ENVIRONMENTAL MANAGEMENT PROGRAMME

ST PATRICK'S HOSPITAL WASTE WATER TREATMENT WORKS

Prepared for:	Prepared by:
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1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT TEAM

According to regulation 33 of GN R 543, an environmental management programme must include:

(a) details of –

(i) the person who prepared the environmental management programme; and

(ii) the expertise of that person to prepare an environmental management

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Project Team:

- Dr Alan Carter
- Dr Greer Hawley
- Dr Cherie-Lynn Mack
- Mr Lungisa Bosman
- Ms Daisy Kotsedi

Coastal & Environmental Services (CES) was established in 1990, and is a specialist environmental consulting company. We believe that a balance between development and environmental protection can be achieved by skilful, considerate and careful planning.

CES has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, and state of environment reporting (SOER), Integrated Waste Management Plans (IWMP), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. CES has been active in all of the above fields, and in so doing has made a positive contribution to towards environmental management and sustainable development in the Eastern Cape, South Africa and many other African countries.

Dr Alan Carter, Director of the East London office, has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants and holds a PhD in Plant Sciences, focusing on marine algae. He is also a certified ISO14001 EMS auditor with the American National Standards Institute and the British Standards Institute. Alan is registered with SACNASP as a Professional Natural Scientist and with Environmental Assessment Practitioners of South Africa (EAPSA) as an environmental practitioner. Alan has participated in the development of the Coastal Management Act and has extensive knowledge and experience with projects on the Wild Coast. Alan will be responsible for the review of all report writing.

The South African Council for Natural Scientific Professions
certifies in terms of section 20(3)(a) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), that

Dr A R Carter

is registered as a Professional Natural Scientist, Reg. no **400332/04**

in the following field(s) of practice:

Environmental Science

Expiry Date: **31 May 2013**

SACNASP

The Interim Certification Board
for
Environmental Assessment Practitioners
of
South Africa

Alan Robert Carter

was certified as an

ENVIRONMENTAL ASSESSMENT PRACTITIONER

on this 1st day of March 2012

Chairperson

Secretary

Dr Greer Hawley, Principal Environmental Consultant, has a BSc degree in Botany and Zoology and a BSc Honours in Botany from the University of Cape Town. She has a PhD in Microbiology from Rhodes University. Greer has been involved in a number of diverse activities. Her core academic focus is in the field of taxonomy both in the plant and fungal kingdoms. The theory of taxonomy and phylogenetic analysis has been applied to further knowledge of species identification and understanding of biodiversity in South Africa. Greer's research ranges from

studying fresh and marine algae (phycology), estuarine diatoms, abalone probiotics. Greer continues to develop her skills in the Botany and Microbiology. She is currently working on numerous impact assessments at the East London branch. Greer will be the project leader overseeing the EIA process and responsible for internal review of reports.

Dr Cherie-Lynn Mack, Senior Environmental Consultant, holds a PhD and MSc (with distinction) degrees in Environmental Biotechnology, with a BSc degree in Microbiology and Biochemistry. She has postgraduate research experience in industrial and domestic wastewater treatment technologies, with particular emphasis on the coal and platinum mining industries. Her interests lie in the water sector, with experience in ecological reserve determination and water quality monitoring and analysis. She has experience in water quality analysis and industrial wastewater treatment research. She is currently employed in the East London office of CES.

Mr Lungisa Bosman, Senior Environmental Consultant, holds a Bachelor of Social Science from UCT, with majors in Public Administration & Sociology, and a Post Graduate Diploma in Organisation and Management. Over the past years Lungisa has gained considerable experience in social facilitation and community education. He is currently working as a consultant for CES at the Grahamstown branch and is involved in a number Environmental Impact Assessments (EIAs), research and public participation.

Ms Daisy Kotsedi, Environmental Consultant, has a BSc in Botany and Microbiology and a BSc Honours both from Nelson Mandela Metropolitan University in Port Elizabeth. She holds an MSc degree in Botany from Nelson Mandela Metropolitan University. Her research focused on the effects of environmental factors on microalgal biomass and community composition in the Sundays River Estuary. Daisy worked at World Wide Fund for Nature (WWF-SA) as an intern in the freshwater unit for a year before joining CES.

