Tronox Fairbreeze Mine Biodiversity Offset

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME (CEMPr) TO GUIDE WETLAND REHABILITATION AT THE FAIRBREEZE MINE BIODIVERSITY OFFSET SITES: FBCX AND KRAAL HILL

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Authors: Adam Teixeira-Leite & Douglas Macfarlane

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Prepared by: Eco-Pulse Environmental Consulting Services
1 Mallory Road
Hilton
3245
South Africa
Tel: 033-3433651
E-mail: dmacfarlane@eco-pulse.co.za

Prepared for: Tronox KZN Sands Pty Ltd

Private Bag X20010
EMPANGENI
3880
Tel: 035 3408103
Fax: 035 3408167

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## 3 REFERENCES

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This Construction Environmental Management Programme (CEMP) has been compiled to inform the mitigation and management of potential environmental impacts that may arise through construction activities associated with the proposed rehabilitation of wetlands at the Fairbreeze Extension C (FBCX) and Kraal Hill Offset Sites. This CEMP must be read in conjunction with the Wetland Rehabilitation Plan for the FBCX and Kraal Hill Offset sites, which are cited below:


A number of key documents were referred to in compiling this wetland rehabilitation Construction Environmental Management Programme (CEMPr) which included:

- Guidelines for the in situ Management of Ecosystems in KwaZulu-Natal, according to Biodiversity Conservation Principles: Wetlands (Kotze and Cowden, 2009).
- WETRehabEvaluate: Guidelines for the monitoring and evaluation of wetland rehabilitation projects (Cowden and Kotze, 2008).
- WET-RehabPlan: Guidelines for planning wetland rehabilitation in South Africa (Kotze et al., 2009).
- Wetland Rehabilitation Plan for the Proposed Edendale Business and Industrial Site (Teixeira-Leite et al., 2012).
1 INTRODUCTION

1.1 Project Background

TRONOX KZN Sands intends to mine the mineralised sand dunes of the Fairbreeze deposit located near Mtunzini in KwaZulu-Natal. Environmental Authorization for the construction of Fairbreeze mine and related activities was granted on 13th July 2012 (Department of Agriculture & Environmental Affairs, 2012). This authorization included a range of conditions related to biodiversity offsets including the need to establish an offset management plan. Eco-Pulse Environmental Consulting Services was subsequently appointed to continue with the development and refinement of an offset management plan for the site. Part of the offset includes the rehabilitation of degraded wetland areas on the proposed offset sites and detailed wetland rehabilitation plans have already been compiled for both the FBCX (Fairbreeze C Extension) and Kraal Hill offset sites to accomplish this. In order to manage potential environmental impacts of rehabilitation activities in wetlands, an Environmental Management Plan (EMP) will be required to guide construction activities and manage/mitigate potential impacts on the natural environment.

1.2 Purpose of the Document

This Construction Environmental Management Plan (CEMP) is essentially an environmental management tool used to ensure that the construction and implementation of planned wetland rehabilitation interventions associated with the proposed offset plans are appropriately managed in order to prevent or limit potential negative impacts to the environment (i.e. wetlands and surrounding natural areas). The CEMP has therefore been designed to fulfill the environmental requirements for the protection of environmental resources and ecological functioning associated with all wetlands/watercourses that have been targeted for rehabilitation.

This document should form part and parcel of the contract or agreement between client and contractor, to be included into all agreements with subcontractors as well as supported and adhered to by the end user.
2 CONSTRUCTION EMP FOR FBCX AND KRAAL HILL

The Construction Environmental Management Programme (CEMP) for the implementation of planned wetland rehabilitation interventions and all activities involved in undertaking of wetland rehabilitation at the FBCX and Kraal Hill biodiversity offset site is contained here. The CEMP includes the following key elements:

- Background to the site;
- Location of rehabilitation activities;
- Summary of planned wetland rehabilitation;
- Potential impacts/risks addressed in the CEMP;
- Legal context that frames the requirements of the CEMP (also see Annexure B);
- Implementation of the CEMP;
- Health and safety issues;
- CEMP: Best Practice Guidelines for wetland rehabilitation/construction activities;
- Monitoring & Reporting;
- Monitoring/Reporting templates, including checklist for structures (Annexure A)

2.1 Background to the site

Refer to the Wetland Rehabilitation Plan for FBCX (Macfarlane et al., 2014a) and the Wetland Rehabilitation Plan for Kraal Hill (Macfarlane et al., 2014b) for details on the site and wetlands.

2.2 Location of rehabilitation activities

The location and description of planned rehabilitation activities, including the design and location of structures to be constructed within the wetlands, is contained within the Wetland Rehabilitation Plans for FBCX and Kraal Hill (Macfarlane et al., 2014a/b). The CEMP has been compiled based on the information contained within the rehabilitation plan documents.

2.3 Summary of planned wetland rehabilitation

Planned wetland rehabilitation interventions and methods/activities associated with rehabilitation of wetlands on the properties will include:

- Earth plugs or berms to block artificial channels that drain water from the wetland;
- Concrete weirs within channels to reduce flow velocity and/or to re-disperse water across
former wetland areas thereby re-establishing natural flow paths;
- Concrete, earth or gabion structures to raise channel floors and reduce water velocity;
- Alien invasive plant clearing;
- The re-vegetation of stabilised areas with appropriate wetland and riparian species;
- The use of biodegradable or natural soil retention systems such as eco-logs, plant plugs, grass
or hay bales, and brush-packing techniques.

For further details on the proposed rehabilitation infrastructure and activities, refer to the Wetland
Rehabilitation Plan for FBCX (Macfarlane et al., 2014a) and Kraal Hill (Macfarlane et al., 2014b).

