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# ENVIRONMENTAL MANAGEMENT SPECIFICATION FOR CONSTRUCTION

## CONTRACT NO. NLM/SWL/2019/20-01 - CONSTRUCTION OF NEW DIKIDIKINI BRIDGE IN WARD 06 NLM.

Development Bank of Southern Africa (DBSA)

14 December 2022



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## 1 GENERAL

### 1.1 Scope

This Specification covers the requirements for controlling the impact of construction activities on the environment. It contains clauses that are generally applicable to the undertaking of civil engineering works to impose pro-active controls on the extent to which the construction activities impact on the environment. This Specification contains specifications as contained in the Environmental Management Plan and/or Environmental Authorisation (Ref No: EC79/AN/LN1/M.21-07).

The Specifications contained herein shall apply to contractors undertaking work as part of the project. The Principle Contractor shall be responsible for the implementation of these Specifications.

### 1.2 Definitions

For the purposes of this Specification the definitions and abbreviations given in the applicable specifications listed in section 1.3 and the following definitions shall apply:

Environment:	<p>The surroundings within which humans exist and that are made up of:</p> <ul style="list-style-type: none"> <li>i. the land, water and atmosphere of the earth;</li> <li>ii. micro-organisms, plant and animal life;</li> <li>iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and</li> <li>iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.</li> </ul>
Potentially hazardous Substance:	A substance that, in the reasonable opinion of the Engineer, can have a deleterious effect on the environment. Any substance or mixture containing such substances as listed in the OHSA General Machinery Regulation 8: Schedule A.
Method Statement:	<p>A written submission by the Contractor to the Engineer in response to the Specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.</p> <p>The Method Statement shall cover applicable details with regard to: construction procedures, materials and equipment to be used, transportation of equipment/materials to and from site, movement of equipment/material on site, storage of materials on site, containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur, timing and location of activities, areas of non-compliance with the Specifications, and any other information deemed necessary by the Engineer.</p>
Reasonable:	Unless the context indicates otherwise, reasonable in the opinion of the Engineer after he has consulted with a suitably experienced person, not an employee of the Employer, in "environmental implementation plans" and "environmental management plans" (both as defined in Act No 107,1998).

Solid waste:	All solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, steel, food and domestic waste (e.g. plastic packets and wrappers).
Contaminated water:	Water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/ personnel wash areas.
Top material:	The top 150 mm of soil (topsoil) and root material of cleared vegetation.
Silt Laden:	Means water containing sand and silt arising from the Contractor's activities and/or as a result of natural run-off.
Site:	This is the area in the possession of the Contractor for the construction of the Works. Where the area is not demarcated, it will include all adjacent areas, which are reasonably required for the activities for the Contractor and approved for such use by the Engineer.

### 1.3 Supporting specifications/documents

The following specifications/documents shall, inter alia, form part of the Contract Document.

- The Approved Environmental Management Plan;
- The conditions associated with the Environmental Authorisation (Ref No: EC79/AN/LN1/M.21-07);
- Conditions associated with any other relevant Licenses/ Permit.
- SANS 1200 Series of Standardized Specifications;
- SANS 1200 A or SANS 1200 AA, as applicable;
- Occupation Health and Safety Act (OHSA): Specification AO,
- Construction Regulations, 2014

### 1.4 Management and administration

The implementation of this Environmental Specification (or subsequent agreements as the case may be) is non-negotiable and every prospective contractor shall cost for and make the necessary provisions available to ensure implementation of these Environmental Specifications and any associated documents (i.e. Environmental Management Plan and or Environmental Authorisation). The Contractor may defer responsibility for implementation and oversight of environmental requirements onto a third party but may not defer liability and will be held accountable for any non-compliances and associated damages.

The Contractor shall construct and/or implement all the necessary environmental protection measures in each area before any construction work may proceed under the direction of the Engineer or delegated official. The Engineer may suspend the Works at any time should the Contractor, in the Engineer or delegated official's opinion, fail to implement, operate or maintain any of the environmental protection measures adequately. The costs of such suspension shall be to the Contractor's account.

### 1.4.1 Contractor's Obligations

- Provide information on previous environmental management experience and company environmental policy in terms of the relevant forms contained in the Contract Document.
- Supply method statements timeously for all activities requiring special attention as specified and / or requested by the Project Manager, Environmental Control Officer and / or Engineer during the duration of the contract.
- Be conversant with the requirements of this environmental specification/ environmental management plan/environmental authorisation.
- Brief all his/ her staff about the requirements of the environmental specification.
- Comply with the Environmental (Control) Officer in terms of this specification and the project specification, as applicable, within the time period specified.
- Ensure any Sub-Contractors/ Suppliers who are utilized within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for noncompliance on their behalf.
- Bear the cost of any delays, with no extension of time granted, should he/his Sub-Contractors/ Suppliers contravene the said specifications such that the engineer orders a suspension of work. The suspension will be enforced until such time as the offending party (ies), procedure, or equipment is corrected.
- Bear the cost of any damages / compensation resulting from non-adherence to the said specifications or written site instructions. The above responsibilities listed for the contractor will also apply to any appointed sub-consultants.