2 INTRODUCTION

2.1 Objectives of an EMPr

The EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction of a waste water treatment works (WWTW) as well as to ensure that all relevant factors are considered to ensure for environmentally responsible development. The purpose of the EMPr is to provide specifications for "good environmental practice" for application during construction.

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

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

The objectives of an EMPr are to:

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

2.2 Structure and Function of an EMPr

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

As such the EMPr provides specifications that must be adhered to, in order to minimise adverse environmental impacts associated with the operations of the sanitation facility. The content of the EMPr is consistent with the requirements as set out in Regulation 33 of the EIA regulations stated below, for the construction and operation phases.

According to regulation 33 of GN R 543, an environmental management programme must include:

(a) details of –

(i) the person who prepared the environmental management programme; and

(ii) the expertise of that person to prepare an environmental management programme;

(b) information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –

(i) planning and design;

(ii) pre-construction and construction activities;

(iii) operation or undertaking of the activity;

(iv) rehabilitation of the environment; and

(v) closure, where relevant.

(c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme;

(d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);

(e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;

(f) As far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally acceptable principle of sustainable development, including, where appropriate, concurrent or progressive or progressive rehabilitation measures;

(g) A description of the manner in which it intends to –

(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
(ii) remedy the cause of pollution or degradation and migration of pollutants;
(iii) comply with any prescribed environmental management standards or practices:
(iv) comply with any applicable provisions of the Act regarding closure where applicable;
(v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

(h) Time periods within which the measures contemplated in the draft environmental management programme must be implemented;

(i) The process for managing any environmental damage, pollution and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;

(j) An environmental awareness plan describing the manner in which –

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and
(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;

(k) Where appropriate, closure plans, including closure objectives

2.3 Legal requirements

LEGISLATION	SECTION	IMPLICATION
The Constitution (Act No. 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental right.
	Section 25	Rights in property.
National Environmental Management Act (No. 107 of 1998)	Section 2	Defines the strategic environmental management goals and objectives of the government. Applies throughout the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24(a) &(d) &24(5)	Listed activities and Regulations.
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
National Heritage Resources Act (No. 25 of 1999)		Provides general principles for governing heritage resources management throughout South Africa including national and provincial heritage sites, burial grounds and graves; archaeological and palaeontological sites, and public monuments and memorials.
National Environmental Management: Air Quality Act (No. 39 of 2004)	Sections 26-27	Control of fuels.
	Section 32	Control of dust.
National Environmental Management: Waste Act (No 59 of 2008)	Section 23	The requirement of a Waste management licence.
National Water Act (No. 36 of 1998)	Section 2, Section 12-20	- The responsible person is accountable for taking reasonable measures to prevent pollution of water resources that it owns, controls occupies or uses the land in question. - The responsible person is required to remedy situation where pollution of a water resource occurs following emergency incident and where it is responsible for the incident or owns or is in control of the substance involved. - The responsible person must report any incidents to: - The Department. - SA Police Service - Relevant catchment management agency. - The responsible person must take all reasonable measures to minimise the impacts of the incident, undertake clean-up procedures, remedy the effects of the incident and take measures as directed by the catchment agency.
Public Access to Information Act (No. 2 of 2000)		The public as well as landowners should be informed timeously of construction processes and activities that many potentially affect them.

2.4 Environmental Authorisation

The relevant listed activities in terms of Government Notice R718 are summarised below (Table 2.1).

Table 2.1: Relevant listed activities in terms of NEM Waste Act activities (2008).

Number of the relevant notice	Activity No (s) (in terms of the relevant notice)	Listed Activity
718, 2009	A (19)	The expansion of facilities which requires an amendment of an existing permit or license or a new permit or license in terms of legislation governing the release of pollution, effluent or waste.
718, 2009	A (20)	Decommissioning of activities in Category A.
718, 2009	B (7)	The treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000 cubic metres or more.
718, 2009	B (11)	The construction of facilities for activities listed in Category B.

3 PROPOSED ACTIVITY

According to regulation 33 of GN R 543, an environmental management programme must include:

(c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme;

3.1 Description of proposed activity

Mbizana Local Municipality consists of 246 156 people and St Patrick's Hospital is one of two hospitals servicing the municipal area. The hospital is currently expanding to include a nursing college and additional hospital services, which is encroaching on the existing sewage oxidation ponds.

