

**ENVIRONMENTAL MANAGEMENT PLAN FOR
THE MAINTENANCE, REPLACEMENT AND
RE-BUILDING OF INGWELALA
INFRASTRUCTURE**

March 2012

Version: 2.0



INGWELALA

Ingwelala Share Block Limited

Reg. No. 1983/006997/06

P O Box 121, Hoedspruit, 1380

Tel: +27 (0) 15 793 1242 / Fax: +27 (0) 15 793 1285

Email: reception@ingwelala.co.za

Compiled by :

EMROSS Consulting Pty Ltd

P O Box 507, White River, 1240

tel: 082 3399 627

e-mail: andrew@emross.co.za

APPROVAL

Approved for Ingwelala by:

Chairman of the Ingwelala Board of Directors
Mr Kevin Alborough

Date

Chairman of the Ingwelala Building Management Committee
Mr Raymond Bezuidenhout

Date

Chairman of the Environmental Management Committee
Dr Chris Henderson

Date



1. BACKGROUND:

Ingwelala Share Block Ltd. (hereafter referred to as Ingwelala) was established in 1983 and covers an area of 3145 hectares of natural vegetation. It is located in the Umbabat Private Nature Reserve which forms part of the Association of Private Nature Reserves (APNR). There is a common border with Kruger National Park.

Ingwelala is a leader in conservation best practice and employs both a Reserve Manager and a Conservation Manager, each with extensive reserve management and conservation experience. Through their efforts, a range of sound policies as well as ecological and environmental management plans have been developed for various aspects of the operation of Ingwelala.

2. OBJECTIVES OF THE EMP:

This EMP has the following key objectives:

1. Demonstrate and implement sound 'duty of care' practice in the private conservation area under Ingwelala management.
2. Protect the environment from detrimental impacts associated with infrastructure maintenance and restoration.
3. Comply with the requirements of current environmental legislation (such as GRN 544 (June 2010) activity # 18).

3. BIODIVERSITY AREA:

Ingwelala lies predominantly in the Phalaborwa-Timbavati Mopaneveld vegetation type (Mucina & Rutherford 2006). This is a summer rainfall area with a mean annual rainfall of 435mm.

The area was originally cattle and game farming (fenced), but in the mid 1990's fences were dropped and an open system with Kruger National Park was developed.



4. INGWELALA LAYOUT:

Ingwelala as a company has 205 member units ranging in size from 50 square meters to 200 square meters. Staff housing is provided for up to 48 staff. In addition there are administration buildings of 520 square meters and carports for 230 vehicles. There is a communal swimming pool and access control gates. A water reticulation system (almost 70 km of piping) and road access supports the development. All of the above is contained in a 'camp' of just 90 hectares.

On the remaining area (over 3000 hectares) there are 3 'hides', 3 'bomas' and various viewing and picnic sites and a road network of about 140 kilometres. This road network crosses the Ga-Sekhobela, Nayanemane, Nharalumi, Hammerkop rivers and other small tributaries at a number of points. The river crossings are possibly best described as access points to the riverbed, as there is no road infrastructure in the rivers. A few of the river access approaches have some concrete erosion prevention.

In addition there is water reticulation from various boreholes on the property to support the 'camp' and limited water provision for wildlife at various points.

5. PLANNED DEVELOPMENTS:

Currently, there are no planned new developments. There is however an ongoing maintenance plan as many of the buildings were poorly built 30 odd years ago. On these occasions the buildings are sometimes altered, within company regulations, which ensure the new rebuilt structures are on the original footprint and within the limited size (maximum of 150 square meters) as per the company regulations.

No additional new member buildings can be developed as the number of company shares have all been allocated.

Ingwelala has been subjected to 1/100 year floods twice in the last 12 years – and 3 times since 1993. These events may well be augmented by the catastrophic failure of dams upstream. In any event, these floods have left considerable ecological and infrastructural damage in their wake.

Ingwelala, as a matter of course, holds any planned activities against the requirements of the National Environmental Management Act 107 of 1998 (NEMA) regulations to see if an



environmental impact assessment (EIA) is required. In addition, Ingwelala subscribes to and is a signatory of the APNR management Plan.

6. EMP SCOPE:

This environmental management plan (EMP) is an update of the Ingwelala EMP implemented in 2007. This version (Version 2) takes into consideration and expands on lessons learnt and the approved APNR management plan (approved by the Mpumalanga MEC of the Department of Economic Development, Environment and Tourism in 2011) – a management plan for the ecological and environmental management of the entire reserve area, of which Ingwelala forms a part. In addition this EMP has been expanded to include all infrastructure (Version 1 only dealt with buildings). The plan is thus divided into four parts to efficiently accommodate this and allow for sectional updates. The first part deals with buildings, the second with roads, the third with water reticulation and boreholes and the fourth with energy and waste. Each of the sections has been written so that it is a stand alone document. Whilst this provides for some duplication in this format, it will enable Ingwelala staff, contractors and all service providers to be provided with a focused environmental management plan relevant to their duties or service.

The environmental management plan has also been revised to comply with the NEMA regulations of 2010.

The existing Ingwelala policies have been incorporated and various relevant best practice documents have been consulted in developing this document.

This EMP covers the following areas of operation:

Part 1:

- Buildings

Part 2:

- Roads

Part 3:

- Water reticulation
- Boreholes



Part 4

- *Waste*
- *Energy*

The EMP is designed to assist Ingwelala management and contractors to undertake services and duties with due consideration and care for the environment (as contained in section 28 of NEMA).

The EMP expressly covers the following:

- Repairs and maintenance of existing infrastructure
- Rebuilding of existing infrastructure on the footprint of the demolished structure
- The realignment and development of new sand roads less than 4 meters wide
- The repair and maintenance of river banks and existing river crossing access points.
- The repair and maintenance of water and power reticulation.
- The repair of flood damage to all infrastructure
- The moving and removal of sand from the river for on site maintenance and to restore access to reserve areas
- The moving and removal of sand from the river for construction and pipe beds
- The moving and removal of sand from the river for maintenance to communal facilities and areas
- Water reticulation management
- The management of waste
- General energy management guidelines

This EMP does not negate the necessity to conduct an EIA whenever a regulation is triggered or as prescribed.

This EMP may, however, form part of the EIA and application for authorisation.

This EMP is a 'living' document and should be reviewed on a regular basis, a minimum every 3 years, to ensure that it continues to meet the objectives and to take into account changes to legislation, technical developments and best practice guidelines.

The EMP is supported by 4 appendices:

Appendix 1: Environmental Incident register

This is an example of a form that may be used to document environmental incidents.



Appendix 2: Contractor penalty schedule

This is the current list of penalties – and may be updated more often than the EMP.

Appendix 3: Listed tree species

This is the gazetted list of nationally protected trees.

Appendix 4: Application under section 18 of the 2010 environmental regulations to undertake maintenance activities within a watercourse.

This application will be included, and is only valid, when accompanied by an approval letter from the relevant authority.



PART 1

CONSTRUCTION AND RENOVATION OF BUILDINGS

1. SCOPE

The scope of this Environmental Management Plan (EMP) is to set a protocol for addressing environmental issues, in connection with construction and renovation of buildings, to ensure that appropriate controls and audits are implemented to minimise potential environmental damage and to mitigate the impacts that may occur during the construction, renovation and development of buildings.

2. AGREEMENT

It is important to note that the EMP is to be read as a contract between the Contractor, the Shareholder and Ingwelala Share Block Ltd, represented by the Reserve Manager. It is therefore crucial that both the Contractor and Shareholder be provided with a copy of the EMP (or access to this through a web link) and that failure to adhere to its requirements may lead to penalties levied against the Contractor.

It is also noted that any damage caused by the Contractor to areas outside the construction site, is to be compensated for, repaired or replaced at the Contractor's expense, to the satisfaction of the Reserve Manager in accordance with the Contractors penalty schedule as listed in Appendix 2.

The Reserve Manager will institute contractual measurements to ascertain that its Contractors adhere to the environmental obligations agreed upon. Penalties for non-compliance are enforced and Construction staff must adhere to the Reserve Code of Conduct for Contractors and requirements of the Contractors Information Pack, as supplied by the Reserve Manager.

The Contractor will be required to sign each page of this EMP as an acceptance of the conditions stipulated.

Ingwelala looks to maintaining a fair, ethical and transparent working environment. Disagreements and grievance structures are in place and should any disagreements or issues arise, these can be managed through the existing company Grievance Procedure which is available and fully described on the website: <http://www.ingwelala.co.za/members/grievance/grievance.htm>



It is preferable to all parties that a reasonable attempt be made to resolve issues through open discussion, and if necessary, with a neutral party present.

3. RESPONSIBLE PERSON

The Conservation Manager, acting in the capacity as Ingwelala's Environmental Control Officer (ECO), is appointed by the Company Building Committee and Board of Directors to ensure full compliance with the requirements of this Environmental Management Plan (EMP). The ECO should be familiar with the contents of this document and the Ingwelala Building Regulations. The appointed ECO shall work closely with the Reserve Manager. The primary role of the Environmental Control Officer is to act as quality controller regarding all environmental concerns. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO will submit regular progress reports to the Reserve Manager during the construction phase to monitor compliance and general progress. These compliance reports will be reviewed by the Building Committee for purposes of control and comment.

The ECO may at any time institute action against a Contractor due to non-compliance with the EMP.

The ECO will be responsible for the training of Contractors in terms of conveying the contents of this EMP and associated Codes of Conduct to them through an induction session.

4. DEFINITIONS

Pre-construction:	Involves all facets for the preparation of the site for construction.
Construction:	For the purpose of this document, construction is defined as the physical action of constructing any structures as described in the Ingwelala Building Regulations.
Post-construction/ rehabilitation:	This phase includes the restoration of the surrounding environment that was impacted upon due to the construction process to its original state.
Decommissioning	The decommissioning of a building will occur when the use of the said structure is no longer required or when it has become non-viable in terms of maintenance to continue its upkeep. This phase is not anticipated, although it is acknowledged as a potential possibility. An EMP for this task specifically will have to be compiled. This activity should be checked prior to ensure it complies with all necessary legislation and EIA regulations.



Incident	<p>An event resulting in temporary or permanent cumulative or immediate adverse effects on the environment, eg an oil or chemical spillage, or release of refrigerant gas.</p> <p>Typically, the spill of more than 1 litre of petrol or diesel or oil or paint would constitute an incident</p>
Natural vegetation	<p>All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.</p>
Rehabilitation:	<p>Making the land useful again after a disturbance. It involves the recovery of natural ecosystem functions and processes in a degraded habitat. Rehabilitation does not necessarily reestablish the pre-disturbance condition, but does involve establishing geological and hydrologically stable landscapes that support the natural ecosystem mosaic.</p>
Topsoil	<p>The upper soil profile irrespective of the fertility appearance, structure, agriculture potential, fertility and composition of the soil, usually containing organic material and which is colour specific.</p>

5. INCIDENT REGISTERS AND REPORTING

Accidents, resulting in an incident will happen from time to time. The reporting process seeks to ensure that these are addressed and that environmental damage is minimised and that practical measures are put in place to prevent recurrence where appropriate. The purpose of the reporting is not to apportion blame, however this does not exclude the possibility that action will be taken if a failure to follow the environmental management plan, specific instructions or negligence is shown.

An incident register will be kept on site at all times and completed/updated by the Contractor on a daily basis. All incidents must be recorded in the register. The register must be available to Ingwelala management for audit inspections. All incidents must be reported to the ECO, and the responsible Contractor will sign the logging of the incident, to ensure that the information contained in the register is correct. The register must contain the date, time and place of the incident that took place. Remedial measure(s) taken must also be recorded in the logbook. Refer to Appendix 1, for an example of the site incident register.



6. CONTROLS DURING PRE-CONSTRUCTION AND CONSTRUCTION

6.1 VEHICLE ACCESS

Vehicle access to Ingwelala will be through the Central Control Gate (CCG) and via the existing main access road. No new roads are to be constructed by the Contractor. Access to the footprint of the development location will be via Ingwelala roads. No new access is to be created without prior authorisation from the Building Committee as stipulated in the Building Regulations section 7.4.

The access road should be closely monitored for signs of potential degradation during the course of the project, this particularly due to the movement of heavy machinery. The ECO and Reserve Manager will advise on appropriate measures to mitigate any road degradation should it be required.

6.2 PROTECTION OF FAUNA AND FLORA

Ingwelala Share Block is located in the Umbabat Private Nature Reserve. It has a responsibility to comply with the National Environmental Management Act (NEMA). The Ingwelala Share Block properties are also declared protected in terms of the National Environmental Management Protected Areas Act. Contractors have no right to damage or destroy fauna and flora without written approval from the ECO. During site layout, trees that are authorised for removal will be identified and tagged and only these trees may be removed. Only the ECO may remove such trees. Any trees that are protected species may not be moved or damaged unless this is the only option available. In these cases, efforts will be made to transplant the tree following the granting of the prescribed permits.

In order to limit damage to the environment during construction, the site layout phase will also identify and peg/demarcate the stockpile sites.

No foreign materials may be nailed or attached to any trees and all 'no-go' areas are to be demarcated through the use of colour coded pegs.

No firewood or any other plant material or animal may be removed from the site.

No soil or overburden or naturally occurring rocks may be removed from the site.

Where necessary, and at the discretion of the ECO, sight screens will be erected adjacent to service roads and between bungalows.

The potential impact on fauna is regarded as low if mitigation measures described are implemented.

The footprint to be impacted must be scrutinised for the presence of any fauna (burrowing animals such as baboon spiders, scorpions etc.) and necessary relocation action taken in the event of finding any. No footprint may be worked until such time that the ECO has completed the footprint investigation.



Open trenches must be marked and if left overnight must have escape routes available for animals – such as a sloped end to natural ground level, or a branch 'ladder' placed in the trench.

Debris and litter on site must be removed daily, particularly plastics, rope, string and wire, which can all form animal traps, or entangle on an animal, compromising its survivability.

All toxins, solvents and harmful substances must be removed from site or stored in a locked vermin proof container or room.

Contractors should clearly understand that they are working within a nature reserve. Contravention of any conservation and environmental legislation may result in prosecution. The Contractor is responsible for any illegal action by his/her staff, e.g. illegal hunting, setting of snares, fishing etc.

The Contractor will be held liable for the replacement of any plant or feature under the protection of these specifications that is removed or damaged by the Contractor's negligence or mismanagement.

The ECO shall monitor that there is no introduction of alien invasive species to the construction site. Should any such species be identified, immediate complete physical removal and any additional appropriate control measures are to be implemented under the guidance of the ECO.

6.3 ESTABLISHMENT OF CONSTRUCTION SITE

6.3.1 Inside of camp:

The location of storage areas etc will be indicated by the ECO and Reserve Manager. No drainage lines may be impacted upon by stored material. Where building materials are stored on the construction site, these must be neatly stacked and kept tidy. All Contractors are to comply with the terms as stipulated in the Ingwelala Building Regulations section 4.3 (dealing with contractors conduct). It is necessary for the Contractors to travel to and from the construction site on a daily basis.

The site boundaries will be laid out by the ECO with coloured pegs. This boundary may not be altered without ECO approval. All activities must be contained within the demarcated area and are the responsibility of the contractor. The demarcations must remain in place until rehabilitation phase has been completed.

6.3.2 Outside of camp:

There is to be no storage of construction materials outside of camp. Should storage be required for an out-of-camp construction job, this will be allocated in camp in consultation with the ECO.



Where building materials are stored on the construction site, these must constitute a maximum of one days supplies, except for stockpiles of sand and stone. Building materials must be neatly stacked on as small a footprint as possible and kept tidy.

All Contractors are to comply with the terms as stipulated in the Ingwelala Building Regulations section 4.3. It is necessary for the Contractors to travel to and from the construction site on a daily basis.