### 1.4.2 Environmental Site Officer (ESO)

The Contractor shall, at commencement, appoint, in writing, a suitably qualified or otherwise senior member of his permanent site staff to perform the role of the ESO. The Contractor shall ensure that this appointee is provided adequate time to fulfil the requirements of the role, which will be proportional to the project scale and extent. Should the Engineer find that the ESO does not adequately fulfil the role and duties of the ESO then the Contractor may be directed to recruit a suitably qualified, dedicated ESO for the duration of the construction period. The ESO will be required to develop a detailed understanding of the Specifications and ensure that the Contractor's fulfils the requirements of the specifications and remains compliant throughout the project term, including any defects liability period. The ESO will be required to report of compliance issues during monthly progress meetings and to co-operate with the any official representative from the Government, Client and Engineer on environmental management matters. The key responsibilities of the ESO include the following:

- Develop a detailed understanding of the requirements of this specification;
- Obtain confirmation in writing from the Client that all regulatory processes, authorisation and permit requirements have been fulfilled. Copies of the permits and authorisations shall be obtained, and retained onsite, and studied by the ESO prior to the commencement of site establishment and site works. Any conditions contained in a permit or authorisation shall be deemed to form part of this Specification. Special attention must be given to any areas identified as No - Go areas during an Environmental Assessment.
- Undertake routine inspections of all areas and activities under the Contractor's control, identify

- Environmental non-conformances and incidents and initiate measures to remedy such issues.
- Ensuring that the Contractor's staff abide by the Specification and initiate disciplinary actions where required.
- Report on environmental incidents and compliance matters at monthly progress meetings.
- Liaise and co-operate with any official environmental representative from the Government, Client and Engineer regarding environmental matters associated with the project.
- Ensure that any environmental monitoring requirements are met and undertaken with precision, according to best practice sampling and monitoring methodologies.

## 2 CONTRACTOR MOBILISATION

### 2.1 Baseline photography

Following official handover of the site to the Contractor and prior to the commencement of mobilisation activities, the Contractor shall take photographs of all areas that will be impacted by construction activity and their immediate surrounds. Photographs shall include, inter alia, all works areas, site establishment and laydown areas, access roads, gates, no go and natural areas, debris, boundary fences, existing structures and infrastructure on the site and any defects or issues to any of the foregoing. These photographs shall be provided to the Engineer for reference purposes.

### 2.2 Method Statements

Method statements shall be produced and submitted for approval by the Engineer/ECO at least five working days prior to the commencement of the activities. The Contractor shall not commence the activity until the Method Statement has been approved. Approval of method statements shall not unreasonably be withheld. The Engineer /ECO may approve, reject or approve with conditions any method statement.

The Engineer/ECO may request, on an ad hoc and reasonable basis, that a method statement be produced for any activity or component of the works which carries significant risk.

The following is a provisional list of required method statements:

- Mobilisation Plan
- Earthworks plan
- Clearing of alien invasive plants.
- Works Plan near/in the Mzintlava River
- Concrete works plan
- Emergency preparedness and response plan

## 2.3 EMP Training

Within seven days of the Commencement Date the Contractor shall arrange for Environmental and Heritage Awareness Training programmes for the personnel on site, to the satisfaction of the Engineer/Project Manager and ECO, and familiarise his/her/its employees with the contents of this EMP, either in written format or verbally. The Contractor shall keep a register of attendance and attendees must sign. This must be implemented in the general orientation of any new employees, who must also sign acknowledgement of the associated materials.

Subject to the implementation of a written warning system and any appropriate disciplinary interventions, repetitive failure to observe the requirements set out in this specification by any one member of staff should be treated as a dismissible offence. Should recurring non-compliances occur as a result of the actions or omissions of one individual, the Engineer/Project Manager may instruct the Contractor to remove such person from site.

## 2.4 Toolbox talks

Relevant environmental site matters, incidents and issues shall form part of the Contractor's toolbox talks. The Contractor shall make a note of what environmental subjects were discussed.

## 2.5 Sensitive elements on site

There are services within the villages which will require precautionary measures to be put into place and also using the steering committee to avoid disturbing any communal important sites. The proposed bridge will be constructed within a watercourse thus precautionary measures during construction must be taken to avoid polluting the water.

