DRAFT FOR PUBLIC REVIEW

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

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PROPOSED ESTABLISHMENT AND OPERATION OF A SEWAGE TREATMENT PACKAGE PLANT AT HEALDTOWN COMPREHENSIVE SCHOOL, FORT BEAUFORT, EASTERN CAPE PROVINCE OF SOUTH AFRICA

May 2012

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1 INTRODUCTION

The purpose of the Construction Environmental Management Programme (CEMPr) is to provide specifications for "good environmental practice" into a contractual environmental specification for application during the construction of the proposed sewage treatment package plant at Healdtown Comprehensive School in the Fort Beaufort District of the Eastern Cape Province of South Africa. The CEMPr provides specifications that the Contractor shall adhere to, to minimise adverse environmental impacts associated with construction activities.

The CEMPr forms part of the contract document and must be read in conjunction with the contract documents including the Specifications and where applicable, the Bill of Quantities.

The contract manager should submit written procedures for all activities that could be potentially harmful to the environment. The project manager or Environmental Control Officer (ECO) will be responsible for ensuring that these are submitted and for monitoring compliance with the CEMPr.

1.1 Guidelines for execution of the CEMPr include the following

- Responsibilities for the environmental performance of the proposed development are known by the construction staff,
- Communications channels to report on environmental performance, problems and priorities are in place,
- A monitoring schedule is established to identify potential negative environmental impacts associated with the construction of the proposed development;
- Method Statements (mitigation measures) are implemented to avoid or minimise the identified negative environmental impacts (rehabilitation of eroded areas; veld clearings; complaints from property owners) as well as to enhance the positive impact on the environment (employment) and,
- Monitoring programme or schedule is developed to track the plans that have been implemented so as to ensure the effectiveness of the plan.

2 BACKGROUND INFORMATION

BKS (Pty) Limited is proposing the establishment and operation of a sewage treatment package plant at Healdtown Comprehensive School, Fort Beaufort. Such construction will aid the management of sewage and help eliminate the health and pollution hazard posed by raw sewage entering the nearby Kat River.

Coastal & Environmental Services (CES) were appointed by BKS (the main consultants for the proposed project) to conduct the require Basic Environmental Assessment in terms of the NEM:Waste Act 718 (2009) and to prepare an Environmental Management Plan (EMP) that seeks to comply with the Environmental Impact Assessment (EIA) regulations GNR 543 of 2010.

Provided below are the details of CES:

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In addition to the above, CES wishes to point out the expertise of the project team that prepared this EMP, which includes CES as a consulting firm and this team's members.

2.1 Expertise of the EAP

CES is a specialist environmental consulting firm. Established in 1990, and with offices in Grahamstown and East London, we primarily specialise in assessing the impacts of development on the natural, social and economic environments. CES' core expertise lies in the fields of strategic environmental assessment, environmental management plans, environmental management systems, ecological/environmental water requirements, environmental risk assessment, environmental auditing and monitoring, integrated coastal zone management, social impact assessment and state of environment reporting. In addition to adhering to all relevant national legislative requirements, which we are often required to review and summarise for specific projects, acquisition of equity funding from the majority of financial institutions demands that developments must meet certain minimum standards that are generally benchmarked against the Policy and Performance Standards of the International Finance Corporation and the World Bank Operational Directives and Policies. The quality of our work has been acknowledged by international lenders such as the World Bank and the International Finance Corporation.

Provided below are short *curriculum vitae* (CVs) of each of the project team members involved in the preparation of this Environmental Management Plan (EMP).

Dr Eric E. Igbinigie
(*Environmental Biotechnologist & Reviewer)*
Eric is a Senior Environmental Consultant at CES. His professional interest is in sustainable integrated environmental management with a keen interest in climate change (mitigation & adaptation), carbon management strategy, hydrocarbon bioremediation, waste management and valorization, and alternative energy generation. He has been involved in several wastewater related projects including water and effluent monitoring requirements towards the achievement of environmental certification by IFC, MIGA and the AfDB. Eric was involved in and developed a packaged plant designed for sewage and domestic wastewater treatment at the Kenmare Moma Mines in Mozambique. He has also project managed a number of contamination assessments including the environmental due diligence for Zone

6 and 13 of the Coega IDZ and he is the specialist consultant for Contaminated Land Assessment for the Fishwater Flats Wastewater Treatment Works Upgrade (Port Elizabeth). Before joining CES he served as a Senior Research Scientist at the Institute for Environmental Biotechnology, Rhodes University where he lectured at postgraduate level and lead a research group tasked with beneficiating coal spoils and acid mine drainage treatment. Eric has several peer reviewed publications and a patent. He is a registered professional natural scientist and a member of several international environmental organizations.

