

# INGULA PUMPED STORAGE SCHEME

## CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN



Surge Shaft Gantry



Revision 6  
*May 2013*

## ABBREVIATIONS, ACRONYMS & DEFINITIONS

<b>BCJV</b>	Braamhoek Consultants Joint Venture
<b>Bund</b>	Impervious enclosure around and under a storage facility to contain leakage or spillage
<b>CEMP</b>	Construction environmental management plan
<b>CM</b>	Conservation Manager employed by Eskom and responsible for managing the nature reserve surrounding the pumped storage scheme.
<b>DCO</b>	Divisional Client Office of Eskom
<b>DEAT</b>	Department of Environmental Affairs and Tourism
<b>DWA</b>	Department of Water Affairs and Forestry
<b>EA</b>	Environmental Authorisation
<b>ECO</b>	Environmental Control Officer employed by Eskom to ensure compliance with ROD and EMPs
<b>EIA</b>	Environnemental impact assessment
<b>EMP</b>	Environnemental management plan
<b>EMS</b>	Environmental management system
<b>FDRS</b>	Fire danger rating system
<b>FSL</b>	Full supply level. The level of water when a reservoir is full
<b>Footprint</b>	An activity or development leaves a footprint comprising land transformed from its pre-impacted state. Footprints may be enduring, and even with rehabilitation may be evident for decades to centuries after disturbance and before environmental function and native biodiversity are fully restored.
<b>GEM</b>	Generation Environmental Management of Eskom
<b>IEMP</b>	Integrated environmental management plan
<b>INR</b>	Ingula Nature Reserve, the provisional name given to the protected area that Eskom will establish around the pumped storage scheme
<b>IPSS</b>	Ingula Pumped Storage Scheme
<b>MOR</b>	Minimum operating level is the minimum water level in a reservoir at which the pumped storage scheme can operate
<b>NEC3</b>	New Engineering Contract (Version3)
<b>No-go</b>	No-go areas include all land within the Ingula Nature Reserve that is not demarcated as construction site, work area, camp or access road
<b>PCO</b>	Pest Control Officer
<b>PMF</b>	Possible maximum flood measured in cubic meters per second ( $\text{m}^3.\text{s}^{-1}$ )
<b>ROD</b>	Record of Decision. The environmental authority's written approval (or disapproval) of an EIA application. The RoD will henceforth be referred to as the EA.
<b>Site</b>	Land demarcated as construction site, work area, camp or access road

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## INTRODUCTION

The purpose of this Construction Environmental Management Plan (hereafter called the CEMP) is to outline the mitigation, and the responsibilities for implementing it, for the construction of the Ingula Pumped Storage Scheme (IPSS). The format of CEMP is to present first the common mitigation with which all contractors must conform, and then provide specific mitigation associated with specific role players (*viz* reservoir construction contractor, quarry contractor, underground works contractor, Eskom). This CEMP is also applicable in the case of other contractors coming to site (*e.g.* communication tower construction contractor, peat extraction contractor, for all of which additional conditions might apply). The approach is to try to indicate the minimal reasonable actions that the contractors and Eskom should undertake to conform to applicable environmental law, the Environmental Authorisation (EA) and good practice.

The RoD and CEMP are legally binding documents, and every contractor and Eskom are obligated to conform with all the clauses relevant to their activities.

Further, each contractor and Eskom must take precautions to avoid pollution and environmental damage whether or not specific provision is made in the RoD and CEMP, and whether or not there are errors or omissions in the RoD and CEMP. In explanation, the contractors and Eskom should consider the following.

- In terms of the Constitution of the Republic of South Africa section 24 everyone has the right to have an environment that is protected and not harmful to his/her health and well-being.
- The Constitution is the supreme law of South Africa and law or action inconsistent with it is invalid, and the obligations that the Constitution imposes must be fulfilled (Constitution, section 2).
- Virtually any citizen might approach a court if he/she feels his/her environmental rights are threatened or infringed (Constitution, section 38).
- There are further far-reaching clauses in the National Environmental Management Act 107 of 1998, for example that a risk-averse and cautious approach should be adopted (section 2 (4) (a) (vii)) and that there is a duty of care and remediation of environmental pollution and damage whereby anyone causing pollution or damaging the environment must take reasonable measures to prevent and remedy at his/her cost all pollution and environmental damage he/she causes (section 28).

## SECTION 1            APPLICABLE TO ALL CONTRACTORS & ESKOM

<b>STRUCTURE &amp; RESPONSIBILITIES</b>	
<b>Eskom Project Manager</b>	
1	Eskom shall appoint a Project Manager with the following responsibilities
	1.1 Receive and decide on reports, recommendations and approvals from Site Supervisor, Conservation Manager, Environmental Manager and ECO.
	1.2 Adjudicate on penalties
<b>Site Supervisor</b>	
2	Eskom shall require appointment of a Site Supervisor (hereafter called the Supervisor) with the following responsibilities
	2.1 Facilitate CEMP implementation
	2.2 Facilitate corrective actions with technical advice when required.
	2.3 Collaborate with EM & ECO on construction progress and environmental management thereof.
	2.4 Issue instructions to contractors
	2.5 Approve siting, installation and decommissioning of infrastructure, with EM and ECO input.
	2.6 Undertake weekly inspections to determine compliance with methods statements
	2.7 Demand and ensure corrective action. Recommend withholding payment in event of non-compliance
	2.8 Inspect rehab and approve
	2.9 Review and approve in writing all technical documentation submitted for approval
<b>Site Manager</b>	
3	3.1 Each contractor shall appoint a Site Manager who shall
	3.2 Comply with the EA and CEMP
	3.3 Operate and maintain his construction site, contractor's camp and staff housing (including electricity, potable water, wastewater treatment and solid and hazardous waste storage and disposal)
	3.4 Collaborate with the ECO, EM and Supervisor regarding environmental management of the construction site, contractor camp and staff housing sites, including electricity supply, potable water supply, wastewater treatment, and solid and hazardous waste storage and disposal
	3.5 Implement corrective action
	3.6 Ensure contractor employees are familiar and comply with the contents of RoD and CEMP
	3.7 Appoint a qualified and experienced Environmental Officer to assist the Site Manager in environmental management to comply with the RoD and CEMP
<b>Environmental Control Officer</b>	
4	Eskom shall appoint an Environmental Control Officer (ECO) who shall
	4.1 Conduct bi-monthly inspections to determine compliance with the EA and CEMP using checklists.
	4.2 Submit a monthly report to the Supervisor, Environmental Manager and Project Manager
	4.3 Ensure contractors and workers have RoD and CEMP and are familiar with the requirements
	4.4 Check records of incidents and verify corrective action implemented.
	4.5 Manage and maintain a complaints register
	4.6 Issue non-compliance warnings where necessary and recommend appropriate action to the Supervisor, Environmental Manager and Project Manager.
	4.7 Inform Eskom if any additional licenses/authorizations are required, prior to activity
	4.8 Provide any information required for external auditing
	4.9 Report to Eskom any problems that cannot be solved by the Supervisor, EM and the Project Manager.
	4.10 Submit monthly audit update to Eskom Project Manager, showing progress with closure of findings