The proposed project aims to move the existing waste water treatment works (WWTW) to accommodate the increased hospital services and training college at St Patrick's Hospital. The existing WWTW consist of 5 ponds that have been recently plastic lined and have a capacity of 96.4 kl/day (Figure 3.1). The proposed new WWTW will include the construction of new oxidation ponds and bio-filter immediately adjacent to the existing ponds, transferring the sludge and effluent from the existing ponds into the new works, then decommission the existing ponds. The new WWTW will be designed to a capacity of 0.1 Mℓ/day.

Figure 3.1: Locality of the existing and proposed new WWTW facility for St Patrick's Hospital. The site for the new WWTW is indicated by the white oval on the right of the existing oxidation ponds.

The WWTW requires environmental authorization from the National Department of Environmental Affairs, in accordance with the EIA Regulations (2010), published in the National Environmental Management Act (No. 107 of 1998).

4 SCOPE OF THE EMPR

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

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

4.1 Layout of the EMPr

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

4.1.1 Planning and Design Phase

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

4.1.2 Construction Phase

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

4.1.3 Operational and Maintenance Phase

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

5 ROLES AND RESPONSIBILITIES

5.1 PROJECT COORDINATOR

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

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

5.2 Environmental Control Officer (ECO)

For the purposes of implementing the conditions contained herein, The Department of Health shall appoint an ECO for the contract. The ECO shall be the responsible person for ensuring that the provisions of the EMPr as well as the environmental authorisation are complied with during the construction period. The ECO's duties in this regard will include, inter alia, the following:

- Conduct regular site visits to be able to report on and respond to any environmental issues;
- Report compliance and non-compliance issues to the municipal representative and authorities as applicable;
- Advise the Contractor on environmental issues within the defined work areas;
- Review access and incident records that may pertain to the environment and reconcile the entries with the observations made during site inspection, monitoring and auditing;
- Recommend corrective action when required for aspects of non-compliance with the EMPr;
- Take immediate action on site where clearly defined and agreed "no-go" areas are violated or in danger of being violated and to inform a Department of Health representative of the occurrence immediately and to take action;
- Be contactable by the public regarding matters of environmental concern as they relate to the operation of the works; and
- Take immediate action on site when prescriptive conditions are violated, or in danger of being violated and to inform the Department of Health representative of the occurrence and action taken.

5.3 Contractor

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

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

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

6 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

According to regulation 33 of GN R 543, an environmental management programme must include:

(b) information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –

(i) planning and design;
(ii) pre-operations and operations activities;
(iii) operation or undertaking of the activity;
(iv) rehabilitation of the environment; and
(v) closure, where relevant.

(f) As far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally acceptable principle of sustainable development, including, where appropriate, concurrent or progressive or progressive rehabilitation measures;

(g) A description of the manner in which it intends to –

(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
(ii) remedy the cause of pollution or degradation and migration of pollutants;
(iii) comply with any prescribed environmental management standards or practices:
(iv) comply with any applicable provisions of the Act regarding closure where applicable;
(v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

6.1 Planning and Design Phase (Construction of a new WWTW adjacent to the existing WWTW)

6.1.1 Project Specific Management targets

RISK	MITIGATION MEASURES
Design capacity and stormwater ingress	• The design of waste stabilisation ponds incorporates a significant free-board volume, which should compensate for most storm events. • Ensure that adequately lined drainage is in place around the outside of the ponds to ensure that any overflow is diverted back to the head of the WWTW. • Stormwater diversion berms should be incorporated into the site design.
Technology employed	• Pro-active environmental management measures must be undertaken in the planning phase to minimise the likelihood of such impacts taking place during the construction and operational phases. However, contingency plans (EMPr, conditions of the Authorisation, etc.) must be employed to further limit the potential impacts. • Regular site inspection and critical observation of the ponds is recommended to ensure that possible leaks are identified and that environmental conditions have not impacted on the operation of the WWTW, e.g. wind blowing litter into the oxidation ponds, excessive rain causing ponds to overtop, etc. On-site operating staff MUST be trained

