and the sensitive nature of this impact.	Contractor	**Daily**
	d) The following strategies should be implemented to minimise potential impacts from construction related traffic:		
	e) All heavy vehicles travelling to and from the site will follow dedicated heavy vehicle routes to avoid roads that are not suited to these vehicles.	Contractor	**Daily**
	f) Heavy vehicles will not be permitted to travel along these roads after more than 20 mm of rain and until the roads have dried satisfactorily.	Contractor	**Daily**
	g) Where practicable, truck deliveries will be restricted to daytime working hours.	Contractor	**Daily**
	h) If possible, the transport of oversize loads will be restricted to non-peak periods to minimise traffic disruptions and will be provided with appropriate escorts and approvals from the Roads Department and the Police.	Contractor Contractor	**Daily** **Daily**
	i) Clear traffic signs and signals will be installed on-site to provide for safe traffic movement.	Contractor	**Daily**
	j) An on-site speed limit will be enforced.	Contractor	**Daily**

SECTION F: OPERATIONAL PHASE			
1. ***<u>Performance evaluation and record keeping</u>*** *To provide guidance during self-performance evaluations of the operation*	**1.1** a) Compile a checklist applicable to the site and the needed permits from the aspect register and the legal requirements specified and ensure that it is completed once a year. The checklist should typically include all identified aspects (as provided in the above document). b) During this evaluation specific attention should be given to the effectiveness of the EMPr's and other proposed mitigation measures. c) Ensure that all information obtained from changed process etc. is relayed to all the applicable documents	Land owner Land owner Land owner	**Annually** **Annually** **When necessary**
2. ***<u>Eradication of alien floral species</u>***	**2.1** a) The use of alien invasive plants for landscaping is prohibited, and a long-term management plan for the eradication and control of existing alien invasive plants should be implemented. b) It is recommended that after the alien plant species are removed, the natural grass or indigenous vegetation from the area be allowed to cover the bare areas where the alien vegetation used to be.	Land owner Land owner	**Once-off, regular monitoring** **Once-off, regular monitoring**
3. ***<u>Erosion</u>***	**3.1** a) The stormwater system, especially the discharge points, must be inspected and damaged areas must be repaired if required b) Litter blocking the stormwater system must be removed. c) Regular maintenance of the stormwater system must be undertaken. This should include removal of blockages, and monitoring of stability of stormwater structures to prevent any signs of erosion.	Land owner Land owner Land owner	**Continuous, bi-annual monitoring** **Bi-weekly** **Bi-weekly, especially during rainy seasons**

4. ***<u>Water quality</u>***	**4.1** a) Any damages to the sewage system must be repaired immediately b) The stormwater system, especially the discharge points, must be inspected and damaged areas must be repaired if required. c) Monitoring of the quality of the water should be done quarterly and sent to DWAF.	Land owner Land owner Land owner/ Specialist Land owner/ Specialist	**Monitor regularly** **Continuous, bi-annual monitoring** **Quarterly**
5. ***<u>Ecological Monitoring</u>***	**5.1** a) Regular removal of alien species b) Removal of any litter c) Monitoring of stormwater entering the system [It is recommended that the stormwater management systems be designed in such a way that the natural flow regime (velocity of the water) of the river is not exceeded by 50% in the event of 1:10 year flood to prevent the possibility of erosion in the river bank]. d) Lodge Management should be permitted to use plants rescued during construction for landscaping their gardens. e) Activities in the "natural bush" and drainage areas must be strictly managed, no quad bikes, motorcycles and off road vehicles may be permitted in these areas. f) Appropriate conservation measures must be developed and implemented in conjunction with the DARDLEA in the event of recording any threatened/near threatened species on the site.	Land owner / Specialist Land owner Specialist Land owner Specialist Land owner/lodge staff Land owner/lodge staff Land owner/lodge staff	**Continuous, bi-annual monitoring** **Continuous** **Annually** **Continuous** **Continuous** **Continuous**

6. ***<u>Waste management</u>***	**6.1** a) Domestic waste must be disposed of by an approved method. b) Sufficient litterbins should be placed at strategic points. c) Hazardous waste must be disposed of at an official registered site, or be removed by registered waste contractors. d) Potentially hazardous materials include empty containers of pesticides, chemicals, and oil. Such containers must be disposed of at an appropriate landfill site, approved for the disposal of hazardous materials.	Land owner/lodge staff Land owner/lodge staff Land owner/lodge staff Land owner/lodge staff	**Once-off, monitor continuously** **Once-off, continuous** **Monitor continuously** **As required**
7. ***<u>Crime & Safety</u>***	**7.1** a) Sufficient lighting (energy saving devices must be implemented) needs to be provided.	Land owner/lodge staff	**Weekly**

ANNEXURE B: Evaluation of Sewerage Treatment Alternatives.