Ingwelala offers no on-site accommodation.

6.4. ABLUTION FACILITIES AND WASTE/ REFUSE DISPOSAL

Toilet facilities are rarely available at the construction sites. Contractors are encouraged to tap into the existing sewerage pipes and septic tanks wherever possible. However, a temporary ablution facility must be in place. Toilets are to be erected at a ratio of at least 1:15 toilets per persons. The ECO will monitor the standard of hygiene and maintenance of toilets throughout the duration of the contract. It is the Contractors responsibility to keep these toilets clean and functional. Toilet paper is to be provided by the Contractor. Temporary toilets are to be secured to prevent toppling over. **Contractors are requested to paint all portable toilets a dull military nutria type colour (eg: Polynesia, matt finish) to lessen the visual impact of these temporary facilities in the natural environment. The same applies to any temporary sheds erected for material storage on building sites.**

In terms of refuse disposal, the Contractor will ensure that, on a daily basis, all refuse is removed from site and disposed of at the company waste centre. The use of plastic refuse liners in the dustbins is obligatory to facilitate the sorting and removal of waste. These dustbins will be managed in accordance with the Ingwelala waste management policy. It is essential that no refuse be disposed of amongst the building rubble generated, since this rubble may later be used in other applications. Building rubble and building waste is not catered for in the Ingwelala waste stream. Building rubble and any other non-compactable rubble should be safely stored to be transported at a later stage. A skip container for rubble may be placed at the site as determined by the ECO / Reserve Manager. All such rubble and building waste must be removed from the site and the reserve unless specifically directed to do otherwise by the ECO.

6.5. PROVISION OF WATER

Water is currently available from the Ingwelala reticulation system. This water is suitable for human consumption.

The ECO is to train Contractors on correct and safe water usage practices. Water is a precious and limited resource at Ingwelala and must be used sparingly.



Washing of vehicles and laundry is prohibited on all construction sites.

Hose pipes must be entire and free of leaks and taps turned off when not in use. Hose pipes should have taps at both ends.

Handwash facilities and drinking water should be available to employees at all times.

6.6. AIR POLLUTION

No significant air pollution is anticipated. Dust suppression may be necessary if work is conducted in camp. This should be discussed with the ECO.

6.7. NOISE

Within camp, contractors should maintain a 5 day working week from 07:00 to 17:00. There is a compulsory lunch break between 13h00 and 14h00. The lunch period must be taken and site personnel may be required to vacate the site during this time to a suitable venue, as directed by the ECO.

Outside of camp, management may allow different work times. Any variation to the above should be in agreement with management and obtained in writing.

Noise pollution will be monitored and should the need arise, the ECO may request the contractors to use manual equipment or to fit sound deadening apparatus to their equipment e.g. silencers, soundproof boxes etc. The ECO will monitor noise levels and if deemed to be excessive will request for the contractors to limit use to specified times.

Noise levels shall adhere to SABS 0103 specifications and no hooters or sirens may be used on site except where required in terms of SABS standards or in emergencies.

The use of generators must comply with section 7.6 of the Ingwelala Building Regulations. This entails their use to be only during work time.

Unnecessary noise will not be tolerated. Contractors will not be permitted to shout on site. The use of megaphones is prohibited. Radios and / or any other music or sound systems are prohibited.

6.8. VEHICLE AND EQUIPMENT FUELLING AND MAINTENANCE

All vehicle refuelling and maintenance is to occur in areas specifically maintained for these activities e.g. the workshop. The servicing and repair of equipment is to take place in the workshop or off site in areas specifically designed and designated for this.



In the event of an onsite emergency repair, the contractor must ensure that all work is conducted over an impervious layer preventing spillage of oils and fuels into the environment. Sufficient absorbent materials and spill kits must be available to assist with potential clean up requirements.

6.9. SOIL CONTAMINATION AND RESPONSE

Should any soil contamination occur during construction, such contamination is to be immediately reported to the ECO. The soil shall be removed and stored in an area determined by the ECO and shall be labelled as to the form of contamination to prevent its future use. After consultation with the Reserve Manager, the contaminated soil must be cleaned or disposed of in accordance with legislation.

6.10. CEMENT

Cement mixing is to take place on an impermeable layer. Cement mixing areas must not be in the vicinity of drainage-lines or water bodies as cement is toxic to aquatic species. Cement wash must be prevented from entering any drainage lines.

It is suggested that cement working equipment, at the end of a working day, is washed in a drum of water. Allowing the water to settle overnight will make the upper layers of water available for further cement mixing and wetting. The remaining sludge can be allowed to dry and disposed of at the end of the project as building rubble.

Any excess cement and concrete mixes shall be retained on the construction site until completion of the construction when all spoil material and rubble will be removed and the rehabilitation process commences.

All used cement bags are immediately to be disposed of into the solid waste system. These bags are not to be used for other on site applications.

6.11. PROVISION OF STORAGE FACILITIES - DANGEROUS AND TOXIC MATERIALS

All toxic materials such as paints, fuel, or oil shall be stored in well ventilated areas that can be locked. It is essential for safety reasons that all toxic materials are handled in an appropriate manner as prescribed by the labels on the products used.

Drip trays are to be placed underneath paints and toxic materials in storage to contain accidental spills.

Toxic substance volumes must be kept at less than a **total** of 100 litres on site at any one time.



Should any spillage or pollution of any toxic materials occur, the ECO should immediately be contacted and mitigation measures taken. The Contractor will be liable for any clean-up costs, legal costs or fines, which may arise from such an accident.

Washing of tools used for the application of these materials is to be done in washing trays and water stored in drums, adequately labelled as toxic, with closing lids for disposal on recommendation by the ECO. No cleaning may take place using the environment as a receptor.

Empty containers that contained toxic substances are not to be used for any other application, but are to be returned to supplier, or punctured and discarded (not in the reserve) as recommended by the ECO and the product label.

6.12. PROVISION OF STORAGE FOR CONSTRUCTION MATERIAL

The Contractor will be responsible for the storage of construction material at a site determined in conjunction with the ECO. Where necessary in the stockpiled areas, the topsoil is to be removed and stored adjacent to the stockpile. No bushes or trees are to be removed for this purpose. All storage areas are to be indicated with the ECO.

6.13. TOPSOIL REMOVAL AND STORAGE

The topsoil of all the areas affected by construction (material stockpiles and construction footprint) is to be removed and stored in heaps not higher than 1.5 meters. Periodic watering will be required to maintain the microbial action within the topsoil. Care should be taken to store topsoil in such an area, where it will not be susceptible to soil erosion or contamination from any other materials. Care should be taken to prevent any compaction of the topsoil occurring. In some case it may be necessary to trench the area around the topsoil stockpiles to prevent runoff water from heavy rains eroding these stockpiles.

6.14 BORROW PITS, QUARRIES AND THATCH

There are no active or permitted borrow pits or quarries on the property. The use or creation of borrow pits and quarries of any size on Ingwelala, is not permitted.

Any imported fill or sand shall be free of weeds, litter and contaminants.

Thatch grass shall be free of contaminants, combed and be free of viable seed as per standard thatching regulations and standards.



6.15 SPOIL MATERIAL

All spoil material shall be disposed of in accordance with legislation. No spoil material will be left on site at completion of the project and the reuse of any material (excess crushed stone, sand etc) should be investigated. These spoil materials may be relocated to stockpile areas within Ingwelala for later use, by arrangement with the ECO or manager.

6.16 FIRE PREVENTION

No open fires will be allowed on the construction site or in the veld under any circumstances.

It will be expected by all Contractors to indicate their ability to fight accidental fires, through having fully functional and serviced equipment on site in the event of accidental fires. The ECO in conjunction with the Reserve Manager will determine the level of equipment and training required by the Contractors.

6.17 STORM WATER MANAGEMENT

No obstructions of any storm water system will be allowed and the dumping of water used for the cleaning of equipment will also not be permissible, the management of this water has been addressed under point 6.3.8.

Only level areas are to be used for stockpile zones and care is to be taken to prevent the stockpiling of materials in drainage lines. The ECO will assist in determining these areas.

6.18 GROUNDWATER MANAGEMENT

Caution should always be deployed when working with or in the vicinity of bore holes. No construction site run-off or waste should be allowed within 100m of a borehole.

6.19 WASTE DISPOSAL

All refuse waste will be managed in accordance with Ingwelala's waste management policy.

Building rubble and any other non-compactable rubble should be safely and suitably stored for later removal. Open vehicles transporting rubble should be carefully loaded to prevent material from falling off the load area. No waste may be buried or burned on site.

6.20 TRAFFIC CONTROL

All vehicles used by Contractors and sub-contractors are to be maintained in a safe working condition. Vehicle operators are to be in possession of valid driver licenses. It is advisable to insure vehicles and



operators against claims arising from accidents and third party liability. All vehicles shall undergo regular checks to ensure they are free of oil or other lubricant leaks. The ECO may at any time prevent sub standard or dangerous equipment from being used on Ingwelala.

Contractors and sub-contractor drivers are to be courteous in all dealings with other road users and shall adhere to all roadway signage and speed limits.

Contractors and sub-contractors are to use the shortest possible route between the place of entry and the construction site at all times. Unauthorised driving through the reserve for purposes other than the building contract is not permitted.

All the contractor's vehicles must have the contractors decal clearly visible on both sides.

Contractors vehicles may not be left on a building site over weekends or holiday periods. These vehicles must be removed and parked in an area indicated by the ECO during these periods.

6.20 LITTERING

No littering by the Contractors or sub-contractors shall be allowed. The ECO shall monitor the neatness of the worksite for any litter.

6.21 COMMUNICATION

It is essential that good communication channels between the Contractor, ECO, Reserve Manager and Shareholder be maintained.

6.22 SIGNAGE

A single signboard is to be erected on the construction site denoting the business name of the Contractor.

The detail regarding the style, size and information on this sign will be given to the contractor by the ECO in conjunction with the Reserve Manager and Building Committee.

Any such signage must be removed on or before the completion date provided in the building application lodged with the Company Building Committee. Any extension must be applied for in writing and will be provided in writing.



6.23 TRENCHING

Trenching must be undertaken with care, considering appropriate drainage, existing water and power services and other buried obstacles.

For significant trees (as indicated by the EO / ECO), trenching must be 3m away from the stem.

Where possible, trenches should be excavated and backfilled on a progressive basis. Excavations to stand open for no longer than 2 days if at all possible. Excavations should preferably be opened and closed on the same day.

Ensure that no trench longer than 500m is exposed at any one time.

Programme excavation to take place only once the required materials are on site. This facilitates the immediate laying of services and / or construction of subsurface infrastructure and minimises open trench time.

7. REHABILITATION PHASE

7.1 REHABILITATION OF THE CONSTRUCTION SITE

On completion of construction, the site must be rehabilitated through the removal of all construction facilities introduced, removal of waste and any other feature constructed or established during the use of the site. All areas devoid of vegetation or where spoils and stockpiles have been stored shall be scarified or ripped and the topsoil, previously removed and stockpiled, shall be reintroduced to these areas. In some cases it may be necessary to re-seed and mulch. This, however, will be at the discretion and under the advice of the ECO.

All natural and appropriate storm water drainage areas and channels must be restored. This may also entail the creation and installation of appropriate erosion control measures. Such measures will be determined by the ECO and may involve berms, walls or other construction.

Any concrete from past activity on the site may be required to be broken and removed – as determined by the ECO.

7.2 FINAL REHABILITATION OF THE SURFACE

On completion of the construction phase, the various surfaces in use by the contractors and sub-contractors shall be finally rehabilitated as described in this document. All infrastructures, equipment,



plant and any other items used during the construction period must be removed from site. Waste receptacles, scrap and rubble will be removed entirely from site. No burial or burning of any material whatsoever will be allowed on site.

Final rehabilitation shall commence within 1 week from cessation of construction operations.

8. SITE SAFETY MANAGEMENT PROCEDURES

Disasters are a constant threat when working in conservation areas and especially on construction sites.

In order to avoid accidental fires and to aid fire fighting, the Contractors must be instructed in Ingwelala fire management procedures by the ECO.

In case of flooding, Ingwelala will notify contractors of flooding potential as soon as this information is received (from, for example, weather forecasts).

The greatest factor regarding disaster management in this instance is the proximity to medical care for injuries on duty or evacuation in the case of serious illness. The Contractor is to have a first aid kit available on site at all times along with at least one person with a basic first aid training and current / valid certificate.

Contractors are expected to abide by the Ingwelala health and safety standards, and as such, hard hats are expected to be worn on site, protective eye wear, dust masks and ear protection made available for tasks that require such and harnesses for any work above 1.8 meters. Scaffolding must be secure and appropriate warning signage placed for dangerous activities. Proper footwear should be worn by all employees.

The contractor must identify the following person(s) to the ECO and management for each site:

A safety representative

A first aid officer

Contractors must be able to demonstrate that all workers are registered with the Workers Compensation Commission - WCA.



PART 2

MAINTENANCE OF ROADS

1. SCOPE

The scope of this Environmental Management Plan (EMP) is to set a protocol for addressing environmental issues, in connection with road management, to ensure that appropriate controls and audits are implemented to prevent potential environmental damage and to mitigate any impacts that may occur.

2. AGREEMENT

It is important to note that the EMP is to be read as a contract between the Contractor and Ingwelala Share Block Ltd, represented by the Reserve Manager. It is therefore crucial that the Contractor be handed a copy of the EMP and that failure to adhere to its requirements may lead to penalties levied against the Contractor.

It is also noted that any damage caused by the Contractor to areas outside the construction site, is to be compensated for, repaired or replaced, at the Contractor's expense, to the satisfaction of the Reserve Manager in accordance with the Contractors penalty schedule as listed in Appendix 2.

The Reserve Manager will institute contractual measurements to ascertain that its Contractors adhere to the environmental obligations agreed upon. Penalties for non-compliance are enforced and Construction staff must adhere to the Reserve Code of Conduct for Contractors and requirements of the Contractors Information Pack, as supplied by the Reserve Manager.

The Contractor will be required to sign each page of this EMP as an acceptance of the conditions stipulated.

3. RESPONSIBLE PERSON

The Conservation Manager, acting in the capacity as Ingwelala's Environmental Control Officer (ECO), is appointed by the Environmental Management Committee to ensure full compliance with the requirements of this Environmental Management Plan (EMP). The ECO should be familiar with the contents of this document and the Ingwelala Building Regulations.

The appointed ECO shall work closely with the Reserve Manager. The ECO will advise on all environmental issues that are unclear and shall further be responsible for the environmental auditing required for the



duration of the project. The ECO will submit weekly progress to the Reserve Manager during the construction phase to monitor compliance and general progress. These compliance reports will be reviewed by the Building Committee for purposes of control and comment.

The ECO may at any time institute action against a Contractor due to non-compliance with the EMP.

The ECO will be responsible for the training of Contractors in terms of conveying the contents of this EMP and associated Codes of Conduct to them through an induction session.