RISK	MITIGATION MEASURES
	and certified by the relevant authorities.
Risks associated with infrastructure	• The sewerage pipes must be tested for defects and leaks before the trenches are closed. • Technically appropriate and SABS approved sewer material must be used.
Disposal of screenings	• Screened material must be dried and contained in a bunded area before disposal to a licensed waste disposal facility. • Ensure suitable drying area is included into the site design.
Management and on-going maintenance	• Regular site inspection and critical observation of the ponds is recommended to ensure that possible leaks are identified and that environmental conditions have not impacted on the operation of the WWTW, e.g. wind blowing litter into the oxidation ponds, excessive rain causing ponds to overtop, etc.
Location of ponds	• The existing ponds will be decommissioned and new hospital buildings constructed on this site. The proposed new WWTW will be situated further from Hope Street and Bizana Senior Secondary School than the existing ponds. • Regular maintenance and inspection of the site is recommended to ensure that possible issues are identified early and appropriate corrective measures carry out. Secure fencing and access control to WWTW to prevent tampering by unauthorized persons.
Land values	• No mitigation required as the new location could improve the aesthetics of residents on Hope Street.

6.2 Construction Phase (Construction of a new WWTW adjacent to the existing WWTW)

6.2.1 General Management targets

ACTIVITY	COMPLIANCE SPECIFICATION
Site Establishment	• The contractor shall establish his construction camps, offices, workshops and any other infrastructure in previously impacted areas and in a manner that does not adversely affect the environment. • The contractor shall submit a method statement for site clearance for approval by the Project Coordinator in consultation with the ECO. • The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction activities to the satisfaction of the Project Coordinator. Ablution facilities shall be within 100m from workplaces but not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce. • Safe drinking water for human consumption shall be available at the site offices and at other convenient locations on site. • No fires will be allowed outside of the construction camp. Activities which may pose a risk of fire must be identified and suitable measures must be

ACTIVITY	COMPLIANCE SPECIFICATION
	put in place to prevent any possible damage by fire. Fire fighting equipment shall be supplied by the Contractor at suitable locations. • The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a municipal registered landfill. Under no circumstances may solid waste be burnt on site.
Site Clearing	• The area to be cleared must be clearly demarcated and this footprint strictly maintained. • Soil that is removed from the site must be removed to an approved soil site or municipal licensed landfill site. • Erosion control measures must be implemented in areas where these risks are more prevalent. These include wetlands and steep areas. • Topsoil from the Right of Way must be neatly stockpiled adjacent to the excavations ready for backfill when required. • The Contractor shall ensure that all work is undertaken in a manner which minimises the impact on vegetation outside the immediate area of the Works.
Environmental training	• Ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include; o What is meant by "Environment" o Why the environment needs to be protected and conserved o How construction activities can impact on the environment o What can be done to mitigate against such impacts o Awareness of emergency and spills response provisions o Social responsibility during construction of the sewage treatment facility and the installation of the reticulation system e.g. being considerate to local residents • The need for a "clean site" policy also needs to be explained to the workers.
Soil Impacts	**Topsoil** • The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprint, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. • Care must be taken not to mix topsoil and subsoil during stripping. • Polluted topsoil must be disposed of at a licensed landfill site. **Soil Stripping** • No soil stripping must take place on areas within the site that the contractor does not require for construction works, or on areas of retained vegetation. • Subsoil and overburden should, in all construction and lay down areas, be stockpiled separately to be returned for backfilling in the correct soil horizon order. • Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes. **Stockpiles** • Stockpiles should not be situated such that they obstruct natural water pathways and drainage channels. • Stockpiles should not exceed 2m in height. • If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth.

ACTIVITY	COMPLIANCE SPECIFICATION
	Fuel storage • Topsoil and subsoil should be protected from contamination. • Cement, concrete and chemicals must be mixed on an impermeable surface and provisions should be made to contain spillages or overflows into the soil. Mixed cement/concrete must not be allowed to get into the storm water system or any rivers, streams, wetlands or existing erosion channels / dongas. • Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. • Contaminated soil must be contained and disposed of offsite at an approved landfill site.
Erosion	• Wind screening and stormwater control should be undertaken to prevent soil loss from the site. • All erosion control mechanisms need to be regularly maintained. • Retention of vegetation where possible to avoid soil erosion. • Re-vegetation of disturbed surfaces should occur immediately after the construction activities are completed.
Air Quality	**Dust control** • Damping down of un-surfaced and un-vegetated areas during dusty periods is required. • Retention of vegetation where possible will reduce dust travel. • Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. • The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the residents of Bizana or neighbouring communities. • A speed limit of 30km/h must not be exceeded on dirt roads (if any). • Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. **Emissions control** • Regular servicing of vehicles in order to limit gaseous emissions (to be done off-site). • Regular servicing of on-site toilets to avoid potential odours. • Allocated cooking areas must be provided. **Fire prevention** • All cooking shall be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • The Contractor shall have operational fire-fighting equipment available on site at all times. The level of fire fighting equipment must be assessed and evaluated thorough a typical risk assessment process. It may be required to increase the level of protection, especially during the winter months.
Water Quality	**Sanitation** • Adequate sanitary and ablutions facilities must be provided for construction workers. • The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.