	<b>Environmental Manager</b>
5	Eskom shall appoint an Environmental Manager (EM) for monitoring of the construction aspects, who shall
	5.1 Ensure daily inspections through Environmental Officers allocated for each activity to determine compliance with EA and CEMPr, and compile weekly action plans to track closure. These reports shall be availed to the ECO.
	5.2 Facilitate reporting, recording, investigation and follow-up of environmental related incidents as per Risk Management process
	5.3 Facilitate and integrate relevant training programs for personnel covering all significant aspects impacting on the environment relevant to the development.
	5.4 Ensure that the environmental commitments in the Construction Environmental Management Plan and RoD are complied with by project managers and contractors
	5.5 Review construction methods, techniques and procedures, identify environmental risk, draw conclusions and recommend possible solutions
	5.6 Develop, implement and manage the necessary construction & operational EMS
	5.7 Assume a leading role in performing environmental audits and guiding other staff in the performing of external and internal audits and follow up on corrective action.
	5.8 Proactively interpret and objectively analyse environmental data and initiate programs to mitigate against the environmental and related risks
	5.9 Assume a leading role in performing environmental audits and guiding other staff in the performing of external and internal audits and follow up on corrective action.
	5.10 Perform monthly environmental reporting for input into Divisional management information reports
	5.11 Maintain records of incidents and corrective action
	5.12 Appoint qualified and experienced Environmental Officers to assist the Environmental Manager in executing the responsibilities prescribed in the EA and CEMPr
	<b>Conservation Manager</b>
6	Eskom shall appoint a Conservation Manager (CM) who shall
	6.1 Prepare an integrated environmental management plan (IEMP) for Ingula Nature Reserve (INR) that integrates environmental management for IPSS (RoD and EMP1-EMP8) and INR
	6.2 Integrate the construction EMS and INR EMS
	6.3 Implement environmental management for INR
	6.4 Monitor impacts of construction and operation of IPSS on INR
	6.5 During IPSS construction submit monthly reports to the Supervisor and Eskom Project Manager via the Environmental Manager. These monthly reports shall be made available to the ECO.
	6.6 Maintain records of incidents and corrective action as relating to INR
	6.7 Provide any information required for external auditing as relating to INR
	6.8 Appoint a specialist who shall <ul style="list-style-type: none"> <li>6.8.1 Conduct research on important habitat management, threatened bird and small mammal species</li> <li>6.8.2 Provide documented recommendations arising from the specialist study/ies on site to the CM</li> </ul>
	6.9 Ensure that relevant recommendations of specialist studies are incorporated into the INR EMP

<b>GENERAL MITIGATION</b>	
7	Eskom shall provide each contractor with copies of the RoD and CEMP
8	Each contractor shall ensure that all his employees are familiar with the contents of RoD and CEMP
	8.1 Each contractor must provide every employee with environmental induction training in 1 <sup>st</sup> week of employment explaining the RoD and CEMP
	8.2 Each contractor must make available to employees copies of the RoD and CEMP
	8.3 Each Contractor shall update the environmental induction during the course of construction, and ensure all employees receive updated induction annually.
9	Each contractor and Eskom shall undertake and record induction and training and ensure employees working at IPSS are aware of conditions with which they must comply and be competent and equipped to undertake relevant environmental management, as follows
	9.1 Prepare a formal environmental induction program (egg PowerPoint presentation) covering requirements of the EA and CEMPr
	9.2 Maintain an environmental training register recording the name and date at which employees are employed and date and nature of environmental induction and other training, and certification by employee's signature that he/she attended such course(s), understood the contents and undertakes to comply with the RoD and CEMP
	9.3 Provide on-the-job environmental training for every employee on the specific environmental risks associated with his/her work as identified by the EIA specialists and noted with mitigation measures in the CEMPr.
10	Each contractor and Eskom shall ensure emergency preparedness (especially evacuation of injured persons, fire fighting), undertake and record emergency drills to the extent that personnel know how to, and do, respond to emergencies effectively, and make incident, accident and emergency reporting to the Supervisor, as follows
	10.1 Each contractor and Eskom shall prepare emergency response procedures for possible emergencies ( <i>e.g.</i> veld fire, pollution events, dam failure, explosions, injuries from machinery and vehicle and other accidents, spillage of hazardous material)
	10.2 The contractors' and Eskom's emergency response procedures must identify the risks, preventive action, main controller, incident controller, emergency services, response actions and equipment and materials
	10.3 Each contractor and Eskom shall prearrange with emergency medical rescue services ( <i>i.e.</i> ambulance and helicopter) that can respond immediately upon an emergency, and establish emergency phone numbers (landline and mobile)
	10.4 Each contractor and Eskom shall instruct all employees on preventive measures and responsive actions
	10.5 Each contractor and Eskom shall train a fire response team specifically in fire prevention and firefighting.
	10.6 Each contractor and Eskom shall undertake emergency drills as often as necessary to ensure that personnel know how, and do, respond appropriately to emergencies
	10.7 Each contractor and Eskom shall prepare incident, accident and emergency reports and submit these to the Supervisor, EM, ECO and Project Manager.
	10.8 Each contractor and Eskom shall maintain a register of emergency plans, drills, incident, accidents and emergencies
11	Each contractor and Eskom shall ensure that no employee, or other person entering upon the construction site and INR, shall have in his/her possession any unauthorised firearm, bow and arrow, sling, catapult, hook, snare, net, trap, poison or other device or substance that might be used to capture or hunt wildlife except with the written permission of the CM
	11.1 Each contractor and Eskom must take all reasonable measures to ensure that their employees do not bring onto site equipment and/or materials that might be used for hunting and fishing (note that the legal definition of hunt includes chase or disturb and anyone in possession of hunting equipment where game is likely to occur may be presumed to be