Sewerage Treatment

Three technology alternatives have been investigated for this development in response to concerns and issues raised during the design process.

The initial departure point was the *need for effluent produced to be managed in the most ecologically, economically and healthy manner available*. The Department of Water Affairs & Forestry's "PROTOCOL TO MANAGE THE POTENTIAL OF GROUNDWATER CONTAMINATION FROM ON SITE SANITATION, National Sanitation Co-ordination Office, Directorate of Geohydrology, Edition 1, 1997" was used to evaluate the risk of groundwater contamination from onsite sanitation.

Initial input from various sources has indicated that traditional septic tanks and soak ways are not viable. This in addition to the site's close proximity to the Machatane River, have led to further investigation of the potential technologies for sewerage treatment.

Additional disposal systems being investigated are:

- The storage of sewerage containing wastewater on site in conservancy tanks for subsequent transportation to the local municipal treatment works for disposal.
- The installation of a small pre-fabricated wastewater treatment plant capable of treating waste water to standards acceptable for its release into a soakaway or directly into a watercourse
- A combination of the various systems

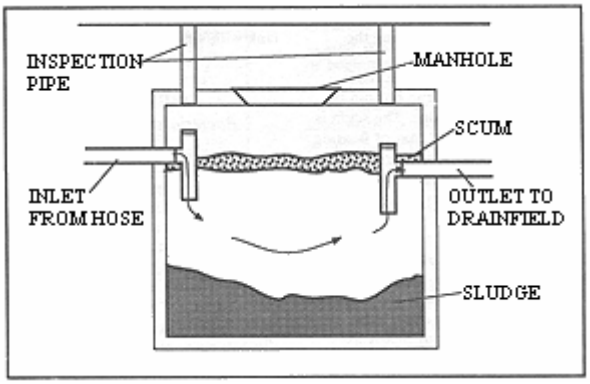
2 Septic tanks coupled to soakaways/French drains

1.1 Description of the system

Each unit will gravity feed wastewater into a septic tank for initial biological treatment. The partially treated liquid outflow from the septic tank passes into a rock or gravel filled soakaway and gradually filters into the surrounding substratum.

Septic tanks will be of the prefabricated variety and will be installed underground. Effluent will be gravity fed to the septic tank using standard 4" PVC piping. The volume of the septic tank will be designed according to the treatment requirements of The Christian Community Center. Septic tanks should be designed to deal with peak period volumes to ensure that the system is not overloaded. The disadvantage of this is that the biological organisms in the tank may not efficiently be able to multiply to deal with peaks and troughs in the supply of effluent to the tank resulting in a below normal operating efficiency.

1.1.1 Septic Tank Function



Sewage or untreated household waste will quickly clog all but the most porous gravel formations. The septic tank conditions sewage to allow percolation of the liquid portion into the subsoil. The most important function of septic tanks is to protect the absorption ability of the subsoil. In doing this the septic tank does the following three things.

Removes solids from liquid. As sewage enters the tank, the rate of flow is reduced and heavy solids settle, forming sludge. Grease and other light solids rise to the surface, forming a scum. The sludge and scum are retained and break down while the clarified effluent (liquid) is discharged to the drainfield/French drain for soil absorption.

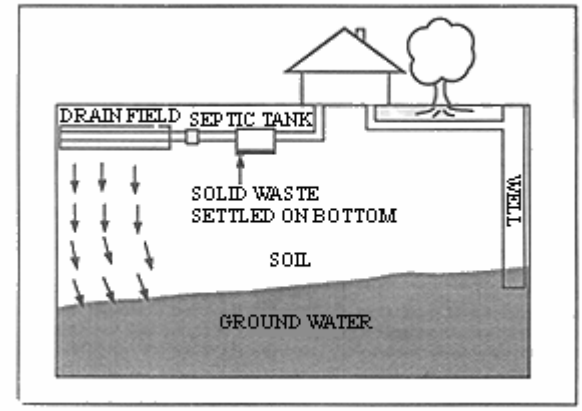


Figure 2. Septic systems can affect groundwater

Provides biological treatment. Natural processes break down the solids and liquids by bacterial action. The breakdown occurs in the absence of oxygen (anaerobic conditions). The anaerobic conditions are referred to as "septic," giving the tank its name.