ACTIVITY	COMPLIANCE SPECIFICATION
	Hazardous materials • Use and/or storage of materials, fuels and chemicals which could potentially leak into the ground must be controlled in a manner that prevents such occurrences. • All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. • The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential high runoff stormwater events. • Any hazardous substances must be stored at least 100m from any of the water bodies on site. • Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility. **Water resources** • Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities. • Municipal water (or another source approved by the ECO) should be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. • Compaction of backfilled material must attain low soil permeability. • Site design and operation must that surface/storm water is diverted away from excavation trenches. • Backfilling of trenches must be done in such a way that water ponding and erosion of the backfilled trench are avoided. **Stormwater** • The site must be managed in a manner that prevents pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Temporary cut-off drains and berms may be required to capture stormwater and promote infiltration. • Hazardous substances must be stored at least 100m away from any water bodies on site to avoid pollution.
Noise	• Construction site yards, workshops, and other noisy fixed facilities should be located well away from noise sensitive areas. • Heavy vehicle traffic should be routed away from noise sensitive areas, where possible. • Blasting operations (if required) are to be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day should be limited, blasting should be undertaken at the same times each day and no blasting may be allowed at night. • Noisy activities should take place during allocated construction hours only as per section 25 of the Noise Control Regulations of the Environment Conservation Act, 1989 (No. 73 of 1989). • The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance.
Biodiversity	• During construction activities wherever possible work should be restricted

ACTIVITY	COMPLIANCE SPECIFICATION
	to one area at a time. This will give smaller birds, mammals, reptiles and amphibians an opportunity to move into undisturbed areas close to their natural habitat. The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase. • No further vegetation clearance except for the removal of alien invasive species. • Vehicle access to the servitude of the sanitation system must as far as possible be limited to existing roads.
Waste Management	**Construction rubble** • Construction rubble shall be disposed of in demarcated spoil dumps that have been approved by the Mbizana Municipality. • Sufficient waste bins must be provided at the construction site for different types of waste disposal and for recycling purposes. • Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. • Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. • All waste must be removed from the site and transported to a landfill site as approved by the Mbizana Municipality. **Hazardous waste** • All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site. • Machinery must be properly maintained to keep oil leaks in check. **Remedial actions** • Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. • The ECO must determine the precise method of treatment of polluted soil. • This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. • If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent materials. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.
Security	• No person shall enter the site unless authorised to do so by the contractor, Project Coordinator and ECO. • The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site
Social Environment	• A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This register is to be tabled during monthly site meetings. • Where possible unskilled job opportunities should be afforded to local community members.
Cultural and Heritage Artefacts	• South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area and mitigation measures recommended by SAHRA should be followed. • The contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken.

ACTIVITY	COMPLIANCE SPECIFICATION
	• Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. • Permits shall be obtained from the South African Heritage Resources Agency.
Rehabilitation	**Rehabilitation** • Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately after the installation of the new towers to prevent further soil erosion. • Re-seeding shall be done on disturbed areas as directed by the ECO. • Existing access roads should be left 'as is' for future use during maintenance operations; • Final inspection in order to ensure adherence to EMPr guidelines, completion of localised/ remaining areas of impact, monitoring of rehabilitation success, etc.