## 2.6 Site Establishment

Construction camps and staff accommodation facilities on the site will be required to be established in appropriate locations prior to the commencement of construction, preferably within already disturbed areas. Camp site must preferably be at an existing homestead (agreed with the owner), otherwise a buffer zone of 100m from the water course must be observed for this purpose.

Notice of the activity must be placed at least 50m ahead of the construction site and/or construction vehicle turning points.

Before construction can begin, the Contractor shall submit a site layout plan to the ECO for approval, including: Site access (including entry and exit points); All material and equipment storage areas (including storage areas for hazardous substances such as fuel and chemicals); Construction offices and other structures; Security requirements (including temporary and permanent fencing, and lighting) and accommodation areas for security staff; and Solid waste collection facilities and waste treatment facilities for litter, refuse, sewage and workshop-derived effluents.

The Contractor must take appropriate and active measures to prevent erosion resulting from his own works, operations and activities as well as storm water control measures to the satisfaction of the ECO / Engineer. Restoration costs are likely to be for the Contractor's account, should these measures not be reasonably implemented. Aspects normally covered in construction contracts in terms of "protection of works" are standard and are not to be billed or confused with any details covered under environmental requirements.

During construction, the Contractor must protect areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible. Other measures as may be necessary must be taken to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other

areas. All such measures must be discussed with and approved by the ECO / Engineer. Measures can include cut off trenches, straw stabilising, brush packing etc.

Only designated areas may be used for the storage of materials, machinery, equipment and site offices. The site offices should not be sited in close proximity to steep areas, as this will increase soil erosion. Offices (and in particular the ablution facilities, aggregate stockpiles, spoil areas and hazardous material stockpiles) must be located as far away as possible from any watercourse.

The contractor shall restrict all activities to within the designated areas on the construction layout plan. Any relaxation or modification of the construction layout plan is to be approved by the ECO.

The following restrictions or constraints are placed on the site camp, and construction staff in general and will not be permitted: The use of rivers and streams for washing of clothes; The use of welding equipment, oxy-acetylene torches and other bare flames where veld fires constitute a hazard; Indiscriminate disposal of rubbish or construction wastes or rubble; Littering of the site; Spillage of potential pollutants, such as petroleum products; Collection of firewood; Poaching of any description; Use of surrounding veld as toilets; Burning of wastes and cleared vegetation.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself and note the date and time that the complaint was resolved.

The Contractor shall provide adequate facilities for his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings. Collection of firewood is not permitted.

### **2.6.1 Site fencing and demarcations**

The construction site must be fenced off for the safety of residents and livestock. The Contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations directed by the Engineer. Such fences shall, if so specified, be erected before undertaking designated activities. The Contractor shall not damage or remove any boundary fences without the agreement of the adjoining landowner. Where property fences are replaced, these shall, at the minimum, meet specification of the fencing it replaces, in terms of top height, sturdiness and rigidity (pole foundations and supports and strength and wire gauge), security (barbed or razor wire) and size of the largest openings (i.e. distances between horizontal wires or mesh dimensions).

### **2.6.2 No Go Areas**

If required, certain areas shall be considered "no go" areas and these may be detailed in the Environmental Management Plan or as conditions attached to an Environmental Authorisation. The Contractor shall ensure that, insofar as he has the authority, no unauthorised entry, stockpiling, dumping or storage of equipment or materials shall be allowed within the demarcated "no go" areas. "No go" area demarcation fencing shall be established prior to the commencement of construction in the vicinity.

"No go" areas shall be demarcated with fencing consisting of wooden or metal posts at 3 m centres with one (1) plain wire strand tensioned horizontally at 900 mm from ground level. Commercially available danger tape shall be wrapped around the wire strand. The Contractor shall maintain the fence for the duration of construction and ensure that the danger tape does not become dislodged.



## 2.7 Access Roads

The final alignment of the access routes and internal camp roads shall be planned in conjunction with the Engineer/Project Manager, and ECO and once finalised only the agreed roads must be used. Roads must be planned to deviate around significant trees and Red Data Species marked out in an approved manner by the ECO where necessary. Construct approved vehicle turning areas, avoiding selected ecological sensitive areas or species, and have turning area routes approved by the ECO. Temporary access roads must be rehabilitated after usage to contract specifications.

Construction staff may only use authorised paths and roads from the camp site.

During construction, the bridge site must be accessed through the existing access road.

Construction roads must follow existing roads and tracks and should not be wider than necessary with a maximum width of 3 m. Should a wider road be required, this will require the approval of the ECO.