	hunting)
	11.2 If a contractor's or Eskom's employees bring firearms to site then the employer shall administer a firearm safe-keeping system at his expense and risk
12	Each contractor and Eskom shall ensure that their employees do not bring pets and domestic animals to site.
13	Each contractor and Eskom shall ensure that propagules of plants not native to South Africa are not brought to site nor cultivated on site
14	Each contractor is responsible for all environmental liabilities related to his construction, campsite, infrastructure, and pollution or environmental damage caused, whether or not covered in this CEMP. Each contractor shall remedy non-compliance, pollution and environmental damage immediately
	14.1 In terms of section 28 of the Environmental Management Act No 107 of 1998 anyone causing environmental pollution or damage is liable for cleanup or restoration, so each contractor must prevent pollution and damage, and must remedy immediately all pollution and damage he causes at his cost
	14.2 Each contractor must minimize his waste stream and footprint
	14.3 On site a contractor may disturb land only with the written consent of the Supervisor/Project Manager.
	14.4 Contractors, Eskom and their employees shall not enter upon no-go areas without the written consent of the CM
	14.5 By induction and training each contractor and Eskom shall inform their employees that they may only enter approved works and laydown areas, and each contractor shall demarcate work and campsite areas accordingly. All areas outside designated construction areas shall be considered "No-Go Areas"
15	On completion of contract each contractor shall dismantle and demolish and truck out all items and materials he brought to site and leave his site clean without environmental liabilities
	15.1 Whatever a contractor brings to site that is not included in the constructed product the contractor shall remove from site
	15.2 Each contractor shall not dispose of waste on site, except black and grey wastewater from ablutions and kitchens that must be treated and purified to meet the General, or at the Upper Site the Special DWA Effluent Standards (Exhibit 3) before release
	15.3 Each contractor shall dispose of construction waste and dismantled and demolished items and materials only at permitted waste site or as approved by Eskom
	15.4 Each contractor shall dispose of waste concrete and other cementitious material only at sites, and in a manner, approved by the Supervisor/Project Manager.
16	All land above FSL of upper and lower reservoirs disturbed by a contractor, including work areas, camps and associated infrastructure and any impacted no-go area shall be rehabilitated including alien plant control and grassing according to the revegetation procedure of the CEMP (Exhibit 4) and land disturbed between FSL and MOL shall be made safe before impoundment
	16.1 Each contractor shall restore all land he disturbed above FSL to former profile as far as possible and grass according to the procedure in Exhibit 4
	16.2 Land disturbed by a contractor between FSL and MOL shall be made safe as far as possible by the Contractor, viz reduce steep slopes to not steeper than 1 in 5 (11° or 20% slope) preferably, and never steeper than 1 in 3 (17° or 32% slope), and not leave holes into which people or livestock including wild animals could fall and not get out, or otherwise only as approved by the Supervisor/Environmental Manager



<b>NOISE SUPPRESSION</b>	
17	The contractors and Eskom shall not enter no-go areas except with the written permission of CM
18	The contractors and Eskom shall not use sound amplification ( <i>e.g.</i> loudspeaker, loud-hailer) except under emergency conditions
19	The contractors and Eskom shall comply with health and safety norms for machinery noise
	19.1 Each contractor shall undertake a baseline noise survey 14 days before starting work to determine ambient noise levels
	19.2 Each contractor shall monitor noise levels during construction and demarcate appropriate rural, urban and industrial noise zones according to SANS 10103 (see Exhibit 1)
	19.3 Each contractor shall provide ear protection as required by health and safety norms
	19.4 Each contractor shall take all reasonable measures to attenuate noise
	19.5 For surface operations, contractors shall confine drilling and blasting to 06h00-18h00 Monday-Saturday except with the permission of the Supervisor to operate outside these times

<b>ATMOSPHERIC POLLUTION</b>	
20	Each contractor shall practice dust suppression to limit dust settlement on no-go areas, to ensure good visibility, to limit dust inhalation, and to meet the national standard of <300 micrograms.m-2.d-1, or as otherwise stipulated in 20.4.
	20.1 Each contractor shall undertake baseline survey 14 days before construction to establish ambient dust and other airborne particulate levels and submit a report to the Eskom ECO
	20.2 Each contractor shall, during construction, undertake routine dust settling sampling, and designate dust-protection zones accordingly
	20.3 Each contractor shall practise dust suppression to limit dust settlement on no-go areas, to ensure good visibility at all times, and to limit dust inhalation by wetting dusty roads and work areas, by surfacing roads with non-mudrock gravel or hardener, by limiting speed of vehicles
	20.4 Each contractor shall devise and apply a dust control schedule routinely applying suppression irrigations as and when required (or alternative control measure if there is insufficient water for irrigation), subject to the application of spot monitoring undertaken by Eskom using a portable dust sensor and resort to a sliding scale (slight atmospheric pollution <250 mg.m-2.d-1 (maintain dust suppression), moderate atmospheric pollution 250<500 mg.m-2.d-1 (increase dust suppression), heavy atmospheric pollution >500 mg.m-2.d-1 (improve dust suppression methods – e.g. use sealants)
	20.5 The Project Manager shall stop a contractor's work, at the contractor's expense, if dust suppression is insufficient such that continuing work is unsafe or the environment is threatened with pollution or damage, or if health and safety norms are not met, and the Supervisor shall require the contractor to exercise sufficient dust suppression before the contractor's work resumes