The APNR Road Policy :

- ***Maintain all roads and tracks in a condition necessary for the optimal fulfilment of their respective functions;***
 - ***Maintain all roads and tracks in a state which minimises their impact on surrounding hydrology, soils and biota;***
 - ***Plan any new roads and tracks with due consideration to their functional requirements, erosion danger and required maintenance levels; and***
 - ***Regulate access and traffic in terms of vehicle types and numbers in order to minimise erosion and maintain road standards;***
- ***The construction of any road requires and Environmental Impact Assessment (EIA).***

Comment: *The regulations under NEMA change periodically and not all roads will necessarily require an EIA. Any new roads planned should be evaluated against the current regulations to see if they trigger a listed activity and require environmental authorisation.*



4. DEFINITIONS

Incident	<p>An event resulting in temporary or permanent cumulative or immediate adverse effects on the environment, eg an oil or chemical spillage, or release of refrigerant gas.</p> <p>Typically, the spill of more than 1 litre of petrol or diesel or oil or paint would constitute an incident</p>
Natural vegetation	<p>All existing vegetation species, indigenous or otherwise, of trees, shrubs, ground cover, grasses and all other plants found growing on the site.</p>
Rehabilitation:	<p>Making the land useful again after a disturbance. It involves the recovery of natural ecosystem functions and processes in a degraded habitat. Rehabilitation does not necessarily re-establish the pre-disturbance condition, but does involve establishing geological and hydrologically stable landscapes that support the natural ecosystem mosaic.</p>
Topsoil	<p>The upper soil profile irrespective of the fertility appearance, structure, agriculture potential, fertility and composition of the soil, usually containing organic material and which is colour specific.</p>
Humps	<p>Compacted placed across the roadway at any angle to aid rapid drainage of water from the roadway. Humps are usually at least a meter wide or more and 300mm high.</p>
Windrow	<p>A line of material (soil or other road material) alongside the road. Often created by grading.</p>
Table drains	<p>A 'V' or trapezoidal shaped open drain located immediately adjacent to the edge of a road .</p>
Flood	<p>Mild: The result of a local or catchment based rainfall event that leads to increased river flow, but not to the extent that it surpasses the 1:50 year flood line.</p> <p>Severe: Any increased river flow above the 1:50 year flood line.</p>



5. INCIDENT REGISTER AND REPORTING

An incident register will be kept on site at all times and completed/updated by the Contractor on a daily basis. All incidents must be recorded in the register. The register is available to Ingwelala management for audit inspections.

All incidents must be reported to the ECO, and the responsible Contractor will sign the logging of the incident, to ensure that the information contained in the register is correct. The register must contain the date, time and place of the incident that took place. Remedial measure taken must also be mentioned in the logbook. Refer to Appendix 1, for an example of the site incident register.

6. ROADS MANAGEMENT

All road management should be based on the requirements identified in the **Ingwelala Roads Plan**. Each road section should be assessed for drainage and road standard requirements prior to any earth works being undertaken. Minimum standard is dry weather 4WD access for all roads.

6.1 ROAD MAINTENANCE

All roads should be assessed at least annually and a maintenance program developed with a costing and priority ranking.

Where possible, less used tracks will not be graded and retain the 'middlemannetjie'

Any gravel for a road must be obtained from a licensed borrow pit.

Road camber and drainage should be sufficient to minimise erosion and maintenance requirements. Methods to achieve this is dealt with in greater depth in the sections below.

6.2 NEW ROADS LESS THAN 4 METERS WIDE

New roads must be planned with care and receive approval from APNR EXCO prior to development. The following information must be submitted to EXCO for any new road:

- Purpose
- Soils and plant communities that will be traversed
- Maintenance requirements
- Source of gravel (if any)
- Alternatives considered

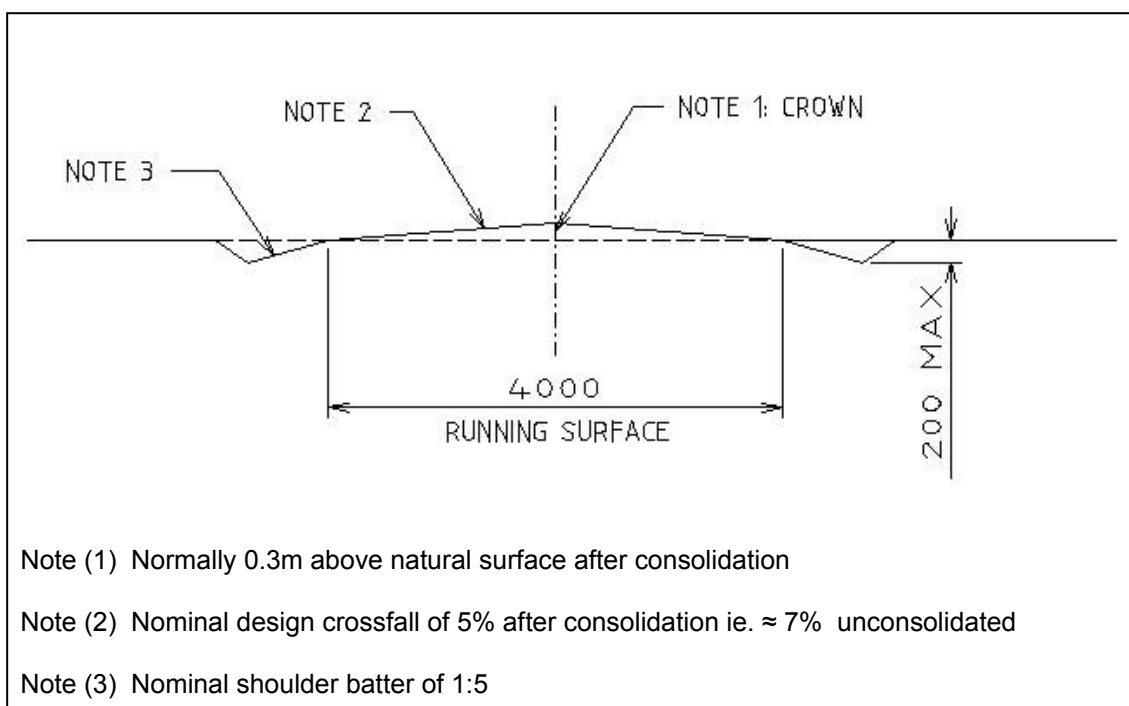


Road alignment should avoid areas with high erosion potential (slope and soil) as well as seep and drainage lines where possible.

Roads wider than 4 meters may require environmental authorisation and it is advisable to check with a specialist before commencing the project.

6.3 FORMATION PROFILES

6.3.1 Crowned Surface Formation

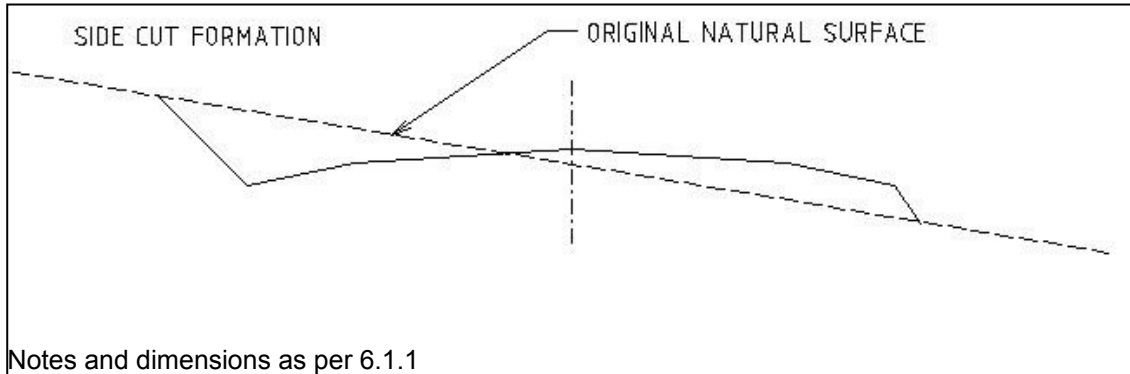


Crowned Surface Formation

- Is suitable for tracks where water can be shed from both sides of the formation
- May be used in other situations in conjunction with suitable cross road drainage techniques (see Section 7.5.)
- May require down road drainage (see Section 7.6.)



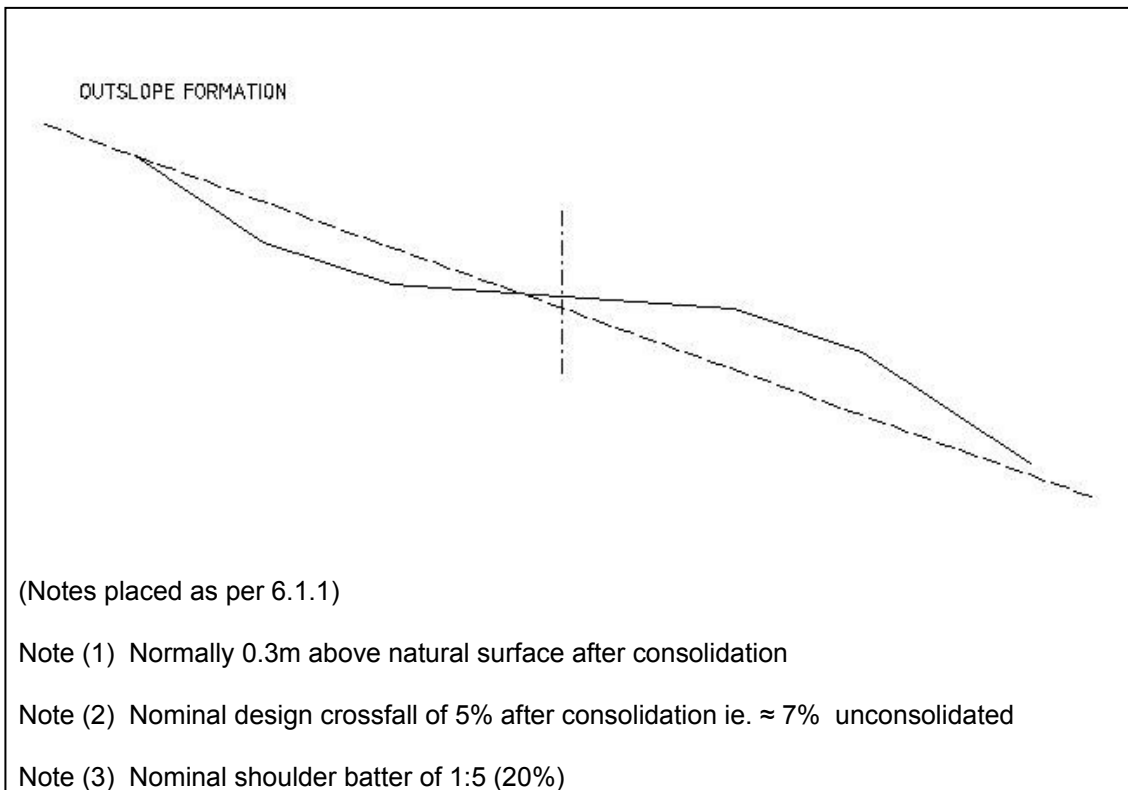
6.3.2 Crowned Side Cut and fill Formation.



Crowned Side Cut and fill formation

- Suitable for smaller lengths of side cut where water can be shed from the confined water table further down the road eg at ridge top saddle.
- May be used in limited situations for longer runs if used in conjunction with acceptable cross drainage techniques (see Section 7.5).

6.3.3 OUTSLOPE FORMATION



Outslope Formation

- Suitable for longer lengths of side cut where water cannot be shed from the confined shoulder of the road except across the running surface
- This design profile should be used in conjunction with approved cross drainage techniques. (see Section 7.6).

7 STORMWATER MANAGEMENT/ ROAD DRAINAGE

In order to avoid damage to roads and drainage areas, any surface water must be led off the road as soon as possible and with as low a velocity as possible.

The following approaches should be used as prescribed.

7.1. BERMS

- Berms are rills of excess or unsuitable road material windrowed on to the side of the worked area.
- Any berm must be discontinuous. Breaks must be opened at intervals of less than 20m.
- Any drainage must extend through the berm
- Berms may be placed on the uphill side of workings; especially in locations suitable for outslope track formation. (See Section 6.1.3). Where possible they should be incorporated into the track shoulder.

7.2. ANGLED HUMP SPACING

Angled humps constructed across the road collect water on the road and disperse it either on both sides or on one side, depending on the local topography. Water flow should be intercepted and dispersed from the road into drains at safe locations at least every 0.5 metres of vertical fall of the track.

It is acknowledged that soil type and other local factors on site may vary the ideal from this specification. This specification is to be used as an appropriate requirement for red soils; any variation to this standard must be authorised by the ECO.

Humps should be at least 0.3m high and compacted.



7.3 TURNOUTS OR MITRE DRAINS

Turnouts generally:

- Should be as short as possible whilst achieving the desired result. This will be dependant on soils, permeability and terrain.
- Should be terminated in as wide (level – 2 to 5%) a discharge as is practical.
- Should run at approximate 1.5% grade (shallow slope to slow water velocity)
- Should extend as far as is required to prevent discharged water from flowing back to the road further down the slope.
- Must discharge onto stable areas of undisturbed vegetation and not onto fill slopes, exposed soils or directly into a water course.
- Be constructed with a grader or suitable blade

7.5. CROSS ROAD DRAINAGE TECHNIQUES

7.5.1. CULVERTS

A culvert is defined as any pipe box or arch construction used for cross road drainage that is covered and below the surface of the road. Culverts are only to be installed at the express and written instructions of the ECO and where other options are not practical.

Existing culverts are to be preserved and culvert heads left in a clean and functional condition.

If existing culverts are damaged during maintenance, the location and extent of damage is to be recorded in writing and relayed to the ECO with in 24 hrs.

7.5.2 INVERTS

Inverts are man-made or naturally occurring open topped depressions in the surface of the roadway which allow for concentrated cross road drainage. These are often utilised where local topography is appropriate.



7.5.3 CROSS FLOW RUN-OFF HUMPS

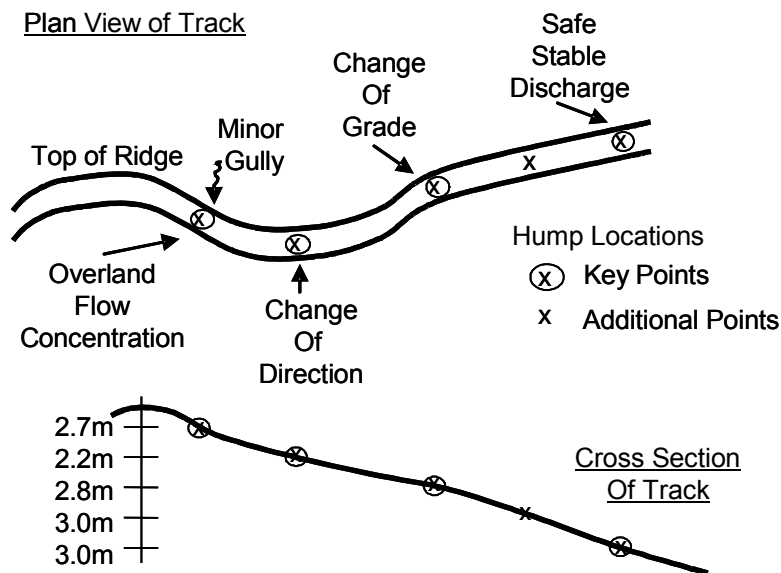
These structures are used to invert water across the road and are used in areas where the topography is very uniform.

Locating Cross Flow Humps

Placement of cross flow Humps requires care and planning. They should be constructed at critical points where there is:

- A significant change of grade
- A significant change of road direction
- A significant point of overland flow concentration
- A safe stable discharge point.

After these key points are located, additional Cross Flow Humps will need to be constructed so as to remain within the minimum specification of 0.5 metres of vertical fall. (see spacing of access track drainage Section 7.2.)



Dimensions Of Cross Flow Humps.

