eThekwini Municipality

Environmental Management Programme (EMP) for the Construction of a 500mmØ Steel Watermain Inlet to Westriding Reservoir

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ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE CONSTRUCTION OF A 500MM Ø STEEL WATERMAIN INLET TO WESTRIDING RESERVOIR

ANNEXURES

CONTACT DETAILS OF RESPONSIBLE PERSONS

Proponent Details

Name of Proponent:	eThekwini Municipality
Contact person:	Leisel Bowes
Designation:	Project Manager
Physical Address:	3 Prior Road, Durban, 4000
Postal Address:	P.O. Box 1038 Durban 4001
Tel:	031 311 8656
Fax:	031 311 8699
E-mail:	Leisel.bowes@durban.gov.za

Details of Environmental Assessment Practitioner

Name of Consultant:	GIBB (Pty) Ltd
Contact person:	Katherine de Jong
Physical Address:	54 Norfolk Terrace, Westville 3630
Postal Address	PO Box 1365, Westville, 3630
Tel:	031 267 8560
Fax:	031 266 3310
E-mail:	kdejong@gibb.co.za

Details of Environmental Authorities

Department Name:	Department of Agriculture and Environmental Affairs (DAEA)
Contact person:	Yugeshni Govender
Physical Address:	16th Floor Eagle Building Munchies Passage 357 Pixley Kaseme Street Durban
Postal Address:	P/Bag X54321 Durban 4000
Tel:	031 3022 800
Fax:	031 3022 824
E-mail:	Yugeshni.govender@kzndae.gov.za

1 INTRODUCTION

eThekwini Water and Sanitation propose to install approximately 4 kilometres of 500mm diameter continuously welded steel pipe which will be constructed in residential roads, including pipe jacking across Old Main . A new reticulation watermains to service the high level zone of West Riding Reservoir will also be constructed. This is to provide a long term solution to water supply challenges experienced in the West Riding area.

This Environmental Management Programme (EMP) has been compiled as part of the Environmental Authorisation Process, required by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The EMP will look at the potential environmental impacts the proposed pipeline could have on the environment and which mitigation and monitoring procedures will need to be put in place to manage these impacts with the smallest environmental footprint possible.

Based on the above information, the following listed Activities in terms of the Environmental Impact Assessment Regulations, 2010 have been applied for:

Government Notice No 544, Listing Notice 1:

Activity No. 9: '' The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water –

(i) with an internal diameter of 0,36 metres or more; or
(ii) with a peak throughput of 120 litres per second or more,
excluding where:

a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or
b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse. The construction of approximately 4km of 500mm diameter pipeline for the bulk transportation of water.''

Government Notice No 544, Listing Notice 1:

Activity No. 11: "The construction of: … (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.''

Government Notice No 544, Listing Notice 1:

Activity No. 18: "The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse …"

1.1 Applicable Documentation

The following environmental documentation is applicable for the project, and should be read in conjunction with this EMP:

- Basic Assessment Report for the West Riding Watermain Inlet Project;
- Other Permits or licences that may need to be acquired; and
- All acts, ordinances and by-laws relevant to the proposed project.

1.2 Applicable Legislation

The following environmental documentation is applicable for the project, and should be read in conjunction with this EMP:

LEGISLATION	RELATES TO
National Environmental Management Act, 1998 (Act no. 107 of 1998) (NEMA))	NEMA is the key environmental management legislation and states in section 2(4)(k) that "the environment is held in public trust for the people, the beneficial use of resources must serve the public interest and the environment must be protected as the people's common heritage" thereby paving the way for EIA process to assess developments that may have a harmful impact on the environment.
Occupational Health and Safety Act, 1993 (Act no. 85 of 1993) (OHSA)	General duties of employers to their employees
	General duties of employers and self-employed persons to persons other than their employees.
National Water Act, 1998 (Act no. 36 of 1998) (NWA)	This Act provides for the protection and management of water resources. A Water Use License Application is made to authorise water use activities pertaining to the altering of the bed, bank, course and characteristics of the watercourse and for the abstraction of water for use during the operational phases.
National Environmental Management: Waste Act, 2008 (Act no. 59 of 2008) (NEM:WA)	This Act provides for regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation. Also to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities.
National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) (NEM:BA)	The Biodiversity Act provides for the management and protection of the country's biodiversity within the framework established by NEMA. It provides for the protection of species and ecosystems in need of protection, sustainable use of indigenous biological resources, and equity in bio-prospecting.
Hazardous Substances Act, 1973 (Act no.15 of 1973) (HSA)	Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances such as fertilizing materials.
SANS 10103 (Noise Regulations)	The measurement and rating of environmental noise with respect to annoyance and to speech communication.
Constitution of the Republic of South Africa	The constitution paved the way for the protection of the natural environment and heritage resources through the recognition of the rights to a safe and healthy environment.

LEGISLATION	RELATES TO
Environmental Impact Assessment (EIA) Regulations, 2010 (Government Notice No. R543, R544 and R546, 18 June 2010)	The EIA regulations describe the EIA process to be followed including the public participation process, and the listed activities that may have a harmful impact on the environment and must be assessed.

1.3 Structure of the Environmental Management Programme

The EMP provides mitigation and management measures for the following phases of the project:

- **Construction Phase**
  This section of the EMP provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required within the construction phase are specified. These specifications shall form part of the contract documentation and, therefore, the Contractor will be required to comply with the specifications to the satisfaction of the Project Co-ordinator and Environmental Control Officer, in terms of the construction contract.

- **Operation Phase**
  This section of the EMP provides management principles for the operation phase of the project. Environmental actions, procedures and responsibilities as required for the operation phase of West Riding Reservoir Project, are specified.

- **Decommissioning Phase**
  This section of the EMP provides some management principles for the decommissioning phase of the project. Please note that it is highly unlikely that the proposed activity will be decommissioned in the short term (due to the life span of the operation) which makes it challenging to predict potential impacts.

It should be noted that this EMP is a dynamic document which should be updated as and when required. Any amendments made must be submitted to both the Environmental Control Officer and Proponent for approval prior to implementation.

1.4 Objectives of the EMP

This EMP has the following objectives:

- To outline functions and responsibilities of responsible persons;
- To state standards and guidelines which are required to be achieved in terms of environmental legislation;
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts; and
- To prevent long-term or permanent environmental degradation.

2 FUNCTIONS AND RESPONSIBILITIES

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the various personnel for this project are detailed below.

The Proponent:

- The proponent (eThekwini Municipality) is ultimately accountable for ensuring compliance to the EMP and conditions contained in the Environmental Authorisation (EA). The ECO must be contracted by the proponent as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of EA's, and the EMP for the project.
- The proponent is further responsible for providing and giving a mandate to enable the ECO to perform responsibilities, and must ensure that the ECO is integrated as part of the project team.

The Consulting Engineer (CE):

- Contracted by the proponent to design and specify the project engineering aspects. Generally the engineer runs the works contract. The CE may also fulfil the role of Project Manager on the proponent's behalf.

Project Manager (PM):

- The Project Manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any operational activity in contravention of the EMP in accordance with an agreed warning procedure.

Site Foreman (SF):

- The project manager's representative on site. Has the power/mandate to issue site instructions, following request by an ECO or instructions from the PM. The SF oversees site works.