<b>SOLID WASTE</b>	
21	Contractors and Eskom shall identify different kinds of solid waste, as specified below, keep these different kinds of solid waste separate, keep solid waste separate from liquid waste, and treat each kind of solid and liquid waste as directed in this CEMP
	21.1 Spoil – waste rock from quarrying for dam wall rock-fill, from excavation of tunnels and other underground works, from quarrying for aggregate (see paragraphs 24-25, 34)
	21.2 Construction waste – nuts and bolts, paper, plastic, steel reinforcing, wire from construction and work areas (see paragraphs 26, 29-34)
	21.3 Concrete waste – mixed and dried concrete (see paragraphs 27, 29, 34)
	21.4 Domestic waste – food and food packaging including cardboard, glass, paper, plastic and non-hazardous biodegradable materials emanating from contractor campsites, construction sites and work areas (see paragraphs 28-34)
	21.5 Hazardous waste – unused or discarded hazardous material in turn defined as any material known to be harmful or of uncertain content and possibly harmful, and hazardous waste includes undried/uncured concrete (see paragraphs 44-50)
22	A contractor shall store or dispose of spoils (i.e. waste rock from quarrying for dam wall rock-fill, from excavation of tunnels and other underground works, from quarrying for aggregate, but excluding all other forms of solid waste) only in dead storage volume of reservoir and other sites approved by the Supervisor, ECO and EM.
	22.1 Each contractor shall have EM, ECO and the Supervisor identify and demarcate where the contractor may dispose of spoil
	22.2 No contractor shall dispose of spoil other than within areas identified and demarcated, and in manner prescribed, by ECO, EM and the Supervisor
23	Each Contractor shall ensure that spoil disposal does not obstruct stream flow or lower its water quality
	23.1 Each contractor must exercise spoil minimization (i.e. limit the amount of waste rock produced)
	23.2 Each contractor shall allow the natural or unregulated stream flow to pass through the upper reservoir site with the natural flow variations unimpeded and the natural water quality unaltered
	23.3 Each contractor must avoid his excavations, workings and disposed spoil contaminating stream flow through upper and lower reservoirs either directly or indirectly such as by runoff or wind transport
	23.4 Before impoundment of a reservoir each contractor must ensure that the spoils he disposed of in a reservoir basin are smoothed over
24	Each contractor shall place construction waste (i.e. nuts and bolts, paper, plastic, steel reinforcing, wire) directly into solid waste storage containers
	24.1 Each contractor shall provide construction waste storage containers into which construction waste is deposited as it is produced
	24.2 Each contractor shall use construction waste containers so that construction waste deposited in them does not disperse (e.g. get blown out by wind)
	24.3 Each contractor shall require his employees to deposit construction waste immediately upon production directly into the construction waste storage containers provided
	24.4 No contractor shall burn construction (or any other solid) waste except as approved by the Supervisor
	24.5 Each contractor shall use the services of a registered waste manager to truck out his construction waste storage containers before they are overfilled
	24.6 Each contractor shall dispose of the solid waste only at a permitted waste disposal site, and keep a paper trail of waste produced, trucked off site, and disposed of at a permitted waste site
25	Each contractor shall dispose of concrete waste only at sites and in manner approved by the Supervisor, ECO and EM.
26	Each contractor shall place domestic waste directly into insect-, rodent- and

	scavenger-proof bins for temporary storage pending trucking out to formal disposal
	26.1 Each contractor shall provide insect-, rodent- and scavenger-proof bins for temporary storage of domestic waste, pending trucking out to formal disposal at a permitted disposal site
	26.2 Each contractor shall require his employees to use the bins by placing domestic waste, directly into the bins immediately upon production of such waste
	26.3 Before the domestic waste bins are overfilled with waste each contractor shall truck out the bins and dispose of the waste at a permitted disposal site
27	Each contractor shall keep site free of uncontained construction, concrete and domestic waste/litter at all times
28	No contractor shall dispose of construction and domestic waste on site
29	Each contractor shall maintain a construction and domestic waste temporary storage site, on an impermeable surface, or in sealed skips where there is potential for pollution.
	29.1 Each contractor's central temporary waste storage area for construction and domestic waste shall be on an impermeable surface. Waste shall be stored in sealed skips, where there is a potential of pollution.
	29.2 Each contractor shall empty daily the construction and domestic waste storage bins and containers located on the construction site, delivering the collected waste and storing in a sealed skip on an impermeable surface
	29.3 Each contractor shall store the construction waste separately from the domestic waste, and store this construction waste without it contaminating surface and ground water
30	Each contractor shall keep his temporary storage site clean and odour-free at all times
31	Each contractor shall truck out temporarily stored construction, domestic and other biodegradable solid waste to a permitted waste disposal site
32	The Project Manager shall stop a contractor's work, at the contractor's expense, and may impose penalties on the contractor for non-conformance, if the solid waste requirements (paragraphs 23-33) are not met, or are likely not to be met, and then the Supervisor shall require each contractor to fulfill the solid waste management requirements of this CEMP before the contractor's work resumes