### 2.4 Potential impacts/risks addressed in the CEMPr

A number of potential negative environmental impacts can be anticipated as a result of planned
construction and associated activities required to achieve the objectives of the Wetland Rehabilitation
Plan for the FBCX and Kraal Hill wetlands. Potential risks/impacts may affect the condition and
ecological functioning of wetlands and therefore require management/mitigation during the
implementation of the rehabilitation plan for the site. The following key environmental/ecological risks
and potential negative impacts have been identified for the wetland rehabilitation project:

<table>
<thead>
<tr>
<th>RISK/IMPACT</th>
<th>ASSOCIATED REHABILITATION ACTIVITIES</th>
<th>RISK RATING BEFORE MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution of wetlands and soils</td>
<td>- Cement mixing and application&lt;br&gt;- An increase in the amount of litter being generated.&lt;br&gt;- Disposal of waste/waste management&lt;br&gt;- Hazardous substances management&lt;br&gt;- Stockpiling of materials&lt;br&gt;- Waste water management and sanitation</td>
<td>Medium</td>
</tr>
<tr>
<td>Disturbance of natural vegetation and habitat</td>
<td>- Earthworks &amp; clearing activities&lt;br&gt;- Vehicle and personnel access&lt;br&gt;- Alien species invasion following site disturbance</td>
<td>Medium-High</td>
</tr>
<tr>
<td>Temporary alteration to stream flow patterns</td>
<td>- Construction of weirs/berms within water courses requires that water be diverted away from working areas, leading to temporary alterations in the current drainage characteristics</td>
<td>Medium</td>
</tr>
<tr>
<td>Soil erosion and sedimentation of aquatic resources</td>
<td>- Earthworks &amp; clearing activities&lt;br&gt;- Water use and dewatering activities</td>
<td>High</td>
</tr>
<tr>
<td>Increased fire risk</td>
<td>- Hazardous substances management&lt;br&gt;- Human presence in the area</td>
<td>Low-Medium</td>
</tr>
<tr>
<td>Disturbance to natural fauna</td>
<td>- Earthworks &amp; clearing activities&lt;br&gt;- Human presence in the area&lt;br&gt;- Poaching</td>
<td>Medium</td>
</tr>
<tr>
<td>Nuisance impacts</td>
<td>- Noise from construction activities, personnel and vehicles.&lt;br&gt;- Dust&lt;br&gt;- Security concerns such as theft or leaving gates open.&lt;br&gt;- Non-use of sanitation facilities.</td>
<td>Medium</td>
</tr>
</tbody>
</table>
It should be noted that while construction-related impacts to wetlands will be addressed through best management practices and the CEMPr, there are a range of long-term management aspects related to the rehabilitation of the wetlands at FBCX and Kraal Hill that will need to be addressed to ensure that anticipated improvements in wetland functionality are achieved and maintained over the long-term. These long-term management aspects will be dealt with separately in the Offset Management Plans and Monitoring Plans that are currently still under development.

### 2.5 Legal Context

A number of existing policies, guidelines and legal requirements relate to the management and conservation of wetlands and the potential impacts on these systems. Further details regarding the legal requirements with regards to management of impacts on wetlands have been included as Annexure B, at the back of this document. Key legislation that is applicable to the project includes, but is not limited to the following:

- National Environmental Management: Air Quality Act 39 of 2004
- Conservation of Agricultural Resources Act No. 43 of 1983
- Environment Conservation Act No. 73 of 1989
- Environmental Management: Biodiversity Act 10 of 2004
- Protected Areas Act 57 of 2003
- Fencing Act No. 31 of 1963
- National Forest Act No. 122 of 1984
- National Veld and Forest Fires Act, No.101 of 1998
- National Water Act No. 36 of 1998
- Animals Protection Act No. 71 of 1962
- Hazardous Substances Act No. 15 of 1973

### 2.6 Implementation of the CEMPr

Key personnel that are responsible for various facets of the implementation of the CEMPr include:

- Project Manager(s);
- Environmental staff (Rehabilitation Officer, Environmental Control Officer and Environmental Officers);
- Contractors and Sub-contractors (including all labourers involved in the project).

The implementation of the interventions detailed in the Wetland Rehabilitation Plan for the site and all associated activities must take into account all aspects of the Construction Environmental
Management Programme (CEMPr), the recommendations of the Basic Assessments submitted for Environmental Authorisation and the requirements of the Environmental Authorisation Record of Decision for the project.

The following will need to be considered in order to effectively implement the CEMPr:

- A copy of the CEMPr will need to be made available on site at all times. All managers, contractors, labourers and personnel involved during the project are to be familiarized with the document.

- Basic environmental awareness training shall be carried out for all employees and is essential for ensuring that the provisions of the CEMPr are implemented efficiently and effectively. The Environmental Control Officer (ECO), with the assistance of the contractor, shall communicate all aspects of the CEMPr to the site staff (i.e. from site agents to labourers) prior to commencement of excavation, construction or any other activity that could potentially disturb the environment.

- All Contractors and Sub-contractors will be required to comply with the Environmental Specifications contained in this CEMPr. Contractors are answerable to the ECO for non-compliance with the requirements of the CEMPr. The ECO may order the Contractors to suspend part or all the works if the Contractors repeatedly cause damage to the environment by not adhering to the requirements of the CEMPr (i.e. more than 3 significant cases of infringement depending on severity). The suspension should be enforced until such time as the offending actions, procedure or equipment is corrected and the environmental damage repaired.