6.3 Operational Phase (Construction of a new WWTW adjacent to the existing WWTW)

6.3.1 Project Specific Management targets

RISK	MITIGATION MEASURES
Above ground (surface water) contamination due to poor maintenance	• Effluent quality must, as a minimum, be analysed monthly for the first two years and thereafter monitored bimonthly (every two months). • Deep green vegetation indicative of nutrient enrichment or shift in plant species composition (to reeds) in the vicinity of the WSP MUST be investigated in order to ensure that it is not a result of nutrient-rich effluent leaking from the treatment works. • Appropriate corrective actions must be taken if contamination is detected or effluent quality does not meet discharge standards. • The sewerage pipes must be tested for defects and leaks before the trenches are closed. • Ground water monitoring holes must be tested for potential sewage leakages.
Waste management	• Stabilized sewage sludge must be disposed of in accordance with the Guideline for Permissible Utilisation and Disposal of Wastewater Sludge Volume 3: Requirements for the on-site and off-site disposal of sludge (2009). • Stabilized sludge must be transported to the nearest registered landfill, unless a more beneficial use can be found. • The sludge ponds must be lined with an impermeable material to prevent soil and groundwater contamination. • Screens must be checked and cleared regularly and the site kept in a tidy state. Ensure that screenings are removed from the grid and dried, placed into the trench and limed on a daily basis. • The relevant staff responsible for solid waste disposal must be trained and must conduct solid waste disposal tasks daily.
Release of non-compliant effluent	• Regular inspection of the site is recommended to ensure that possible leaks are identified. • Effluent quality must be monitored by an accredited laboratory. Green

RISK	MITIGATION MEASURES
	Drop status standards and guidelines must be achieved. • No treated effluent may be discharged into any water course and must only be utilised for irrigation. • The facility must be consistently monitored of leakage and resultant contamination of ground water.
Health risks to employees	• Employees must undergo training in Health and Safety of a WWTW in order to minimise the likelihood and severity or this impact.
Foul odours and pest management	• Correct operation of the waste water treatment works would mitigate this impact. When sulphurous odours are detectable, this is normally the first indication that the works are not functioning optimally. The source of odour should be investigated immediately and appropriate corrective measures taken. • If offensive odours arise, the source should be investigated immediately and appropriate corrective measures taken. • Ensure that screenings are correctly and securely kept prior to disposal.
Operational skills capacity	• The applicant must implement extensive training for all employees and staff on the operation and maintenance of the treatment facility. • An annual audit on the training expertise of the staff needs to be undertaken in order to assess whether further training is necessary.
Operational budget	• Provide adequate operational and maintenance budget.
Contamination of surface and ground water sources	• Educational programmes on the risks and management of effluent irrigation and utilisation must be rolled out to the community and local authorities and operators. The community must also be educated on the agricultural activities that can and cannot be undertaken on the irrigated land.
Risks to human health and livestock due to irrigation with treated effluent	• The utilisation of effluent from the WWTW in St Patrick's Hospital must comply with the DWA Guidelines for Permissible utilisation and disposal of treated sewage effluent (1978) that allows the following uses for an oxidation pond system (with associated conditions): - Crops for human consumption which are NOT eaten raw - Cultivation of cut flowers - Fruit trees and vineyards - Grazing for cattle (excluding milk producing animals) - Crops not for grazing, but utilised as dry fodder.

6.4 Decommissioning of the existing St Patrick's Hospital WWTW

RISK	MITIGATION MEASURES
Sludge drying	• All areas used for sludge drying MUST be suitably bunded to prevent leachate from entering the surrounding environment. • A portion of sludge from the existing WWTW may be transferred to the new WWTW in order to serve as a microbial "starter" culture in the anaerobic ponds. • Leachate must be evaporated or diverted back into the new WWTW for

RISK	MITIGATION MEASURES
	treatment. • Dispose of sludge in a licensed landfill site.
Sludge stabilization	• Sludge MUST be appropriately stabilized using one of the methods described in the Guideline for Permissible Utilisation and Disposal of Wastewater Sludge Volume 3: Requirements for the on-site and off-site disposal of sludge (2009) prior to disposal.
High methane risk	• The treatment works MUST be upgraded to avoid this. • Cease using existing ponds. • Identify a safe method to extract methane.
Liner disposal	• Liner MUST be left to dry out properly before removal. A minimum of 30 consecutive dry weather days is suggested. • If drying is not possible, liners can be rinsed with a mild bleach solution and left to dry until all residual liquid has evaporated and then disposed of in a licensed landfill site.
Soil erosion	• Unlined excavations MUST be filled in as soon as possible.
Health hazards for construction workers	• Ensure all staff are adequately trained to handle hazardous material. • Construction workers must wear protective gear in line with Health and Safety regulations.