<b>WATER SUPPLY &amp; DISCHARGE</b>	
33	Each contractor shall provide all installations with on/off switches
	33.1 Each contractor shall provide all water and wastewater installations, and the machinery that powers them, with on/off switches or taps
	33.2 Each contractor shall maintain on/off switches and taps in good working order
	33.3 Each contractor shall shut off installations and the machinery that powers them when the installations do not need to be operating
34	Each contractor shall meter and monitor all main uses to identify and control undue consumption
	34.1 Each contractor shall install means to measure, and then measure and record his water abstraction, use and discharge,
	34.2 Each contractor shall control undue consumption by maintaining the abstraction, transfer, storage, treatment and discharge systems in good working order, repairing leaks and malfunctioning, improving operational efficiency and reducing wastage
	34.3 Each contractor shall submit his water abstraction records to the Environmental Manager on a monthly basis.
35	Each contractor shall ensure that water abstraction is switched off when reservoir is full
36	Each contractor shall pipe all wastewater to the wastewater treatment system without leakage/spillage
	36.1 For purposes of this CEMP wastewater includes sewage effluent and industrial waste water including runoff from refueling and vehicle/machinery service and washing areas
	36.2 Each contractor shall convey or transfer all wastewater to a wastewater treatment system without leakage or spillage
	36.3 Where waste water is removed for disposal at an approved facility off-site, proper control measures shall be implemented to monitor its safe disposal (such as triplicate waybill, tag system, etc.), which shall be monitored by Environmental Manager.
	36.4 All wastewater shall pass through a wastewater treatment system, and grey water may be used for dust suppression subject to written approval from and continual compliance with DWA requirements for this application.
	36.5 Quarry water may not be released into streams, but may be used for compaction and dust suppression subject to conformance with DWA water quality standards for such application, and approval by the Supervisor
37	Each contractor shall keep his kitchens and ablutions and his camp sites clean and in good working order at all times
38	Each contractor shall monitor his water quality of wastewater discharge that must meet the DWA Special Standard at the upper site and the General Standard at the lower site
	38.1 Hereafter the Special Standard at the upper site and the General Standard at the lower site are referred to as the DWA Standard (Exhibit 3)
	38.2 Each contractor shall monitor and record the water quality of the wastewater discharge to show any exceedance of the DWA Standard
	38.3 Each contractor shall stop discharge immediately if the DWA Standard is exceeded, the contractor shall rectify the wastewater treatment so that the DWA Standard is no longer exceeded, and the contractor shall not resume the wastewater discharge until the DWA Standard is met
39	If the DWA Standard is not met the Supervisor shall instruct the contractor responsible to remedy immediately
	39.1 If the DWA Standard is not met, then the contractor responsible should immediately stop wastewater discharge, and remedy the exceedance.
	39.2 The Supervisor may impose penalties on a contractor for serious or repeated exceedance of the DWA Standard
	39.3 A contractor releasing wastewater exceeding the DWA Standard shall be responsible for the costs of any work stoppage and other consequences, penalties, pollution cleanup and

	environmental damage repair
40	No contractor shall discharge untreated wastewater during construction of the wastewater treatment system or at other times, and any wastewater produced during these times will be stored and disposed of at an approved treatment facility
41	The Contractor shall dissipate the energy of flow of released treated wastewater and disperse so as not to accelerate erosion and sedimentation

<b>HAZARDOUS MATERIALS &amp; WASTE</b>	
42	Each contractor shall hold relevant material safety data sheets on site
43	Each contractor shall provide locked storage for hazardous materials with impermeable floor bunded to contain 110% of stored volume. Each contractor will provide sealed containers for fluid supplies and waste, and store each type of hazardous material and hazardous waste separately
44	Each contractor shall service and refuel vehicles and machinery only on impermeable dished surface draining to oil trap from which water goes to wastewater treatment and oil to hazardous waste storage, except if field refueling is necessary then drip trays shall be used
45	Following analysis, and should material be proved hazardous, each contractor shall treat cement/concrete sludge as hazardous waste, the wastewater arising there-from shall go to wastewater treatment, and the residual sludge or solid material shall be disposed of only at sites, and in a manner, approved by the Supervisor, ECO and EM.
46	Each contractor shall handle hazardous materials only with trained personnel and use only for purpose specified by manufacturer
47	Each contractor shall, using trained personnel, immediately clean up leaks or spills and dispose of hazardous materials in accordance with MSDS requirements, and in the case of defective equipment or machinery the Project Manager may request removal of plant from site
48	Each contractor shall comply with the law in respect of transporting, using and disposing of hazardous substances

<b>CONSTRUCTION FOOTPRINT</b>	
49	Each contractor shall work within marked off construction and work areas, campsites and roads and regard all else as no-go area. Work areas and campsites may not extend into wetland
	49.1 Each contractor shall confine all his activities to within construction and work areas, campsites and roads identified and indicated by EM, ECO and the Supervisor
	49.2 Each contractor shall regard all areas other than those identified and indicated as construction and work areas, campsites and roads as no-go areas
50	No person shall enter no-go areas without written permission of CM
51	No contractor shall damage any archaeological, palaeontological, historical, <i>etc.</i> material in the construction footprint or elsewhere without a destruction permit
	51.1 Each contractor shall maintain surveillance of his footprint and identify and prevent damage to archaeological, paleontological, historical, <i>etc.</i> material, including graves
	51.2 Upon identification of archaeological, paleontological, historical, <i>etc.</i> material, the contractor concerned shall immediately fence off the material, stop work within the fenced off area, and advise the Supervisor. Work may continue outside the fenced off area
	51.3 The Supervisor shall have identified archaeological, paleontological, historical, <i>etc.</i> material assessed by qualified archaeologists, paleontologists or other relevant specialists who will recommend on the action warranted
	51.4 The Supervisor shall allow the fenced off area to be opened, and work to continue therein, only after the actions recommended by the specialists have been completed
52	Each contractor shall avoid, mitigate and remediate immediately any construction impacts ( <i>e.g.</i> littering, spillage, erosion) he causes in no-go areas as instructed by the Supervisor
	52.1 Each contractor shall take all reasonable measures to avoid and minimize impacts on no-go areas
	52.2 Each contractor shall mitigate and remediate his impacts on no-go areas even if these impacts are inadvertent
	53.3 Each contractor shall mitigate and remediate according to method statements approved by the Supervisor
53	Each contractor shall rehabilitate his footprint above FSL and downstream of the reservoir walls according to the revegetation procedure of this CEMP (see Exhibit 4)



<b>VELD FIRE</b>	
54	No contractor shall light open fires except to conform with FDRS (see Exhibit 2)
	54.1 Eskom's Conservation Manager shall update the FDRS daily during fire season (between April and December annually)
	54.2 Eskom's Conservation Manager shall communicate the FDRS risk to all Contractors and the FDI boards must be updated accordingly by EO or Fire Officer during the fire season.
	54.3 Each contractor shall require his employees to conform with the FDRS
	54.4 Each contractor shall light open fires, when FDR permits, only at sites and in a manner approved by the Supervisor, or CM if outside designated work areas.
55	No contractor shall permit smoking except to conform with FDRS and at sites approved by the Supervisor, or CM if outside designated construction areas.
56	Each contractor shall designate fire safe and smoking safe places only with Supervisor's approval
	56.1 Each contractor shall provide fire extinguishers at his designated fire safe and smoking safe places
	56.2 Each contractor shall service the fire extinguishers frequently and ensure they are always in working order
	56.3 Each contractor shall ensure that at fire safe places fires are extinguished and not left unattended
	56.4 Each contractor shall provide at smoke safe places buckets filled with sand in which cigarettes must be extinguished
	56.5 Each contractor shall ensure that no lighted cigarettes are disposed of other than directly into the provided sand buckets
57	Each contractor shall undertake fuel or biomass reduction ( <i>e.g.</i> cut rank/tall grass) around all his installations
	57.1 Each contractor shall remove flammable material such as dry grass from his construction and work areas and campsite at the beginning of each winter
	57.2 Each contractor shall equip his construction and work areas and campsites with fire fighting equipment including fire beaters and fire hoses
	57.3 Each contractor shall use the fire fighting equipment to extinguish fires and to wet buildings and equipment in the event of wildfire
	57.4 Each contractor shall service the fire fighting equipment frequently and ensure that it is always in working order
	57.5 Each contractor shall undertake at least monthly fire emergency drills during the dry season (April-October inclusive)
58	Each contractor shall observe FDRS restrictions when using naked flames and welding