Stores scum and sludge. The solids accumulate in the bottom of the tank to form sludge. The scum is a partially submerged mat of floating solids and grease. Scum and sludge are digested over time and compacted into a small volume. Areas with warm climates allow more complete breakdown of solids and scum than in the cooler climates. For this reason, tanks in warm climates do not usually need to be pumped or cleaned out nearly as often as those in cold climates. Regardless of climate, a non-volatile residue of material remains in the tank. Sufficient volume for the solids must be provided in the tank between pumping's or cleanings. If the solids fill the tank and enter the drainfield, the solids can clog the soil in the drainfield.

Grease from the kitchen is detrimental to septic tank functions. Effluent from grease traps must go through septic tanks before being discharged to drainfields to prevent soil plugging. Small amounts of kitchen grease can go into the septic tank without damaging the system.

Effluent -- Bacteria and Nutrients. The liquid fraction that leaves the septic tank and enters the drainfield is called the effluent. The bacterial level of the effluent is quite high, contrary to popular belief. The effluent also contains nitrates (among other nutrients), which move downward. To reduce potential for groundwater contamination by the effluent, a sufficient soil depth and soil contact time is required. Pathogens break down with soil contact and pathogen levels are reduced as the effluent percolates through the soil. Bacteria eventually die and are removed by the filtering effect of the soil, further purifying the effluent. In soils of insufficient depth or those with high permeability the risk of incompletely treated effluent entering the groundwater is elevated.

2.3 Requirements for operation of septic tanks and soakaways

1.2.1 Physical

For the effective operation of a septic tank system the following elements are critical:

- The ability to locate the tank and French drain adjacent to the house. Soil should be of a nature to allow a suitable sized hole to be excavated for the tank as well as to allow the laying of pipework to allow the tank to be gravity fed
- There should be sufficient soil depth to allow for the percolation of effluent. The absence of perched water tables must be ascertained.
- The permeability of the soil must ensure sufficient soil contact time to allow pathogens to be broken down

1.2.2 Legal

As a minimum the following legal parameters must be met:

- The release of effluent from septic tanks is contemplated in Schedule 4 of the General Authorisation issued under the National Water Act (36 of 1998). Compliance in this regard must be established to verify that the activity does not require a licence.
- National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977) for construction, operation and maintenance of any structure used for the collection, treatment or disposal of waste.
- SABS 0400-1990
- Risk assessment according to "*A protocol to manage the potential of groundwater contamination from on site sanitation. Version 2"*
- Discharge of effluent at a suitable distance from boreholes and rivercourses (>100m)

1.3 Advantages/Disadvantages of the system in the context of this development

Table 32: Advantages/Disadvantages of septic tanks and soakaways.

Advantages/Positive	Disadvantage/Negative
Low cost in terms of equipment	The site is located closer than 100m to river course or abstraction points.
Low maintenance – only requires infrequent sludge removal (2-5 years)	A septic tank can cause a smell nuisance and is totally reliant on the efficiency of the soak away system. The effluent produced from a septic tank cannot be discharged to a ditch or stream.
	It is essential that there is frequent through flow of effluent in the septic tank to maintain the bacterial content and for decomposition to take place, failure in this regard may result in discharge that will be even more polluting than normal and may even include "gross solids".

	These solids can block the septic tank soak away system.

1.4 Suitability of technology

Septic tanks coupled to soakaway systems are only considered applicable where the risk of contamination can be verified as being "low" in terms of the *"protocol to manage the potential of groundwater contamination from on site sanitation. Version 2".* The risk of potential contamination of groundwater may be viewed as a 'fatal flaw' to the extent that this type of system is not viewed as a feasible alternative where risk levels reach "medium" or "high".

Further to this the close proximity of the soak away and tank, raises doubt concerning the applicability of this type of system.

3 Temporary storage in conservancy tanks for removal to municipal treatment works

2.1 Description of the system

Two separate systems be designed for the house by separating grey water (bath, shower and hand basin water) and sewage (toilets and kitchen water). This will gravity feed sewerage laden wastewater into a conservancy tank for temporary storage. The conservancy tank is a covered tank that receives untreated effluent and stores it temporarily. The tank requires routine emptying at intervals.