Ms. Lara Crous (Report writer)
Lara is a junior environmental consultant holds a BSc (Environmental Science and Geography) as well as a BSc Honours (Environmental Science) from Rhodes University. Her honours thesis evaluated Grahamstown's Municipal water supply, focussing on aluminium for which she received a distinction. She Is currently writing up her MSc (fisheries science) thesis on using constructed wetland technology in the treatment and beneficiation of brewery effluent. Lara presented her preliminary results at the International Water Association's conference on Wetland Systems for Water Pollution Control in Venice, 2010. She is interested in environmental, municipal and effluent water quality.

2.2 Project Description

Healdtown Comprehensive School, Fort Beaufort, previously dealt with sewage by employing a system of septic tanks; and more recently a series of sewage treatment ponds situated on the property. Due to vandalism, neglect and old age, it is now necessary to construct an entirely new system at the school to manage sewage and to eliminate the health and pollution hazard posed by raw sewage entering the Kat River. A new gravity reticulation system is proposed with sewage flowing to a convenient point for treatment in a package plant. This eliminates the need for evaporation ponds, which are unsuitable due to their close proximity to residential houses.

There are two alternative locations (*site alternatives*) proposed, namely Location A and B). These locations are clearly shown on the locality map (Appendix A) and Site photographs (Appendix B) of this report. Important to note is that there is a borehole in the vicinity of Alternate Site 2 (Location B). Hence, Alternate Site 1 (Location A), would be better from the viewpoint of a lower risk of contaminating the groundwater should there be sewage overflow/spill. For the purpose of this report, alternative Site 1 (Location A) will be assessed as the preferred alternative.

There are also several options (*activity alternatives*) for the disposal of the treated effluent:

- Discharge into the nearby river (Option 1);
- Evaporation ponds (Option 2); or
- Irrigation of agricultural fields or sports fields using the treated effluent (Option 3). This option would require either a lined holding pond or dam to cater for emergency overflow and a reed-bed type "polishing system". The irrigation water will be used on agricultural lands (not to fruit or vegetables that are eaten without cooking, or to sports fields where there is not normally physical contact with the ground surface (that is, a golf course but not a rugby filed), or to gardens within the College grounds.

The sewage treatment package plant will process 30KL per day which equates to 10 950m³ per annum.

A Becon Bio-Filter Rotating Biological Contactor (RBC) sewage purification plant (Becon Bio-filter RBC plant) will be used to treat sewage from the college. The unit consists of a primary combined settlement tank and anaerobic digester, a secondary aerobic process consisting of the Becon Bio-Filter RBC plant fixed film reactor units, followed by a humus settlement tank and a disinfection tank. Figure 1 below illustrates the Becon Bio-Filter RBC plant flow process.

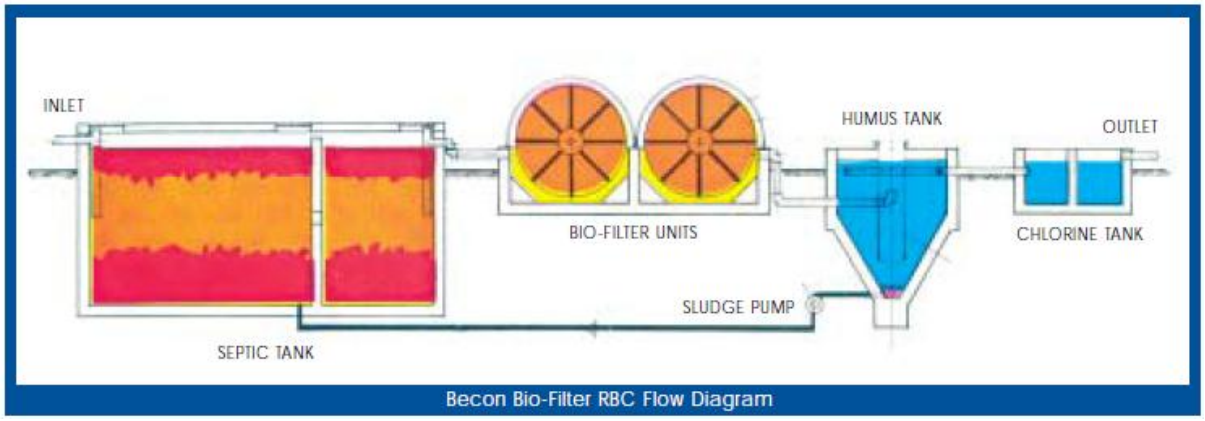

Figure 1: Becon Bio-Filter RBC plant flow diagram

2.3 Listed Activities

INDICATE THE NO. & DATE OF THE RELEVANT NOTICE	ACTIVITY NUMBERS (AS LISTED IN THE WASTE MANAGEMENT ACTIVITY LIST)	DESCRIBE EACH LISTED ACTIVITY
NEM: Waste Act (Act No. 59 of 2008) Government Notice No. 718 – 3 JULY 2009	Category A: Activity 11	The treatment of effluent, wastewater or sewage with an annual throughput capacity of more than 2000 cubic metres but less than 15000 cubic metres
NEM: Waste Act (Act No. 59 of 2008) Government Notice No. 718 – 3 JULY 2009	Category A: Activity 18	The construction of facilities for activities listed in Category A of this Schedule (not in isolation to associated activity)