<b>ELECTRICITY USAGE &amp; CONSUMPTION</b>	
59	Each contractor and Eskom shall ensure all electrical installations are equipped with on/off switches
60	Each contractor and Eskom shall meter and monitor all main uses of electricity to identify and control undue consumption
	60.1 Each contractor and Eskom shall meter and record the electricity consumption of each main area of electricity consumption
	60.2 Each contractor and Eskom shall identify areas of high electricity consumption and implement measures to economize
61	Each contractor and Eskom shall subdue outside lighting
	61.1 Each contractor and Eskom shall keep outdoor lighting to a minimum
	61.2 Each contractor and Eskom shall ensure that where outdoor lighting is installed it is no brighter or extensive than necessary for safety and security reasons
62	Each contractor and Eskom shall ensure energy saving globes are fitted
63	Each contractor and Eskom shall switch off lights and electrical appliances when not in use. Only emergency equipment may be left on standby. Water abstraction is to be switched off when storage full
	63.1 Each contractor and Eskom shall ensure that equipment is switched off when not in use or rooms not occupied, including air-conditioners, geysers, heaters and lights
	63.2 Each contractor and Eskom shall ensure that installations such as electrically driven water abstractors are fitted with off-switches, and that abstraction is shut down as soon as storage is full

<b>CONTRACTOR WORK AREAS &amp; CAMPSITES</b>	
64	Each contractor shall obtain the approval of the Supervisor for layout and design of individual camp infrastructure before erection
65	Each contractor's layout and design of camps shall be appropriate – insulated against heat and cold (+35°C to -10°C), withstand gale force winds (~100 kph), durable, easy to clean, subdued colour to limit visual impact, minimize footprint in space and time, as advised and approved by the Supervisor
66	Each contractor shall fence with $\geq 1.8$ m-high security fence all work areas, camps and staff housing areas. No one shall enter or leave other than through gate(s) capable of being closed to exclude livestock
67	On his work areas, campsites and staff housing areas each contractor shall prevent accelerated wind and water erosion and sedimentation with cut-off drains, paving, gravel, settlement ponds, grass and structures to slow down runoff, limit soil erosion, intercept sediment, dissipate energy of flow and disperse the runoff
68	Each contractor shall immediately stop, prevent and repair erosion caused by contractor work areas, camps and associated infrastructure according to a method statement approved by Supervisor
69	Each contractor shall decommission his work areas and campsites, dismantling and demolishing all temporary infrastructure unless instructed otherwise by the Supervisor
70	Each contractor shall truck out everything brought in for the construction project, with all solid waste disposed of only as specified in paragraphs 23-34 above
71	Each contractor shall reshape his work areas, campsites and staff housing areas to pre-construction landscape form
72	Each contractor shall eradicate all invader plants on his work areas, campsites and staff housing areas
	72.1 Each contractor must dig out alien invader plants, as a means of eradication
	72.2 As an alternative to digging out alien plants, or in addition to digging out, each contractor may use herbicides to control alien invader plants but only as prescribed by the manufacturers, and under the license of a trained PCO.
	72.3 Appropriate methods must be developed, in conjunction with the CM, to manage excess alien plant material.
73	Each contractor shall establish all disturbed areas above FSL or downstream of reservoir walls, to grass as per revegetation procedure of the CEMP (appended here as Exhibit 4)

<b>ACCESS ROAD USE</b>	
74	Each contractor and Eskom shall observe the sign-posted speed limits on internal access roads between De Beers Pass and site
75	Each contractor and Eskom shall dim lights at night if wildlife is caught in headlights, reduce speed to $\leq 20$ km/h, stop and make noise if necessary to chase wildlife away from road, not disembark, and continue with journey only when road is clear and wildlife away from road
76	Each contractor and Eskom shall drive safely according to conditions, <i>e.g.</i> reduce speed in dust, fog and smoke so as to be able to stop within the range of visibility
77	Each contractor and Eskom shall observe SA rules of the road
78	Each contractor and Eskom shall keep all vehicles in roadworthy condition with daily checklist and service manual maintained
79	On site no contractor nor Eskom shall travel off IPSS access roads, contractors' camps and work areas and construction sites, <i>i.e.</i> no vehicles allowed in no-go areas except with written permission of the CM
80	Each contractor and Eskom shall give wildlife and domestic livestock right of way