Grey water originating from baths and showers will be released through an approved soak-away drainage system.

Conservancy tanks will be of the prefabricated variety and will be installed underground. Effluent will be gravity fed to the septic tank using standard 4" PVC piping. The volume of the conservancy tank will be designed according to the needs of The Christian Community Center. Conservancy tanks will be designed to accommodate peak volumes of effluent for periods of 1 week at a time. The tanks will have a reserve volume equal to the design volume. All tanks will be fitted with a monitor and alarm to indicate the level of effluent in the tank as well as to warn when the tank reaches the pump-out level (50% of total volume).

Effluent will be pumped from the conservancy tanks by a registered waste removal company and transported to the municipal sewerage treatment works in Middelburg for disposal.

2.2 Requirements for operation of conservancy tanks and soakaways

2.2.1 Physical

For the effective operation of a conservancy tank system the following elements are critical:

- The ability to locate the tank adjacent to the house. Soil should be of a nature to allow a suitable sized hole to be excavated for the tank as well as to allow the laying of pipework to allow the tank to be gravity fed

For the effective operation of a soakaway system for grey water the following elements are critical:

- There should be sufficient soil depth to allow for the percolation of effluent. Such water does not contain pathogens and therefore does not have the same requirements as water exiting a septic tank.
- The permeability of the soil must ensure sufficient soil contact time to allow for the breakdown of soap and other contaminants.

2.2.2 Legal

As a minimum the following legal parameters must be met:

- The storage of effluent for the purpose of disposal is contemplated in Schedule 4 of the General Authorisation issued under the National Water Act (36 of 1998). Compliance in this regard must be established to verify that the activity does not require a licence.
- Registration of the storage of wastewater must be made with DWAF of more than 1000 cubic meters of wastewater are stored (4.11 of GA)
- National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977) for construction, operation and maintenance of any structure used for the collection, treatment or disposal of waste.
- SABS 0400-1990
- MoU or service agreement from the municipal sewerage treatment works confirming capacity and willingness to accept waste.

2.3 Advantages/Disadvantages of the system in the context of this development

Table 33: Advantages/Disadvantages of conservancy tanks and soakaways.

Advantages/Positive	Disadvantage/Negative
Low cost in terms of equipment	Risk of overflow due to inadequate pumping and monitoring failure.
No discharge into the immediate environment. Dramatically reduced risk of groundwater contamination.	High maintenance. Requires regular monitoring and pumping.
	High operational cost in terms of pumping, transport, treatment and maintenance of monitoring equipment.
	Access to site may be very difficult. Not suitable for access by standard waste removal vehicle.
	Risk of spillage while pumping and transporting untreated effluent.
	Potential for odours.

2.4 Suitability of technology

While a dual system of conservancy tanks for sewerage and soakaway systems for grey water holds environmental benefits in terms of reduced discharge of pathogens and pollutants, they are only considered applicable where access to the conservancy tanks is readily possible.

4 Prefabricated treatment plants – Biobox type system

3.1 Description of the system

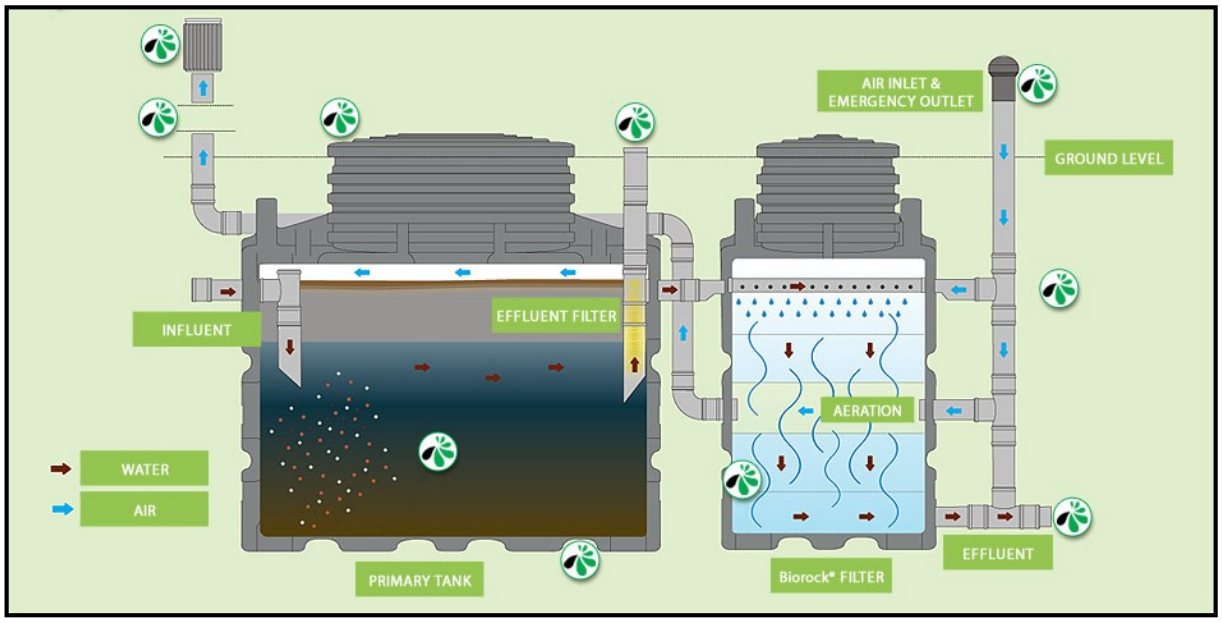
The chosen system is known as the Biobox The Biorock® system. This technology not only meets, but exceeds South African Discharge Standards as specified in the National Water Act. With water quality in catchments a growing concern, the need to phase out septic tanks and soakaways is gaining importance.