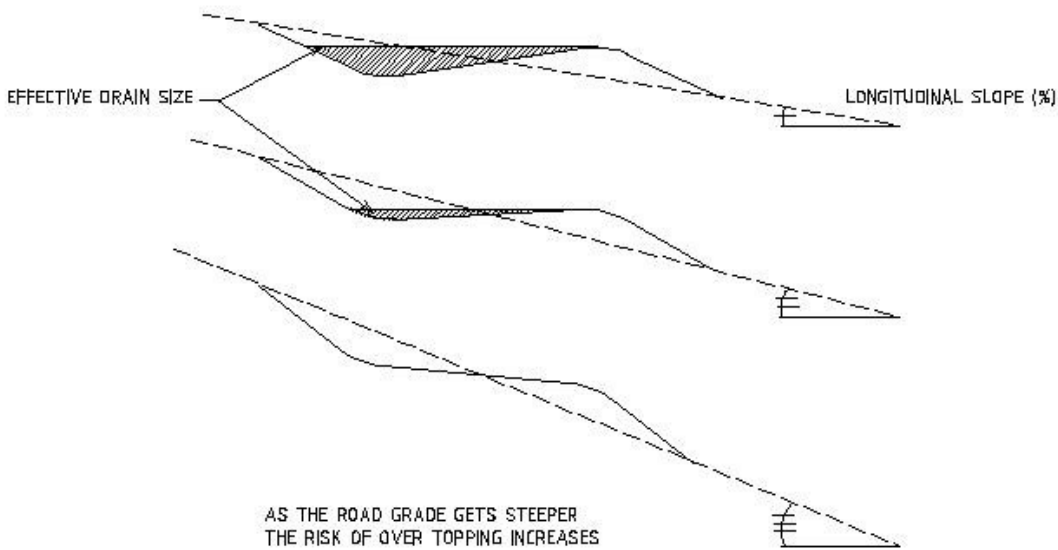
Humps must be easily trafficable and must drain water across the road without scouring, ponding or



overtopping.

They should be \approx 0.3 to 0.6m high (unconsolidated) and be compacted for a minimum of 2 metres on both top & bottom sides of the mound.

As the longitudinal slope (grade) increases so too does the risk of overtopping. A corresponding degree of care with construction is warranted to preclude any risk of the structure failing.



Generally:

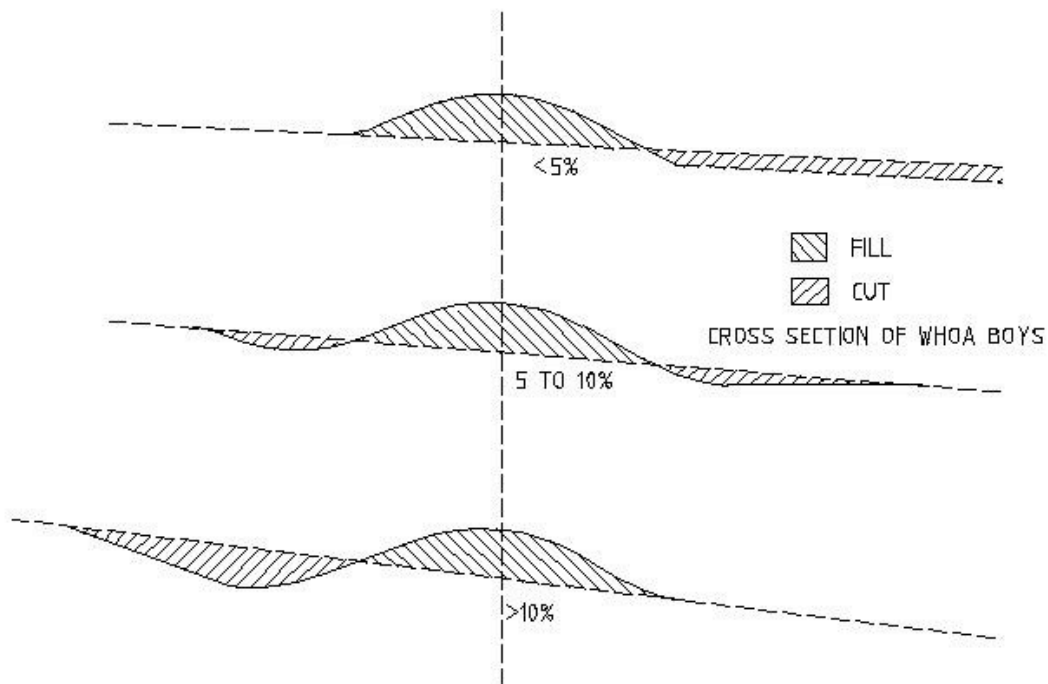
For slopes $<5\%$, materials should be sourced from the lower side of the mound.

For slopes 5% to 10% , materials should be sourced from both sides of the mound

For slopes $>10\%$, all material should be sourced from above the mound (where possible)

In some very steep situations additional material may be required. Gravel may need to be sourced elsewhere and imported to the required hump location.





7.6. DOWN ROAD DRAINAGE TECHNIQUES

These techniques specifically relate to dispersal of water confined or concentrated on the running surface of the track (eg in wheel ruts or compacted zone).

Water is to be dispersed using:

- Cross Fall of running surface
- Humps
- Combination of the two above

Normally the cross fall of the running surface will suffice. Exceptions occur where the formation is :

- On very steep slopes where the longitudinal slope is much greater than the cross fall of the formation and even minor ruts may channel the water and frustrate water shedding from the running surface.
- In areas of highly erodable soil types

In these situations additional protective techniques should be incorporated. The techniques include cross road drainage structures if applicable; or if not applicable, Minor humps should be installed.

If the track intercepts and concentrates overland (surface water runoff) flows of water then normal cross flow humps should be constructed. In these situation it is imperative that the structure discharge extends a sufficient distance to preclude any chance of this water migrating back to the track.

If overland flow is not a problem then Minor Humps would be acceptable.

7.6.3. MINOR HUMPS

Positioning Minor Humps

Placement of minor humps requires care and planning. They should be constructed at a critical point where there is:

- A significant change of grade
- A significant change of road direction
- A safe stable discharge point.

After these key points are located, additional Minor humps will need to be constructed so as to intercept the potential flow every 6 metres of vertical fall.

These structures must be free draining. Discharges must extend a sufficient distance to preclude any chance of this water migrating back to the track.

Dimensions Of Minor Humps

Minor Humps must be easily trafficable and must drain water off the running surface without scouring, ponding or overtopping.

They should be \approx 0.2 to 0.4m high (unconsolidated) and be compacted for a minimum of 2 metres on both top & bottom sides of the mound.

7.7. RIVER, STREAM & DRAINAGE-LINE CROSSINGS

As far as possible, these should:



- Be avoided
- Cross at right-angles
- Be situated to avoid box cuts
- Have minimal clearing
- Be protected by drainage structures immediately above the approach slopes.

Particular care should be paid to the river banks where the slope is likely to increase erosion potential.

NOTE: Any activity where more than 5 cubic meters of material may be moved requires an approved management plan. See Appendix 4.

Care should be taken that these activities don't trigger an environmental impact assessment (EIA)

7.7.1 Culverts in drainage lines

Culverts should be placed at the lowest location in a road crossing. Wide, flat culvert profiles are recommended for use but other design criteria should still be the primary deciding factors. The inlets and outlets to the culverts should be protected to prevent erosion, scouring and collapses. In areas where piping in soils occur, all culvert joints should be watertight. The possibility of soil mechanical failure must be taken into account, especially in the case of non-cohesive materials.

Where steep gradients occur the need for erosion control on the outlet and down stream side is important to prevent loss of topsoil and erosion.

In the case of flat (shallow) gradients the minimum desirable slope in the culvert should not be less than 0.5% to ensure that maintenance and silting-up within the system can be kept to a minimum.

Each culvert should be treated individually and factors regarding slope of immediate adjacent areas and / or streams also play part in the deciding factor.

Culverts size should err on the side of being too large and too small.

7.7.2. Dry river crossings

These crossings need little maintenance in the river bed itself. Occasional smoothing may make crossings more comfortable.

The access to the river bed is the most important area and most likely to require stabilisation and protection from erosion and damage. Each access point needs to be assessed for the most appropriate and lowest impact methods.

Any of the following should be considered to protect the access against erosion and minor flooding.



- Concrete (re-inforced and 100mm thick)
- Gabion structures
- Well paced rocks
- Angled approach down the bank before crossing the river bed at 90 degrees
- Existing rock
- Suitability of existing soils
- Gravel packing

The angle of approach to the river bed may be considered to reduce erosion potential.

8 GENERAL CONTROLS

8.1 VEHICLE ACCESS

Vehicle access to Ingwelala will be through the Central Control Gate (CCG) and via the existing access road. Access to the footprint of any development location will be via Ingwelala roads. No new roads are to be created without prior authorisation from the Directors or their representative and shall be in writing with appropriate GPS co-ordinates and within a defined route.

The contractor will be responsible for clearly marking any roads that are required to be closed to traffic for the construction or maintenance activity. The closure of any roads must be undertaken in consultation with the ECO.

8.2 PROTECTION OF FAUNA AND FLORA

No tree of a trunk diameter exceeding 100mm should be removed without the written permission of the ECO and densely wooded areas should be avoided where possible. No 'listed' trees requiring a permit may be removed without such a permit. If in doubt on a particular tree, the ECO will assist.

In order to limit damage to the environment during construction, the planning phase includes identification of and pegging /demarcation of any stockpile sites.

No firewood or any other plant material or animal may be removed from the site.

In order to minimise the potential impact on Fauna, the footprints of the proposed development should be



scrutinised for the presence of any vulnerable fauna and necessary relocation action taken in the event of finding any. No footprint may be worked until such time that the ECO has completed the footprint investigation. Contractors should clearly understand that they are working within a nature reserve. Contravention of any conservation and environmental legislation may result in prosecution. The Contractor is responsible for any illegal action by his/her staff, e.g. illegal hunting, setting of snares, fishing etc.

The ECO shall monitor that there is no introduction of alien invasive species to the construction site. Should any such species be identified, immediate and appropriate control measures are to be implemented under the guidance of the ECO.

The area is an open system Big 5 reserve. Dangerous wild animals exist in the area and suitable precautions should be undertaken so as not to increase the risk of site personnel. It is also a malaria area. The ECO will advise on suitable action to take as appropriate to the site, work and equipment.

8.3 ESTABLISHMENT OF CONSTRUCTION SITE

The ECO will direct where stockpiles and equipment may be stored or parked.

8.4 ABLUTION FACILITIES AND WASTE/ REFUSE DISPOSAL

Toilet facilities are rarely available at the construction site. Road contractors are requested to use existing Ingwelala toilets as pointed out by the ECO and to ensure that they are always left clean.

No refuse or litter may be allowed to be left overnight. Any building rubble and any other non-compactable rubble should be safely stored to be transported at a later stage. Building rubble must be removed from the reserve.

8.5 PROVISION OF WATER

Water may need to be transported to the construction site. Filling of water tankers and similar must be arranged in consultation with the ECO.

The ECO is to train Contractors on correct and safe water usage practices. Water is a precious and limited resource and should be used sparingly.

Washing of vehicles is prohibited.

Hose pipes must be entire and free of leaks and taps turned off when not in use.



8.6 AIR POLLUTION

No significant air pollution is anticipated, however, dust suppression may be necessary. This should be discussed with the ECO.

8.7 NOISE

Management may allow different work times to those normally permitted (7:00 to 17:00). Any variation to the above should be in agreement with management.

Unnecessary noise will not be tolerated. Contractors will not be permitted to shout on site. The use of megaphones is prohibited.

8.8 VEHICLE AND EQUIPMENT FUELLING AND MAINTENANCE

All vehicle fuelling and maintenance is to occur in areas specifically maintained for these activities e.g. the workshop. The servicing and repair of equipment is to take place in the workshop or off site in areas specifically designed and designated for this.

In the event of an on-site emergency repair, the contractor must ensure that all work is conducted over an impervious layer preventing spillage of oils and fuels into the environment. Sufficient absorbent materials and spill kits must be available to assist with clean-up operations.

8.9 SOIL CONTAMINATION AND RESPONSE

Should any soil contamination occur during construction, such contamination is to be immediately reported to the ECO. The soil shall be removed and stored in an area determined by the ECO and shall be labelled as to the form of contamination to prevent its future use. After consultation with the Reserve Manager, the contaminated soil must be disposed of, in accordance with legislation.

8.10 CEMENT

Cement mixing is to take place on an impermeable layer. Cement mixing areas must not be in the vicinity of



drainage-lines or water bodies as cement is toxic to aquatic species. This is particularly important if cement is used on river crossing areas.

The cleaning of cement equipment, at the end of a working day, shall be washed in a drum of water. Allow the water to settle overnight. The top layer of water is subsequently used for further cement mixing and wetting. The process is repeated. Remaining sludge is allowed to dry and disposed of at the end of the project.

Any excess cement and concrete mixes shall be retained on the construction site until completion of the construction when all spoil material and rubble will be removed and the rehabilitation process commences.

All used cement bags are immediately to be disposed of into the solid waste system. These bags are not to be used for other on site applications.

8.11 PROVISION OF STORAGE FACILITIES - DANGEROUS AND TOXIC MATERIALS

All toxic materials such as paints, fuel, or oil shall be stored in well ventilated areas that can be locked. It is essential for safety reasons that all toxic materials are handled in an appropriate manner as prescribed by the labels on the products used.

Drip trays are to be placed underneath paints and toxic materials in storage to contain accidental spills.

Should any spillage or pollution of any toxic materials occur, the ECO should immediately be contacted and mitigation measures taken. The Contractor will be liable for any clean-up costs, legal costs or fines, which may arise from such an accident.

Empty containers that contained toxic substances are not to be used for any other application, but are to be returned to supplier, or punctured and discarded (not in the reserve) as recommended by the ECO and the product label.

8.12 PROVISION OF STORAGE FOR CONSTRUCTION MATERIAL

The Contractor will be responsible for the storage of construction material at a site determined in conjunction with the ECO. Where necessary in the stockpiled areas, the topsoil is to be removed and stored adjacent to the stockpile. No bushes or trees are to be removed for this purpose. All storage areas are to be indicated with the ECO.



8.13 BORROW PITS AND QUARRIES

There are no borrow pits and quarries on Ingwelala property and none are to be made.

Harvest of construction materials such as sand and stone is only to be done in limited amounts and under strict control by the ECO/ Reserve Manager.

Any imported gravel or sand shall be free of weeds, litter and contaminants.

8.14 SPOIL MATERIAL

All spoil material shall be disposed of in accordance with legislation. No spoil material will be left on site at completion of the project and the potential of the reuse of any material (excess crushed stone, sand etc) should be investigated. These spoil materials may be relocated to stockpile areas within Ingwelala for later use, after arrangement with the ECO.

8.15 FIRE PREVENTION

No open fires will be allowed on the construction site or in the veld under any circumstances.

Road contractors must be aware of and be able to raise the alarm if a fire is discovered.

8.16 STORM WATER MANAGEMENT

No obstructions of any storm water system will be allowed and the dumping of water used for the cleaning of equipment will also not be permissible, the management of this water has been addressed in detail in section 7 above.

Only level areas are to be used for stockpile zones and care is to be taken to prevent the stockpiling of materials in drainage lines. The ECO will assist in determining these areas.

8.17 TRAFFIC CONTROL

All vehicles used by Contractors and sub-contractors are to be maintained in a safe working condition. Vehicle operators are to be in possession of valid driver licenses. It is advisable to insure vehicles and operators against claims arising from accidents and third party liability. All vehicles shall undergo regular checks to ensure they are free of oil or other lubricant leaks. The ECO may at any time prevent sub standard



equipment from being used on Ingwelala.

Contractors and sub-contractor drivers are to be courteous in all dealings with all other road users and shall adhere to all roadway signage and speed limits.

Contractors and sub-contractors are to use the shortest possible route between the place of entry and the construction site at all times. Unauthorised driving through the reserve for purposes other than the contract is not permitted.

Road closures necessary for works must be adequately marked.

6.18 COMMUNICATION

It is essential that good communication channels between the Contractor, ECO, Reserve Manager be maintained. This is particularly important with regard to road closures and wildlife safety.

6.19 SIGNAGE

A single signboard is to be erected on the construction site denoting the business name of the Contractor.