3 ENVIRONMENTAL POLICY

3.1 Construction Environmental Policy

The contractor (contractor is defined as principal contractor, sub-contractors and any employees retained on this project) is required to be familiar with the construction environmental policy and all that it implies, and to adopt and implement the policy throughout the course of construction.

The environmental policy is as follows:

- The environmental specifications and intentions of the specifications must be upheld.
- Natural resources will not be degraded, and no unnecessary environmental degradation must take place.
- Site activities will be conducted in a manner that does not create a nuisance, risk or hazard to the natural environment.
- Employee and public health and safety must be considered a priority.

3.2 Environmental Legislation and Guidelines

The Contractor must ensure that all South African legislation concerning the natural environment, pollution and the built environment is strictly enforced. Such legislation must include, but is not limited to the:

- The Constitution of the Republic of South Africa Act No. 108 of 1996
- National Environmental Management Act No. 107 of 1998
- National Heritage Resources Act No. 25 of 1999
- National Environmental Management: Biodiversity Act No. 10 of 2004
- National Environmental Management: Waste Management Act No. 59 of 2008
- Health Act No. 63 of 1977
- Occupational Health and Safety Act No. 85 of 1993
- Hazardous Substances Act No. 15 of 1973

4 ENVIRONMENTAL SPECIFICATIONS

4.1 General Site Procedures

4.1.1 Environmental awareness training or instruction

The project manager, before commencement of any construction activities, must implement an environmental awareness programme or instruction. All construction personnel must attend the training programme or instruction. Where possible, the training needs to be conducted in the language of the employees. The environmental training should, 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, 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;
- The importance of not littering;
- 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 Basic Environmental Education Material to be included in this training programme is provided in **Appendix 1** of this CEMPr. In addition to the above, the programme must include all relevant aspects covered in the CEMPr and must be repeated for all new or temporary staff.

4.1.2 Demarcation of the site

The “site” refers to all areas required for construction purposes i.e. buildings and infrastructure. The boundary of the site must be agreed with the project manager or ECO. All activities must be conducted within this area so as to facilitate control and to minimise the impact on the existing natural environment. The project manager must ensure that the construction is done according to the final site layout/plans only.

The contractor must demarcate the boundaries of the site in order to restrict construction and other activities (eating and ablution). The contractor must ensure that all his plant, labour and materials remain within the demarcated boundaries. Construction must be restricted to within the boundaries of the site.

4.1.3 Location of the camp and depot (If required)

The Contractor shall establish his construction camp and depot on the site in a manner that does not adversely affect the environment. However, before construction can begin, the contractor shall submit to the project manager for his approval a site layout plan detailing plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the contractor proposes to put in place. In particular, this plan must include:-

- Site access (including entry and exit points).
- Access and haulage routes.

- All material and equipment storage areas (including storage areas for hazardous substances such as fuel and chemicals) - Only designated areas may be used for the storage of materials, machinery, equipment and site offices.
- Security requirements (including temporary fencing and lighting).
- Areas where vegetation will be cleared.
- The locality as well as the layout of the temporary waste storage facilities for litter. Waste storage facilities.
- Stormwater control measures.
- Provision of potable water and temporary ablution facilities.
- Potential pollution hazards and mechanisms to manage these.
- Intended mitigation measures for approval by the ECO.

Throughout the period of construction, the Contractor shall restrict all activities to within the designated areas on the approved construction layout plan. Any relaxation or modification of the construction layout plan is to be approved by the Project Manager and ECO.

4.2 Required Actions

4.2.1 Vegetation

- The Contractor has a responsibility to inform all staff of the need to be vigilant against any practice that will have a harmful effect on vegetation. This information shall form part of the Environmental Education Programme to be effected by the Contractor.
- The natural vegetation encountered on the site is to be conserved and left as intact as possible.
- Re-vegetation of disturbed areas must be undertaken with site indigenous species and in accordance with the instructions issued by the ECO.
- Only trees and shrubs directly affected by the works, and such others as may be indicated by the ECO in writing, may be felled or cleared.
- Sensitive areas adjacent to the construction site, including all potential habitat for threatened species, must be demarcated and no construction activities or impacts must be permitted to occur across these demarcations. Demarcated areas must be fenced off and no personnel or equipment must be permitted to enter these areas.
- Any proclaimed weed or alien species that germinates during the contract period shall be cleared by hand before flowering.
- Fires shall only be allowed in facilities or equipment specially constructed for this purpose.
- If necessary a firebreak shall be cleared and maintained around the perimeter of the site camp.
- Ongoing monitoring and maintenance of re-vegetation works should be undertaken following construction.