It is anticipated that this system will be installed to supply The Christian Community Center [see below for technical data]. The system is scalable and can be designed according to specific requirements. In this regard it is anticipated that a system catering for 15 persons will be installed. If, however increased capacity is required the system can be installed in parallel and thus cater for 30, 45, 60 people and so on.

Capacity determination for the system was influenced by the following:

- Considering that water allocation per person is set at 250l/ person per day (this is conservative and is the standard volume adopted by SANPARKS and many other conservation based tourist facilities); and
- That 30l/ person per day will be used for sewerage (the system is designed for separating grey water (bath, shower and hand basin water) and sewage (toilets and kitchen water)).
- Given that there will be a maximum of 10 people occupying the house at any one time, and that water usage has been calculated for a maximum stay of 5 consecutive days, it can be calculated that 1800l/ 5 day stay of effluent will be generated.
- This is how ever a very conservative precaution as it is highly unlikely that the house will be used at maximum capacity and for a full five night stay.

Liquid waste produced will be collected in a septic tank and piped directly to the Biobox system, from where treated effluent will be held in a conservatory tank and used for irrigation thereafter.



3.1.1 How does a Biobox work?

The raw sewage enters the pre-filter tank which separates the solids from the liquid part of the effluent. (This could be an existing septic tank in the case of a retrofit installation.) This pre-filter digests most of the solids anaerobically and should only require emptying every 2-3 years. The solids-free effluent then enters the Biorock® biofilter which uses layers of natural fibre to treat the effluent in exactly the same way as nature treats effluent in the soil or on the margins of a pond.

Bacteria grow in the fibre and digest the organic material as it passes through the system. So, instead of using electricity guzzling compressors or pumps to provide the air, the Biorock® biofilter sewage treatment plant utilises the wind and natural chimney-draft to draw the air through the plant. No electricity required. The natural fibre is self-cleansing and works with nature, not against it.

The average sewage treatment plant takes 2-6 weeks to work properly. Basically, sewage (or wastewater) needs to be flowing through the treatment plant for a few weeks before the bacteria can establish themselves. The Biorock® system however is fully functional in just 24 hours – and will

continue to function even after several months without use. This is because the Biorock® natural fibre material is preseeded with numerous strains of enzymes and bacteria which speed up the processes. This has enormous benefit for systems that experience periodic or seasonal use as nearly all conventional systems will fail to meet their discharge consent standards for several weeks or months when occupation resumes.

The Biorock® system will produce effluent to a 4:3:3 effluent standard (BOD 4mg/l, TSS 3mg/l, NH3 3mg/l). The typical worldwide standard is 20:30:20. This means that the final effluent from a Biorock® sewage treatment plant is four times as clean as the minimum standard. Most packaged plants commercially available in Africa don't even meet the minimum standard. The final effluent will be reused for irrigation and will be further treated (to reduce ammonia to under 6mg/l) and sterilised.