The Environmental Control Officer (ECO):

- An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of EA, and the EMP for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team.
- The ECO must be proactive and have access to specialist expertise as and when required, these include wetland specialists, etc.
- The ECO must conduct audits on compliance to relevant environmental legislation, conditions of EA, and the EMP for the project. The size and sensitivity of the development, based on the Section 24 G, and the EA will determine the frequency at which the ECO will be required to conduct audits. (Based on the nature of this project it is recommended that a bi-annual site inspection be undertaken).
- The ECO must be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the proponent and project manager of any changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration

and updating of all relevant EMP documentation is carried out.

- The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in environmental related methods and practices.
- The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authority as soon as possible.

The Contractor:

- Is to ensure that the environmental specifications of this document (including any revisions, additions or amendments) are effectively implemented. This includes the on-site implementation of steps to mitigate environmental impacts.
- Will ensure that all Employees and co-contractors employed comply with the requirements and provisions of the EMP.
- Prepares method statements.
- Monitors environmental performance and conformance with the specifications contained in this document during daily site inspections.
- Discusses implementation of and compliance with this document with staff at routine site meetings;
- Reports progress towards implementation of and non-conformances with this document at site meetings with ECO.
- Will notify the ECO of the anticipated programme of works and fully disclose all details of activities involved.
- Will ensure that suitable records are kept and that the appropriate documentation is available to the ECO.
- Will Notify the ECO of all incidents, accidents and transgressions on site with respect to environmental management as well as requirements of the EMP and corrective actions/remedial action taken.
- Reports and record all accidents and incidents resulting in injury or death.
- Informs the ECO of problems arising when implementing the EMP and ways of improving the EMP.
- Informs the ECO of any complaints received.

2.1 General Guidelines

The following measures provide guideline solutions to frequently anticipated issues on most development activities:

- The prevention of any site degradation due to non-compliance, administrative or financial problems, and inactivity during the operation phase, illegal activities, delays caused by archaeological finds etc. is ultimately the responsibility of the applicant/developer. Section 28, National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA].
- The study area must be clearly defined according to the project authorisation. All workforce members and other construction personnel are not to go beyond the designated footprint.
- The site staff must adhere to agreed and approved access points and haul roads.
- No camping is allowed on any private property.
- Damage to private or public property such as fences, gates and other infrastructure may occur at any time. All damage to be repaired immediately and to the satisfaction of the owner.

- The Project Manager must adhere to all conditions of contract including this EMP.
- Proper planning of the construction process must be undertaken to allow for disruptions due to rain and very wet conditions.
- All private and public manmade structures near the project site must be protected against damage at all times and any damage must be rectified immediately.
- Proper site management and regular monitoring of site works.
- Proper documentation and record keeping of all complaints and actions taken.
- Regular site inspections and good control over the construction process throughout the construction period.
- A positive attitude towards Environmental Management by all site personnel must be motivated through regular and effective awareness and training sessions.
- An ECO is to be appointed to implement this EMP. The ECO is to deal with any landowner related matters.
- Environmental Audits to be carried out during construction operations and upon completion of decommissioning of the project.

2.2 Awareness Training

The ECO is responsible for ensuring everyone on site is given an environmental awareness induction session which not only clearly defines what the environment is and gives specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment.

Refresher courses must be conducted as and when required. The PM must ensure weekly (or as needed) toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that week or the area/habitat in which they are working. Awareness posters and a hand out must be produced to create awareness throughout the site (as needed).

2.3 Environmental Method Statements

Method Statements are written submissions to the ECO by the PM, in response to a request by the ECO. The Method Statements set out the plant, materials, labour and method that the PM proposes using to carry out an activity, identified by the ECO. The Method Statements contain the appropriate detail such that the ECO is able to assess whether the PM's proposal is in accordance with the requirements of the EMP. The PM must sign each Method Statement along with the ECO to formalise the approved Method Statement.

All Method Statements including those which may be required as ad hoc or emergency construction method statements must be submitted to the ECO for approval prior to the commencement of the activity.

Any changes to the method of works must be reflected by amendments to the original approved Method Statement. Any changes in this regard must be approved by the ECO on the understanding that such changes are environmentally acceptable and in line with the requirements of this EMP.

The pro forma Method Statements attached (amongst others) must be used and method statements for the following activities must be submitted to the ECO for approval as soon as construction of the West Riding Pipeline occurs:

- Solid waste management;
- Crew camps and operation lay down areas;
- Dust control;
- Hydrocarbon and emergency spills procedures; and
- Fire.

2.4 Site Documentation

The following is a list of documentation amongst others, which must be held on site and must be made available to the ECO and/or Approving Authority on request.

- Site daily diary /instruction book/ Incident reports;
- Records of all remediation / rehabilitation activities;
- Copies of ECO reports (management and monitoring);
- Environmental Management Programme (EMP);
- Complaints register;
- Method statements; and
- Environmental Authorisation.

2.4.1 Pro forma Documentation

(a) Prior to the re-commencement of construction activities

The following attached *pro forma* documentation is to be filled out and is binding to the EMP and project contract and includes, but is not limited to the following:

- Declaration of understanding by the Proponent/Developer;
- Declaration of understanding by the Project Manager;
- Declaration of understanding by the Contractor;
- Method statements; and
- ECO approval for method statements.

(b) During construction activities

The following attached pro forma documentation is to be filled out and maintained. These are binding to the EMP and project contract. They include, but are not limited to, the following:

- Amended Method Statements;
- ECO approval for amended method statements;
- Environmental incidents; and
- Records of all remediation / rehabilitation activities.

3 ENVIRONMENTAL MANAGEMENT REQUIREMENTS

3.1 Section A: Planning and Pre-construction Phase Activities

A.1. Construction Camp set up (if required)		Responsibility	Frequency	Notes
Careful planning of the construction camp can ensure that the time and costs associated with environmental management and rehabilitation are reduced.	**A.1.1 Site Layout** (a) The choice of the Contractor's camp requires the Project Manager's permission and must ensure that the camp is located in an area that will ensure a minimum impact on the environment and surrounding residents. (b) Ensure that pipeline and associated infrastructure and access road to the site take all the environmental characteristics of the site into account. (c) The contractor should submit plans of exact location, extent and construction details of the temporary construction camp facilities to the Project Manager for approval, prior to establishment of the camp. (d) The layout plans should reflect the proposed camp's location in relation to any existing infrastructure (water mains, electricity cables, sewage mains, etc.) on site. (e) Access to the construction camp must be through an	PM	Prior to moving on site	

	existing route or one that is clearly demarcated and agreed upon. (f) The construction camp can comprise of the following (as required): a. Site office b. Ablution facilities c. Designated first aid area d. Eating area e. Storage areas (g) The location of the existing sewer and water lines must be surveyed and demarcated prior to construction commencing. (h) During the construction phase, the edge of the riparian and wetland areas to be crossed extending 5m beyond the crossing must be clearly demarcated. (i) The centre line of the excavation for the pipe through a river or stream is to be marked with survey pegs and the extent of the working servitude demarcated.			
Careful planning of the proposed location of the pipeline ensure that the time and costs associated with environmental management and rehabilitation are reduced.	**A.1.2 Pipeline alignment and crossing design recommendations** (a) Wherever possible, the pipeline should be established within the watercourses as close to the road crossings as possible as these areas are already disturbed and transformed. (b) Wherever possible, all watercourses crossings must be via pipe bridges.	PM/ECO	Prior to moving on site.	