4.2.2 Slope stabilisation

- The Contractor shall take measures to protect all areas susceptible to erosion by installing all the necessary temporary drainage works as soon as possible. The Contractor shall take any other measures that may be necessary to prevent surface water from scouring the slopes or other areas.
- If runnels or erosion channels develop, they shall be back-filled and compacted, and the areas restored to a proper condition. The Contractor shall not allow erosion to develop on a large scale before effecting repairs.
- Where artificial slope stabilisers are used, these shall be applied to the slope, preferably before topsoiling, but according to the detailed construction plan and as specified in this specification:
    - Where the slopes are 1.3 to 1:6 they shall be logged or otherwise stepped in order to prevent soil erosion. Logs must be laid in continuous lines following the contours and

spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

- In areas where slopes are less than 1:6, horizontal grooves, shallow steps or ledges parallel to contours shall be made on the cut slopes. They shall be made randomly to appear natural.
- Shallow slopes shall be stabilised by using brushwood to initially minimise soil erosion until revegetation has been successful.

4.2.3 Topsoil Removal and Stockpiling

- Prior to site establishment and any earthmoving operations, the Contractor shall strip and stockpile all topsoil within the works areas for subsequent use in the rehabilitation and re-vegetation of the site.
- All topsoil shall be stripped and stockpiled separately from subsoil for subsequent use during rehabilitation and re-vegetation.
- Soil shall be stripped in a phased manner, so as to retain vegetation cover for as long as possible.
- The top 100mm of topsoil shall be stripped unless otherwise stipulated by the ECO.
- Topsoil from different soil types shall be stockpiled separately and replaced in the same areas from which they were taken. This shall be supervised by the ECO.
- The ECO will identify a suitable site for stockpiling and this must be approved by the ECO and Project manager.
- Topsoil shall be treated with care and precautions shall be taken to prevent unnecessary handling and compaction. In particular, topsoil shall not be subject to compaction greater than 1 500kg/m² and shall not be pushed by a bulldozer for more than 50m. Trucks may not drive over the stockpiles.
- Unless otherwise instructed, topsoil shall not be mixed with any other type of material, nor contaminated with machine oils or any other pollutant.
- Topsoil stockpiles shall be convex and should not exceed 2m in height to minimise wind and water erosion. The Contractor shall ensure that the material does not blow or wash away. If the topsoil is in danger of being washed or blown away, or requires storage for more than 2 weeks, the Contractor shall cover it with a suitable material, such as mulch and/or seed it with a fast-growing annual grass.
- Topsoil areas shall be demarcated in order to ensure the safekeeping of topsoil and to separate different stockpile types.
- Soil shall be stockpiled for as short a period as possible.
- Stockpiles shall be monitored at weekly intervals to identify invasive plants, which shall be removed when they germinate, to prevent contamination of the seed bank. The ECO shall assist in the identification of alien plants.
- Stockpiles shall not be covered with materials such as plastic that may cause it to compost, or kill any seeds.
- The Contractor, before indigenous vegetation clearing or soil removal for stockpiling begins, shall remove alien invasive weeds present within the construction area.
- The Contractor shall be held responsible for the replacement, at his own cost, for any unnecessary loss of topsoil due to his failure to work according to the progress plan approved by the ECO.

4.2.4 Protection of Flora and Fauna

- Where applicable ALL indigenous fauna and flora must be protected.

- Trapping, poisoning and/or shooting of animals is strictly forbidden. No domestic pets are permitted on site.
- Except to the extent necessary for the carrying out of the works i.e. defining the construction sites and construction camps / lay-down areas, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted, other than as specified in the re-vegetation specifications.
- Where the use of herbicides, pesticides and other poisonous substances is required, the Contractor shall submit a Method Statement for approval by the ECO and Engineer.
- Construction activities must remain within defined construction areas. No construction / disturbance will occur outside these areas.

4.2.5 Workshop, Equipment Maintenance and Storage

- Where practical, all maintenance of equipment and vehicles on site shall be performed in a workshop/designated equipment maintenance area.
- The Contractor shall ensure that there is no contamination of soil or vegetation.
- The Contractor shall ensure the workshop/equipment maintenance area is kept neat and clean at all times.
- The workshop/equipment maintenance area shall have a smooth impermeable (thick plastic covered with sand) floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil).
- Drip trays shall be provided in construction areas for stationary and “parked” plant, and when servicing vehicles.
- All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the site.