The relevant roles and responsibilities for key personnel involved in the housing development project are summarized below in Table 1.

**Table 1. Roles & responsibilities for key personnel identified for the wetland rehabilitation project**

<table>
<thead>
<tr>
<th>Responsible Person(s)</th>
<th>Key Roles &amp; Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>The Project Manager has the overall responsibility of managing the project contractors and ensuring that the environmental management requirements specified within the EMP are met. The Project Manager is also tasked with appointing relevant environmental staff (ECO and EO’s) for the relevant phases of the project.</td>
</tr>
</tbody>
</table>
| Environmental Control Officer (ECO) | An ECO (Environmental Control Officer) will need to be appointed for the duration of the project. The ECO should have appropriate training/experience in terms of the implementation of environmental management specifications. The ECO will be tasked with providing feedback to the Project Manager regarding all environmental matters. The ECO is responsible for the following key tasks:  
  - Monitoring activities to ensure that the requirements of the EMP are implemented;  
  - Liaison between Project Manager and Contractors on environmental matters;  
  - Monitoring the performance of contractors and ensuring compliance with the EMP;  
  - Reviewing and approving method statements from the Contractors prior to the commencement of construction activities;  
  - Undertaking regular site inspections of the construction site in order to monitor compliance with the specifications outlined in the CEMPr;  
  - Preparing regular audit reports that summarize the findings of the site inspections and which ensure that the system for implementing the CEMPr is operating effectively; |
• Ensuring that the Contractors have received the appropriate environmental awareness training prior to commencing construction;
• Maintaining an Environmental Incident Log (Template in Annexure A2 of this document) of all major incidents including spills, injuries, and legal transgressions and other documentation related to the CEMPr;
• Issuing of site instructions to the contractor for corrective actions required as recorded in the Environmental Incident Log;
• The ECO may order the Contractors to suspend part or all the works if the Contractors repeatedly cause damage to the environment by not adhering to the CEMPr (i.e. more than 3 significant cases of infringement depending on severity). The suspension shall be enforced until such time as the offending actions, procedure or equipment is corrected and the environmental damage repaired.
• Maintaining a Complaints Register of all local environment-related complaints;
• Assisting in the resolution of conflict;
• Review and updating of the CEMPr during the project construction phase on a quarterly basis as a minimum, in order to make it more practical and effective; and
• Communication of any modifications to the CEMPr to all stakeholders.

Environmental Officer (EO)
The EO for the construction phase will be appointed by the Main Contractor and will act as his representative. The main responsibility of the EO is to implement the CEMPr requirements. Other responsibilities include the following:
• Supporting the ECO in the monitoring of the CEMPr by maintaining a regular presence on site;
• Inspecting the site as required to ensure adherence to the CEMPr;
• Liaising with the construction team on issues pertinent to the CEMPr;
• Maintaining an Environmental Incident Log (Template 1 in Chapter 8 of this document) as well as corrective and preventative actions taken; and
• Maintaining a ‘Public Complaints Register’ in which all complaints are recorded, as well as actions taken (Template in Annexure A3 of this document).

Contractors/Subcontractors
All Contractors and Sub-contractors will be required to comply with the Environmental Specifications contained in this CEMPr. Contractors are answerable to the ECO for non-compliance with the requirements of the CEMPr.

2.7 Health & Safety Issues

The following occupational health and safety guidelines apply to construction activities associated with wetland rehabilitation in general:

• All site workers to undergo specific safety training before undertaking this work so that they are aware of the various risks and measures to be taken in emergency situations
• Each project manager and contractor shall have a copy of the Occupational Health and Safety Act No. 85 of 1993 (OHS). All relevant OHS standards will be fully implemented.
• An adequately equipped first aid kit shall be easily accessible at all work areas and needs to be kept fully stocked. All first aid treatment and usage shall be recorded. The first aid kit shall be under control of a trained and competent first aid officer.
• PPE (Personal Protective Equipment) prescribed in the agreement between the rehabilitation implementer and contractor shall be worn at all times during work. PPE shall meet the minimum prescribed standards of quality (SABS approved). PPE shall be replaced when it becomes ineffective through wear and tear.
• Workers should be encouraged not to drink water directly from any wetland or watercourse and suitable drinking water in adequate quantities will need to be provided to workers.
• Project managers and contractors will need to be sensitive to the potential dangers of floods when working in wetland areas. Rainfall in the catchment above the wetland, and flow within the wetland should be visually monitored by project managers and contractors. In high rainfall events where there is an increased risk of flash floods, work should ideally cease within wetland areas to limit risks to personnel, equipment and the environment.

• All vehicles (including trailers) used shall comply with all legal requirements in terms of roadworthiness and licensing. Daily pre-trip vehicle checks should be done and recorded by the driver on a suitable checklist. Trailers also form part of the daily checklist. Any faults affecting the roadworthiness of the vehicle shall be repaired immediately or alternative transport used. Vehicles used for transporting workers shall have suitable passenger facilities.

• All hand tools and machinery is to be suited to the nature of the work and are to be maintained in safe working order.

• All machinery will need to have the required safety guards to enclose dangerous working parts.

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2.8 CEMPr: Best Practice Environmental Guidelines for Construction Activities associated with Wetland Rehabilitation

The CEMPr Environmental Guidelines below have been formulated in order to guide the construction/implementation of rehabilitation interventions and associated activities occurring within or adjacent to wetlands/rivers.