Appropriate traffic signage should be erected where appropriate advising road users of closures and of maintenance.

9. REHABILITATION PHASE

On completion of construction, the site must be rehabilitated through the removal of all construction facilities introduced, removal of waste and any other feature constructed or established during the use of the site. All areas devoid of vegetation or where spoils and stockpiles have been stored shall be scarified or ripped and the topsoil, previously removed, shall be reintroduced to these areas. In some cases it may be necessary to re-seed and mulch. This, however, will be at the discretion of the ECO.

10. DISASTER MANAGEMENT PROCEDURES

Disasters are a constant threat when working in conservation areas and especially on construction sites.



Where flooding is likely, the Contractor must be informed and trained in the Ingwelala flood management procedures.

In order to avoid accidental fires, the Contractors must be instructed in Ingwelala fire management procedures.

The greatest factor regarding disaster management in this instance is the proximity to medical care for injuries on duty or evacuation in the case of serious illness. The Contractor is to develop and maintain a medical disaster management procedure that will be communicated to all staff. This procedure will, as a minimum, have evacuation protocols, medical attention detail and a list of necessary contact numbers included. This procedure is to be communicated to all workers and a copy is to be handed to the ECO for inclusion in the audit results. Contractors will also be required to have a first aid kit available on site at all times.



PART 3

WATER RETICULATION AND BOREHOLES

1. SCOPE

The scope of this Environmental Management Plan (EMP) is to set a protocol for addressing environmental issues, in connection with maintenance of the water reticulation system and boreholes, to ensure that correct controls and audits are implemented to constrain potential environmental damage and to mitigate the impacts that may occur during the construction, renovation and operation phases.

2. AGREEMENT

It is important to note that the EMP is to be read as a contract between the Contractor and Ingwelala Share Block Ltd., represented by the Reserve Manager. It is therefore crucial that the Contractor be handed a copy of the EMP and that failure to adhere to its requirements may lead to penalties levied against the Contractor.

It is also noted that any damage caused by the Contractor to areas outside the construction site, is to be compensated for, repaired or replaced at the Contractor's expense, to the satisfaction of the Reserve Manager in accordance with the Contractors penalty schedule as listed in Appendix 2.

The Reserve Manager will institute contractual measurements to ascertain that its Contractors adhere to the environmental obligations agreed upon. Penalties for non-compliance are enforced and Construction staff must adhere to the Reserve Code of Conduct for Contractors and requirements of the Contractors Information Pack, as supplied by the Reserve Manager.

The Contractor will be required to sign each page of this EMP as an acceptance of the conditions stipulated.

3. RESPONSIBLE PERSON

The Conservation Manager, acting in the capacity as Ingwelala's Environmental Control Officer (ECO), is appointed by the Building Committee / Environmental Management Committee to ensure full compliance with the requirements of this Environmental Management Plan (EMP). The ECO should be familiar with the contents of this document and the Ingwelala Regulations. The appointed ECO shall



work closely with the Reserve Manager. The ECO will advise on all environmental issues that are unclear and shall further be responsible for the environmental auditing required for the duration of the project. The ECO will submit weekly progress to the Reserve Manager during the construction phase to monitor compliance and general progress. These compliance reports will be reviewed by the Building Committee and Environmental Management committee for purposes of control and comment.

The ECO may at any time institute action against a Contractor due to non-compliance with the EMP.

The ECO will be responsible for the training of Contractors in terms of conveying the contents of this EMP and associated Codes of Conduct to them through an induction / training session.

4. DEFINITIONS

Borehole:	A narrow deep hole drilled in the ground to locate water.
Trenching:	A long narrow ditch of any depth into which a pipe, cable or other service is located and then covered.
Rehabilitation:	The restoration of the surrounding environment that was impacted upon due to the construction or trenching process to its original state.
Incident	<p>An event resulting in temporary or permanent cumulative or immediate adverse effects on the environment, eg an oil or chemical spillage, or release of refrigerant gas.</p> <p>Typically, the spill of more than 1 litre of petrol or diesel or oil or paint would constitute an incident</p>
Natural vegetation	All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.
Topsoil	The upper soil profile irrespective of the fertility appearance, structure, agriculture potential, fertility and composition of the soil, usually containing organic material and which is colour specific.



5. WATER INFRASTRUCTURE

5.1. BOREHOLES

Caution should always be deployed when working with or in the vicinity of bore holes. No construction site run-off or waste should be allowed within 100m of a borehole.

Only qualified Hydro-geologists and borehole drillers are allowed to drill boreholes. Bore hole drilling companies must be registered with Borehole Water Association or a similar professional organisation.

Purging and dosing of boreholes should be conducted in consultation with a specialist.

5.1.1 Disinfection of Borehole

Should bacterial contamination of a borehole be discovered, the borehole should be inspected to identify potential source of contamination.

The borehole and reticulation should be flushed to remove any mud, silt, rust or other solids.

Disinfection dosing should be applied to the effective bore hole and water quality tested before assessing the need for re-dosing. The use of 'soft' type disinfectants, such as "milton" is recommended.

5.1.2 Borehole drilling

Two types of drilling may take place – either using compressed air or using water (also called mud drilling).

Drill water discharged from water (mud) drills must be contained where possible and prevented from entering the environment. This is due to the additives likely to be added to the water. The sump tanks for water drilling should be above ground porta-pool type and must be completely removed from site after drilling.

Air drill water discharge may be allowed to soak away. Care should be taken that it is not hot. If it is hot, the water should be channelled away to cool.

Water discharge from drilling must be undertaken in a manner that will not cause any erosion or site damage.

5.2 WATER QUALITY

Water quality should be tested at least annually. Test water should be collected as per the testing laboratory protocol and delivered for testing within 24 hours, 12 would be preferable.



Water tests must include coliforms, e-coli and bacteria.

Should some event occur that may cause borehole water contamination (local spill, flooding, leakage of undesirable products), the borehole water should be tested before further use. Water failing the potable water standard should be dosed and the borehole pumped prior to re-testing.

5.3 WATER QUANTITY

All boreholes must be monitored with a flow meter. Flow meters must be placed at the lowest practical point in the pipeline so that false readings are minimised.

All boreholes must be allowed to 'rest' at least 8 hours every 24.

Periodically and at least annually (at the same time of the year) all boreholes (current and old) should be inspected for any problems and the water table depth measured. This data must be collated so that a long term monitoring of the water table (resource) can be undertaken. This will provide some warning on possible water shortage challenges.

5.4 WATER RETICULATION

No major changes to the water reticulation system is envisaged and focus is therefore on maintenance of existing system. In case of major damage to the reticulation system, for example in connection with major flooding events, changes may however need to take place in order to prevent recurring damage.

Where possible the water reticulation system should be aligned with other infrastructure, such as roads and river crossings in order to minimise impacts and allow ease of access.

5.4.1 Excavations and Trenching

- Trenches should be kept as narrow as possible;
- Water pipes should if possible be buried at least 500mm and preferably 1.5m, unless where this is made impossible by rocks or other restraints of the land.
- For significant trees (as indicated by the ECO), trenching must be at least 3m away from the stem. Care should be taken to avoid listed trees (Appendix 3)
- Excavate and backfill trenches on a progressive basis.



- Ensure that no trench longer than 500m is exposed at any one time.
- Do not allow excavations to stand open for longer than 2 days where at all possible. Excavations should preferably be opened and closed on the same day.
- Programme excavation to take place once the required materials are on site. This facilitates the immediate laying of services and / or construction of subsurface infrastructure and minimises open trench time.
- Trenching through drainage lines may only be undertaken upon instruction by the EO / ECO. In such a situation be sure to return the profile of the wetland / drainage line to one similar to the pre-construction profile. No ridge or channel feature may remain.
- During trenching through a drainage line, no damming must be allowed to take place.

Trenching in a drainage line most probably requires an approved management plan – see appendix 4.

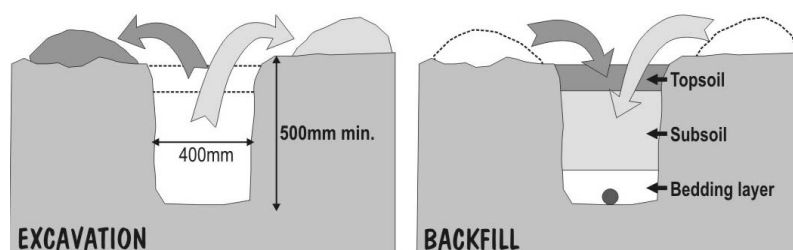


figure: Section through a typical trenching operation showing minimum depth and maximum width

5.4.2 Leak detection in camp area

A pressure gauge is situated at the gate and is monitored 24 hours. A sustained drop in pressure will indicate a leak in the reticulation. The stop-cocks on the system can be used to isolate the general area of the leak which then needs to be detected through investigation of the pipe routes.

Gate security personnel must be trained to monitor the water pressure. Should the pressure drop be maintained for more than 15 minutes, the gate security must contact the duty maintenance team and report the issue.

5.4.3 Pipe repair

All repairs must be undertaken with the correct class of pipe (class 6) and with purpose suited fittings.



Pipes may not be repaired with rubber tubing, tape or any non standard fittings.

All repairs should be monitored for at least 30 minutes to ensure the leak is addressed before the excavation is filled in.

Any leaks found must be repaired the same working day.

Should a large leak be discovered (such as through elephant damage), water must be turned off at the nearest stop cock. If the stop cock cannot be located, water must be turned off at the main feed line to camp.

5.4.4 Water saving systems

Ingwelala operates a reservoir made up of several 10 000 litre tanks. Each of these can be isolated should any become damaged or develop a leak. This system must be maintained and inspected at least weekly for any damage or slow leaks.

The reservoir water is connected to tanks on a 5 meter stand. An electronic float switch operates a lift pump to maintain sufficient water in the elevated tanks. This creates the water pressure for Ingwelala camp area. At night, the feed pump must be turned off so that, should any major leak occur, water loss will be limited to that in the elevated tanks.

Every building must have a water stop cock so that the water supply can be isolated.

Where possible, all end use fittings should be of a water conservation type.

Apart from the communal pool and administration building areas, no irrigation is permitted.

There are to be no pumped waterholes in the camp area.

6. INCIDENT REGISTERS AND REPORTING

An incident register will be kept on site at all times and completed/updated by the contractor on a daily basis. All incidents must be recorded in the register. The register is available to Ingwelala management for audit inspections. All incidents must be reported to the ECO, and the responsible Contractor will sign the logging of the incident, to ensure that the information contained in the register is correct. The register must contain the date, time and place of the incident that took place. Remedial measure taken must also be mentioned in the logbook. Refer to Appendix 1, for an example of the site incident register.



7. GENERAL CONTROLS

7.1 VEHICLE ACCESS

Vehicle access to Ingwelala will be through the Central Control Gate (CCG) and via the existing access road. No new roads are to be constructed by the contractor. Access to the footprint of the development location will be via Ingwelala roads. No new access is to be created without prior authorisation from the Building Committee or Directors as stipulated in the Building Regulations section 7.4.

The access road should be closely monitored for signs of potential degradation during the course of the project, this particularly due to the movement of heavy machinery. The ECO and Reserve Manager will advise on appropriate measures to mitigate any road degradation should it be required.

7.2 PROTECTION OF FAUNA AND FLORA

No tree of a trunk diameter exceeding 100mm should be removed without the written permission of the ECO and densely wooded areas should be avoided where possible. No 'listed' trees requiring a permit may be removed without such a permit. If in doubt on a particular tree, the ECO will assist.

In order to limit damage to the environment during construction, the planning phase includes identification of and pegging /demarcation of any stockpile sites.

No firewood or any other plant material or animal may be removed from the site.

In order to minimise the potential impact on Fauna, the footprints of the proposed development should be scrutinised for the presence of any vulnerable fauna and necessary relocation action taken in the event of finding any. No footprint may be worked until such time that the ECO has completed the footprint investigation. Contractors should clearly understand that they are working within a nature reserve. Contravention of any conservation and environmental legislation may result in prosecution. The Contractor is responsible for any illegal action by his/her staff, e.g. illegal hunting, setting of snares, fishing etc.

The ECO shall monitor that there is no introduction of alien invasive species to the construction site. Should any such species be identified, immediate and appropriate control measures are to be implemented under the guidance of the ECO.

The area is an open system Big 5 reserve. Dangerous wild animals exist in the area and suitable precautions should be undertaken so as not to increase the risk of site personnel. It is also a malaria area. The ECO will advise on suitable action to take as appropriate to the site, work and equipment.



7.3 ESTABLISHMENT OF CONSTRUCTION SITE

Work sites and no-go areas should be demarcated using pegs, hazard tape and/ or droppers. Do not paint, mark or nail anything to any natural feature or infrastructure.

A site should be identified for safe food storage, preparation and consumption in conjunction with the ECO.

7.3.1 Inside of camp:

The location of storage areas etc will be indicated by the ECO and Reserve Manager. No drainage lines may be impacted upon by stored material. Where building materials are stored on the construction site, these must be neatly stacked and kept tidy. All Contractors are to comply with the terms as stipulated in the Ingwelala Building Regulations section 4.3 (dealing with contractors conduct) . It is necessary for the Contractors to travel to and from the construction site on a daily basis.

The site boundaries will be laid out by the ECO with coloured pegs. This boundary may not be altered without ECO approval. All activities must be contained within the demarcated area and are the responsibility of the contractor. The demarcations must remain in place until rehabilitation phase has been completed.

7.3.2 Outside of camp:

There is to be no storage of construction materials outside of camp. Should storage be required for an out-of-camp construction job, this will be allocated in camp in consultation with the ECO.

Where building materials are stored on the construction site, these must constitute a maximum of one days supplies, except for stockpiles of sand and stone. Building materials must be neatly stacked on as small a footprint as possible and kept tidy.

All Contractors are to comply with the terms as stipulated in the Ingwelala Building Regulations section 4.3. It is necessary for the Contractors to travel to and from the construction site on a daily basis.

Ingwelala offers no on-site accommodation.

7.4. ABLUTION FACILITIES AND WASTE/ REFUSE DISPOSAL

Toilet facilities are rarely available at the construction site. Contractors are requested to use existing Ingwelala toilets as pointed out by the ECO and to ensure that they are always left clean.



No refuse or litter may be allowed to be left overnight. Any building rubble and any other non-compactable rubble should be safely stored to be transported at a later stage. Building rubble must be removed from the reserve.

Do not locate any sump or depot for any substance which causes or is likely to cause pollution within the 1:100year flood line or within 100m of a watercourse.

7.5. PROVISION OF WATER

Water is currently available from the Ingwelala reticulation system. This water is suitable for human consumption.

The ECO is to train Contractors on correct and safe water usage practices. Water is a precious and limited resource and should be used sparingly.

Washing of vehicles and laundry is prohibited on construction sites.

Hose pipes must be entire and free of leaks and taps turned off when not in use.

7.6. AIR POLLUTION

No significant air pollution is anticipated. Dust suppression may be necessary if work is conducted in camp. This should be discussed with the ECO.

7.7. VEHICLE AND EQUIPMENT FUELLING AND MAINTENANCE

All vehicle fuelling and maintenance is to occur in areas specifically maintained for these activities e.g. the workshop. The servicing and repair of equipment is to take place in the workshop or off site in areas specifically designed and designated for this.

In the event of an on-site emergency repair, the contractor must ensure that all work is conducted over an impervious layer preventing spillage of oils and fuels into the environment. Sufficient absorbent materials and spill kits must be available to assist with clean-up operations.

7.8. SOIL CONTAMINATION AND RESPONSE

Should any soil contamination occur during construction, such contamination is to be immediately reported to the ECO. The soil shall be treated appropriately or removed and stored in an area determined by the ECO and shall be labelled as to the form of contamination to prevent its future use. After consultation with the Reserve Manager, the contaminated soil must be disposed of, in accordance with legislation.