4.2.6 Materials Handling, Use and Storage

- The Contractor shall ensure that drivers are informed of all procedures and restrictions required to comply with the specifications.
- The Contractor shall ensure that these drivers are supervised during off-loading by someone with an adequate understanding of the requirements of the specifications.
- Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to, sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent spillage from the vehicle during transit.
- The Contractor shall be responsible for any and all clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.
- All manufactured and/or imported material shall be stored within the Contractor’s camp, preferably out of the rain.
- All lay-down areas outside of the construction camp shall be subject to the Project Manager’s and ECO’s approval, which shall not be withheld unreasonably.

4.2.7 Hazardous Substances

- If potentially hazardous substances are to be stored on site, the Contractor shall provide a Method Statement to the ECO detailing the substances/materials to be used, together with the storage, handling and disposal procedures of the materials.
- Hazardous chemical substances used during construction shall be stored in secondary containers.
- The relevant Material Safety Data Sheets (MSDS) must be available on site. Procedures detailed in the MSDS must be followed in the event of an emergency situation.

4.2.8 Paint

- No paint products may be disposed of on site.
- Brush / roller wash facilities shall be established to the satisfaction of the Project Manager.
- Oil based paints and chemical additives and cleaners such as thinners and turpentine shall be strictly controlled. A Method Statement, approved by the Project Manager, is required.

4.2.9 Servicing/fuelling of construction equipment

- Servicing and fuelling should preferably occur off-site. If these activities occur on-site, the Contractor shall ensure that it takes place in designated areas. All waste generated during these activities shall be collected and disposed off at an appropriate off site facility capable of handling such waste. All equipment that leaks shall be repaired immediately. In the case of changing oil or lubricants on-site, the Contractor shall have Drizit pads (or equivalent) and/or drip trays available to collect any oil, fluid, etc.
- The Contractor shall take all reasonable precautions to prevent the pollution of the ground by fuels and chemicals as a result of construction activities. No oil, diesel, petrol, etc., shall be discharged onto the ground. Pumps and other machinery requiring oil, diesel, petrol, etc. that is to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be emptied regularly and the contaminated water disposed of off site at a facility capable of handling such waste water. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing, and before weekends and holidays.
- The Contractor shall remove all oil, petrol and diesel-soaked sand immediately and shall dispose of it as hazardous waste. Tanks containing fuel shall have lids and shall remain firmly shut. Fuel stores shall be placed on a bunded seal base, and waste water or spilled fuel collected within the bund shall be disposed of as hazardous waste. Only clean, empty tanks may be stored on the ground.
- The Contractor shall take the necessary precautions to prevent fires or spills at the fuel stores. No smoking or other activities that can initiate fires shall be allowed in the vicinity of the stores/designated storage areas. Any hazardous waste substances must be disposed of off-site at a licensed landfill site.

4.2.10 Fuel Storage

- Fuel should preferably not be stored on site, but if this is required, fuel storage must comply with the specifications presented in this section.
- The fuel storage area shall be located in an area approved by the ECO, and must not be located in or be less than 100m from any surface or underground water source.
- The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut.
- The tanks shall be situated on a smooth impermeable surface (plastic or concrete) base with an earth bund (plastic must have sand on top to prevent UV degradation). The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 110% of the total capacity of all the storage tanks. The floor of the bund shall be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel-soaked water to be removed, or the bunded area shall be covered.
- The Contractor shall keep fuel under lock and key at all times, and the fuel storage area should preferably be fenced.
- No smoking or naked flame shall be allowed in the vicinity of the stores/designated storage areas.

- Only empty and externally cleaned tanks may be stored on the bare ground. All empty and externally dirty tanks shall be sealed and stored in an area where the ground has been protected. In addition, if fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a water proof container when not in use.
- Symbolic safety signs depicting “No Smoking”, “No Naked Lights” and “Danger” are to be provided, and are to conform to local standards. The volume capacity of the tank shall be displayed.
- The product contained within the tank shall be clearly identified, using an appropriate emergency information system.
- Any electrical or fuel-driven pump shall be equipped and positioned so as not to cause any danger of ignition of the product.
- Areas for storage of fuels and other flammable materials shall comply with fire safety regulations.
- The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores.

4.2.11 Eating Areas (If required)

- The Contractor shall designate eating areas which shall contain bins with lids and cooking facilities, if necessary.
- Eating outside of these designated areas is prohibited.
- The feeding of, or leaving food for wild animals is strictly prohibited.

4.2.12 Ablution Facilities

- Washing, whether for personal hygiene or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided.
- The Contractor shall ensure that temporary toilets are emptied and serviced regularly and that no spillage occurs when the toilets are cleaned or emptied.
- Discharge of waste from toilets into the environment and burial of waste is strictly prohibited.
- Sanitation facilities shall be located within 100m from any point of work, but not closer than 50m to any water body.
- Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers. Toilet paper shall be provided.