If two-way traffic movement is to take place, passing bays are to be used where specified by the ECO to prevent access / detours into the surrounding areas. The drivers delivering construction materials to site are to be made aware of this. They may not drive off the road in order to allow another vehicle to pass.

Continual use of dirt access roads by heavy machinery and increased transport loads means they will have to be carefully monitored and regularly graded as soon as potholes or rutting occurs.

## 2.8 Social

The local labour will be used in doing the clearing and preparation of road bed, side drain construction, site establishment, stone pitching, and removal of oversize material and removal of unwanted material and traffic control.

# 3 CONSTRUCTION PROVISIONS

## 3.1 Movement of Construction Personnel, Laborer's and Equipment

The Contractor must ensure that all construction personnel, labourers and equipment remain within the demarcated construction sites at all times. Where construction personnel and/or equipment wish to move outside the boundaries of the site, the Contractor/ labourers must obtain permission from the ECO.

## 3.2 Water Supply

Water for human consumption should be available at the site offices and at other convenient locations on site.

The contractor shall not make use of/collect water from any other source than those pointed out to them as suitable for use by them for construction purposes.

## 3.3 Solid Waste Management

An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate.

Any solid waste shall be disposed of at a landfill licensed in terms of section 20 (b) of the National Environment Management Waste Act, 2008 (Act No. 59 of 2008).

Solid waste must be stored in scavenger proof and sealed containers at a demarcated area within the site camp site for collection and safe disposal.

During the construction period, the facilities shall be maintained in a neat and tidy condition, and the site is to be kept free of litter. At all places of work, the Contractor shall provide litter collection facilities for later safe disposal at approved waste disposal sites. The contractor will maintain 'good housekeeping' practises.

The Contractor will ensure that all personnel immediately deposit waste in the waste bins provided.

All waste must be transported in an appropriate manner (e.g. plastic rubbish bags).

The Contractor may not dispose of any waste and / or construction debris by burning, or by burying.

General waste must be kept in different recycling bins onsite (where necessary). General waste being waste that does not impose any threat to health or the environment

### **3.4 Liquid Waste Management**

Sanitary arrangements should be to the satisfaction of the Engineer/Project Manager and ECO. Chemical toilets must be supplied (1 per 10 persons) and must be regularly cleaned and maintained by the Contractor. The positioning of the chemical toilets is to be done in consultation with the ECO. The toilets must be emptied by a licensed service provider on a weekly basis. The Contractor will be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly and sanitary condition to the satisfaction of the ECO. If necessary, the ablution facilities must be screened from the public view. In remote areas where chemical toilets may not be a viable option, agreement must be reached on alternatives before construction starts.

The Contractor must take reasonable precautions to prevent the pollution of the ground and / or water resources on and adjacent to the site as a result of his activities.

No natural watercourse is to be used for the cleaning of tools or any other apparatus. This includes for purposes of bathing, or the washing of clothes etc.

All washing operations will take place off-site at a location where wastewater can be disposed of in an appropriate manner.

Trucks delivering concrete may not be washed on site or anywhere within the project area.

No spills may be hosed down into a storm water drain or sewer, or into the surrounding natural environment.

All soil contaminated, for example by leaking machines, refuelling spills etc. is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an approved landfill site.

### **3.5 Stockpiling, Handling and Storage of Building Materials**

Stockpiles and storage yards will be demarcated in areas already disturbed or where they will cause minimal disturbance.

Clearly indicate which activities are to take place in which areas within the site e.g. the mixing of cement, stockpiling of materials etc.

Limit these activities to single sites only. This may not always be possible for example for heaps of topsoil, but should definitely be the case for other building materials.

Stockpiles of expensive materials such as cement bags should be such that they can easily be removed from the site over weekends or during rainy weather.

Specific sites should be allocated for construction waste e.g. empty cement bags, discarded planks, etc. A low temporary fence may be erected around such a site in order to contain the waste and assist the effective removal thereof from the site.

Cement bags will be placed in wind and spill proof containers as soon as they are empty. The Contractor will not allow closed, open or empty bags to lie around the site.

The Contractor will ensure that all operations that involve the use of cement and concrete are carefully controlled.

Concrete may not be mixed directly on the ground. No mixed concrete may be deposited directly onto the ground prior to placing. A board or other suitable platform / surface are to be provided onto which the mixed concrete can be deposited before placing.

All visible remains of excess concrete will be deposited in a designated area awaiting removal to an approved landfill site.

### **3.6 Hazardous Materials handling, Use and Storage**

The Contractor must comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemicals, harmful and hazardous substances and materials.

The Contractor will furthermore be responsible for the training and education of all personnel on site who will be handling the material about its proper use, handling and disposal.