2.8.1 Timing of rehabilitation activities and rehabilitation work plan

A work plan for rehabilitation activities should be compiled prior to any activities taking place on site. The timing and phasing of rehabilitation activities should be guided by the following sequence of works:

1. Site establishment
2. Demarcate all work areas
3. Alien plant clearing and removal and stockpiling of indigenous vegetation
4. Propagation of wetland plants for re-establishment
5. Initial excavation and stockpiling of wetland topsoil and subgrade
6. Re-shaping of wetlands to re-instate natural topographical profiles
7. Installation of concrete weirs, gabions and earthen structures with appropriate water diversion and sediment/erosion control measures
8. Preparation of soils for planting
9. Re-vegetation of wetlands according to method statements for targeted habitat types.1

1 Method statements indicating the process to be followed for vegetation re-establishment will be developed by Eco-pulse for herbaceous wetlands and swamp forest areas in consultation with Tronox KZN Sands prior to rehabilitation activities being implemented.
2.8.2 Site establishment and access

The following guidelines pertain to the establishment of work, storage, parking, toilet, processing and other areas associated with rehabilitation activities as well as access management and the management of roads at the site:

- Wetland areas requiring rehabilitation shall be marked out on a site map (as outlined in the wetland rehabilitation plan) and demarcated on the ground using suitable pegs, as per the locality plan/maps contained in the Wetland Rehabilitation Plan for the site. Any sensitive “no-go” areas must also be demarcated accordingly (e.g., intact riparian vegetation).
- The project manager shall design a site plan that identifies suitable locations for all work, storage, parking, toilet, processing and other areas prior to site establishment. Any clearance of vegetation for site establishment will need to be restricted to the minimum required to establish sites and should occur in a planned manner. Cleared areas shall be stabilised as soon as possible.
- The Contractor shall ensure that no unauthorized entry, stockpiling, dumping or storage of equipment or materials be allowed within the demarcated “no go” areas.
- Existing access roads and tracks should be used to access the site, additional roads through wetland areas should be avoided.
- In very wet areas, avoid the use of heavy machinery and make use of foot access using foot boards to transport materials and equipment to work areas (e.g., along stream lines).
- The closure and rehabilitation of temporary access routes and addressing any potential erosion risks will need to be undertaken upon completion of rehabilitation activities at each site.

2.8.3 Method of work

The following guidelines and standards relate to the method of work undertaken during wetland rehabilitation:

- The physical location of planned interventions must be pegged out by the responsible engineer prior to works commencing.
- The engineer will verify intervention dimension and make adjustments to any designs if required (e.g., in response to a widened erosion feature).
- All work must be undertaken in accordance with design drawings, bills of quantities, intervention-specific construction notes and the general construction notes outlined in the wetland rehabilitation plans.
- Actual work done (volumes and areas) shall be recorded by the implementer and verified by the rehabilitation officer, who is responsible for ensuring that invoices correspond to actual production.
• Works must be regularly monitored to ensure that interventions comply with design specifications and that potential negative environmental impacts are mitigated (See Section 2.9).
• Payment shall not be made for work that does not comply with contract specifications. A record shall be kept of non-compliance to standards and poor performance. Copies of instructions issued to contractors to correct deficiencies shall be kept.

2.8.4 **Fuels, chemicals and hazardous substances management**

The following guidelines pertain to the management of all forms of hazardous substances that may be used during construction (e.g. fuels for machinery) that pose the risk of polluting/damaging the natural environment:

• All relevant national, regional and local legislation with regard to the transport, use and disposal of hazardous materials shall be strictly complied with. The contractor shall obtain the advice of the manufacturer (e.g. MSDS - Material Safety Data Sheets) with regard to the safe handling and disposal of hazardous materials.
• The contractor shall ensure that all personnel on site are trained concerning the proper use, handling and disposal of hazardous substances.
• All fuels and chemicals (e.g. drums of fuel, grease, oil, brake fluid, hydraulic fluid) are to be stored and handled carefully so as to prevent spillage.
• Hazardous substances (including chemicals and fuels liable to spillage) that could contaminate water resources are to be only mixed and stored well outside of wetland areas (20m from the delineated wetland edge recommended).
• Chemical/fuel storage areas and containers shall be located on high-lying ground, away from wetlands.
• Refueling of vehicles shall only take place within designated areas, where adequate pollution prevention measures are in place (e.g. a smooth impermeable floor such as concrete or 250 µm plastic covered in sand).
• Drip trays are to be put in place in relevant locations to reduce contamination risks. This includes beneath leaking vehicles/machinery and for the temporary storage of hazardous substances used during wetland rehabilitation. Drip trays shall be of an appropriate size that the equipment can be placed fully inside. Drip trays shall be cleaned regularly and shall not be allowed to overflow.
• Routinely check machinery/plant for oil or fuel leaks before use.
• Cement batching boards should be used with no mixing to be done directly on the ground. Cement products/wash not to be disposed of into the wetlands.
• Proper dispensing equipment shall be used in order to dispense fuels, oil and chemicals. The dispensing mechanism shall be stored in a waterproof container when not in use.
• If fuel is dispensed from 200 litre drums, only empty externally clean drums may be stored on the bare ground. All empty externally dirty drums shall be stored on an area where the ground has been protected against contamination.

• Servicing and maintenance of vehicles on-site shall be avoided as far as possible.

• The contractor shall ensure that there is an emergency procedure in place to deal with accidents and incidents (e.g. spills) arising from hazardous substances and must ensure that all employees are aware of such procedures. The contractor will need to notify the ECO in the event of a spill. In the event of a fuel/chemical/oil spill, appropriate steps shall be undertaken to prevent widespread pollution. The source of the spillage shall be isolated, and the spillage contained. A record must be kept of all spills and the corrective action taken. The clean-up of spills caused as a result of the construction activities, and any damage to the environment, shall be for the contractors own account.