	(c) The pipeline must be routed so that the watercourses are crossed at as close to right angles to the direction of flow as possible. The number of bridge piers within the watercourses must be minimised as far as possible and the central/wettest parts (active channels/channel beds) of the watercourses must be spanned where possible.			
	A.1.3. Provision for waste disposal (a) Bins and skips shall be provided at convenient intervals for disposal of waste within the construction camp / site. (b) Ensure that waste is placed in skips and stored in a designated storage/collection area prior to being safely disposed of and it must be ensured that it will not cause any surface and groundwater pollution or pose any health hazards. (c) Recycling and provision of separate waste receptacles for different types of waste should be encouraged. (d) Develop and implement a detailed on-site Waste Management Plan, prior to the relevant waste generating activities commencing. (e) Reduce, recycling and reuse of waste must occur whenever possible. (f) Develop and implement a detailed on-site Waste Management Plan, prior to the relevant waste generating activities commencing, covering inter alia: • Identification, classification and keeping of a register of type of waste generated; • Planning for the construction / establishment /	PM/Contractor	On-going	

	operation / decommissioning of a centralised waste management facility and/or designated waste management areas; • Procedures to be followed for waste separation at source as well as reduce, re-use, recycle, recover and treatment of waste prior to the disposal option; and • Waste management procedures for waste disposal, e.g. storage, disposal, keeping of waste consignment certificates, etc.			
A.2. Establishing storage areas		**Responsibility**	**Frequency**	**Notes**
Storage areas can be hazardous and unsightly. These storage areas can also cause environmental pollution if not designed and managed properly.	**A.2.1. General Substances and Materials** (a) When deciding on the location of temporary stockpiles, the following needs to be considered: • road access, • length of time the stockpile will exist. (b) Additionally all stockpiles should be located away from sensitive ecosystems and protected from the prevailing winds. (c) Storage areas must be designated, demarcated and fenced if necessary. (d) Storage areas should be secured, to minimize the risk of crime and contamination. (e) The storage area must be adequately fenced with bonnox type fencing (approximately 2m high, topped with razor wire) to discourage the theft of materials and	ECO approval	During site set up.	

	equipment from the construction site. (f) The storage area is to be maintained in a neat and orderly state at all times.			
	A.2.2 Hazardous Substances and Materials (a) Should it happen that there is a need to store fuel on site; it must be stored in a bunded area with at least a volume of 110% of the largest tank. (b) Hazardous chemical working/refueling areas must be bunded with an impermeable liner. (c) Ensure that there is always a supply of absorbent material readily available to absorb/break down any hydrocarbon spillage. (d) In the case of a spill, contaminated material must be removed from the site immediately and disposed of at an appropriate hazardous waste facility. (e) The Contractor must devise a procedure for dealing with accidental spills, which has to be approved by the ECO. (f) Any contaminated soil or water must be removed and stored in a skip until it can be disposed of at an appropriate disposal site.	ECO approval	During site set up	
A.3. Education of site staff on general Environmental Conduct		**Responsibility**	**Frequency**	**Notes**
These points must be communicated to all staff before the project commence on site.	**A.3.1. Environmental Education and Awareness** Ensure that all site personnel have a basic level of	ECO	During staff induction	

	environmental awareness training. Topics covered should include: • What is meant by 'Environment'? • Why do we have to protect the environment? • How construction activities can impact on the environment. • How can these impacts be mitigated. • Awareness of emergency and spills response provisions. • Social responsibility during construction e.g. being considerate to local residents. It is the contractor's responsibility to provide the SF with no less than 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass the information onto the construction staff. (a) Translators are to be used where necessary. (b) The use of pictures and real-life examples is encouraged as these are easier to remember. (c) The need for a 'clean site' policy also needs to be explained to the construction workers. (d) The need for a 'clean site' policy also needs to be explained to the construction workers. (e) Monitor the Contractors' undertaking of environmental awareness training (induction and refresher) for contractor personnel.			
	A.3.2. Worker Conduct on Site Under no circumstances may open areas or surrounding bush be used as toilet facilities. A general regard for the social and ecological well-being of the	PM/Contractor	During staff induction, followed by on-going monitoring.	

	site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: • No alcohol/drugs to be present on site. • No fire arms allowed on site or in vehicles transporting staff to/from the site (unless by security personnel.) / eThekwini Municipality policy will be implemented in this regard. • Construction staff is to make use of facilities provided for them, as opposed to ad hoc alternatives.			
A.4. Water Quality		**Responsibility**	**Frequency**	**Notes**
Incorrect disposal of substances and materials and polluted run-off can cause serious negative impacts on surrounding water resources.	**A.4.1. Water Quality** (a) Equipment and machinery must be in good operation condition, clean (power washed), free of leaks, excess oil and grease. (b) Ensure that machinery is operated by a skilled driver who has been trained to use it correctly and who will be able to identify if something is wrong with the engine and conduct regular inspections identifying engine related leaks. (c) Minimise impacts on natural watercourse areas, by taking all necessary precautions to ensure that construction activities do not alter natural ground and surface water quality or flows in areas identified as sensitive. (d) Locate the construction camp (and laydown areas) outside the 32m buffer. (e) Prohibit the use of natural surface water sources (i.e. streams, rivers, wetlands) for potable and other water use, as only municipal water (or from another legal source) may be used on site.	ECO	During site set up.	

A.5. Set up of waste management activities		Responsibility	Frequency	Notes
	A.5.1 Waste management (a) A dedicated area must be allocated for waste sorting and storage. (b) Individual waste skip or wheelie bins for different types of waste should be provided (if none currently exist).	ECO	During site set up	
A.6. Security and safety		**Responsibility**	**Frequency**	**Notes**
	A.6.1. Risk Associated with materials on site (a) Material stockpiles or stacks such as cement, steel, bricks, corrugated iron sheeting, plastic piping, etc. must be stable and well packed to avoid collapse and possible injury to site workers, stockpiles must also be covered to avoid seepage and ground water pollution (where applicable). (b) No materials are to be stored in unstable or high risk areas such as in close proximity of the entrance road, excavated areas, etc.	PM/Contractor	On-going	

3.2 Section B: Construction Phase Activities

B.1. Site Access		Responsibility	Frequency	Notes
	B.1.1 Access to the site (a) Ensure that access to the site is via the gravel access path only.			