3.2 Requirements for operation of the Biobox

3.2.1 Physical

For the effective operation of Biobox system the following elements are critical:

- The ability to locate the unit close to or adjacent to the house. Soil should be of a nature to allow a suitable sized hole to be excavated for the system as well as to allow the laying of pipework to allow the system to be gravity fed

3.2.2 Legal

As a minimum the following legal parameters must be met:

- The discharge of domestic wastewater into a watercourse is contemplated in Schedule 3 of the General Authorisation issued under the National Water Act (36 of 1998). The general Authorisation in regard of this activity is not applicable in catchments B11 and B12. Since the site falls within these catchments, a licence application will be required to discharge treated effluent into a watercourse.
- The release of effluent in a manner which may detrimentally impact on a water resource is contemplated in Schedule 4 of the General Authorisation issued under the National Water Act (36 of 1998). The release of effluent into a soakaway is covered in this schedule. The applicability of the general authorisation must be established. The disposal of wastewater must be registered with DWAF if the quantity of wastewater exceeds 50 000l per day.
- National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977) for construction, operation and maintenance of any structure used for the collection, treatment or disposal of waste.
- SABS 0400-1990
- MoU or service agreement from the municipal sewerage treatment works confirming capacity and willingness to accept waste.

3.3 Advantages/Disadvantages of the system in the context of this development

Table 34: Advantages/Disadvantages of Prefabricated treatment plants – Biobox type system.

Advantages/Positive	Disadvantage/Negative
Completely silent operation as there are no pumps, motors or compressors.	High initial outlay cost
A small lid, flush with the ground ensures no visual obtrusion. No compressor, blower or pump, so no above-ground kiosk.	
Minimum Annual Maintenance - The maintenance on a Biorock® is lower than any of its rivals, saving money and reducing carbon emissions.	
No Electricity Required - The Biorock® relies on gravity and natural air flow to work. This is a significant monthly saving even on small single house sewage plants	
Long Desludge Interval - The primary tank only requires a desludge every 3-5 years, cutting running cost substantially.	
No Concrete Required - The Biorock® requires no concrete for the installation (depending on ground conditions); saving you money as no concrete plinth is needed to install the unit.	
No Moving Parts - No pumps, blowers or other equipment is used in the sewage treatment plant.	
Solar Power Friendly - Where a pumped outlet is required, the Biorock® uses a tiny low-voltage pump which can comfortably operate on SOLAR POWER - not mains electricity!	
Biorock® sewage treatment plants also use biological treatment processes. The Biorock® treatment philosophy enhances and combines the principles of pre-separation (used in a septic tank) and aerobic biological filtration. The treated effluent from this system exceeds most water-discharge standards and surpasses the highest regulations and norms, including the	

criteria for several prestigious certifications.	

3.4 Evaluation of suitability of technology

This system offers on-site sanitation with a very low risk of groundwater contamination. In this regard it appears to be superior to alternative 1 and 2.

The system has low space requirement and is not constrained in its placement. Further to this only one system is required. This greatly reduces the physical footprint and allows the system to be optimally placed to reduce risk of groundwater contamination.

The ability to place the unit close to the house reduces the impact of excavation and trenching.

The system is also not reliant on regular maintenance of vehicle access.

5 Evaluation matrix for alternatives identified:

For the purpose of evaluation of alternative options, a weighting matrix was utilised to compare the various components of each alternative.

Impacts are rated on a scale of 1 to 10, with 1 being very low impact/cost and 10 being very severe impact/cost. Impacts are considered without mitigation. The lowest total score defines the preferred alternative.

Weightings are assigned to impacts to account for the significance of the different impacts. Impacts that are short-term in their nature are weighted less heavily than long term impacts. It is significant to note that the primary factor in the consideration of sanitation alternatives is the risk of ground water contamination. This impact is highly significant and has a weighting of 5 assigned to it. A high risk of ground water contamination can be viewed as a ‘fatal flaw’ to the extent that that alternative should be excluded, or only contemplated where the risk can be reduced to ‘low’.

Table 35: Evaluation matrix for sewerage treatment alternatives identified

		Septic tank and soakaway		Conservancy tank and grey water soakaway		Prefabricated onsite treatment plant	
Criterion	Factor weighting	Score	Weighted score	Score	Weighted score	Score	Weighted score
Installation cost	1	2	2	3	3	8	8
Risk of Groundwater contamination	5	8	40	4	20	2	10
Installation impact (trenching, blasting and earthworks)	1	7	7	7	7	5	5
Footprint area	2	7	14	7	14	5	10
Operational cost	2	1	2	8	16	5	10
Total Score		25	65	29	60	25	43
			□		□		□□

6 Recommendation:

Based on the above evaluation of alternatives, it is recommended that the development consider the use of alternative 3. *Alternatives 1& 2 – Septic tank systems* and *Conservancy systems with soakaways* are not viewed as an acceptable alternative for the development as a whole. Septic tank systems and any systems with soakaways should only be considered where the risk of groundwater contamination can be shown to be low.