2.8.5 Stockpiling

The following guidelines pertain to the stockpiling of materials, soils and vegetation on site:

• The contractor shall temporarily stockpile excavated materials (e.g. soils and rocks) and construction materials in such a way that the spread of materials is minimised.

• Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils.

2.8.6 Waste management

Waste in the form of hazardous substances/chemicals, rubble and construction debris and general litter has the potential to contaminate the environment and be transported via wind/water to areas further afield. These waste products pose a great risk of environmental degradation that can persist for long periods of time. Guidelines to manage waste appropriately in order to prevent environmental degradation and pollution are dealt with below:

• Builders’ rubble and other construction debris shall be confined to the site and shall not be stored or discarded on any open space outside the construction area.

• Water from washing concrete-mixing equipment (mixers and the like) shall not be discharged into wetland areas or watercourses. Such activities shall be managed to limit impacts on the environment.

• Refuse and solid waste, including construction debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste, etc. must be controlled and appropriately removed from the site. The contractor shall be responsible for the establishment of a refuse control and removal system that prevents the spread of refuse within and beyond the construction site.

• The contractor shall ensure that all refuse is disposed of in adequate refuse bins which the contractor shall supply and arrange to be emptied on a regular basis.
• Waste shall be separated and reused / recycled as far as possible.
• Refuse shall not be burned or buried on or near the site.
• The site is to be cleaned and cleared of waste, including litter and building materials, on a regular basis.
• The contractor shall be warned, in writing, by the ECO of any infringement and shall be expected to clear litter or other waste within 24 hours of the notification.

### 2.8.7 Sanitation/ablution facilities

The contractor shall be responsible for providing adequate sanitation for employees at the site in accordance with the following guidelines:

• Where possible, a minimum of one portable toilet shall be provided per 15 persons.
• Toilets may not be situated within 50 metres of the edge of the wetland and their location shall first need to be approved by the ECO. Toilets shall be placed outside areas susceptible to potential flooding.
• The contractor shall ensure that the labourers make use of the toilets provided.
• The contractor shall be responsible for the cleaning, maintenance and servicing of the toilets.
• Upon completion of the contract all toilets are to be removed from the site.

### 2.8.8 Hydrological impacts

The construction of interventions within watercourses/wetlands is likely to have difficulties associated with the presence of water, under both normal and wet conditions. The following guidelines pertain to the management of impacts where works take place within wet areas:

• To reduce the requirements to divert water from the construction site, implementation of the rehabilitation activities within wet areas shall take place in the dry season/winter (May to September).
• Ensure storage areas/stockpiles are located outside of floodable areas.
• Sandbags must be in a good condition, so that they do not burst. Earth that is used to fill sand bags should come from and be returned to the designated existing excavation points
• Minimise the extent of disturbed/exposed areas to reduce extensive damage during flood events.
• Where planned interventions are located within wet areas such as channels (unavoidable), the following is to be implemented:
  o Diversions may need to be put in place to temporarily divert water away from the work site;
  o Diversions shall be temporary in nature (e.g. removable sand bags, eco-logs, etc.);
  o Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns.
2.8.9 Erosion and sediment mobilisation

The construction of interventions within wetlands and river channels is likely to result in impacts to downstream habitat as a result of erosion and associated sediment within runoff water. In order to reduce impacts associated with erosion and sedimentation, the following management guidelines should be followed:

- Implementation of the rehabilitation activities, particularly any major earthworks should be restricted primarily to the dry season/winter (May - September) to reduce the risk of runoff erosion.
- In instances where the toes of structures such as weirs/berms are designed to be flooded by the downstream structures work shall commence from the top of the system down. This serves to ensure that work occurs in drier conditions and lessens the risk of large amounts of sediment being mobilised during excavation.
- The impacts associated with sediment generated during earthworks shall be minimised by constructing appropriate temporary sediment traps downstream of excavations. The application of such traps should be tailored according to the risk posed to the receiving environment (e.g. risk is typically low in areas with low flow & gentle elevation). In the case of extensive earthworks, this may include the use of silt curtains at regular intervals to slow water and trap sediment washed from upstream.
- Further measures to reduce sediment generated from construction activities include ensuring that soil is not deposited into a watercourse and that re-vegetation of the exposed areas occurs as soon as practically possible.
- The contractor shall take reasonable measures (to the satisfaction of the ECO) to prevent erosion caused by work, operations and activities undertaken during excavation and construction activities. The contractor shall ensure that disturbance on steep channel banks is kept to a minimum, thus reducing the potential for erosion. The contractor is responsible for rehabilitated all disturbed areas in such a way that the potential for future erosion is limited.
- Sandbags used to temporarily divert water shall be in a good condition to prevent additional sedimentation and/or failure.

2.8.10 Noise control

Noise pollution from vehicles, machinery and laborers can affect local wildlife and becomes a nuisance to neighbouring residential areas. The following guidelines are proposed to manage noise levels generated during construction activities:

- Local/Municipal and Provincial Noise Regulations shall be complied with at all times.
- Construction shall be limited to normal working hours, in order to limit disturbance from vehicles and construction activity. Working hours for all operations shall be limited to between 08h00
and 17h00 on weekdays. No work shall take place on a Saturday, Sunday and or Public Holidays. Any deviations to these work hours shall be cleared with the ECO prior to implementation

- Every effort shall be made to limit exceedingly noisy activities. Construction vehicles shall be in good working order such that they do not create a noise nuisance. No amplified music shall be allowed on site. Sound amplification equipment is not to be used on site unless for an emergency situation.