4.2.13 Litter

- No littering by construction workers shall be allowed.
- During the construction period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter.
- Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse.
- At all places of work the contractor shall provide litter collection facilities for later safe disposal at approved sites.

4.2.14 Solid Waste Management

- All solid waste shall be disposed of in accordance with the former Department of Water Affairs and Forestry waste disposal regulations.
- The Contractor shall set up a solid waste control and removal system and a Method Statement is required in this regard. The system shall comply with the requirements detailed in this section.
- No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur.

- Bins, with lids, shall be positioned within the working areas and shall be emptied daily.
- All solid waste shall be disposed of at a designated public disposal site.
- Receipts for hazardous waste disposal shall be copied to the ECO.
- Waste and litter shall be disposed of into scavenger- and weather-proof bins. The Contractor shall remove the refuse collected from the working areas from site at least once a week.
- The contractor must where possible limit the amount of waste produced on the construction site, and ensure that wherever possible, waste materials are re-used or recycled, or donated or sold to an organisation for this purpose.
- Biodegradable items should be separated from other waste and used either in composting or mulching.

4.2.15 Dust

- The Contractor shall be solely responsible for the control of dust.
- The Contractor shall take all reasonable measures to minimise the generation of dust, as a result of construction activities, to the satisfaction of the ECO.
- Removal of vegetation shall be avoided until such time as soil stripping is necessary. Exposed surfaces shall be re-vegetated or stabilised as soon as is practically possible.
- Where possible, soil stockpiles shall be located in sheltered areas where they are not exposed to the erosive effects of the wind. Where erosion of stockpiles becomes a problem, erosion control measures shall be implemented. These could include grassing, reducing the size of stockpiles or positioning them in areas where they are protected from wind erosion.
- Vehicle speeds shall not exceed 20km/h in the site.
- The Contractor must ensure that the wheels of trucks do not contain large amounts of soil, to prevent large quantities of soil being deposited on the roads.
- Appropriate dust suppression measures shall be used during high dust conditions e.g. dampening with water or the use of other suppression measures.
- Stabilisation methods using mulch, straw, etc. will be applied to areas where earthworks are complete and the area is left exposed.

4.2.16 Noise

- The Contractor shall limit noise levels (e.g. install and maintain silencers on machinery).
- Appropriate directional and intensity settings are to be maintained on all hooters and sirens.
- No amplification equipment shall be allowed on site.
- Should noise generating activities have to occur at night the people in the vicinity of the drilling shall be warned about the noise well in advance and the activities kept to a minimum.
- Compliance with the appropriate legislation with respect to noise shall be mandatory.

4.2.17 Access Roads

- Only roads and tracks allocated as access roads shall be used.
- The Contractor shall control the movement of all vehicles and plant (including that of his suppliers) so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic, and that all relevant laws are complied with.
- In addition, such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes not on the site.
- In the event of a vehicle getting stuck or bogged down in a wet section or road, any damage from digging and attempts to extract the vehicle (holes, deep ruts, etc.) shall be repaired.

4.2.18 Fire Control

- No fires may be lit on site, other than in designated areas.
- The Contractor shall be responsible for establishing a fire drill, fire procedures and ensuring that all fire-fighting equipment is readily accessible and in good working order.
- Any fires that occur shall be reported to the ECO immediately.
- Smoking shall not be permitted in those areas where there is a fire hazard e.g. fuel storage areas and in the vicinity of dry vegetation.
- Smoking shall only be permitted in clearly marked designated areas.

4.2.19 Storm Water Controls

- The Contractor shall take reasonable measures to control the erosive effects of storm water runoff at the construction areas by creating storm water channels and berms, if deemed necessary by the ECO.
- The Contractor shall be liable for any damage to downstream areas caused by the diversion of overland storm water flows.
- The Contractor shall use silt screens to prevent overland flowing water from causing erosion and shall use bales of straw as filters, if necessary.
- The Contractor must ensure that erosion or pollution of ground water, drainage courses, wetlands and the river does not occur as a result of site activities. Pollution could result from the release, accidental or otherwise, of contaminated runoff from construction camps, discharge of contaminated construction water, chemicals, oils, fuels, sewage, run off from stockpiles, solid waste, litter, etc. All equipment and machinery, e.g. cement mixers, generators etc., must be placed on drip trays.
- The Contractor shall ensure that any polluted runoff is collected in a lined sump and not discharged overland. Natural run-off shall be diverted away from the work site and storage areas. The Contractor shall take appropriate measures e.g. the erection of silt traps, or drainage retention areas, to prevent silt and sand entering drainage courses, the river and wetlands.
- Where required, stormwater retention ponds will be constructed prior to the onset of construction of the rest of the site to prevent stormwater from the adjacent areas running through the construction site and damaging sensitive areas.