Alternative 3 is the preferred alternative; however, it is recommended that prefabricated treatment plant must be monitored in line with the requirements of DWAF and other compliance organisations.

Based on an assessment of the available information and applicable guidelines, standards and legislation the EAP recommends that alternative 3 be installed. The final design must take cognisance of all recommendations and adherence to guidelines, standards and legislation must be ensured though regular monitoring.

ANNEXURE C: Curriculum Vitae of EAP.

Curriculum Vitae
Steven James Henwood

General:

Name:	Steve Henwood
Address:	PO Box 12340, Steiltes, Nelspruit, 1213
ID Number:	760927 5026 087
Telephone No.:	082 455 0731 or 078 672 3645
Email:	shenwood@mweb.co.za
D.O.B.:	27 Sep 1976
Marital Status:	Married
Gender:	Male
Dependants:	One
Drivers Licence:	Code 10
Home Language:	English
Second Language:	Afrikaans
Third Language:	Shangaan (can converse basically in Zulu)
Health:	Excellent
Criminal Offences:	None

Education:

Secondary Education:

School:	St Martins High School, Rosettenville, JHB (1989 – 1994)
Highest Standard Passed:	Matric – Senior Certificate

Teritary Education:

Institution:	Pretoria Technikon (1995 – 1997)
Course:	National Diploma in Nature Conservation

Other Qualifications:

Environmental Impact Assessment – Rhodes University and CES Environmental Consultants

GIS (Introduction to Geographic Information Systems) – South African Wildlife College - Conduct and plan an assessment (Theta)

FGASA level 3 SKS dangerous animals.

Advanced weapon handling through Adriaan Louw.

First Aid level 1 – St Johns and Save a Life First Aid Services.

Basic fire fighting and prevention certificate - Waldens Fire and Safety Services.

The Touch Company - Hospitality training - Interpersonal sales and service skills course.

Work Experience: **(From the most recent position)**

April 2011 to date	**Henwood Environmental Solutions, Nelspruit**
Position:	Director and Environmental consultant
Duties:	Drafting BA and EIR reports
	Environmental Planning
	Environmental Management
	Tourism Planning
	Consult on various projects
	Water & sewer pipelines
	ECO projects
	Mapping
	Visual Impact Assessments
Jan 2008 to April 2011	**Velcich & Louw Landscape Architects, Nelspruit**
Position:	Environmental consultant
Duties:	Drafting BA and EIR reports
	Environmental Planning
	Environmental Management
	Tourism Planning
	Consult on various projects
	Water & sewer pipelines
	ECO projects
	Mapping
	Visual Impact Assessments
Dec 2007 – Jan 2008	**Ninham Shand, Nelspruit**
Position:	Environmental consultant
Duties:	Drafting BA and EIR reports
	Consult on various projects
	Water & sewer pipelines
	Game lodge development
	Shopping centre development
	Non-compliance (24G)
	Residential development
	Advertising signage
	Borrow pits and rehabilitation
	School development
Nov 2006 – Dec 2007	**Ecotechnik Environmental Consultants, Nelspruit (Company bought by Ninham Shand in Dec 2007)**
Position:	Environmental consultant
Duties:	Drafting BA and EIR reports
	Consult on various projects
	Water & sewer pipelines
	Game lodge development
	Shopping centre development
	Non-compliance (24G)

	Residential development Advertising signage Borrow pits and rehabilitation School development
Jul 2006 – Oct 2006	**Makweti Safari Lodge, Welgevonden Game Reserve** 10 bedded 5* safari lodge
Position:	Camp Management Couple
Duties:	Management of all aspects of the camp Acting as host to guests Supervising general daily running of the lodge Responsible for ensure high standards in all departments Game drives and walks Ensure vehicles are maintained and in good order Maintain fire breaks surrounding the lodge Check equipment is in good order Ensure rifles are kept in good condition and ensure control over rifle registers Assist with administration Liaise with other lodges Head Rangers with regards to game drive procedures and problems
May 2004 – Jul 2006	**Honeyguide Tented Safari Camps, Manyeleti Game Reserve** Two 24 bedded 4* tented safari camps situated in the Manyeleti Game Reserve
Position:	Lodge Management Couple
Duties:	Management of all aspects of two tented safari camps Acting as host to guests Supervising general daily running of the lodge Recruitment and training of new staff Responsible for ensure high standards in all departments Game drives and walks Ensure vehicles are maintained and in good order Supervision of rangers and trackers Check equipment is in good order Maintain working rosters for rangers and trackers Ensure rifles are kept in good condition and ensure control over rifle registers Prepare month end statistic reports Ensure petrol and diesel log books are kept up to date Liaise with other lodges Head Rangers with regards to game drive procedures and problems