	(b) Clearly communicate access policy for the properties to the staff and public, using notice boards on access gates and by directly communication with the nearby residents. (c) Define and demarcate limited access tracks, where travelling / transportation through sensitive environments cannot be avoided. (d) Refrain from using off-road vehicles outside designated and demarcated roads or tracks, when travelling / transporting outside the construction / operations footprint. (e) Declare and display / indicate appropriate speed limits that would effectively mitigate potential environmental impacts; e.g. dust, noise, spills, accidents, etc.			
B.2. Maintenance of construction camp		**Responsibility**	**Frequency**	**Notes**
	B.2.1 Ablution (a) Provide adequate temporary chemical toilets on site: • Provide for a suitable ratio of toilets per number of employees (usually at least 1 toilet per 15 employees) • Provide for toilets to have hand wash facility either within the toilet cubicle or adjacent thereto • Locate toilets (porta loos) outside the 1:100 year floodline and preferably away and/or hidden from public roads, residential areas and other public places • Secure toilets (porta loos) firmly to prevent them from toppling over due to wind or any other cause	Contractor	Weekly inspection	

	• Appoint a service provider to remove sewage from the chemical toilets and/or sewage sludge from package plants on a regular basis; and provide and ensure for this sewage / sewage sludge to be disposed of at a municipal sewage treatment plant or alternatively on an appropriately designed on-site sewerage treatment plant • Clean the sewage system out regularly and immediately before long weekends, builders holidays and work breaks; and disposed the sewage to the municipal sewage system • Ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents is properly stored and removed from site • Keep toilets locked after working hours. {Method Statement} / {SOP} (b) Prohibit staff from abluting anywhere other than in toilets. (c) Keep toilets locked after working hours.			
	B.2.2. Eating Areas (a) Eating areas (if applicable) should be serviced and cleaned regularly to ensure the highest possible standards of hygiene and cleanliness. (b) All litter throughout the site should be picked up and placed in the appropriate recycling bins provided.	Contractor	Weekly inspection	

	B.2.3. Housekeeping (a) Adhere to and practice good housekeeping to ensure that construction camps and sites are well organised, material is neatly stacked and waste is regularly removed.	Contractor	Weekly	
B.3. Staff Conduct		**Responsibility**	**Frequency**	**Notes**
	B.3.1. Environmental Education and Awareness / Safety (a) The contractor must monitor the performance of construction workers to ensure that all the topics that where covered in the induction meeting is properly understood, and followed. (b) The contractor shall ensure that his camp and working areas are kept clean and tidy at all times.	Contractor	Daily	Toolbox talks and lunchtime Q&A.
B.4. Waste Management		**Responsibility**	**Frequency**	**Notes**
Activities in the construction site such as office work, usage of construction materials, etc., generate different types of waste that requires to be managed properly. These wastes could result in environmental pollution such as soil contamination/ pollution or health hazards to employees working on-site, if not managed properly.	**B.4.1 On-site waste management** (a) Waste is grouped into "general" or "hazardous", depending on its characteristics. The classification determines the handling methods and the ultimate disposal of the material. The Contractor/ECO must classify waste into general or hazardous based on the toxicity or hazard nature of waste. (b) Develop and implement a detailed on-site Waste Management Plan, prior to the relevant waste generating activities commencing, covering inter alia: • Identification, classification and keeping of a	Contractor/EO/ PM	During the start-up of construction on site and on-going thereafter. During waste collection Prior to signing an agreement with the waste removal contractor.	ECO and PM needs to ensure that all construction staff is educated on waste management.

	register of type of waste generated; • Planning for the construction / establishment / operation / decommissioning of a centralised waste management facility and/or designated waste management areas; • Procedures to be followed for waste separation at source as well as reduce, re-use, recycle, recover and treatment of waste prior to the disposal option; and • Waste management procedures for waste disposal, e.g. storage, disposal, keeping of waste consignment certificates, etc. {Method Statement} / {SOP} (c) Waste must be placed in the designated or marked skips/bins which must be emptied on a regular basis by a contracted waste collector. These should remain within the demarcated areas and should be designed to prevent refuse from being blown out by wind. (d) Ensure that all conventional waste is properly disposed of and removed from the site to a permitted landfill site, or where applicable to an appropriately licensed waste recycling facility. (e) Separation of waste and recycling of paper, glass, cans, scrap, metals, plastic bottles, etc., must be considered prior to disposal. The disposal at the landfill site should be considered as the last option, after having taken into consideration the prevention of waste generation, reduction waste generation, reuse and recycling. (f) Hazardous waste that require disposal (oily rags, used fuel/oil, etc.) must be placed in a suitable leak proof skip or wheelie bin for disposal at an approved hazardous waste disposal facility. (g) The contractor is responsible for arranging the removal of			

	all waste from site generated through construction activities. Waste must be removed to a registered, appropriate disposal and recycling facilities. (h) Obtain safe waste disposal certificates for all wastes disposed and retain and keep these certificates on record for proof of appropriate disposal for at least 3 years (or alternatively in accordance with any other Municipal requirements). (i) No burning and littering of waste on site should be allowed. (j) Request the following from the waste contractors that are used to collect waste: • Copies of the weighbridge receipt from the waste removal contractor for all waste collected on site.			
B.5. Construction vehicles / equipment		**Responsibility**	**Frequency**	**Notes**
Engine machines such as compressors, pumps, etc. can have small leaks (usually oil) that can accumulate to become spills, which require clean-up. These leaks become more evident if the equipment remains in the same place for an extended period of time. Damaged fuel tanks, fuel hoses, and fuel pumps can be sources of significant fuel leaks. Hydraulic systems can blow gaskets or hoses resulting in large quantities of hydraulic fluid spilled to the ground.	**B.5.1 Construction equipment** (a) Vehicles and machinery are to be kept in good working order and to meet manufactures specification for safety, fuel consumption and emission. (b) Should excessive emissions be observed, the site manager needs to implement an effective vehicle and equipment service and maintenance plan. (c) Vehicle parking and equipment storage must be done on a hardened and sealed surface area such that oil, fuel and other fluid leaks do not pollute soil or ground water sources.	Contractor / EO	On going	Contractor must follow a detailed checklist for machinery and equipment maintenance.

B.6. Emergency Response to spillages		**Responsibility**	**Frequency**	**Notes**
This section aims to provide measures to manage spillages from equipment used on site and measures for other construction materials handled on site.	**B.6.1 Emergency Response to spillages** The contractor shall take into account the following prevention measures to be applied during spillages. (a) Immediately repair all leaks of hydrocarbons, oil, etc. (b) Take reasonable measure to prevent the spills or leaks. (c) Dispose contaminated materials to a location designated thereto. (d) The contractor shall have its own spill response plan in the event of any spills (oil, fuel, hazardous materials) from his machinery or equipment used on site.	Contractor	During spillages	The ECO/EO and contractor must ensure that the Emergency response procedure is well understood by all workers on site and that a summary is available for site visitors.
B.7. Protection of Biophysical Environments				
Most animal species are likely to move away from the construction site into the surrounding wetland habitats once the activities and noise associated with constructions becomes evident. Thus it is unlikely that they would suffer any long-term effect. Indigenous vegetation will be protected as far as possible so that animal habitats and breeding species are not disturbed. All activities on site must	**B.7.1 Mitigation measures against impacts on Fauna** (a) Minimize disturbance of animals on and within close vicinity of the site. (b) All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. (c) Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. No wild animal may under any circumstance be hunted, snared, captured, injured, killed, harmed in any way or removed from the site. This includes animals perceived to be vermin. (d) Employees must be trained on how to deal with fauna			

comply with the regulations of the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) (NEM:BA). Focus should also be on animals such as snakes and other reptiles that often generate fear, by training workers on how to move safely away and to whom to report the sighting.	species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake a specialist must be called in to safely relocate the animal if the ECO is not able to. (e) Environmental induction training and awareness must include aspects dealing in safety with wild animals on site. (f) Minimize interruption of breeding patterns of birds. (g) Minimize destruction of habitats. (h) Ensure that waste bins are kept tidy and that waste is removed weekly to reduce any rodent infestation. (i) Place pipelines and cables underground to prevent surface barriers, wherever reasonably possible, and fill in trenches and rehabilitate the affected area as soon as reasonably possible. (j) Facilitate search-and-rescue operations before and during site clearance, by rescuing at least but not limited to individuals of threatened species and re-locating these in neighbouring protected / conservation areas. (k) Any animal found within the construction corridor should be moved to the closest point of natural or semi-natural vegetation outside the construction zone. (l) Prohibit feeding of wild animals; unless it forms part of a formal conservation programmer. (m) Where rare fauna (vertebrate and invertebrate) stands to be lost, every effort should be made to minimize the impact, bearing in mind that rescue and relocation of invertebrate species is generally not recommended as an option due to uncertainties and low success rate.			
According to the Vegetation Specialist: "Nearly all vegetation along the route is	**B.7.2 Mitigation measures against impacts on Flora** (a) Where possible, cut vegetation to ground-level rather than removing it completely, leaving root systems intact			