4.2.20 Erosion

- The removal of the natural vegetation cover must be avoided and where this cannot be done, minimised.
- The disturbance of the natural soil structure must be prevented.
- The moving of heavy machinery into areas unnecessarily must be avoided.
- All fill material must be very well compacted and innovative use of geo-textile materials in the retention of soil fill areas made.
- Rainwater runoff from cut slopes must be prevented as far as possible.
- Cut off drains in areas above cut slopes must be created and these cut off drains must be lined in such a way that they do not create, rather than, alleviate problems.
- Sufficient storm water take off points must be created in such a way that water does not have an opportunity to gather momentum.
- Storm water ditches must contain structures that will reduce velocity of the run off.
- The use of vegetated swales must be investigated in less steep areas.
- Only local indigenous vegetation shall be used for mulching.

4.2.21 Discharge of construction water

Construction water refers to all water dirtied as a result of construction activities. Silt laden water may be discharged overland and be allowed to filter into the ground, but the Contractor shall ensure that no erosion results from this procedure. The contractor shall ensure that silt-laden water is not discharged directly into any surface water courses, and shall take suitable measures to prevent this. Cement-laden water, i.e. water from washings from trowels, wheelbarrows, etc., may not be discharged overland but must be disposed of off site at a facility capable of handling such waste water. Where possible, water should preferably be collected and reused for mixing new concrete.

4.2.22 Access to Site and Safety

The Contractor shall ensure that access to the various work sites and associated infrastructure and equipment is off-limits to the public (especially children) at all times during construction. Additional areas restricted to the public and suggested detours shall be clearly marked on information boards to the satisfaction of the ECO. Any access to site that may pose a danger to the public must be suitably provided with warnings.

4.2.23 Cement and Concrete Batching

- Concrete shall not be mixed directly on the ground, or in any area where runoff may pose a pollution threat.
- Any concrete batching activity shall be located in an area of low environmental sensitivity.
- The cement/concrete batching works shall be kept neat and clean at all times.
- Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.
- Used bags shall be stored in weatherproof containers to prevent wind blown cement dust and water contamination. Used bags shall be disposed of on a regular basis and shall not be used for any other purpose.
- Spillage of concrete must not occur during batching and laying.
- All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed. Washing the remains into the ground is not acceptable. All excess aggregate shall also be removed.

4.2.24 Power Tools

- The Contractor shall take preventative measures, such as screening, muffling, dust control, timing and pre-notification of affected parties to minimise complaints regarding dust, noise and vibration nuisances.

4.3 Specific measures

4.3.1 Pollution of nearby water bodies

Two alternative sites have been proposed for the establishment of the sewage plant, alternatives A and B. It is important to note, that the current drinking water supply for the school comes from a borehole that is eastward and less than 100m from the vicinity of site B. Due to this, site A is considered the preferred location for this assessment due to the lowered risk of groundwater contamination as a result of accidental sewerage overflow/spill at this site.

All effort will be made to avoid any leaks or spillages through efficient design and operation, however, emergency preparedness plans should be in place in the case of accidental leaks or spillages. The sewage effluent will be monitored monthly and ground water quarterly to ensure that it meets the requirements set out by DWA as ‘safe effluent’. Immediate mitigation such as clean up and repairs

must be implemented in the event of a spill or leak. The management of the treatment plant will ensure that there are always sufficient parts and resources available, such that if a leak were to be found, it could be easily repaired. Care will be taken to ensure that there is always suitable trained personnel on sight to attend to any issues should they occur.

The following measure must be implemented accordingly;