### 2.8.11 Vegetation/flora management

The following guidelines pertain to the management of vegetation or flora which may be impacted during rehabilitation implementation:

- The removal, damage or disturbance of any flora and fauna outside the construction area shall not be permitted unless specifically authorised by the ECO.
- Where possible, leave large indigenous trees in place (i.e. where working in riparian areas/swamp forests). The relevant permits will need to be obtained where indigenous trees are likely to be damaged/destroyed.

### 2.8.12 Wildlife management

Working in natural areas often means that wildlife and habitat may be affected by rehabilitation activities. The following guidelines should be followed for managing local wildlife in natural areas:

- No collection of indigenous animals may only take place.
- Should fauna (animals) be encountered they should be safely relocated to a suitable site. Species may not be killed or otherwise deliberately disturbed, including snakes.
- The feeding, or leaving of food, for animals in the area must be strictly prohibited.

### 2.8.13 Water use

The following guidelines pertain to the use of water from wetlands/rivers at the site:

- No water to be abstracted from wetlands for use in construction activities without prior approval by the Department of Water Affairs (DWA). The contractor shall only be allowed to draw water from the source/s designated by the client and the ECO. The client shall ensure that the contractor is aware of the designated water sources, and the ECO shall ensure that this is adhered to.
Drinking water to be provided to all employees and labourers are to be discouraged from drinking directly from wetlands/rivers on site. Suitable domestic water supply to be sourced for human consumption by workers onsite (to comply with DWA specifications for drinking water).

### 2.8.14 Fire management

Fire poses a risk of damage to natural resources and to human health. The following guidelines should be followed with regards to fire management on site:

- Ensure that workers are aware of the potential for fires and the damage that could be caused.
- The contractor shall take all reasonable measures to ensure that fires are not started as a result of negligence of contractor employees (e.g. cigarettes).
- Basic functional fire-fighting equipment shall be made available on site at all times.
- The contractor shall notify the rehabilitation officer / safety officer in case of a fire starting on site.

### 2.8.15 Site rehabilitation

All temporary access routes, storage areas, site camps, etc. will need to be rehabilitated once work has been completed and before the team leaves the site. The following guidelines are to be considered:

- All foreign material not forming part of the Permanent Works shall be removed from the site. This includes construction equipment and excess aggregate, gravel, stone, concrete, bricks, temporary fencing and the like.
- No discarded materials of any nature shall be buried on the site, or on any vacant or open land in the area and shall only be disposed of at the appropriate registered waste disposal site. Re-vegetation of all exposed soil shall be done before the team leaves the site.
- Any potential erosion risks shall be addressed before the team leaves the site.

### 2.8.16 Heritage resources

Should any artifact / suspected artifact / site of cultural significance be encountered during construction, then the Contractor must cease work in that vicinity and alert the relevant authorities. AMAFA can be contacted at 033 394 6543.
2.9 Monitoring & Reporting

This section focuses on procedures required to ensure that the environmental specifications contained in the CEMPr are effectively implemented, monitored and recorded.

The ECO and contractors on site are responsible for ensuring compliance with the CEMPr. Monthly site audits shall be undertaken by the ECO and an Incident Report submitted to the Client (Tronox) for review prior to the following audit. Refer to Annexure A2 for the Incident Report. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified to the DEA. Interested and Affected Parties must be allowed access to the CEMPr document. They have the right to monitor specific aspects of the CEMPr (e.g. noise regulations, working hours stipulated) in conjunction with the contractor in a reasonable and formal manner without unreasonably disrupting construction activities. However, no member of the public shall enter the site without prior approval from Tronox (KZN) Sands.

The ECO shall keep a record of all complaints received from the community in a complaints register (Annexure A3). These complaints shall be addressed and mitigated within reason. Records relating to the compliance/non-compliance with the conditions of the CEMPr shall be made available to the DEA or other Government Department on request.

Regular monitoring of rehabilitation activities is also critical to ensure that any problems with rehabilitation interventions are picked up in a timeous manner. In this regard, the rehabilitation officer should undertake regular inspections of interventions with a focus on the following aspects:

- Ensuring that interventions are completed in line with design specifications;
- Ensuring the appropriate mitigation measures are implemented to avoid potential negative impacts in line with the CEMPr;
- Ensuring that signs of erosion that could undermine structures are timeously addressed;
- Ensuring that re-vegetation is progressing in line with expectations and risk of sediment loss is being adequately addressed.

Where concerns are noted, input from the implementer/engineer should be sought to assess the need for maintenance or additional interventions to address issues of concern. A simple monitoring checklist for structures has been included in Annexure A1.

Monthly fixed-point photography monitoring information shall be undertaken by the Rehabilitation Officer / ECO in order to document rehabilitation activities and any concerns noted during field inspections. The following guidelines should be followed when locating photographic points across the wetland system for fixed-point photographs:

- Photo-points should be selected at various locations throughout the rehabilitation site and at points that will be easily accessible at all times.
• Use the same camera, lens and zoom each time. If this is not possible, record the settings used. The camera should preferably be located on a tripod at a fixed height.
• Photographs should be taken at roughly the same time of year and at the same time of the day, and under similar weather conditions.
• The orientation of the photographer should be recorded.
• Record the geographical co-ordinates of each point, with a mapping grade Global Positioning System (GPS) - this provides any individual with the information required to navigate to the exact location of each photo point.
• Permanent field markers maybe placed in the ground at each point to ensure that photos are always taken from exactly the same point.
• A standard object, such as a soil auger or a metre rule should be included in the photograph as a reference for scale.
• Record relevant information about factors that may influence features in the photograph (e.g. a recent fire, late or early rains, etc.), especially those relating to the visual appearance of the site.