All the necessary handling and safety equipment required for the safe use of petrochemicals and oils shall be provided by the Contractor to and used or worn by the staff whose duty it is to manage and maintain the Contractor's and his subcontractor's and supplier's plant, machinery and equipment. The Contractor must comply with the Occupational Health and Safety Act (Act 85 of 1993) and Construction Regulations, 2014 as this governs what the contractor has to do/provide for his staff.

Procedures detailed in the Material Safety Data Sheets (MSDSs) shall be followed in the event of an emergency situation.

The Contractor will be responsible for establishing an emergency procedure for dealing with spills of petroleum, chemical, etc.

Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions. All hazardous materials will be stored in a secure appointed/ demarcated area that is fenced and has restricted entry. Storage of hazardous products shall only take place using suitable containers approved by the ECO. In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure. Storage of all hazardous material is to be safe, tamper proof and under strict control.

Hazardous substances must be stored on an impermeable surface and in containers which are not filled to the maximum volume.

Fuel should be stored in a secure area in a steel tank supplied and maintained by the Contractor according to safety procedures. Gas welding cylinders and LPG cylinders should be stored in a secure, well-ventilated area. The Contractor must supply sufficient firefighting equipment in the event of an accident and no smoking will be allowed where fuel is stored and used.

Shutter oil and curing compound pose a risk of causing water and soil contamination and accordingly are regarded as potential hazardous substances. The Contractor shall ensure that shutter oil and curing compound containers in use are stored within the fuel bund. The remaining containers shall be inspected regularly to ensure that no leakage occurs. When shutter oil or curing compound is dispensed, the proper dispensing equipment shall be used, and the storage container shall not be tipped in order to dispense the oil/compound. The dispensing mechanism of the shutter oil/curing compound storage container shall be stored in a waterproof container when not in use.

Shutter oil and curing shall be used in moderation and shall be applied under controlled conditions using appropriate equipment. The Contractor shall take all reasonable precautions to prevent accidental and incidental spillage during the application of these compounds.

In the event of a shutter oil or curing compound spill, the source of the spillage shall be isolated, and the spillage contained. The Contractor shall clean up the spill, either by removing the contaminated soil or by the application of absorbent material in the event of a larger spill. Treatment and remediation of the spill area shall be undertaken to the reasonable satisfaction of the Engineer.

Any accidental chemical / fuel spills to be corrected immediately.

### **3.7 Fire**

The Contractor must take all the necessary precautions to ensure that fires are not started as a result of activities on site. The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.

Gas and liquid fuel may not be stored in the same storage area.

No fuels or chemicals may be stored under trees.

No open fires for heating or cooking will be permitted on site, unless otherwise agreed and then only in designated areas.

The construction site must be protected against fire, and a sufficient fire break must be constructed, on advice by the ECO around each construction site and the construction camp where necessary.

### **3.8 Vegetation clearing**

The natural vegetation encountered on the site is to be conserved and left as intact as possible. Only trees and shrubs directly affected by the works, may be felled or cleared. Should such trees and shrubs be protected under relevant legislation, the necessary approval/permit/licenses will be required prior to clearing.

The areas needing to be cleared and the degree of clearing required will be determined and demarcated in consultation with the ECO before clearing begins.

Clearing of vegetation shall be done by hand.

De-stumping shall only occur on the request of the ECO. Where roots can act as erosion protection, trees should be cut as close as possible to the ground level. During the clearing of woody vegetation, no basal cover or grass and topsoil shall be removed and damage to this layer shall be minimised as far as possible.

#### **Vegetation Removal and Trimming on watercourses -**

No heavy machinery shall be permitted for any purpose, except emergency procedures, without the prior approval of the ECO. Clearing of vegetation shall be conducted by hand. All cleared and trimmed vegetation shall be removed from any natural watercourse to prevent flooding/snagging hazards being created.

### **3.9 Protection of Natural Features, Flora and Fauna**

The Contractor may not deface, paint or otherwise mark and / or damage natural features / vegetation on the site, unless agreed beforehand with the ECO. Any features / vegetation defaced by the Contractor will be restored to the satisfaction of the ECO.

The Contractor shall ensure that plant, equipment, materials and staff are not permitted to enter any designated "no go" area.

The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, and open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

Except to the extent necessary for the carrying out of the Works (as per an approved method statement), flora shall not be removed, damaged or disturbed nor shall any vegetation be planted without the Engineer's approval. Firewood may not be collected from the site unless written approval is provided by the Engineer.

Under no circumstances shall any animals be handled, removed, killed or be interfered with by the Contractor, his employees, his subcontractors or his subcontractors' employees.

The Contractor and his employees shall not bring any domesticated animals onto the site.