7 ENVIRONMENTAL MONITORING

A monitoring programme will be implemented for the duration of the construction and operation of the St Patrick's Hospital WWTW. This programme will include:

- Establishing a baseline of pre-construction site conditions validated with photographic evidence.
- Bi-weekly (fortnightly) monitoring during the first month of construction, where-after monthly audits will be conducted by an independent ECO for the remainder of the construction phase to ensure compliance to the EMPr conditions, and where necessary make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Coordinator.
- Compilation of an audit report with a rating of compliance with the EMPr. The ECO shall keep a photographic record of any damage to areas outside the demarcated site and construction area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the community. All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

8 ENVIRONMENTAL AWARENESS

According to regulation 33 of GN R 543, an environmental management programme must include:

(j) An environmental awareness plan describing the manner in which –

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained with regard to the implementation of the EMPr, as well as regarding environmental legal requirements and obligations. Training shall be conducted by the ECO where necessary.

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

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

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

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

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

Recommended Environmental Education Material is provided in Appendix 1.

Monitoring of environmental training

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

9 COMPLIANCE WITH THE EMPR

According to regulation 33 of GN R 543, an environmental management programme must include:
(e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;
(i) The process for managing any environmental damage, pollution and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;

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

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

9.1 Non-compliance

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

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

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

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

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

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

- Urination and defecation anywhere except at designated facilities.

9.2 Emergency Preparedness

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

- Accidental waste water discharges to water and land.
- Accidental exposure of employees to hazardous substances, relating to the decommissioning of the old oxidation ponds.
- Accidental fires.
- Accidental spillage of hazardous substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans shall include:

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

The Contractor shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act (No. 85 of 1993), the NEMA (No. 107 of 1998), the National Water Act (No. 36 of 1998) and the National Veld and Forest Fire Act (No. 101 of 1998) as amended and/or any other relevant legislation.

9.3 Incident Reporting and Remedy

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

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

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

9.4 Penalties

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

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

- Hazardous chemical/oil spill and/or dumping in non-approved sites.
- Damage to sensitive environments.
- Damage to cultural and historical sites.
- Unauthorised removal/damage to indigenous trees and other vegetation, particularly in identified sensitive areas.
- Uncontrolled/unmanaged erosion.
- Unauthorised blasting activities (if applicable).
- Pollution of water sources.
- Unnecessary removal or damage to trees.

APPENDIX 1

PROPOSED ENVIRONMENTAL EDUCATION COURSE

WHAT IS THE ENVIRONMENT?

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

WHY MUST WE LOOK AFTER THE ENVIRONMENT?

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

HOW DO WE LOOK AFTER THE ENVIRONMENT?

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

WORKING AREAS

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

RIVERS & STREAMS

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

ANIMALS

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

TREES AND FLOWERS

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

SMOKING AND FIRE

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

PETROL, OIL AND DIESEL

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

DUST

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

NOISE

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

TOILETS

- Use the toilets provided
- Report full or leaking toilets

EATING

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

RUBBISH

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

TRUCKS AND DRIVING

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

EMERGENCY PHONE NUMBERS

Know all the emergency phone numbers:

- Ambulance:
- Fire:
- Police:

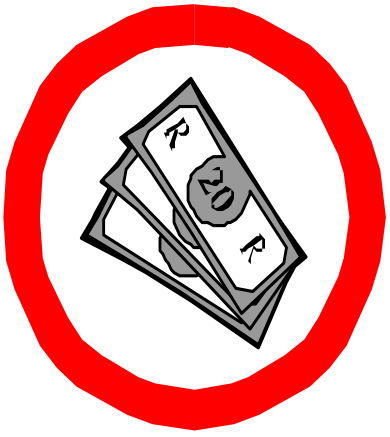
Mbizana Local Municipality:

FINES AND PENALTIES

- Spot fines of between

To be confirmed by Engineer

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



PROBLEMS - WHAT TO DO!

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

APPENDIX 2

PRO-FORMA: PROTECTION OF THE ENVIRONMENT

To be signed by Contractors

PRO FORMA

Employer_____
Contract No_____
Contract title_____

PROTECTION OF THE ENVIRONMENT

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

I/ we_____(Contractor) record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.

2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in so far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

3. I/ we acknowledge and accept the right of _____ to deduct, should they so wish, from any amounts due to me/us, such amounts (hereinafter referred to as fines) as the Resident Engineer and Environmental Site Officer shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:

3.1 The Resident Engineer and Environmental Officer, in determining the amount of such fine, shall take into account *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences.

3.2 The Resident Engineer and Environmental Officer shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Resident Engineer and Environmental Officer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed_____
CONTRACTOR

Date_____