Jul 2002 – Jan 2004	**Lukimbi Safari Lodge, KNP** 32 bedded 5* game lodge, a concession situated in the Southern Kruger National Park
Position:	Head Ranger
Duties:	As below Ranger and tracker training Road building Environmental liaising between KNP, DEAT and lodge
Dec 1998 – Jun 2002	**Idube Game Lodge, Sabi Sands Game Reserve** 20 bedded 4* game lodge situated in the North West section of the Sabi Sands Game Reserve
Position:	Field Guide (Dec 1998 - Jul 2000) Head Ranger (Aug 2000 – Jun 2002)
Duties:	Game drives and walks Ensure vehicles are maintained and in good order Supervision of rangers and trackers Check equipment is in good order Maintain working rosters for rangers and trackers Ensure rifles are kept in good condition and ensure control over rifle registers Prepare month end statistic reports Ensure petrol and diesel log books are kept up to date Liaise with other lodges Head Rangers with regards to game drive procedures and problems Ensure that the bush is not abused by off road driving Responsible for maintenance of roads Responsible for necessary bush work, Environmental Management Back-up for the manger while he was on leave Drawing up policies for emergency procedures
Dec 1996 – Dec 1997	**Crocodile Bridge, Kruger National Park**
Position:	Student Field Guide for experiential training
Experience gained:	Game capture with Dr. Douw Grobler Monitoring 'elephant contraception' (tracking and collecting data, problem animal control) Veld evaluations (Grass surveys for KNP, veld assessment and carrying capacity for a number of game areas) Controlled burning Day and night drives Bush braais General information and interpretive services Foot and vehicle patrols (anti-poaching, water points etc.)

Technikon Vacations:	**Mountain Sanctuary Park**
Position:	Student Ranger
Duties:	Control block burns Service maintenance and use of chainsaws Maintenance of centrifugal pumps Maintenance and monitoring of game fences
Technikon Vacation:	**Matetsi Private Game Reserve (Conservation Corporation), Zimbabwe**
Position:	Student Ecologist
Duties:	Involved in replenishing borehole pumps Anti poaching patrols Maintenance of roads and other general field work
Technikon Vacations	**Makro, Woodmead**
Position:	Casual
Duties:	Performed duties in the accounts department

Developed Abilities:

Computer Knowledge**:**	Microsoft Office Fagawi (GIS System) Arcview (GIS System) Global Mapper Photoshop CS Corel Draw Garmin Map Source

Hobbies and Interests:

Art – Painting and drawing
Photography
Reading
Hiking
Bird watching
Geology
Running
Hockey
Cricket
Soccer

References:

Ecotechnik and Ninham Shand	Iain Garratt Email: iain.garratt@af.aurecongroup.com	084 514 9169

Lukimbi Safari Lodge and Idube Game Lodge

	Marilyn & Louis Marais (Owners)	011 869 9115
	Email: positive@global.co.za	
	Sally Kernick (Owner)	011 431 1120
	Email: iduberes@global.co.za	

ANNEXURE D: Declaration by EAP.

10.2 The Environmental Assessment Practitioner (EAP)

I ……, as the appointed environmental assessment practitioner ("EAP") hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent (tick which is applicable):

	other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or

	am not independent, but another EAP that is independent and meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review EAP must be submitted);

- have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- will ensure compliance with the EIA Regulations 2014;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application;
- will take into account, to the extent possible, the matters listed in regulation **18** of the regulations when preparing the application and any report, plan or document relating to the application;
- will disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority or the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority (unless access to that information is protected by law, in which case I will indicate that such protected information exists and is only provided to the competent authority);
- will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- declare that all the particulars furnished by me in this form are true and correct;
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).

_____

Signature of the environmental assessment practitioner

_____

Name of company

_____

Date