The Contractor shall ensure that the work site is kept clean, tidy and free of rubbish that would attract animals.

Trapping, poisoning and/ or shooting of animals is strictly forbidden and shall not be tolerated by the Contractor or his personnel on Site or elsewhere.

The use of biocides is subject to the approval of the Engineer unless provided for in the project specification. Where the use of biocides and other poisonous substances has been specified, they shall be stored, handled and applied with due regard to their potential harmful effects. Persons using any biocide or poisonous substances shall have received training in the appropriate handling, use and storage of such materials. Care will be taken to ensure no movement or drift occurs into non-target areas. Dyes shall be mixed into sprayed biocide so that the treatment areas may be inspected and the risk of over spray / re-spraying is avoided.

### **3.10 Historical and Archaeological Sites**

If any artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the ECO of such discovery. The South African Heritage Resources Agency (SAHRA) or Provincial Heritage Agencies shall be contacted and if necessary an archaeological/paleontological consultant will be appointed to excavate and record the site. Work may only resume once clearance is given in writing by the archaeologist/paleontological consultant.

### 3.11 Soil Management

#### Topsoil:

The Contractor is required to strip topsoil together with grass / groundcover from all areas where permanent or temporary structures are located, construction related activities occur; access roads are to be constructed, etc. This must be read together with the contract specifications & conditions.

Topsoil must be stockpiled for later use. Topsoil is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.

Topsoil stockpiles are not to exceed 1.5 m in height and should be protected to prevent erosion where needed.

Topsoil stockpiles are to be maintained in a weed free condition.

Topsoil is to be replaced by direct return where feasible (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods.

Topsoil stripped from the road diversion to the temporary crossing and within the 32m zone from the edge of the Mzintlava river must:

- not exceed 1.5 meters in height,
- not be compacted,
- be separated from other stockpiles to avoid soil mixing and maintain soil material for rehabilitation, and be covered with Hessian, Shade Cloth or Dam Plastic Course (DPC) in order to avoid erosion.
- be located on an area of level ground that will not be in the path of runoff water during a storm, away from the working installed area, drainage lines, areas of valuable vegetation and/or on the bases of the watercourse.

#### Spoil Material:

The location of spoil stockpile sites shall be agreed upon by the ECO prior to the commencement of any operations that will generate spoil materials. No spoil material shall be dumped outside the defined site. The Contractor shall ensure that the material does not blow or wash away. If the spoil material is in danger of being washed or blown away, the Contractor shall cover it with a suitable material, such as hessian or plastic.

### 3.12 Stormwater Run-off

Construction must include appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows.

Drainage measures that promote the dissipation of storm water run-off must be implemented.

The Contractor must ensure that rainwater containing pollutants does not run-off into natural areas and thus result in a pollution threat.

A drainage diversion system is to be installed to divert runoff from areas of potential pollution, e.g. batching area, vehicle maintenance area, workshops, chemical and fuel stores, etc.

### 3.13 Erosion and Sedimentation Control

The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the ECO. This must be read together with the contract specifications & conditions.

The Contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible.

The specifics of erosion protection work will vary from situation to situation. These specifics should be cleared with the Engineer/Project Manager and/or ECO and comply with the contract specifications.

During construction, areas susceptible to erosion must be protected by installing temporary or permanent drainage works and energy dispersion mechanisms – to be agreed to by Contractor

In areas where topsoil has been compacted by construction activities, on completion of construction work the affected areas must be properly treated (ripped and graded) to allow organic matter to settle and vegetation to grow. Where necessary, indigenous vegetation must be planted in these areas. Site camps areas must be clearly demarcated to allow for the movement of construction equipment and staff during construction. The reason for the demarcated/fenced area is to limit movement of equipment and people, thereby limiting disturbance and unnecessary soil compaction.

Storm water drainage measures are required on site to control runoff and prevent erosion.

### 3.14 Excavation, Backfilling and Trenching if necessary

Where at all possible, excavations must not stand open longer than 2 days, and should preferably be opened and closed on the same day. They should not be permitted to stand open longer than a week under any circumstances. Excavations must be marked with tape to clearly demarcate the area and warn against access

Excess rocks and sand as a result of excavation activities is not to be dumped along or next to the construction site – rocks to be spread in a natural looking manner in the surrounding area

Removed soil is to be used to backfill areas where required (i.e. such as existing and un-rehabilitated gravel pits).

Excavated material is to be stockpiled along the trench within the working servitude, unless otherwise authorised

Deficiency of backfill material will not be made up by excavation within the protected area. Where backfill material is deficient, it must be made up by importation from a commercial quarry or otherwise authorised.