## SECTION 2 RESERVOIR CONSTRUCTION CONTRACTOR

UPPER RESERVOIR	
81	The Contractor shall maintain and monitor natural stream flow in quality and quantity throughout construction
	81.1 The Contractor shall maintain the natural stream flow, with its natural flow variations, in both quantity and quality ( <i>e.g.</i> the instantaneous rate of abstraction shall never exceed 5% the instantaneous rate of stream flow, the stream flow shall not be obstructed) subject to the minimum flow rates specified by DWA being met (Exhibit 5)
	81.2 The Contractor shall monitor the quantity and quality of stream flow with the onus on the Contractor to show conformance with the RoD conditions that the natural stream flow be maintained in quantity, fluctuation and quality ( <i>e.g.</i> the Contractor should measure stream flow quantities and qualities above his works and stream flow quantities and qualities flowing out of his works)
	81.3 The Project Manager shall stop the Contractor's construction work, at the Contractor's expense, in the event of failure to meet the RoD conditions that the natural stream flow be maintained in quantity, fluctuation and quality, and the Project Manager shall allow the Contractor to resume construction work only when the RoD conditions are met
82	The Contractor shall adopt and build the the design that has already been prepared by Eskom for outlet works. Operation of the works to mitigate as far reasonably possible the mixing of interbasin fish species as informed by research, and incorporated into the OEMP.
83	Before impounding, the Contractor shall await verification from Eskom regarding eradication of bass in the upper reservoir on completion of construction
84	For rockfill portion of the dam wall the Contractor shall use sandstone, not mudrock
85	The Contractor shall treat cement/concrete sludge as prescribed in paragraph 47 above
86	The Contractor shall not apply fine-textured material ( <i>e.g.</i> topsoil) to the downstream face of the rockfill wall and the Contractor shall leave the rockfill downstream face unvegetated
87	The Contractor shall commission a landscape architect to ensure wall and surrounds conform with local landscape shape, texture and colour
88	For the non-rockfill portion of the dam wall the Contractor shall build the downstream face not steeper than 1 in 3 (17° or 32% slope)
89	On downstream face of the non-rockfill portion of the dam wall the Contractor shall grade from clay core to sandy loam topsoil if the grassing option is selected (see paragraph 92 below)
90	The Contractor shall either grass the downstream face of the non-rockfill portion of the dam wall as per revegetation procedure of the CEMP (appended here as Exhibit 4), or apply a protective layer of coarse gravel or cobble provided the gravel or cobble is not comprised of mudrock
91	The Contractor shall construct parapet, embankment and armoflex roads to avoid concentrating runoff by providing roadside drains (gutters) and by constructing frequent mitre drains to discharge runoff away from the road
92	The Contractor shall disperse, and dissipate energy of, any concentrated runoff so roads do not cause erosion
93	The Contractor shall repair erosion caused by construction, and grass as per revegetation procedure of the CEMP (appended here as Exhibit 4)
94	The Contractor shall inspect post-construction his construction and rehabilitation works after every storm within the defects and maintenance period, and

	immediately repair any erosion and grass any bared areas as per revegetation procedure of the CEMPr (appended here as Exhibit 4)
95	The Contractor shall build the lip of the stilling pond level with average water level in wetland, following the stilling pond design prepared specifically to disperse flow release across the wetland and to avoid flow concentration and scouring of the wetland
96	The Contractor shall construct the emergency spillway with $\geq 1\text{m}$ vertical drop on its downstream face so that in the unlikely event of a spill fish cannot enter the upper reservoir from downstream
97	The Contractor shall, within his construction and work areas (above FSL and downstream of the dam wall), rehabilitate all paths, tracks and erosion scars, control alien invader plants and grass as per revegetation procedure of the CEMP (appended here as Exhibit 4)

<b>LOWER RESERVOIR</b>	
98	The Contractor shall maintain natural stream flow in quality and quantity throughout construction as far as possible, and during first filling shall meet the release requirements specified by DWA (Exhibit 5)
99	The Contractor shall adopt, and construct according to, the outlet works design prepared by the dam designers to prevent fish from entering the lower reservoir from downstream
100	The Contractor shall adopt, and construct according to, the dam design prepared by the dam with $\geq 1$ m vertical fall from outlet works to stilling pond at possible maximum flood (PMF)
101	The Contractor shall treat cement/concrete sludge as prescribed in paragraph 47 above
102	The Contractor shall construct the access and any other roads so as to avoid concentrating runoff by providing roadside drains (gutters) and by constructing frequent mitre drains to discharge runoff away from the road
103	The Contractor shall disperse, and dissipate energy of, any concentrated runoff so roads do not cause erosion
104	The Contractor shall repair erosion caused by construction, and grass as per revegetation procedure of the CEMP
105	The Contractor shall inspect post-construction his construction and rehabilitation works after erosive storms within the defects and maintenance period, and immediately repair any erosion and grass any bared areas as per revegetation procedure of the CEMPr (appended here as Exhibit 4)

## SECTION 3 UNDERGROUND WORKS CONTRACTOR

<b>UNDERGROUND WORKS</b>	
106	The Contractor shall apply mitigation in terms of Mines Health & Safety Act & relevant mining laws & regulations
107	The Contractor shall meet the DWA Special Standard (upper site) & DWA General Standard (lower site) before effluent is discharged (see Exhibit 3)
	107.1 The Contractor shall collect all wastewater & settled fines, subject to wastewater treatment & discharge the effluent provided it meets the DWA Special Standard at the upper site or the DWA General Standard at the lower site (see Exhibit 3)
	107.2 The Contractor shall dispose of dewatered settled fines only as directed by the Supervisor (cf paragraph 47 above regarding cement/concrete sludge)

<b>SWITCH YARD, CONTROL BUILDINGS, MAIN WORKS SERVICES</b>	
108	The Contractor shall follow sound environmental design for all buildings with attention to life cycles costs, as shall be required by Eskom
109	The Contractor shall build with materials that blend with the surrounds in form, texture and colour, as shall be required by Eskom
110	The Contractor shall follow design and construct buildings for efficient internal climate control via building shape, orientation, insulation, ventilation, <i>etc.</i> , as shall be required by Eskom
111	The Contractor shall equip and furnish with attention to life cycle costs, as shall be required by Eskom
112	The Contractor shall adopt preventive maintenance for buildings, equipment and furnishings, as shall be required by Eskom