7.9. CEMENT

Cement mixing it is to take place on an impermeable layer. Cement mixing areas must not be in the vicinity of drainage-lines or water bodies as cement is toxic to aquatic species.

The waste water from the cleaning of cement equipment shall not be allowed to enter the environment.

All used cement bags are immediately to be disposed of into the solid waste system. These bags are not to be used for other on site applications.

7.10. PROVISION OF STORAGE FACILITIES - DANGEROUS AND TOXIC MATERIALS

All toxic materials such as paints, fuel, or oil shall be stored in well ventilated areas that can be locked. It is essential for safety reasons that all toxic materials are handled in an appropriate manner as prescribed by the labels on the products used.

Drip trays are to be placed underneath paints and toxic materials in storage to contain accidental spills.

Should any spillage or pollution of any toxic materials occur, the ECO should immediately be contacted and mitigation measures taken. The Contractor will be liable for any clean-up costs, legal costs or fines, which may arise from such an accident.

Washing of tools used for the application of these materials is to be done in washing trays and water stored in drums, adequately labelled as toxic, with closing lids for disposal on recommendation by the ECO. No cleaning may take place using the environment as a receptor.

Empty containers that contained toxic substances are not to be used for any other application, but are to be returned to supplier, or punctured and discarded (not in the reserve) as recommended by the ECO and the product label.

7.11. PROVISION OF STORAGE FOR CONSTRUCTION MATERIAL

The Contractor will be responsible for the storage of construction material at a site determined in conjunction with the ECO. Where necessary in the stockpiled areas, the topsoil is to be removed and stored adjacent to the stockpile. No bushes or trees are to be removed for this purpose. All storage areas are to be indicated with the ECO.

7.12. TOPSOIL REMOVAL AND STORAGE

The topsoil of all the areas affected by construction (material stockpiles and construction footprint) is to be removed and stored in heaps not higher than 1.5 meter. Periodic watering will be required to



maintain the microbial action within the topsoil. Care should be taken to store topsoil in such an area, where it will not be susceptible to soil erosion or contamination of any other materials. Care should be taken to prevent any compaction of the topsoil occurring. In some case it may be necessary to trench the area around the topsoil stockpiles to prevent runoff water from heavy rains eroding these stockpiles.

7.13 BORROW PITS AND QUARRIES

The use of borrow pits and quarries on Ingwelala is not permitted.

Any imported fill or sand shall be free of weeds, litter and contaminants.

By direction of the ECO, river sand may be collected at the designated area for pipe beds etc.

7.14 FIRE PREVENTION

No open fires will be allowed on the construction site or in the veld under any circumstances.

It will be expected by all Contractors to indicate their ability to fight accidental fires, through having serviced and fully functional equipment on site in the event of accidental fires. The ECO in conjunction with the Reserve Manager will determine the level of equipment and training required by the Contractors.

7.15 GROUNDWATER MANAGEMENT

Caution should always be deployed when working with or in the vicinity of bore holes. No construction site run-off or waste should be allowed within 100m of a borehole.

7.16 WASTE DISPOSAL

All refuse waste will be managed in accordance with Ingwelala's waste management policy.

Building rubble and any other non-compactable rubble should be safely and suitably stored for later removal. Open vehicles transporting rubble should be carefully loaded to prevent material from falling off the load area. No waste may be burned on site.

7.17 TRAFFIC CONTROL

All vehicles used by Contractors and sub-contractors are to be maintained in a safe working condition. Vehicle operators are to be in possession of valid driver licenses. It is advisable to insure vehicles and



operators against claims arising from accidents and third party liability. All vehicles shall undergo regular checks to ensure they are free of oil or other lubricant leaks. The ECO may at any time prevent sub standard equipment from being used on Ingwelala.

Contractors and sub-contractor drivers are to be courteous in all dealings with other road users and shall adhere to all roadway signage and speed limits.

Contractors and sub-contractors are to use the shortest possible route between the place of entry and the construction site at all times. Unauthorised driving through the reserve for purposes other than the building contract is not permitted.

7.18 LITTERING

In terms of the Environmental Conservation Act, No 73 of 1989, no littering by the Contractors or sub-contractors shall be allowed. The ECO shall monitor the neatness of the worksite as well their place of accommodation for the duration of the project.

7.19 COMMUNICATION

It is essential that good communication channels between the Contractor, ECO, Reserve Manager and Shareholder be maintained.

7.20 SIGNAGE

A single signboard is to be erected on the construction site denoting the business name of the Contractor.

The detail regarding the style, size and information on this sign will be given to the contractor by the ECO in conjunction with the Reserve Manager and Building Committee.

8. REHABILITATION PHASE

8.1 REHABILITATION OF THE CONSTRUCTION SITE

On completion of construction, the site must be rehabilitated through the removal of all construction facilities introduced, removal of waste and any other feature constructed or established during the use of the site. All areas devoid of vegetation or where spoils and stockpiles have been stored shall be scarified or ripped and the topsoil, previously removed, shall be reintroduced to these areas. In some cases it may be necessary to re-seed and mulch. This, however, will be at the discretion of the ECO.



8.2 FINAL REHABILITATION OF THE SURFACE

On completion of the construction the site shall be finally rehabilitated. All infrastructures, equipment, plant and any other items used during the construction period must be removed from site. Waste receptacles, scrap and rubble will be removed entirely from site. No burial or burning of any material whatsoever will be allowed on site.

Final rehabilitation shall commence within 1 week from cessation of construction operations.

All trenches should be returned to natural ground level. No sinking or unnecessary humps will be allowed. This means that appropriate compaction must be obtained during the filling of trenches.

9. DISASTER MANAGEMENT PROCEDURES

Disasters are a constant threat when working in conservation areas and especially on construction sites.

Where flooding is likely, the Contractor must be informed and trained in the Ingwelala flood management procedures.

In order to avoid accidental fires, the Contractors must be instructed in Ingwelala fire management procedures.

The greatest factor regarding disaster management in this instance is the proximity to medical care for injuries on duty or evacuation in the case of serious illness. The Contractor is to develop and maintain a medical disaster management procedure that will be communicated to all staff. This procedure will, as a minimum, have evacuation protocols, medical attention detail and a list of necessary contact numbers included. This procedure is to be communicated to all workers and a copy is to be handed to the ECO for inclusion in the audit results. Contractors will also be required to have a first aid kit available on site at all times.



PART 4

WASTE AND ENERGY

1. SCOPE

The scope of this Environmental Management Plan (EMP) is to set a protocol for addressing environmental issues, in connection with maintenance of the waste and energy aspects at Ingwelala, to ensure that correct controls and audits are implemented to limit potential environmental damage and to mitigate the impacts that may occur.

2. AGREEMENT

It is important to note that the EMP is to be read as a contract between the Contractor and Ingwelala Share Block Ltd., represented by the Reserve Manager. It is therefore crucial that the Contractor be handed a copy of the EMP and that failure to adhere to its requirements may lead to penalties levied against the Contractor.

It is also noted that any damage caused by the Contractor to areas outside the construction site, is to be compensated for, repaired or replaced at the Contractor's expense, to the satisfaction of the Reserve Manager in accordance with the Contractors penalty schedule as listed in Appendix 2.

The Reserve Manager will institute contractual measurements to ascertain that its Contractors adhere to the environmental obligations agreed upon. Penalties for non-compliance are enforced and Construction staff must adhere to the Reserve Code of Conduct for Contractors and requirements of the Contractors Information Pack, as supplied by the Reserve Manager.

The Contractor will be required to sign each page of this EMP as an acceptance of the conditions stipulated.

This EMP equally applies to Ingwelala personnel undertaking these activities.

3. RESPONSIBLE PERSON

The Conservation Manager, acting in the capacity as Ingwelala's Environmental Control Officer (ECO), is appointed by the Building Committee / Environmental Management Committee to ensure full



compliance with the requirements of this Environmental Management Plan (EMP). The ECO should be familiar with the contents of this document and the Ingwelala Regulations. The appointed ECO shall work closely with the Reserve Manager. The ECO will advise on all environmental issues that are unclear and shall further be responsible for the environmental auditing required for the duration of the project. The ECO will submit weekly progress to the Reserve Manager during the construction phase to monitor compliance and general progress. These compliance reports will be reviewed by the Building Committee and Environmental Management committee for purposes of control and comment.

The ECO may at any time institute action against a contractor due to non-compliance with the EMP.

The ECO will be responsible for the training of Contractors in terms of conveying the contents of this EMP and associated Codes of Conduct to them through an induction / training session.

4. DEFINITIONS

- Waste:** The unwanted, discarded and useless materials from any activity. Some components may be able to be recycled, whilst others destroyed or discarded in a site fit for purpose.
- Burning:** The destruction of material by fire. In this particular context it is the reduction of certain waste fractions to ash through the action of fire in a ventilated grid. (It is not incineration, as temperatures and controls are not present and potential toxins are not introduced).
- Recycling:** Conversion waste into a reusable or new product. This may be done on site, or involve the removal of waste to a site or centre where the recycling process is undertaken.
- Organic waste:** Biodegradable waste that is typically originating from plant or animal sources, which may be broken down by other living organisms.
- Waste sorting:** Waste sorting is the process by which waste is separated into different fractions. Each fraction is particular in its requirements for safe disposal, recycling or biodegradation.
- Solar power:** Energy derived from the sun. Can be either direct and used in heating water (solar heating) or indirect and used to generate electricity (photovoltaic).



5. WASTE MANAGEMENT

Significant volumes of waste are being generated by both staff and members. Pollution of rivers and groundwater sources is a real danger from the transport of liquid fuels to the administration and workshop complexes.

The distances to remove waste from Ingwelala is significant and this in turn has its own risks and pollution aspects. Where possible, waste should be managed on sight and minimised wherever possible. This is achieved through the following mechanisms:

- Waste sorting into various fractions allowing the recycling of some components (glass, tin, steel, cardboard, plastic), the correct disposal of hazardous components (batteries, solvents) and the on-site destruction or management of other components (organic waste, paper, food waste).
- Waste reduction – encourage members to take with them their waste such as plastics and batteries.
- Waste minimisation – sensitise members to the cost and challenges dealing with waste at Ingwelala and encourage them to leave unnecessary packaging behind.
- Waste utilisation – composting of organic waste which can be used to maintain the common garden.
- No waste may be buried on the property

APNR Waste Management Policy

To minimise all forms of pollution and effects thereof.



Ingwelala Domestic Waste Management Policy:

Ingwelala recognises that all human-generated waste has an impact on the environment and therefore undertakes to minimise this impact through this Domestic Waste Management Policy.

The objectives of this Domestic Waste Management Policy are:

1. to minimise the impact on the environment of domestic waste through the implementation of an efficient waste collection, recycling and disposal system, centralised at a control point;
2. to minimise the impact on the environment of all domestic waste production through member and staff education;
3. to maximise the recycling of domestic waste;
4. to encourage and promote a responsible waste management ethic amongst all users;
5. to fulfill the need to undergo independent environmental audits on domestic waste management through the implementation of best practice for this field; and
6. to improve best practice wherever possible.

All domestic waste will be meticulously sorted by members into the following categories:

- Metal
- Glass
- Plastic
- Biodegradable materials (food, paper etc)
- Ash (deposited in a metal container)
- Batteries

Suitable refuse bags are supplied to members 24 hours per day at the entrance gate. All refuse bags are to be deposited by members at the central collection point, known as the "dirt box". Clear signage posted in the "dirt box" will denote the demarcated areas, referring to the above waste categories.

Refuse bags containing biodegradable material are to be deposited by members at the dirt box no less frequently than every second day.

The waste categories of:

- Metal
- Glass
- Plastic

are to be delivered by Ingwelala to the Central Control Gate for recycling or for the disposal at a properly registered waste dump site.

The waste categories of:

- Biodegradable materials
- Ash

are to be sorted and processed by Ingwelala staff using a recognized composting technique. The resultant compost product is to be used to nourish poor soils in the camp environment.

The waste category:

- Batteries

to be disposed of by management at an approved disposal agency.

Recognised hazardous waste outside of these categories will be collected and removed by a specialist waste management company. Management will obtain a "proof of disposal" certificate from the service provider.



5.1. DOMESTIC SOLID WASTE

Member and staff shall separate their waste according to the Ingwelala sorting guidelines:

Ingwelala approved sorting guidelines are presented in the table below:

<i>Plastic</i>	<i>Glass</i>	<i>Metal</i>	<i>Paper</i>	<i>Food</i>
Food wrapping	Bottles	Cans	Cardboard	Meat
Water bottles	Crockery	Tin foil	Newsprint	Raw vegetables
Bags	Windscreens	Scrap metal	Glossy paper	Cooked vegetables
Nylon		Fencing	Brown paper bags	Teabags
Mattresses		Piping	Office paper	
Seat covers		Chicken wire	Hardboard and wood off-cuts	
Containers		Bottle tops		

Notes:

- Nappies can not be stored at the facility. Diapers will be burnt with waste food to avoid obvious health risks.
- Cooked meat and vegetables will be burnt (yellow in table)
- Some paper will be burnt (yellow in table)
- Teabags, raw vegetables, fruit and raw food waste will be composted.(grey in table)
- Batteries (all types), solvents, hydrocarbons, florescent tubes and other toxic waste will be collected and disposed of periodically through a registered facility.
- Ash from the burning process will be added to the compost.
- Communal bins must be vermin proof and emptied at least weekly



5.2 HAZARDOUS WASTE

Batteries, fluorescent tubes, paint solvents and hydrocarbons should be collected for safe disposal.

These items should be collected until an amount that is cost effective to dispose of is obtained – but less than 1 ton.

Use can be made of any collection points at department stores for the the hazardous items (particularly batteries and fluorescent tubes).

5.3 RECYCLABLE WASTE

Recyclable waste should be stockpiled until volumes are appropriate to deliver to a recycling centre.

Glass crushing using a purpose made crusher may be used to reduce volumes.

Cans should be flattened to reduce volumes.

Stockpiles should not exceed 4 tons.

5.4 WASTE MINIMISATION

Strategies to reduce the volumes of waste brought onto the reserve should be investigated.

Where possible, environmentally friendly packaging and products should be sought.

5.5 CONSTRUCTION WASTE

Building rubble must, unless otherwise directed by ECO, be removed from Ingwelala by the contractors or company.

Building waste such as plastics, steel (door frames, pipes) and other (electrical fittings etc) must be removed from site by the contractor and disposed of at a registered facility. Ingwelala maintenance staff may generate construction waste on a small scale - and this may be separated and placed in the existing waste streams for recycling or safe disposal.

Thatch waste may be spread on in an area indicated by the ECO to aid veld rehabilitation. If this option is taken, the thatch MUST be clean and free of string, wire or other contaminants. If no areas require thatch, it may be burnt, at the direction of the ECO, in a controlled manner.



5.6 SEWAGE WASTE

Sewage is currently disposed of through septic tank and soak-away systems.

Sewage disposal systems must be located at the legally and environmentally required distance from streams.

The investigation and implementation of alternative systems for soak-aways near the rivers should be prioritised.

Staff and members may not wash themselves or do their laundry in any flowing streams or river. In the event of these requirements away from proper facilities, any washing must be done away from the river using a hand basin. Soaps should be biodegradable, low phosphate type. Field security patrols should, where possible, use supplied water tanks.



6. ENERGY

The provision of energy is vital for the smooth functioning of management (in particular administrative facilities), for the living comfort of staff and Owners and for the efficient operation of member facilities at a standard commensurate with the expectations of members.