### 3.15 Levelling

Excess sand and soil resulting from levelling activities of the work area should be stored in low heaps either on the access road or already disturbed areas.

Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.

Once heavy machinery has cleared the bulk of these material stockpiles, the disturbed areas should be levelled and cleared of any foreign material manually e.g. with spades. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.

### 3.16 Crane operations

Drive plants shall be well maintained and drip trays shall be positioned at potential leak areas. Over-greasing of crane cables shall be avoided.

Movement and lifting of hazardous materials shall be undertaken such that they do not cause a pollution, spillage or safety risk (in particular where concrete buckets are in use).

### 3.17 Servicing and Re-Fueling of Construction Equipment

All maintenance and repair work will be carried out at the main Construction camp within an area designated for this purpose, equipped with the necessary pollution containment measures.

The ground under the servicing and refuelling areas must be protected against pollution caused by spills and / or tank overfills (bundled / lined).

The Contractor may only change oil or lubricants at agreed and designated locations, except if there is a breakdown or emergency repair, and then any accidental spillages must be cleaned up / removed immediately.

In such instances the Contractor will ensure that he has drip trays available to collect any oil or fluid.

Construction vehicles are to be maintained in an acceptable state of repair. No vehicles or equipment with leaks or causing spills will be permitted to operate at any of the construction sites. These will be sent immediately back to the Contractor's off-site workshop for repair. All equipment that leaks must be repaired immediately or must be removed from site.

Fuels required during construction must be stored in a central depot at the construction camp. This storage area should be located on a slab and be contained within a bund capable of containing at least the volume of one of the containers.

Temporary fuel storage tanks and transfer areas also need to be located on an impervious surface adequately bundled to contain accidental spills. Appropriate run-off containment measures must be in place.

### 3.18 Dust

The Contractor shall take precautions to the satisfaction of the ECO to limit the production of dust and damage caused by dust.

During dry and, or windy periods, a water tanker shall be available for the control of dust, and the Contractor shall ensure that the sprays do not generate excess run-off.

Speed limits for vehicles on unpaved roads and minimisation of haul distances must be implemented.

Measures to ensure that material loads are properly covered during transportation.

Minimisation of the areas disturbed at any one time and protection of exposed soil against wind erosion, e.g. by dampening with water or covering with straw

The Engineer may request the temporary cessation of all construction activities where wind speeds are unacceptably high, and until such time as dust levels return to acceptable levels.



In terms of the National Dust Control Regulations, promulgated in terms of section 53 (o) of National Environmental Air Quality Act (Act 39 of 2004) the air quality officer may require any person, through a written notice, to undertake a dustfall monitoring programme as contemplated in subregulation (5) if: the air quality officer reasonably suspects that the person is contravening regulation 3; or the activity being conducted by the person requires a fugitive dust emission management plan as per the notice published in terms of section 21 of the Act. Any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in regulation 3 must upon receipt of a notice from the air quality officer, implement dustfall monitoring programme. A person required to implement the dustfall monitoring programme must, within a specified period, submit a dustfall monitoring report to the air quality officer. The following standards apply:

- For residential areas the dust fallout may not exceed 600mg/m<sup>2</sup>/day (on a 30 day average) more than two times a year and not on sequential months.
- For non-residential areas the dust fallout may not exceed 1200mg/m<sup>2</sup>/day (on a 30 day average) more than two times a year and not on sequential months.

### 3.19 Noise

Machinery and vehicle silencer units are to be maintained in good working order. Offending machinery and / or vehicles will be banned from use on site until they have been repaired.

Noise levels must be kept within acceptable limits for a residential area.

Appropriate directional and intensity settings are to be maintained on all hooters and sirens, and the Contractor shall provide and use suitable and effective silencing devices for pneumatic tools and other plant.

The Contractor shall restrict any of his operations that may result in excessive noise disturbance to those communities and dwellings abutting the Site to the hours of 08:00 to 17:00 on weekdays and Saturdays. No work will be permitted on Sundays unless otherwise agreed to with the Engineer.

Where loud construction operations or plant are required (i.e. Pile driving, hydraulic breakers or rock crushing), nearby residents that may be disturbed by the operation will be notified and provided with a program for the works prior to commencement. The Contractor shall be reasonable in accommodating the needs of neighbours and take reasonable measures to minimise the impact of noise on neighbouring communities.

### 3.20 Visual / Aesthetics

Security lighting must be placed such that it is not a nuisance to residents and visitors to the area. Shields may be required to prevent lights from being visible from other parts of the residential area.

Care will be taken when positioning the lights to ensure the least visual impact, while still providing a safe work environment for construction staff.

The contractor will maintain 'good housekeeping' practises and have the resources available to undertake routine housekeeping.