A final inspection must be undertaken by the project engineer to inspect all structural interventions prior to sign-off. Any deviations should then be addressed prior to completion. A management and monitoring plan will be developed to assess the long-term success of rehabilitation activities.
3 REFERENCES


## 4 ANNEXURES

### Annexure A1. Reporting Templates: Checklist for structures before sign-off

<table>
<thead>
<tr>
<th>SITE NUMBER:</th>
<th>STRUCTURE TYPE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE OF INSPECTION:</td>
<td>PREVIOUS INSPECTION DATE:</td>
</tr>
<tr>
<td>INSPECTED BY:</td>
<td></td>
</tr>
<tr>
<td>PREVIOUS PROBLEMS IDENTIFIED:</td>
<td>List/description of problems identified from previous inspections</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASPECT</th>
<th>COMPONENTS</th>
<th>CHECKED (Y/N)</th>
<th>SATISFACTORY (Y/N)</th>
<th>REQUIRED ACTIONS (WHERE NOT SATISFACTORY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMENSIONS</td>
<td>Are dimensions of the structure according to design specifications?</td>
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<td></td>
<td>Are there any deviations from the original design?</td>
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<tr>
<td></td>
<td>Have any design deviations been authorised?</td>
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<tr>
<td>STRUCTURAL COMPONENTS</td>
<td>Are there adequate downstream shoulder walls?</td>
<td></td>
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<tr>
<td></td>
<td>Are energy dissipaters present if needed?</td>
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<td></td>
<td>Has erosion protection been installed for the structure?</td>
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<tr>
<td>CONCRETE</td>
<td>Has concrete been mixed according to specifications?</td>
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<tr>
<td>MATERIALS</td>
<td>Have the correct materials been used in the construction of the structure?</td>
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<tr>
<td>STRUCTURAL INTEGRITY</td>
<td>Are there any signs of defects/cracks evident in the structure?</td>
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<td></td>
<td>Are there any signs of damage to sidewalls?</td>
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<tr>
<td></td>
<td>Are gabion baskets still intact?</td>
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<td></td>
<td>Is there evidence of sliding, tilting, slumping or overturning of the structure?</td>
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<td></td>
<td>Are there any signs of undercutting below the structure?</td>
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<tr>
<td></td>
<td>Evidence of tunnelling upstream/around the structure?</td>
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<tr>
<td></td>
<td>Any signs of inflicted damage/vandalism?</td>
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<tr>
<td>ADJACENT IMPACTS</td>
<td>Is there evidence of bank erosion at the structure or immediately upstream/downstream that could threaten the structure?</td>
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<tr>
<td></td>
<td>Are there any signs of sediment or debris (e.g. tree stumps) accumulation behind the structure?</td>
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<tr>
<td><strong>Is topsoil in place?</strong></td>
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<td><strong>Has soil around structure been adequately compacted?</strong></td>
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<td><strong>Has adequate vegetation cover been reinstated around structure?</strong></td>
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<td><strong>Has construction generated sediment been removed?</strong></td>
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<tr>
<td><strong>Has all waste products been removed from the site?</strong></td>
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</tr>
</tbody>
</table>

**Downstream Impacts**

| **Is there evidence of downstream scouring of the channel bed?** |  |
| **Is there evidence of outflanking?** |  |
| **Is there evidence of downstream bank erosion?** |  |

**Performance**

| **Does the structure show any major/significance signs of under-performance (i.e. is the structure performing in the way it has been designed)?** |  |

### Specific Monitoring Focus

<table>
<thead>
<tr>
<th><strong>Structure Type</strong></th>
<th><strong>Specific Monitoring Focus</strong></th>
</tr>
</thead>
</table>
| Gabion structures | - Correctly packed rock  
- Correctly sized rock  
- Lacing and bracing correctly implemented  
- Evidence of rusting  
- Evidence of sliding, tilting, slumping of structures  
- Evidence of undercutting  
- Scouring downstream of structures  
- Evidence of outflanking  
- Evidence of tunneling  
- Dimensions according to specifications  
- Authorized deviations from plan |
| Concrete weirs | - Evidence of sliding, tilting, slumping of structures  
- Concrete mixed to specifications  
- Evidence of cracks within concrete  
- Scouring downstream of structures  
- Evidence of undercutting due to poor founding  
- Evidence of outflanking  
- Evidence of tunneling  
- Dimensions according to specifications  
- Authorized deviations from plan |
| Earthen berms/plugs | - Erosion  
- Scouring downstream of structures  
- Evidence of undercutting due to poor founding  
- Evidence of outflanking  
- Evidence of tunneling  
- Adequate compaction of soil achieved  
- Dimensions according to specifications  
- Authorized deviations from plan |
| Earthworks | - Hydrological monitoring wells located and demarcated prior to excavations  
- Work areas and “no-go areas” clearly demarcated  
- Vegetation to be used in re-vegetation removed prior to excavations  
- Re-shaping undertaken in line with profiles included in the wetland rehabilitation plan  
- Backfilling and compaction of soil in main drains  
- Erosion control measures  
- Authorized deviations from plan |
## Annexure A2. Reporting Templates: Environmental Incidents