transformed and none is in natural state. The great majority of the route passes along mown or cultivated verges along which there is contiguous suburban development. Vegetation that may be affected by construction in this area comprises only garden plantings, garden escapes, alien plants and occasional indigenous trees. The small number of scattered indigenous trees have either been planted, have established by chance distribution of seeds, or in a few cases could be remnants of the original vegetation. There is no indigenous herbaceous component in this habitat except for garden plantings or weeds of disturbance." He also notes that: "Amongst the plantings on verges and fence lines are a small number of species that while planted in gardens, are protected by the National Forests Act or the provincial conservation ordinance."	to ensure rapid re-colonization. (b) Any exotic vegetation (trees and plants) encountered should be removed from the site and properly disposed of. (c) Inform site staff that under no circumstance may firewood or medicinal plants be harvested. (d) No open fires shall be allowed on site under any circumstances, fires will only be permitted in adequate facility within the crew camp. (e) Minimize scarring of the soil surface and land features. (f) Minimize disturbance and loss of topsoil. (g) Re-vegetation of the area should be allowed to proceed naturally or be re-instated through a suitable replanting / re-vegetation programmer where necessary. (h) All bare surfaces across the construction site must be checked for alien plants at the end of every week and alien pants removed by hand pulling and adequately disposed. (i) Avoid protected species if possible; (j) Relocate or replace protected species if they cannot be avoided (note that aloes relocate well); (k) If trees are destroyed, whether indigenous or alien, these can be replaced with an indigenous tree on a one-to-one basis. Those species that are suitable for the according to the criteria of probably once naturally occurring in the area, hardiness, availability in horticulture and which are also productive for wildlife (birds, bats and insects) are Appendix 5. (l) If new plantings are necessary, ensure that this occurs in the summer / near-summer months (i.e. the time of year when rains occur) and if this is necessary the planting			

	exercise should be delayed until then. This should also occur under direction of a horticulturist. Maintenance should be provided by way of thorough watering once a week for a six week period after planting, or longer if the horticulturist deems conditions make this necessary. (m) Monitor the route for a one year period afterwards, at six month intervals, and destroy any alien species that establish within the construction footprint. Best practice will involve herbicide treatment or herbicide treatment following cutting of stumps or frilling of non-herbaceous alien plants, not cutting alone. (n) Where construction encroaches into open space areas, destroy all alien species within 30 metres of the footprint during or by the end of construction and allow follow up annually for two years. However, due to the difficulty and hazard (including to members of the public) in dealing with the very tall *Eucalyptus grandis* trees in open space area 5, cutting down or frilling and herbiciding of the trees can be omitted.			
	B.7.3 Water Contamination and Pollution (a) All maintenance vehicles and equipment shall be kept in good working order, are serviced regularly. (b) Portable toilets must be regularly emptied and secured. (c) Refuse bins must be regularly emptied by an appropriate licensed waste contractor and secured (d) Drip trays (where appropriate) must be emptied regularly and secured. (e) Posters in the work site, educating and informing employees of pollution management.			

B.8. Noise				
Construction noise will mainly result from the use of vehicles during construction activities. However noise from site activities is considered of low significance.	**B.8.1 Noise Control** (a) Restrict very noisy construction activities to daytime, if feasible; and if not, obtain authorisation from the local authority for alternative arrangements. (b) Refrain from operations during the night as sound may travel to residential areas, businesses and communities. (c) Provide affected parties with prior knowledge of scheduling for ultra-heavy-duty vehicles and advise on the frequency and day periods of exposure to such noise (d) Ensure that all vehicles and where possible noisy equipment are fitted with silencers that are regularly and properly maintained (e) Meet regulatory requirements in terms of site boundary noises (in terms of municipal requirements). (f) Restrict very noisy construction activities, e.g. breaking up concrete hardstanding with pressure hammers to daytime. (g) Noise impacts generated by machinery must be minimised as far as possible by ensuring all machinery is in good working order, all machinery has the necessary noise suppression, and working hours are restricted to 7am – 5pm.			
B.9. Air Quality				
Minimal dust and vehicle emissions will be generated during the construction phase	**B.9.1 Air Emissions and Odour Control** (a) Minimise the surface area of exposed soil and fine construction materials to wind erosion (construction			

	phase) (b) Appropriate dust suppression measures must be applied at all times, particularly during winter.(e.g. Sprinkle water on dust on exposed areas or soil mounds from trenching) as and when dust problems arise (construction phase) (a) Maintain vehicles and other driven machinery regularly to ensure that no smoke is emitted from exhausts (construction and operational phase) (b) Prevent any uncontrolled fires (construction and operational phase) (c) Prohibit burning of wastes/refuse (construction and operational phase) (d) Regular monitoring of the road, undertake regular audits to monitor any significant dust emissions (a)			
B.10. Heritage				
	B.10.1 Heritage Control (a) Cease all construction within a radius of at least 20m of any heritage features or artefacts, or skeletons or bones that are found during construction. This distance should be increased at the discretion of supervisory staff if heavy machinery or explosives could cause further disturbance to the suspected heritage resource. (b) Mark this area using clearly visible means, such as barrier tape, and all personnel should be informed that it is a no-go area. (c) Appoint a guard to enforce this no-go area if there is any possibility that it could be violated, whether intentionally			

	or inadvertently, by construction staff or members of the public. (d) No measures should be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone or stone. (e) If a heritage practitioner has been appointed to monitor the project, s/he should be contacted and a site inspection arranged as soon as possible. (f) If no heritage practitioner has been appointed to monitor the project, the head of archaeology at Amafas Pietermaritzburg office should be contacted; telephone 033 3946 543). (g) Notify the South African Police Services by an Amafa staff member or an independent heritage practitioner if human remains are identified. No SAPS official may disturb or exhume such remains, whether of recent origin or not. (h) Respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time. **(i)** Any extension of the project beyond its current footprint involving vegetation and/or earth clearance should be subject to prior assessment by a qualified heritage practitioner, taking into account all information gathered during this initial heritage impact assessment			

Please note that Section B must be updated with any further conditions as stipulated by the Environmental Authorisation.