- All construction must be undertaken according to the CEMP.
- All water bodies, wetlands and river systems will be considered No-go areas for all construction workers.
- Any servicing or repairs to the plant or construction machinery will be done offsite.
- The use of drip trays will be used to prevent oil and fuel spills in the case of emergency on-site emergency maintenance.
- Temporary ablution facilities will also be provided as well as appropriate collection and disposal of all sewage and waste.
- Hazardous chemical substances used during construction must be stored in secondary containers (container within a container), and in a secure area in terms of the Material Safety Data Sheets (MSDS)
- The relevant MSDS must be available on site. Procedures detailed in the MSDS must be followed in the event of an emergency situation
- If potentially hazardous substances are to be stored on site, the Contractor must provide a Method Statement to the CM or ECO, detailing the substances/materials to be used, together with the storage, handling and disposal procedures of the materials.
- No paint products may be disposed of on-site and brush/roller wash facilities must be established to the satisfaction of the CM.
- Oil-based paints and chemical additives and cleaners such as thinners and turpentine must be strictly controlled. A Method Statement detailing storage and cleaning must be submitted to and approved by the CM and ECO.
- Roads and parking area surfaces will be on surfaces with no gradient, to prevent/ reduce runoff. Sufficient stormwater take-off points must be created in such a way that water does not have an opportunity to gather momentum. Stormwater ditches must contain structures that will reduce velocity of the runoff.
- Vehicles must be serviced and maintained to minimise the risks of leakages of hydrocarbons and other pollutants, by sing drip trays.
- Storage areas that contain hazardous substances such as oil and other pollutants must be bunded with an approved impermeable liner.
- A designated, bunded area should be set aside for vehicle washing and maintenance
- Implement a monitoring programme in accordance with the DWA Water Use Registration conditions of discharge. This monitoring programme shall include the following: -
    - The quantity of the final effluent discharged must be metered and the total recorded weekly;
    - Quality of domestic wastewater discharges monitored on a monthly basis. The discharge volume shall be monitored for as per DWA General Authorisations.
- Maintain all components in good working condition
- Ensure continual compliance with all procedures for ongoing monitoring and maintenance of the operational efficiency of the works.
- Implement a management control system to ensure immediate remedial action if the outcome of the monitoring programme indicates non-compliance with specific DWA Standards.

4.3.2 Accidental leaks and/or spillages

- The contractor must set up a contaminated water management system, and a Method Statement for approval is required in this regard. The Method Statement must state the collection facilities that are to be used to prevent pollution, as well as the proposed method of disposal of the contaminated water.
- The contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall included notifying the engineer and ECO.
- The contractor shall ensure that the necessary materials (e.g. chemcap, spill-sorb, drizzat pads, enretech and peat moss) and equipment for dealing with spills and leaks are available on site at all times.
- The source of the spillage shall be isolated.
- The contractor shall contain the spillage using sand berms, sandbags, pre-made booms, sawdust or absorbent materials.
- The contractor shall submit his emergency procedure to all employees prior to operation of the sewage treatment package plant.

4.3.3 Treated Sewage Effluent quality

- The Becon Bio-filter RBC Plant should be well maintained and managed.
- Regular monitoring must be conducted to ensure that the system is performing at its peak.
- Treated waste water effluent must be tested and monitored in accordance with the DWA requirements.
- All data from monitoring must be kept on file.

4.3.4 Defective functioning of the sewage treatment package plant

- All wash water and sewage from the Healdtown Comprehensive School must be diverted to the proposed Becon Bio-filter RBC Plant and this plant must be correctly maintained and operated at all times.
- The quality of treated effluent should be monitored to ensure that it meets the required National discharge standards as set out by DWA.
- The management of the treatment plant must also ensure that they have access to component parts and a management team in order to avoid premature termination of the wastewater treatment technologies' service life.
- Maintain a suitable supply of spare parts on-site and implement a sound maintenance regime.
- Components of a non-mechanical nature (e.g. other personnel trained to manage the system in case the employee who usually does this is off sick) need to also be readily available.

4.3.5 Reduced water consumption

To optimise and/or enhance the benefits of reduced water consumption, the sewage treatment system should be well maintained and managed to ensure that effluent produced is generally within the DWA requirements for irrigation water.

4.3.6 Evaporation pond mitigation measures

Should there be an inclusion of an evaporation pond, the following measures must be adhered to:

- The Environmental Control Officer (ECO) must ensure that there is (1) no damage to any heritage structures on site throughout the construction phase; (2) as little damage to the

ecological environment as possible.

- The evaporation pond must be sufficiently lined to prevent unwanted seepage or contamination.
- Access to the evaporation pond should be restricted.
- In the case that any archaeological artefacts or graves are found on site, all construction activities will be suspended. The South African Heritage Resources Agency (SAHRA) or the National Monuments Council should be contacted.
- An archaeological consultant will be allowed to record the site or make necessary excavations.
- Work will only continue after clearance has been given by the archaeologist in writing.

Archaeological finds

- Should any archaeological artefacts or graves be encountered on site, construction activities must be suspended and the appropriate authorities contacted. The South African Heritage Resources Agency (SAHRA) or the National Monuments Council shall be contacted and they will appoint an archaeological consultant to record the site and excavate if necessary. Work may only resume once clearance is given in writing by the archaeologist.

5 CONCLUSION

Although every effort has been made to ensure that all foreseeable actions and potential mitigations or management actions are contained in this document, the CEMPr should be seen as a day to day management document.

The CEMPr thus sets out the environmental standards, which would be required to minimise the negative impacts and maximise the positive benefits of the development of the sewage treatment package plant at Healdtown Comprehensive School. The CEMPr could thus change daily, and if managed correctly lead to a successful construction phase.

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

APPENDIX 1: PROPOSED BASIC 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

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

FINES AND PENALTIES

- Spot fines may be issued
- 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!