### ENVIRONMENTAL INCIDENT LOG

<table>
<thead>
<tr>
<th>REF/DATE</th>
<th>CATEGORY</th>
<th>INCIDENT DESCRIPTION</th>
<th>CORRECTIVE ACTION REQUIRED</th>
<th>COMPLIANCE DUE DATE</th>
<th>COMPLIANCE ACHIEVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>eg. 29/08/2012</td>
<td>eg. Fuel Spillage</td>
<td>eg. Diesel spill adjacent to wetland boundary</td>
<td>eg. Clean-up fuel spill including contaminated soil and rehabilitate disturbed area</td>
<td>eg. 30/08/2012</td>
<td>Eg. Yes/No</td>
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</tbody>
</table>
Annexure A3. Reporting Templates: Complaints Register

<table>
<thead>
<tr>
<th>REF</th>
<th>DATE</th>
<th>COMPLAINANT DETAILS</th>
<th>COMPLAINT DESCRIPTION</th>
<th>PROPOSED REMEDIAL ACTION</th>
<th>ECO NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<td>4</td>
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</tbody>
</table>
In response to the importance of wetland systems, protection of wetlands has been campaigned at national and international levels. This has led to the development of various policies and promulgation of a range of legislation to help protect wetland systems.

At an international level, wetland protection is emphasized through the following conventions and agreements:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The RAMSAR Convention</td>
<td>Emphasis is placed on protecting wetlands and implementing initiatives to maintain or improve the state of wetland resources.</td>
</tr>
<tr>
<td>Convention on Biological Diversity</td>
<td>Countries are to rehabilitate or restore degraded ecosystem through the formulation of appropriate strategies and plans;</td>
</tr>
<tr>
<td>United Nations Convention to Combat Desertification</td>
<td>South Africa has responded to the UN Convention to Combat Desertification by developing a National Action Plan. The aim of the NAP is to implement at current and future policies that affect natural resource management and rural development, and establish partnerships between government departments, overseas development agencies, the private sector and NGOs</td>
</tr>
<tr>
<td>New Partnership for Africa’s Development (NEPAD)</td>
<td>Wetland conservation and sustainable use is one of the eight themes under the environment initiative.</td>
</tr>
<tr>
<td>The World Summit on Sustainable Development (WSSD)</td>
<td>The Implementation Plan highlights actions that reduce the risk of flooding in drought-vulnerable countries by promoting the restoration and protection of wetlands and watersheds.</td>
</tr>
</tbody>
</table>

At a national level, there are a plethora of policies and legislation dealing either directly or indirectly with wetland protection and management. These include:

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>South African Constitution 108 of 1996</td>
<td>This includes the right to have the environment protected through legislative or other means.</td>
</tr>
<tr>
<td>National Environmental Management Act 107 of 1998</td>
<td>This is a fundamentally important piece of legislation and effectively promotes sustainable development and entrenches principles such as the ‘precautionary approach’, ‘polluter pays’, and requires responsibility for impacts to be taken throughout the life cycle of a project.</td>
</tr>
<tr>
<td>Environmental Impact Assessment (EIA) regulations</td>
<td>New regulations have been promulgated in terms of Chapter 5 of NEMA and were published on 18 June 2010 in Government Notice No. R. 543. In addition, listing notices (GN 544-546) lists activities which are subject to an environmental assessment. A number of activities listed in the regulations have relevance to wetlands including a range of activities within 32m of a watercourse (which includes wetlands).</td>
</tr>
<tr>
<td>The National Water Act 36 of 1998</td>
<td>This Act imposes ‘duty of care’ on all landowners, to ensure that water resources are not polluted. The following Clause in terms of the National Water Act is applicable in this case:</td>
</tr>
</tbody>
</table>
|                                                       | 19 (1) “An owner of land, a person in control of land or a person who occupies or uses the land on which (a) any activity or process is or was performed or undertaken; which causes, has caused or likely to cause pollution of a water
resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring”

Chapter 4 of the National Water Act is of particular relevance to wetlands and addresses the use of water and stipulates the various types of licensed and unlicensed entitlements to the use water. Water use is defined very broadly in the Act and effectively requires that any activities with a potential impact on wetlands (within a distance of 500m upstream or downstream of a wetland) be authorized.

**General Authorisations (GAs)**

These have been promulgated under the National Water Act and were published under GNR 398 of 26 March 2004. Any uses of water which do not meet the requirements of Schedule 1 or the GAs, require a license which should be obtained from the Department of Water Affairs and Forestry.

**National Environmental Management: Biodiversity Act No 10 of 2004**

The intention of this Act is to protect species and ecosystems and promote the sustainable use of indigenous biological resources. It addresses aspects such as protection of threatened ecosystems and imposes a duty of care relating to listed alien invasive species.

**Conservation of Agricultural Resources Act 43 of 1967**

The intention of this Act is to control the over-utilization of South Africa’s natural agricultural resources, and to promote the conservation of soil and water resources and natural vegetation. This includes wetland systems and requires authorizations to be obtained for a range of impacts associated with cultivation of wetland areas.

At the Provincial level, there is little legislation. The following guidelines and ordinances are however relevant:

- **Guidelines for development activities that may affect wetlands released by the KwaZulu-Natal Department of Agriculture and Environmental Affairs (2002)** – This includes a draft set of norms and standards for the avoidance and mitigation of impacts to wetlands in urban areas.


Makes extensive provision for protected areas (including private nature reserves) and protection of flora and fauna (including marine and freshwater fish).

Other pieces of legislation that are also of some relevance to wetlands include:

- The National Forest Act 84 of 1998;
- The Natural Heritage Resources Act 25 of 1999;
- The National Environmental Management: Protected Areas Act 57 of 2003;
- The Mountain Catchments Areas Act 62 of 1970

Any developments with a potential impact to wetland systems therefore typically need to be assessed to ensure that impacts are adequately minimized. Authorizations may also be required before planned activities can commence.