The Contractor shall not establish any activities which, in the opinion of the ECO, are likely to adversely affect the scenic quality of the area. The ECO may direct the Contractor to refrain from such activities or to take corrective actions to reduce the adverse effects of such activities.

All packed rock and exposed rock cuttings shall be treated in order to blend their colour with the colours of the natural weathered rocks of the adjacent environment.

### 3.21 Temporary site closure

If the site is closed for a period exceeding one week, the Contractor, in consultation with the Engineer shall carry out the following checklist procedure.

#### Hazardous materials stores:

- Outlet secure / locked.
- Bund empty (where applicable).
- Fire extinguishers serviced and accessible.
- Secure area from accidental damage e.g. vehicle collision.
- Emergency and contact details displayed.
- Adequate ventilation.

#### Safety:

- All trenches secured.
- Fencing and barriers in place as per the Occupational Health and Safety Act (No 85 of 1193).
- Emergency and management contact details for at least two standby staff displayed.
- Emergency equipment, including firefighting and spill response materials and equipment remain readily accessible to standby staff.
- Site security measures in place.
- All plant and equipment have their keys removed or are disabled to prevent unauthorised start-up / theft.

#### Erosion:

- Wind and dust mitigation in place.
- Slopes and stockpiles at stable angle.
- Revegetated areas watering schedules and supply secured.

#### Water contamination and pollution:

- Cement and materials stores secured.
- Toilets empty and secured.
- Refuse bins empty and secured.
- Drip trays empty and secure (where possible).

- Structures vulnerable to high winds secure.
- All plant and equipment not in use are withdrawn from areas prone to flooding.

### 3.22 Site Clean-up/Closure and Rehabilitation

The Contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed within 30 days from completion date project.

The Engineer/Project Manager, ECO, and Contractor must agree on rehabilitation of areas. The Contractor shall be held responsible for the rehabilitation of all areas disturbed during construction. This includes, for example, site camp area, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the road reserve, or at designated or instructed areas outside the construction reserve. This responsibility shall extend until expiry of the Defects Liability Period.

Upon completion of the construction period, the Contractor will ensure that the access roads are returned to a state no worse than prior to construction commencing.

The environment (temporary crossing, road diversion and aside of the bridge) must be rehabilitated with grass species that is representative of the local setting. Only indigenous plants which are able to establish easily and will need less maintenance because they have already adapted to the local conditions should be considered. Before final decisions about the choice of plant species are taken the ECO should be approached for their advice.

The Contractor may not use herbicides, pesticides, fertilisers or other poisonous substances for the rehabilitation process unless otherwise agreed with the Engineer.

All rehabilitated areas shall be considered “no go” areas and the Contractor shall ensure that none of his staff or equipment enters these areas.

The Contractor shall undertake to remove all alien vegetation re-establishing on the area and shall implement the necessary temporary or permanent measures to combat soil erosion.

## 4 COMPLIANCE WITH THE ENVIRONMENTAL REQUIREMENTS (EMP / ENVIRONMENTAL AUTHORISATION / LICENSES)

Outlined below are a number of steps, relating to increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

### Step 1

The ECO discusses the problem with the Contractor or guilty party, and they work out a solution together. The ECO records the discussion and the solution implemented.

### Step 2

The ECO or Engineer/Project Manager observes a more serious infringement, and the Principal Agent notifies the guilty party in writing, with a deadline by which the problem must be rectified. All costs will be borne by the Contractor.

**Step 3**

The Principal Agent shall order the Contractor to suspend part, or all, the works. The suspension will be enforced until such time as the offending party (ies), procedure or equipment is corrected and/or remedial measures put in place if required. No extension of time will be granted for such delays and all cost will be borne by the Contractor.

**Step 4**

Breach of Contract - One of the possible consequences of this is the removal of the Contractor and/or equipment from the project and/or the termination of the Contract, whether a construction contract or an employment contract. Such measures will not replace any legal proceedings that the Engineer/Project Manager may institute against the Contractor.

**5 MEASUREMENT AND PAYMENT****5.1 Basic principles****5.1.1 General**

Except as specified below, or in the Specification Data or as billed, no separate measurement and payment will be made to cover the costs of complying with the provisions of this Specification and such costs shall be deemed to be covered by the rates tendered for the items in the Bill of Quantities completed by the Contractor when submitting his tender.

**5.2 Billed items****5.2.1 Compliance with all requirements of the Environmental Management Specification:**

Expenditure related to the compilation of plans, documentation, structure, and implementation

Unit: Sum

**5.2.2 Maintenance, audits, training, monitoring, reporting and management**

Unit: Month

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