3.3 Section C: Operation Phase Activities

C.1. General		Responsibility	Frequency	Notes
Refer to **Section 1.2** above.	**C.1.1 Compliance with Environmental Legislation** (g) The Project Manager shall ensure that all pertinent legislation concerning the protection of the natural environmental and prevention of pollution and environmental impacts is strictly enforced (**Section 1.2**). (h) The applicant shall maintain a database of all legislation, regulations and guidance pertinent to the environmental management of the West Riding Watermain Pipeline Project for the duration of the contract.	PM/SF	On-going throughout the Operational and Decommissioning Phase of the project	
	C.1.2 Working Areas and No-go Areas (a) The Site shall be divided into working areas and 'no-go' areas and shall be marked on appropriate plans for reference. (b) Working areas are those areas required by the construction staff for their site works. (c) No-go' areas are generally those large areas outside the designated working areas, and may include, but not be limited to: • Existing services and infrastructure • Privately owned land and residences (unless a	PM/SF	On-going throughout the Construction, Operational and Decommissioning Phase of the project	

	formal agreement has been signed for access, use or impact) • Durban Metropolitan Open Space System (D'MOSS) areas • Watercourses • Any heritage sites that receives the protection from Amafa • Natural or special features as defined in the Environmental Specification (d) The PM and SF shall ensure that all "no go" areas are demarcated and that no unauthorised entry, litter, stockpiling, dumping or storage of equipment or materials shall be allowed within the demarcated "no go" areas. (e) Once construction within an area or along the pipeline route has been completed and the area has been rehabilitated and re-vegetated, it shall be considered a "no go" area. In the event that any damage is caused to the 'no-go' areas, the PM will be required to repair, restore, reinstate and/or rehabilitate these areas at their own cost.			
C.2. Access to the site		**Responsibility**	**Frequency**	**Notes**
The proposed site runs along Assagay Road, crosses Old Main Road then turns into Galoway Road from there is runs along Ashley Road finally heading up Marion Road where it will link up with the West Riding Reservoir	**C.2.2 Access paths to the site** (a) No other routes will be used by vehicles or personnel for the purpose of gaining access to the site. (b) Access to the site is to be shown on a site plan and approved by the PM.	PM	On-going throughout the Operational Phase of the project	

	(c) Disruption to regular road users must be minimised. (d) The PM shall ensure traffic safety at all times and shall implement safety measures to this end. General and personal traffic safety is the responsibility of the individual. (e) Declare and display / indicate appropriate speed limits that would effectively mitigate potential environmental impacts; e.g. dust, noise, spills, accidents, etc.			
C.3. Stormwater Management and Erosion Control		**Responsibility**	**Frequency**	**Notes**
	C.3.1 Mitigation measures for storm water management and the impacts of Erosion (a) A suitable stormwater drainage system and containment must be implemented by the PM to prevent soil and silt erosion, protect storage areas, to prevent uncontrolled stagnant ponds forming and avoid siltation of water resources (b) Excavated and filled trenches and stockpiles are at a stable angle and capable of accommodating normal expected water flows. (c) The PM shall take reasonable measures to control stormwater and the erosive effects thereof and shall provide a Method Statement for this. (d) During the proposed activity, the PM shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water from being concentrated in streams and from scouring slopes, banks or other areas. (e) Measures shall be implemented to effectively contain and treat any stormwater contaminated with silt, soil or any other substance in order to protect the	PM	On-going throughout the Construction Phase of the project	

	environment. (f) Areas susceptible to erosion must be monitored regularly for evidence of erosion – this includes: • Areas stripped of topsoil • Soil stockpiles • Steep slopes and embankments. (g) On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be restricted to: • Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls • Straw stabilising • Brushcut packing • Mulch or chip cover • Hydroseeding • Constructing anti-erosion berms. (h) Where erosion does occur on any completed work/working areas, the PM shall reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the ECO. (i) Traffic and movement over stabilised areas shall be restricted and controlled. Any damage to the stabilized areas shall be repaired and maintained.			
C.4. Fauna		**Responsibility**	**Frequency**	**Notes**
All activities on site must comply with the regulations of the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) (NEM:BA). Focus should also be on animals such as snakes and other reptiles that often generate	**C.4.1 Mitigation measures against impacts on Fauna** (a) Minimize disturbance of animals on and within close vicinity of the site. (b) All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society.	PM	Daily inspection	Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones etc.

fear, by training workers on how to move safely away and to whom to report the sighting.	(c) Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. No wild animal may under any circumstance be hunted, snared, captured, injured, killed, harmed in any way or removed from the site. This includes animals perceived to be vermin. (d) Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake a specialist must be called in to safely relocate the animal if the ECO is not able to. (e) Environmental induction training and awareness must include aspects dealing in safety with wild animals on site. (f) Minimize interruption of breeding patterns of birds. (g) Minimize destruction of habitats. (h) Ensure that waste bins are kept tidy and that waste is removed weekly to reduce any rodent infestation. (i) Place pipelines and cables underground to prevent surface barriers, wherever reasonably possible, and fill in trenches and rehabilitate the affected area as soon as reasonably possible. (j) Facilitate search-and-rescue operations before and during site clearance, by rescuing at least but not limited to individuals of threatened species and re-locating these in neighbouring protected / conservation areas. (k) Any animal found within the construction corridor should be moved to the closest point of natural or semi-natural vegetation outside the construction zone.			
C.6. Flora		**Responsibility**	**Frequency**	**Notes**
	C.6.1 Mitigation measures against impacts on Flora	PM/SF	Daily inspection	

	(a) Where possible, cut vegetation to ground-level rather than removing it completely, leaving root systems intact to ensure rapid re-colonization. (b) Any exotic vegetation (trees and plants) encountered should be removed from the site and properly disposed of. (c) Inform site staff that under no circumstance may firewood or medicinal plants be harvested. (d) The success of natural regeneration should be monitored. In areas requiring further intervention, a suitable replanting /re-vegetation programmer should be implemented. This should comprise a mix of rapidly germinating indigenous grasses, shrubs and trees naturally occurring in the affected habitat and adapted to stabilizing areas. (e) No open fires shall be allowed on site under any circumstances, fires will only be permitted in adequate facility within the crew camp. (f) Minimize scarring of the soil surface and land features. (g) Minimize disturbance and loss of topsoil. (h) Re-vegetation of the area should be allowed to proceed naturally or be re-instated through a suitable replanting / re-vegetation programmer where necessary.			
C.9. Noise		**Responsibility**	**Frequency**	**Notes**
Operating noise will mainly result from the construction of the proposed activity and from maintenance vehicles during maintenance operations. However noise from site activities is considered of low significance.	**C.9.1 Noise Control** (a) Restrict very noisy construction activities to daytime, if feasible; and if not, obtain authorization from the local authority for alternative arrangements. (b) Refrain from operations during the night as sound may travel to residential areas, businesses and communities. (c) Provide affected parties with prior knowledge of scheduling for ultra-heavy-duty vehicles and advise on	PM	On-going throughout the Operational Phase of the project	

	the frequency and day periods of exposure to such noise (d) Ensure that all vehicles and where possible noisy equipment are fitted with silencers that are regularly and properly maintained (e) Meet regulatory requirements in terms of site boundary noises (in terms of municipal requirements). (f) Restrict very noisy construction activities, e.g. breaking up concrete hardstanding with pressure hammers to daytime.			
C.10. Air Quality		**Responsibility**	**Frequency**	**Notes**
Once the pipeline is installed and re-vegetated, there will be no air quality impact.	**C.10.1 Air Emissions and Odour Control** (j) Ensure that all maintenance vehicles are maintained in good working order to help reduce air emissions. (k) Make sure the proposed pipeline trenches are properly covered to reduce erosion on site or safety risks to surrounding community.	PM	Monthly monitoring	

Please note that Section D must be updated by the ECO closer to decommissioning of the pipeline