Although much progress is being made with alternative sources of energy (such as solar power – where Ingwelala has the great majority of buildings powered only by solar), ESKOM remains the most effective supplier. Diesel generators are utilised as a back-up for the Eskom power (which has reliability challenges). Diesel generators have their own drawbacks, not the least of these being the risks of pollution that accompanies the frequent delivery of diesel along narrow winding roads.

The APNR Energy Policy is as follows:

- ***As far as possible, electricity should be provided to management and tourism development nodes;***
- ***The provision of power must be done in an environmentally sensitive manner that does not impact negatively on the conservation objectives of the APNR, including the preservation of its wilderness character (where applicable);***
- ***Alternative sources of energy and energy-saving designs should be considered.***

6.1 ENERGY USE

Wherever possible, energy saving options should be incorporated into design and management of all new buildings and in any refurbishment.

Where possible, energy use should be monitored so that energy savings can be evaluated.

6.2 ENERGY MANAGEMENT

Any energy equipment (electrical or fuel) that is to be replaced, should be replaced with the best energy saving option available that will continue to satisfy the requirements of the equipment.

Generators should be as quiet as possible. This can be achieved by enclosing them, improved exhaust silencers and possibly the use of a berm wall.



Large motors (borehole pumps, pool pumps, fridge compressors) should be located such that the noise does not impact guests and members enjoyment. Use of buildings and berm walls can help achieve this as well as limiting operating hours.

Power reticulation at Ingwelala should where ever possible, be via underground power lines.

6.3 ENERGY SAVINGS

Where possible, borehole pumps and other remote energy systems should be converted to renewable energy systems such as solar (photovoltaic) and wind.

Energy requirements of national building regulations should be adhered to and all hot water requirements on existing and new /refurbished buildings should be carefully evaluated and the best energy efficient solution implemented (eg. heat pumps or solar).

6.4 LIGHT POLLUTION

There must be as little light pollution as possible. There should be no naked lights – all building lights should be shielded. The Ingwelala building regulations address this requirement.

6. INCIDENT REGISTERS AND REPORTING

An incident register will be kept on site at all times and completed/updated by the contractor on a daily basis. All incidents must be recorded in the register. The register is available to Ingwelala management for audit inspections. All incidents must be reported to the ECO, and the responsible Contractor will sign the logging of the incident, to ensure that the information contained in the register is correct. The register must contain the date, time and place of the incident that took place. Remedial measure taken must also be mentioned in the logbook. Refer to Appendix 1, for an example of the site incident register.

7. GENERAL CONTROLS

7.1 VEHICLE ACCESS

Vehicle access to Ingwelala will be through the Central Control Gate (CCG) and via the existing access road. No new roads are to be constructed by the contractor. Access to the location will be via Ingwelala roads. No new access is to be created.



7.2 PROTECTION OF FAUNA AND FLORA

No tree of a trunk diameter exceeding 100mm should be removed without the written permission of the ECO and densely wooded areas should be avoided where possible. No 'listed' trees requiring a permit may be removed without such a permit. If in doubt on a particular tree, the ECO will assist.

The area is an open system Big 5 reserve. Dangerous wild animals exist in the area and suitable precautions should be undertaken so as not to increase the risk of site personnel or of fauna through the handling of waste. It is also a malaria area. The ECO will advise on suitable action to take as appropriate to the site, work and equipment.

7.3 PROVISION OF WATER

Water is currently available from the Ingwelala reticulation system. This water is suitable for human consumption.

Hose pipes must be entire and free of leaks and taps turned off when not in use.

7.4 VEHICLE AND EQUIPMENT FUELLING AND MAINTENANCE

All vehicle fuelling and maintenance is to occur in areas specifically maintained for these activities e.g. the workshop. The servicing and repair of equipment is to take place in the workshop or off site in areas specifically designed and designated for this.

7.5 WASTE TRANSPORT

Waste should be transported in a manner that reduces risk of litter. ie the waste should be secured and covered where appropriate to prevent it falling or blowing off the vehicle.

7.6 PROVISION OF STORAGE FACILITIES - DANGEROUS AND TOXIC MATERIALS

All toxic materials such as paints, fuel, or oil shall be stored in well ventilated areas that can be locked. It is essential for safety reasons that all toxic materials are handled in an appropriate manner as prescribed by the labels on the products used.

The stores must be inaccessible to fauna such as baboons, badgers, monkeys etc.



7.7 FIRE PREVENTION

No open fires will be allowed under any circumstances.

7.8 COMMUNICATION

It is essential that good communication channels between the Contractor, ECO, Reserve Manager and Shareholder be maintained.



Appendices:

1. Environmental Incident register
2. Contractor penalty schedule
3. Listed tree species
4. EMP for maintenance activities in a watercourse

Appendix 2:**Contractor Penalty Schedule**

Lost Contractors cards	(R50, 00)
Site uncleanliness and/or damage	(From R 750.00, incident dependant)
Off route or out of camp driving	(R350, 00)
Noise and disturbance	(R500, 00)
Feeding animals	(R1000, 00)
Illegal hunting	(expulsion)

EMP fines

Trees	(incident dependant)
Litter	(R1500, 00)
Cement spillage and mixing on top soil	(From R500, 00)
Fires in non demarcated areas	(incident dependant)
No temporary site ablution facility	(R1000, 00)
Illegal dumping	(incident dependant)
Illegal sand collection	(incident dependant)
Water abuse and wastage	(incident dependant)
No vehicle decals displayed	(R200,00)

Appendix 4: Approved EMP for maintenance activities in a watercourse

WATERCOURSE MANAGEMENT PLAN

1 BACKGROUND

Under the National Environmental Management Act, watercourses are considered sensitive and vulnerable environments and as such, there are a number of activities around watercourses that trigger an Environmental Impact Assessment. In order to allow normal and regular maintenance, the regulations contain a provision in activity #18 (see box below) whereby a management plan can be submitted and, if approved, will allow the movement into, out of and within a watercourse of more than 5 cubic meters of material for maintenance purposes.

This management plan is in terms of this regulation as well as the “duty of care” expressed in the National Environmental Management Act (Act 107 of 1998, section 28) (NEMA).

Listing Notice 1, activity #18.

The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from

(i) a watercourse;

(ii) the sea;

(iii) the seashore;

(iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater-

but excluding where such infilling, depositing, dredging, excavation, removal or moving

(I) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or

(ii) occurs behind the development setback line.

2 SCOPE AND LIMITATIONS

The scope of this Management Plan (EMP) is to set out methods and mitigation measures to address potential environmental issues arising from maintenance activities conducted within or on the banks of a watercourse. No other activities outside of a watercourse and nothing other than maintenance (see definitions below in section 4) are considered within this management plan.

This management plan, and the approval thereof, does not provide any authorization or exemption from any of the listed activities requiring authorisation within the various regulations under NEMA or the National Water Act (Act 36 of 1998) or any other act or regulation that may be in effect for the duration of this management plan. If the holder of this approved management plan is unsure if a planned activity may require an environmental assessment or not, it is strongly suggested that an expert opinion be sought from either an Environmental Assessment Practitioner, an environmental lawyer or from the relevant Department itself. The management plan thus does not authorise the removal or damage to listed trees, realignment of infrastructure, expansion of infrastructure etc.

The management plan is in respect of the locations identified in the table in Appendix 1 and the corresponding map in Appendix 2. It may not be assumed to apply to any other locations without approval from the lead authority.

The management plan is not transferable to any other sites and should new watercourse points not included require maintenance, these must be applied for.

This management plan considers infrastructure **within** watercourses which require maintenance such as roads, drifts, bridges, culverts, causeways, weirs etc.

This management plan covers the diversion of flow of a watercourse as defined and covered by general authorisation in NWA GNR 1199 of 18 December 2009.

Dams and dam walls requiring a water use license and/or Dame Safety Certificate are specifically excluded, as maintenance of these are neither regular nor low impact and as such that they can not be adequately accommodated in this broad management plan. Dams less than 10 000 cubic meters and with walls less than 5 meters are included as these fall under the General Authorisation in regulation NWA GNR 399 of 26 March 2004. Should these criteria change during the lifetime of this EMP, the EMP will remain valid for dams falling under a “general authorisation” only.

3 VALIDATION AND RESPONSIBLE PERSONS

This management plan must be accompanied by the letter of approval from the department in order for it to be considered valid under regulation 18 of NEMA GRN 544 of June 2010.

The approval of this management plan forms an agreement between the applicant and the provincial authority and as such, the applicant may be found non-compliant if the management plan is not implemented and adhered to. Non-compliance may lead to fines and delays.

The applicant is the responsible person / body in this agreement.

It is suggested that should any contractor be engaged to perform any of the activities considered within this management plan, they should be provided with a copy of this prior to commencement. This management plan may also form part of the agreement between the contractor and the landowner / responsible party.

4 DEFINITIONS

Construction	means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint;
Development setback	means a setback line as defined or adopted by the competent authority and where none has been defined or adopted it will be assumed that no setback line applies
Expansion	means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased
Indigenous vegetation	refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years

Riparian Habitat	The vegetation zone along a watercourse which is adapted to the permanent or intermittent presence of water, either in the form of surface or below surface water.
Watercourse	means – (a) a river or spring; (b) a natural depression in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks
Wetland	means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.
Severe Flood	The result of a local or catchment based rainfall event that leads to increased river flow, to the extent that it surpasses the 1:50 year flood line.
Diverting the flow (temporarily)	Means a temporary structure causing the flow of water to be routes in a watercourse for any purpose
Impeding the flow (temporarily)	Means the temporary obstruction or hinderance to the flow of water in a watercourse by a structure built either fully or partially across a watercourse

5 DURATION OF APPROVAL

This management plan shall have the lifespan provided for in the approval, which is suggested to be no more than 10 years.

6 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES FOR MAINTENANCE

All requirements stipulated in National Water Act Government Notice GNR 1199 of 18 December 2009 in respect of National Water Act section 21(c) and (i) applies (*Impeding or diverting the flow in a watercourse – and – Altering the bed, bank course or characteristics of a watercourse*).

Where possible, activities in the watercourse should be undertaken during the winter months when the water table and flow is lowest. This will reduce risks of machinery getting stuck, flash flooding during maintenance and disruption of activities by rain storms.

All infrastructure through and within a watercourse should be inspected annually – and at least every 3 years. A checklist must be maintained to demonstrate this has been undertaken.

6.1 RIVER BANK ROADS AND TRACKS

This refers to roads within the riparian areas of rivers and along the banks.

Areas with high erosion potential (slope and soil) as well as areas that are frequently wet, where possible, should have preventative maintenance undertaken to prevent degradation..

The access to the river bed is the most important area and most likely to require stabilisation and maintenance protection from erosion and damage. Each watercourse access point needs to be assessed for the most appropriate and lowest impact maintenance structures or activity. In this respect impact should be viewed on a sustainable basis – ie. Sound initial maintenance may be preferable to annual maintenance.

Any of the following should be considered to protect the access points and bank roads against erosion or collapse during minor flooding.

- Concrete (reinforced and 100mm thick)
- Gabion structures
- Well paced rocks
- Use of existing rock
- Gravel packing
- Planting trees and other vegetation to stabilise the road edges
- Ensuring adequate storm water drainage off the road

The angle of approach to the river bed may be considered to reduce erosion potential. In places some cut and fill may be necessary to reduce existing erosion potential.

Any maintenance activities on the banks **MUST** be within the footprint of the existing infrastructure.

6.2 DRIFTS, FORDS AND CAUSEWAY MAINTENANCE

This includes all current river bed crossings, particularly the dry river beds common in the area.

As far as possible, these crossings should:

- Cross at right-angles
- Have minimal clearing
- Be protected by maintaining drainage structures immediately above the approach roads.

Occasional smoothing with a blade or tyre will make crossings easier and reduce risks of vehicles getting stuck.

If the river bed is deep sand, it is unlikely that this will be able to be compacted. In order to stabilise the ford, gabions and stone packing within the existing footprint may be considered to reduce the risk of vehicles being stuck, particularly in summer.

Concrete drifts should be maintained by keeping debris clear and ensuring that the river does not undermine or scour foundations. Cracks and damage should be repaired prior to the summer rains. Scouring should be repaired with concrete and stone packing. Care must be taken to prevent cement entering the watercourse and all mixing must take place on an impermeable surface, preferably out of the 1:50 yr flood line.

6.3 CULVERT REPAIR

This considers culverts over narrow watercourses.

Culverts should be placed at the lowest location in a road crossing. Wide, flat culvert profiles are recommended for use but other design criteria, like bank profiles, should still be the primary deciding factors. The inlets and outlets to the culverts should be maintained to prevent erosion, scouring and collapses. In areas where piping in soils occur, all culvert joints should be watertight.

The possibility of soil mechanical failure must be taken into account, especially in the case of non-cohesive materials.

Where steep watercourse gradients occur the need for erosion control on the outlet and down stream side is important to prevent loss of topsoil and erosion. This must be maintained with water velocity reduction mechanisms such as small rocks.

In the case of flat (shallow) gradients the minimum desirable slope in the culvert should not be less than 0.5% to ensure that maintenance and silting-up within the system can be kept to a minimum.

Each culvert should be treated individually and factors regarding slope of immediate adjacent areas and / or streams also play part in the deciding factor.

Culverts size should err on the side of being too large rather than too small. This helps prevent debris forcing water over the culvert and scouring.

Culverts should be inspected annually for silting and debris. Any vegetative debris should be removed to above the 1:100 year floodline. Silt should be removed and spread in the watercourse, down stream of the culvert.

6.4 SERVICES THROUGH RIVER BEDS (POWER, WATER)

This applies to water and electricity services only, sewage lines and similar are not covered by the general authorisation (GNR1199) and as such are excluded from this EMP.

Services should be buried at 1.5m or as deep as possible, to avoid damage by animals and water flow. Any trenching should be kept as narrow as possible, whilst recognising the risk of trench collapse. Trenching is to be done only when services are ready to lay, no trenches are allowed to be left open more than 24 hours. Top soil and overburden/ subsoils should be kept separate and returned in the trench in correct order where possible.

Care should be taken when disturbing river banks and river bed that;

- strict erosion control measures are taken, during and after construction;
- surface water quality is not impacted;
- all necessary measures are taken to stabilise the structure and prevent future impact;

- invasion by alien vegetation is prevented.

To maintain connectivity in the river – particularly if there is surface or subsurface flow, the service maintenance should be on a sectional basis such that only a portion (at most 50%) of the river is trenched at any one time – see section 6.8.

Banks disturbed through service maintenance must be rehabilitated and re-planted with riparian vegetation.

The service trench may be marked on the banks with small, unobtrusive markings.

6.5 FLOOD DEBRIS

If flood debris, vegetation or sand, is impeding river flow, blocking culverts or potentially endangering peoples lives or infrastructure, it may be deemed necessary to remove such debris.

The least impact method should always be used, i.e. manual removal where possible. Machinery should only be used if there is no other safe option.

If sand is blocking culverts, this sand should be removed to the nearest suitable place in the riverbed, which will not cause the sand to return and re-block the culvert at the next flooding event.

Any vegetation debris should be removed to the riparian area, out of the 1:50 year floodline where known and left to naturally decompose. Should there be large pieces or tree trunks these may need to be hauled out with appropriate machinery or systems, again to the riparian area, out of the 1:50 year flood line if known, and left to decompose.

When moving flood debris care should be taken that;

- no persons, animals or infrastructure is endangered;
- surface water is not impacted;
- the stability of the watercourse is not detrimentally affected, and
- scouring, erosion or sedimentation of the watercourse is prevented in future.

6.6 ALIEN VEGETATION

It is very important to prevent and control alien vegetation in and along watercourses. Should alien vegetation occur, any plants should be removed using the least impact method. Any seeds present

should ideally be removed and destroyed.

When removing alien vegetation care should be taken that;

- no persons, animals or infrastructure is endangered;
- surface water is not polluted or impacted;
- the stability of the watercourse and banks is not detrimentally affected, and
- scouring, erosion or sedimentation of the watercourse is prevented in future.
- The impacted sites are rehabilitated
- Alien seeds are removed or prevented from entering the stream flow areas.
-

6.7 WEIRS AND SMALL DAM WALLS

This section deals with small dams and weirs that fall under the general authorisation description. As specified, in section 7 of the NWA GNR 1199 of 18 December 2009, maintenance of weirs and small dams must not cause a detrimental impact to the watercourse.

Maintenance of structures must not:

- cause erosion, scouring or sedimentation or change the stability or physical structure of the watercourse;
- be structurally unstable;
- induce flooding;
- be a health and safety hazard;
- cause a change to the ecological flow or diversity of natural vegetation.

The least impact method must always be applied.

If cement or concrete is to be used, care should be taken to avoid surface water contamination. There is to be no mixing of cement or concrete within the 1:100 year flood line. Please refer to section 7.10 for general directions on the use of cement and concrete.

If any earth moving is to be done, this should, where possible be done manually. If machinery is to be used, the lightest model suitable for the job should be used. Please refer to section 7 for

general directions on the use of vehicles and other applications. Repaired sections must be soundly compacted and secure.

Earth walls should be re-vegetated and erosion prevention methods employed.

Walls and weir maintenance must be undertaken in a manner that will not halt the reserve (ecological) flow of the river.

All walls and weir spillways must be inspected annually for soundness and erosion risks.

6.8 DIVERSION OF A WATERCOURSE FOR MAINTENANCE PURPOSES

In order to repair a service line or watercourse infrastructure it may be necessary to divert any stream flow away from the working area.

The temporary diversion or impeding of the stream must only be undertaken if it is essential to provide safe working conditions and the repair is urgent.

No watercourse may be diverted or impeded for longer than 30 days.

Any measures undertaken (see below) to divert or impede a watercourse must be removed as soon as possible following the maintenance and the watercourse restored and rehabilitated.

Any diversion or impeding of the watercourse should not extend more than 50% across the watercourse and this may only be exceeded in exceptional situations.

Any temporary structures in the watercourse must not impact on water quality, movement of aquatic biota, affect the velocity or pattern or assurance of flow, and must not impact on down stream water users.

7 GENERAL CONTROLS

7.1 VEHICLE ACCESS

Vehicle access to Ingwelala will be through the Central Control Gate (CCG) and via the existing access road. Access to the footprint of any location will be via Ingwelala roads. No new site access roads are to be created without prior authorisation from the Directors or their representative and shall be in writing with appropriate GPS co-ordinates and within a defined route.

The contractor will be responsible for clearly marking any roads that are required to be closed to traffic for the maintenance activity. The closure of any roads must be undertaken in consultation with the ECO.

7.2 PROTECTION OF FAUNA AND FLORA

No tree of a trunk diameter exceeding 100mm should be removed without the written permission of the warden. No 'listed' trees requiring a permit may be removed without such a permit.

Contractors should clearly understand that they are working within a nature reserve. Contravention of any conservation and environmental legislation may result in prosecution. The Contractor is responsible for any illegal action by his/her staff, e.g. illegal hunting, setting of snares, fishing etc.

The ECO shall monitor that there is no introduction of alien invasive species to the construction site. Should any such species be identified, immediate and appropriate control measures are to be implemented under the guidance of the ECO.

The area is an open system Big 5 reserve. Dangerous wild animals exist in the area and suitable precautions should be undertaken so as not to increase the risk of site personnel. It is also a malaria area.

7.3 POLLUTION PREVENTION OF SURFACE AND GROUND WATER

Stockpiles and equipment may not be stored or parked within the 1:50 year flood line.

Cement mixing is to take place on an impermeable layer and out of the watercourse and 1:50 year flood line. Cement is toxic to aquatic species.

Cement washings (cement tool cleaning etc) must be prevented from entering the watercourse. Tools may not be washed or cleaned in the watercourse or natural pools.

All used cement bags are immediately to be disposed of into the solid waste system. These bags are not to be used for other on site applications.

7.4 ABLUTION FACILITIES AND WASTE/ REFUSE DISPOSAL

Toilet facilities are rarely available at the maintenance site. Contractors are requested to use existing toilets where possible.

No refuse or litter may be allowed to be left overnight. Any building rubble and any other non-

compactable rubble should be safely stored out of the 1:50 year flood line or watercourse to be transported at a later stage. Building rubble must be removed from the reserve.

7.5 PROVISION OF WATER

Water may need to be transported to the construction site. Filling of water tankers and similar must be arranged with the reserve manager.

Washing of vehicles is prohibited.

7.6 AIR POLLUTION

No significant air pollution is anticipated, however, dust suppression may be necessary. This should be discussed with the ECO.

7.7 NOISE

Management may allow different work times to those normally permitted (7:00 to 17:00). Any variation to the above should be in agreement with management.

Unnecessary noise will not be tolerated. Contractors will not be permitted to shout on site. The use of megaphones is prohibited.

7.8 VEHICLE AND EQUIPMENT FUELLING AND MAINTENANCE

All vehicle fuelling and maintenance is to occur in areas specifically maintained for these activities e.g. the workshop / fuel station. The servicing and repair of equipment is to take place in the workshop or off site in areas specifically designed and designated for this.

In the event of an on-site emergency repair, the contractor must ensure that all work is conducted over an impervious layer preventing spillage of oils and fuels into the environment. Sufficient absorbent materials and spill kits must be available to assist with clean-up operations.

7.9 SOIL CONTAMINATION AND RESPONSE

Should any soil contamination occur during construction, such contamination is to be immediately reported to the reserve manager. The soil shall be removed and stored in an area determined by the reserve manager and shall be labelled as to the form of contamination to prevent its future use. After consultation with the Reserve Manager, the contaminated soil must be disposed of, in accordance with legislation.

7.10 BORROW PITS AND QUARRIES

Any imported gravel or sand shall be free of weeds, litter and contaminants.

No sand may be harvested from non approved source sites.

7.11 FIRE PREVENTION

No open fires will be allowed on the construction site or in the veld under any circumstances.

Road contractors must be aware of and be able to raise the alarm if a fire is discovered.

7.12 STORM WATER MANAGEMENT

No obstructions of any storm water system will be allowed and the dumping of water used for the cleaning of equipment will also not be permissible.

Only level areas are to be used for stockpile zones and care is to be taken to prevent the stockpiling of materials in drainage lines.

7.13 TRAFFIC CONTROL

All vehicles used by Contractors and sub-contractors are to be maintained in a safe working condition. Vehicle operators are to be in possession of valid driver licenses.

Contractors and sub-contractor drivers are to be courteous in all dealings with all other road users and shall adhere to all roadway signage and speed limits.

Contractors and sub-contractors are to use the shortest possible route between the place of entry and the construction site at all times. Unauthorised driving through the reserve for purposes other than the contract is not permitted.

Road closures necessary for works must be adequately marked.

7.14 COMMUNICATION

It is essential that good communication channels between the Contractor, ECO, Reserve Manager be maintained. This is particularly important with regard to road closures and wildlife safety.

7.15 SIGNAGE

A single signboard is to be erected on the construction site denoting the business name of the Contractor.

Appropriate traffic signage should be erected where appropriate advising road users of closures and of maintenance.

Appendix 1: Table of sites under this EMP

Dams. *The numbers correspond with the map labels in Appendix 2.*

Dam Points	Longitude	Latitude
1	31.375858	-24.120953
2	31.405001	-24.144805
3	31.385496	-24.164147
4	31.356010	-24.158094
5	31.350937	-24.155586
6	31.341857	-24.181347

Road and service crossings. *The numbers correspond with the map labels in Appendix 2.*

River Crossing Point	Longitude	Latitude
1	31.384171	-24.155843
2	31.378255	-24.156507
3	31.380757	-24.162630
4	31.376780	-24.163976
5	31.382821	-24.164033
6	31.379835	-24.166763
7	31.381389	-24.168623
8	31.383412	-24.170170
9	31.371703	-24.163988
10	31.371375	-24.176387
11	31.364961	-24.187176
12	31.361440	-24.185165
13	31.358452	-24.187513
14	31.352176	-24.187636
15	31.342939	-24.182099
16	31.345801	-24.182290
17	31.347557	-24.176234
18	31.345674	-24.175151
19	31.349743	-24.165706
20	31.357078	-24.178425
21	31.367377	-24.175852
22	31.374197	-24.178926
23	31.376456	-24.179151
24	31.372930	-24.180886
25	31.370910	-24.182733

Ingwelala Watercourse Environmental Management Plan

26	31.368480	-24.185583
27	31.382712	-24.185630
28	31.389644	-24.163475
29	31.388603	-24.163344
30	31.385097	-24.162918
31	31.383779	-24.162885
32	31.386308	-24.167073
33	31.390672	-24.159362
34	31.389143	-24.159003
35	31.387836	-24.158136
36	31.386289	-24.156411
37	31.385606	-24.157066
38	31.385865	-24.154978
39	31.391183	-24.154632
40	31.383276	-24.153761
41	31.385279	-24.151837
42	31.387034	-24.149475
43	31.389027	-24.149500
44	31.386347	-24.145593
45	31.389873	-24.146038
46	31.389922	-24.145811
47	31.383539	-24.142699
48	31.399348	-24.132141
49	31.395893	-24.132951
50	31.393598	-24.125704
51	31.391525	-24.126162
52	31.393049	-24.129211
53	31.393279	-24.129089
54	31.392621	-24.129408
55	31.391225	-24.125075
56	31.392257	-24.117713
57	31.391582	-24.117745
58	31.391203	-24.117867
59	31.390512	-24.117884
60	31.397475	-24.112290
61	31.401144	-24.111359
62	31.383175	-24.110757
63	31.382481	-24.112931
64	31.381301	-24.110346
65	31.382865	-24.110304
66	31.378110	-24.110165
67	31.377457	-24.111753
68	31.376536	-24.113777
69	31.375611	-24.120957
70	31.376681	-24.120935

Ingwelala Watercourse Environmental Management Plan

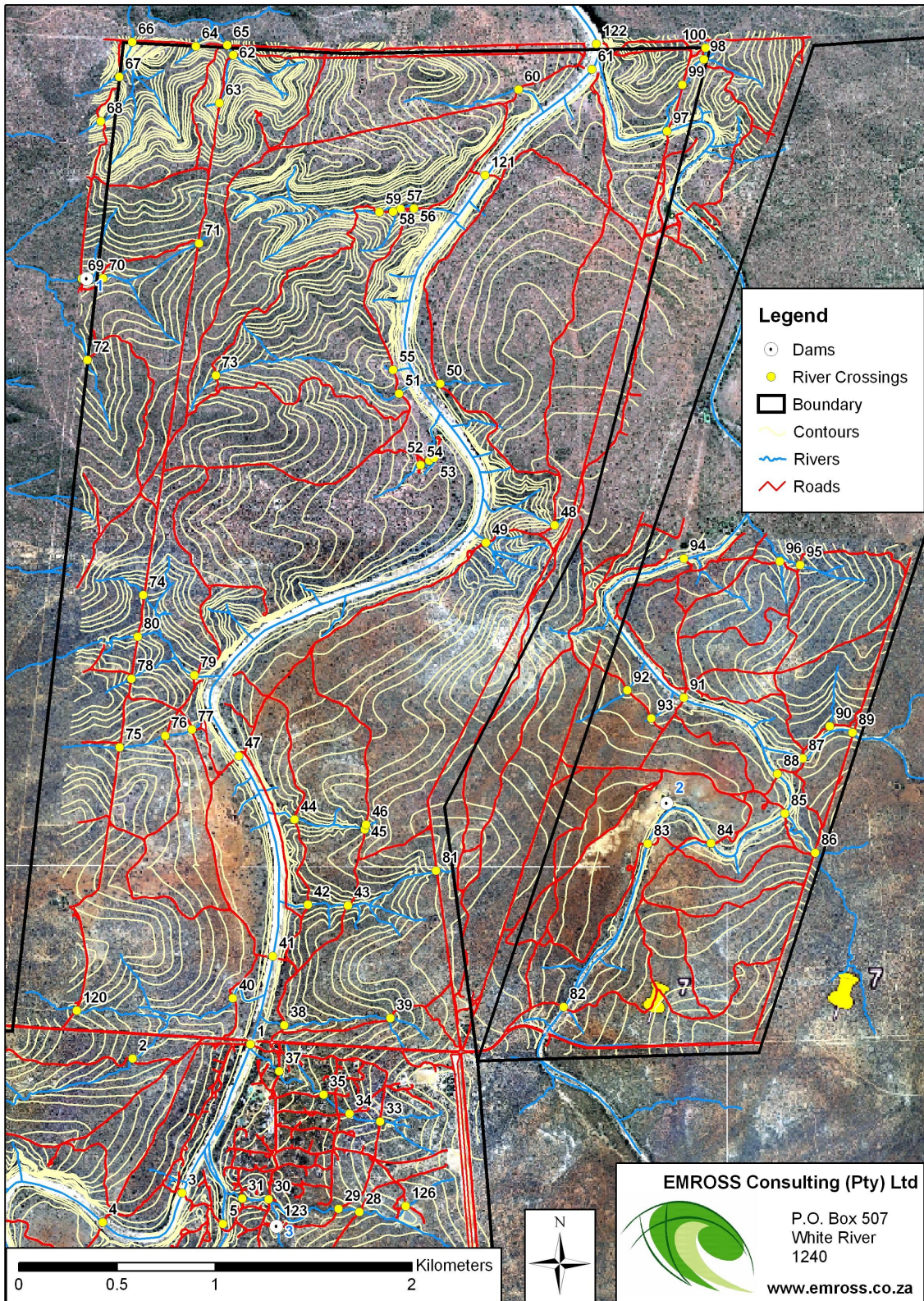
71	31.381471	-24.119337
72	31.375910	-24.124658
73	31.382354	-24.125360
74	31.378740	-24.135380
75	31.377567	-24.142315
76	31.379850	-24.141800
77	31.381187	-24.141494
78	31.378155	-24.139197
79	31.381303	-24.139019
80	31.378458	-24.137270
81	31.393454	-24.147904
82	31.399875	-24.154102
83	31.404051	-24.146649
84	31.407221	-24.146621
85	31.410922	-24.145251
86	31.412451	-24.147042
87	31.411799	-24.142737
88	31.410546	-24.143458
89	31.414306	-24.141559
90	31.413153	-24.141279
91	31.405842	-24.139995
92	31.403021	-24.139662
93	31.404218	-24.140944
94	31.405822	-24.133648
95	31.411668	-24.133916
96	31.410638	-24.133768
97	31.404920	-24.114163
98	31.406756	-24.110886
99	31.405691	-24.112051
100	31.406844	-24.110370
101	31.367521	-24.170035
102	31.367279	-24.167264
103	31.373706	-24.169239
104	31.361946	-24.168864
105	31.350649	-24.165904
106	31.350358	-24.166712
107	31.346416	-24.173124
108	31.346359	-24.173420
109	31.355112	-24.157527
110	31.354001	-24.158713
111	31.349288	-24.161468
112	31.341612	-24.186102
113	31.341376	-24.185323
114	31.349653	-24.188048
115	31.346340	-24.188352

Ingwelala Watercourse Environmental Management Plan

116	31.370238	-24.186869
117	31.375311	-24.186561
118	31.368362	-24.156285
119	31.370648	-24.156091
120	31.375452	-24.154330
121	31.395808	-24.116198
122	31.401366	-24.110201
123	31.385531	-24.164041
124	31.360706	-24.177660
125	31.363067	-24.177080
126	31.391965	-24.163199



Appendix 2: Map of sites.



Ingwelala Watercourse Environmental Management Plan