3.4 Section D: Decommissioning Phase Activities

D.1. Rehabilitation of the site		**Responsibility**	**Frequency**	**Notes**
	D.1.1 Rehabilitation of the pipeline (a) Develop a Rehabilitation Plan that provides for effective, systematic and continual remediation and rehabilitation of the site and impacted areas outside the site to a high standard in accordance with all the relevant requirements of this EMP and the Basic Assessment specialist studies; including but not limited to the following:	PM/SF	On-going	

	• Landscape exposed and/or destabilised areas to blend in with the surrounding natural areas; • Provide for and arrange for the safe removal and legal disposal of any and all hazardous substances from the area to be rehabilitated; • Provide for all areas disturbed during the development of the proposed facility; including areas outside the site footprint (e.g. access tracks) and the natural areas inside the site boundaries, to be effectively rehabilitated with locally occurring indigenous species; • Provide for ultimate remediation of the development footprint to be remediated effectively to allow for the relevant change in land use; and in doing so, follow all relevant planning requirements that would be applicable at the time; and Undertake rehabilitation out to a high standard so that stabilisation, aesthetic form and ecological sustainability are able to rapidly improve with time.			
	D.1.2 Construction and rehabilitation recommendations for pipe bridge crossings (a) Construction should be undertaken between the months of April and August. (b) A photographic record of the state of the watercourse prior to construction must be compiled for reference purposes. (c) Disturbance to the delineated riparian and wetland areas and soils along the pipeline route should be restricted to an established construction right-of-way (ROW) corridor. (d) The width of the ROW corridor should be as narrow as	ECO	On-going	

	practically possible and should be demarcated and fenced off during the site setup phase to the satisfaction of the Environmental Control Officer (ECO). (e) Once the construction ROW is established, all areas outside of the demarcated ROW must be considered no-go areas. Encroachment into no-go areas without prior approval from the ECO must be penalised with a fine. (f) All pipes and equipment must be stored outside of the demarcated watercourses in a stockpile area approved by the ECO. (g) The construction ROW should comprise the following: • a one-way running track of a maximum width of 2m. • a pipeline bridge and plinth corridor of a maximum width of 1.5m. (h) Notwithstanding the above, every effort should be made to utilise the existing roads and associated embankments as running tracks for the establishment of the pipe bridges. (i) The running track should not be established within the central, wettest lowest lying portions of the watercourses where no piers are proposed. In this regard, the running tracks must extend into the watercourses from each valley side to the furthest pier construction site, thus avoiding the crossing of the central wet or channelled areas. (j) Before clearing, indigenous plants suitable for rescue are to be relocated to a temporary holding area by a vegetation specialist. Indigenous plants suitable for rescue include small ingenious shrubs and trees (saplings) and grass clumps. (k) Before stripping, all vegetation within the wetland and riparian areas must be chopped down by hand prior to more intensive wetland clearing and alteration. Any			

	fauna encountered during the clearing process must be relocated to the adjacent habitats under the supervision of the ECO. (l) Thereafter, the working servitude is to be stripped of topsoil and vegetation to a nominal depth and this top soil placed at a temporary stockpile area and maintained for re-use. (m) Soil stockpiles must be located outside of the demarcated watercourses. The location of these topsoil stockpiles must be agreed upon by the ECO prior to construction commencing. (n) Topsoil and subsoil must be stored separately. (o) Wherever possible, excavations within the watercourses should be undertaken by hand. If this is unfeasible for sound reasons, a small excavation vehicle may be used. (p) Once the pipe bridge is completed, the running track must be removed by hand wherever possible. (q) Once completed, the disturbed bed and banks of the streams and wetlands must be reshaped. (r) Compacted wetland and riparian soils along the running track must be ripped to a depth of 30cm. (s) Once the watercourses are re-shaped and the compacted soils are ripped, topsoil from that particular area must be reinstated within the wetland and riparian areas along the running track by hand to the satisfaction of the ECO. (t) The prepared soils along the construction corridor must be re-vegetated via hand broadcasting and plugs by a professional. For un-shaded areas, the seed mix should comprise an indigenous grass mix comprising of 'runner' grasses like *Cynodon dactylon var. Sea Green*. If the construction corridor is shaded, the grass mix should comprise shade tolerant species. In addition, the rescued indigenous plants must also be replanted			

	within the construction corridor by a professional. (u) Biodegradable geo-fabrics to be used on steep slopes to facilitate establishment of vegetation e.g. Geojute®. (v) The areas to be hand broadcasted must be lightly watered before planting to ensure that the seed material does not come into contact with dry ground. (w) The seed mixture must be evenly broadcasted over the entire surface of the construction corridor. In this regard, a mechanical seeding device may be used in order to ensure a uniform distribution of grass seed over the area to be rehabilitated. (x) The grass seed must be lightly worked into the upper topsoil layer by means of hand labour (using a rake). (y) The seeded area must be watered daily until planting has been completed. (z) The soil must be kept moist for the first two weeks after hand broadcasting to ensure seed germination. Thereafter irrigation should be applied weekly until reasonable groundcover is obtained. (aa) Watering should be gentle so that rill erosion is avoided and minimised. (bb) Any erosion damage resulting from watering/irrigation must be repaired immediately. (cc) The disturbed area should be monitored for erosion and alien plant encroachment weekly for a month, and monthly for 3 months. (dd) Alien plants within the rehabilitated area must be eradicated immediately. The alien plant species should be removed by hand-pulling where possible. Herbicides should be utilised where hand pulling is not possible. (ee) ONLY herbicides which have been certified safe for use in wetlands by independent testing authority to be used. (ff) The ECO must undertake a close-out audit after the monitoring period and sign-off on the success of the rehabilitation.			

	(gg) A detailed method statement for all watercourse pipe bridge crossings must be submitted to the ECO by the contractor for approval prior to construction commencing.			
	D.1.3 Construction and rehabilitation recommendations for pipe bridge crossings (a) The construction ROW should comprise the following: • a one-way running track of a maximum width of 2m. • a pipeline trench zone of a maximum width of 1.5m (b) Geotextile/geofabric must be laid down along the running track and crusher run/stone/rock material laid down on top of the geofabric. (c) The running track should be located upstream of the trench so that it can act as the dam above the trench. Water from the dammed up section must be diverted into the stream areas below the trench via pumping or fluming if necessary. (d) Care must be taken to ensure that water pumped or flumed from the dammed area above the trench does not erode the channel at the discharge point. In this regard, any water pumped out of the trench must be discharged into a hay bale silt trap outside of the watercourse to ensure erosion and/or sedimentation of the watercourse is minimised. The location of the silt trap must be agreed upon by the engineer and the ECO prior to construction commencing. The silt trap must be regularly monitored during dewatering. (e) If the more perennial flowing streams are to be trenched (not advisable), water from the stream is to be piped over the working area to allow the excavation to take place. This will be by means of sand bag embankments forming an in-stream dam with a pipe carrying the water			

	past the working area. The water must remain within the watercourse. The following measures apply to flow diversion: • The pipe section where the machinery is to cross the river or stream must be covered with spoil material to minimise damage to the pipe and allow machines to cross. • The discharge from the pipe is to be located so as to minimise the risk of erosion. Remedial measures such as discharging the water onto a rock bed may be required. (f) The trench must be backfilled first and the subsoils and topsoils must be reinstated in the proper order that they were excavated. (g) Thereafter the running track must be removed in a phased manner. Firstly, a section of the track must be removed by the excavator working back along the running track. Thereafter, the underlying soils must be ripped to a depth of 30cm and the top soils reinstated. This sequence should continue until the running track has been removed and the top soils reinstated.			
	D.1.4 Final Rehabilitation (a) All infrastructures, equipment, plant, temporary housing and other items used during the proposed activity period will be removed from the site. (b) Waste material of any description, including receptacles, scrap, rubble and tires will be removed entirely from the construction areas and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site. (c) Final rehabilitation shall be completed within a period specified by the Regional Manager.	PM/SF	On-going	

D.2. Monitoring and Reporting		Responsibility	Frequency	Notes
	D.2.1 Inspections and Monitoring (a) Regular monitoring of all the environmental management measures and components shall be carried out by proponent in order to ensure that the provisions of this programmer are adhered to. (b) Ongoing and regular reporting of the progress of implementation of this programmer will be done (c) Various points of compliance will be identified with regard to the various impacts that the operations will have on the environment (d) Inspections and monitoring shall be carried out on both the implementation of the programmer and the impact on plant and animal life (e) Visual inspections on erosion and physical pollution shall be carried out on a regular basis.	**ECO/Proponent**	**Bi-weekly or monthly during rehabilitation (as directed by the ECO)**	
	D.2.2 Compliance Reporting/submission of information (a) Layout plans will be updated on a regular basis and updated copies will be submitted on a biennial basis to the Regional manager. (b) Reports confirming compliance with various points identified in the environmental management programmer will be submitted to the Regional Manager on a regular basis and as decided by the said manager. (c) Any emergency or unforeseen impact will be reported as soon as possible. (d) An assessment of environmental impacts that were not properly addressed or were unknown when the programmer was compiled shall be carried out and added as a corrective action.	**ECO**	**Bi-weekly or monthly during rehabilitation (as directed by the ECO)**	

ANNEXURE 1

DECLARATION OF UNDERSTANDING BY THE DEVELOPER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:
Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 2

DECLARATION OF UNDERSTANDING BY THE PROJECT MANAGER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:
Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 3

DECLARATION OF UNDERSTANDING BY THE CONTRACTOR

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:
Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2:

ANNEXURE 4 A

METHOD STATEMENT: Solid Waste Management

CONTRACT:……**DATE**:…….

WHAT WORK IS TO BE UNDERTAKEN? [Give a brief description of the works to be undertaken on site that will generate waste (hazardous and non-hazardous wastes)]: * Note: please attach extra pages if more space is required.

***Insert additional pages as required**

WHERE ARE THE WORKS TO BE UNDERTAKEN? (Where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

METHOD STATEMENT: Solid Waste Management (contd.)

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:
Start Date:……**End Date:**……

HOW IS WASTE TO BE MANAGED ON SITE? (Provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

DECLARATIONS for Method Statement : **Solid Waste Management (contd.)**

1) PROJECT MANAGER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:_____

2) ECO

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:._____

ANNEXURE 4 B

METHOD STATEMENT: Crew Camps and Operation Lay Down Areas

CONTRACT:……**DATE**:…….

WHAT CREW CAMPS AND OPERATION LAY DOWN AREAS ARE REQUIRED ON SITE DURING OPERATION? (Give a brief description of these): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

WHERE ARE THE CREW CAMPS AND OPERATION LAY DOWN AREAS TO BE LOCATED? (Where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

METHOD STATEMENT:
Crew Camps and Operation Lay Down Areas (contd.)

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:
Start Date:……**End Date:**……

HOW ARE CREW CAMPS AND OPERATION LAY DOWN AREAS TO BE MANAGED? (Provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

DECLARATIONS for Method Statement

Crew Camps and Operation Lay Down Areas (contd.)

1) PROJECT MANAGER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:_____

2) ECO

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:._____

ANNEXURE 4 C

METHOD STATEMENT: Dust Control

CONTRACT:……**DATE**:…….

WHAT WORK IS TO BE UNDERTAKEN ON SITE THAT COULD GENERATE DUST? (Give a brief description of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

METHOD STATEMENT: Dust Control (contd.)

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:
Start Date:……**End Date:**……

HOW ARE THE WORKS TO BE UNDERTAKEN SO AS TO MINIMISE AND CONTROL DUST GENERATION ON SITE? (Provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

DECLARATIONS for Method Statement: **Dust Control (contd.)**

1) PROJECT MANAGER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:_____

2) ECO

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:._____

ANNEXURE 4 D

METHOD STATEMENT:
Hydrocarbon and Emergency Spill Procedures

CONTRACT:……**DATE**:…….

WHAT HAZARDOUS SUBSTANCES (INCL. FUELS) ARE TO BE STORED ON SITE? (Give a brief description of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

WHERE ARE THE THESE SUBSTANCES TO BE STORED ON SITE? (Where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

METHOD STATEMENT:
Hydrocarbon and Emergency Spill Procedures (contd.)

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:
Start Date:……**End Date:**……

HOW ARE HAZARDOUS SUBSTANCES TO BE MANAGED TO AVOID SPILLAGES AND WHAT EMERGENCY PROCEDURES ARE TO BE IMPLEMENTED IN CASE OF A SPILLAGE? (Provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

DECLARATIONS for Method Statement

Hydrocarbon and Emergency Spill Procedures (contd.)

1) PROJECT MANAGER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:_____

2) ECO

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:._____

ANNEXURE 4 E

METHOD STATEMENT: Fire Management

CONTRACT:……**DATE**:…….

WHAT WORK IS TO BE UNDERTAKEN? (Give a brief description of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

WHERE ARE THE WORKS TO BE UNDERTAKEN? (Where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

METHOD STATEMENT:
Fire Management (contd.)

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:
Start Date:……**End Date:**……

HOW ARE THE WORKS TO BE UNDERTAKEN? (Provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

DECLARATIONS for Method Statement

Fire Management (contd.)

1) PROJECT MANAGER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:_____

2) ECO

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

_____ _____

(Signed) (Print name)

Dated:._____

ANNEXURE 5

INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	**Env. Condition**	**Comments** *(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)*	**Corrective Action Taken** (*Give details and attach documentation as far as possible)*	Signature

DOCUMENT CONTROL
FORM IP180_B

CLIENT	:	eThekwini Municipality			
PROJECT NAME	:	West Riding Reservoir EIA	**PROJECT No.**	:	J34049
TITLE OF DOCUMENT	:	West Riding Reservoir EMP			
ELECTRONIC LOCATION	:	P:\3230 - Environmental\J34049 - West Riding Reservoir EIA\Reports\BAR\DBAR\DBAR Working version\Appendix F - EMP\J24096_West Riding Reservoir_EMP_v5_2014 11 28.docx			

	Approved By	**Reviewed By**	**Prepared By**
ORIGINAL	NAME **Elisabeth Nortje**	NAME **Katherine de Jong**	NAME **Charl Kruger**
DATE **November 2014**	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By	**Reviewed By**	**Prepared By**
REVISION	**NAME**	**NAME**	**NAME**
DATE	**SIGNATURE**	**SIGNATURE**	**SIGNATURE**

GIBB (Pty) Ltd

Postal Address	:	PO Box 1365, Westville, 3630	Website	:	www.gibb.co.za
Contact Person	:	Katherine de Jong	Physical Address	:	54 Norfolk Terrace, Westville, 3630
Telephone No.	:	031 268 8567	Email Address	:	kdejong@gibb.co.za
			Fax No.	:	031 266 3310