<b>CANAL</b>	
113	The Contractor shall divert stream flow out of excavation-construction path for canal
	113.1 The Contractor shall divert the stream flow around, or canalize or pipe the stream flow through, his excavation and construction works to maintain the natural flow regime in flow quantity, flow variability and flow quality and deliver the flow below the downstream end of the proposed canal
	113.2 The Contractor shall similarly divert or canalize flow from seeps and springs along the length of the proposed canal, ensuring their natural flow quantity, variability and quality are delivered at the downstream end of the proposed canal
	113.3 The Project Manager shall stop the Contractor's construction work, at the Contractor's expense, in the event of failure to meet the RoD condition that the natural stream flow be maintained in quantity, fluctuation and quality, and the Project Manager shall allow the Contractor to resume construction work only when the RoD condition is met
114	Eskom shall consult the Braambosch landowner to determine his fencing and stock-watering needs during construction
115	The Contractor shall, if instructed by Eskom, fence construction works on Braambosch & provide a compensatory volume of water in a drinking trough for the farmer's livestock, as approved by the farmer, Eskom and Supervisor
	115.1 The Contractor shall protect the Braambosch landowner's interests, in particular his veld resource & livestock operation, from damage or impairment as a result of the excavation/construction project
	115.2 The Contractor shall, subject to agreement between the landowner and Eskom, fence Eskom's servitude on Braambosch to keep livestock off the servitude & demarcate the no-go area (on Braambosch outside the servitude)
	115.3 The Contractor shall, subject to agreement between the landowner and Eskom, provide stock-watering facilities for the landowner to compensate for the loss of the natural watering facility provided at the head of the stream
	115.4 The Contractor shall, subject to agreement between the landowner and Eskom, site the stock-watering facility to minimize soil erosion that will arise because of livestock concentration, and take measures to limit erosion by enhancing the protective grass cover for example by fertilizing & converting the veld to <i>mtshiki</i> ( <i>Eragrostis</i> & <i>Sporobolus</i> species) & other grazing & trampling resistant native grasses
	115.5 Eskom shall, as an alternative to requirements 118.1-118.4, negotiate with the landowner, withdrawal of all farming activity during construction, and compensation by Eskom accordingly
116	The Contractor shall minimize disturbance, habitat degradation, soil loss & habitat loss in construction & operation of the stream diversion
117	The Contractor shall, for all areas that he impacts above FSL inside and outside the servitude, rehabilitate and grass as per revegetation procedure of this EMP

## SECTION 4 QUARRY CONTRACTOR

<b>QUARRYING, STONE CRUSHING &amp; AGGREGATE STORAGE</b>	
118	The Contractor shall confine his quarrying to below full supply level (FSL) of the lower reservoir
119	The Contractor shall limit atmospheric pollution (see paragraphs 20-22)
120	The Contractor shall dispose of all spoils (waste rock and overburden – see paragraphs 23-25) only below minimum operating level (MOL) of the lower reservoir where the spoil must be smoothed over (paragraph 25), or at other sites approved by the Supervisor
121	The Contractor shall not release wastewater except if it conforms to the DWA Standard ( <i>i.e.</i> at the lower site the General Standard in Exhibit 3 applies)
122	The Contractor may use wastewater for dust suppression provided it meets the required standard approved by the Supervisor (see paragraph 38)
123	The Contractor shall dispose of dewatered sludge only as directed by the Supervisor ( <i>cf</i> paragraph 47 above regarding cement/concrete sludge)
124	The Contractor shall manage and rehabilitate his footprint above FSL (stone crushing, aggregate storage and campsite areas) according to the requirements of this CEMP (see especially paragraphs 51-55)
125	Land disturbed by the Contractor between FSL and MOL shall be made safe as far as possible by the Contractor, <i>viz</i> reduce steep slopes to not steeper than 1 in 5 (11° or 20% slope) preferably, and never steeper than 1 in 3 (17° or 32% slope), and not leave holes into which people or livestock including wild animals could fall and not get out (see paragraph 15), or otherwise only as approved by the Supervisor/Environmental Manager

## SECTION 5 ESKOM

<b>GENERAL CONDITIONS</b>	
126	Eskom shall give one week's notice to the Department of Environmental Affairs & Tourism (DEAT) of the start of construction, giving clear reference to site details and Record of Decision (RoD) authorization number A24/16/3/124
127	Eskom shall advise DEA within 24 hours if any condition of the EA is not complied with
128	Eskom shall make the RoD available on site during construction and all staff, contractors and sub-contractors shall be familiar with or be made aware of the contents of the RoD
129	Eskom shall keep in good records relating to the compliance and non-compliance with the conditions of the EA. Such records shall be made available to DEA within seven days of receipt of a written request by DEA for such records
130	Eskom shall inform DEA and the relevant provincial departments of any change to the project resulting in significant environmental impacts, and require the written permission of DEA
131	Eskom shall notify DEA within 30 days of any change in ownership or development of the project, and Eskom shall make known that the contents of the EA are binding on the new owner or developer
132	Eskom shall advise DEA of any change in Eskom's address
133	Eskom shall not hold responsible national government, provincial government, local authorities or committees appointed in terms of the conditions of RoD or any other public authority or organization for any damages or losses suffered by Eskom or its successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by Eskom or its successor in title with the conditions of the RoD or any other subsequent document emanating from the RoD
134	Eskom shall remedy any non-compliance within 30 days of written notice from DEA, unless otherwise stipulated by the Department, otherwise the EA may be withdrawn
135	Eskom shall comply with the conditions of the RoD otherwise be liable to committing offences dealt with in terms of sections 29, 30 and 31 of the Environment Conservation Act, 1989 (Act No.73 of 1989), and other legal mechanisms
136	Eskom shall be responsible for all costs incurred in meeting the conditions of the RoD
137	Eskom shall maintain an up-to-date complaints register, attend to all complaints promptly, and produce the complaints register upon request
138	Eskom shall make separate EIA application for any proposed activities not covered in the RoD

<b>SPECIFIC CONDITIONS</b>	
139	Eskom shall implement the mitigation measures and recommendations contained in the reports of Dr MT Mentis and Professor TC Partridge as follows
	139.1 Eskom shall purchase the farms Wilge Rivier 319, Bedford 389 and Chatsworth 388, hereafter called the Ingula Nature Reserve (INR)
	139.2 In addition to operating the pumped storage scheme, the objectives of INR shall be to conserve, as far as reasonably possible, the natural features and native biota of INR by means of a management plan that addresses significant environmental effects
	139.3 Eskom shall dispense with the previously proposed by-pass system and ensure that the unregulated stream flow regime is replicated in terms of volume and seasonal timing of base and flood flows
	139.4 Eskom shall ensure that concentrated delivery of runoff and stream flow into the wetland immediately below the upper reservoir is prevented
	139.5 Eskom shall ensure that the geometry of the wetland below the upper reservoir is not altered, and the base level to which erosion is working is unchanged
	139.6 Eskom shall rehabilitate sheet and gully erosion in the catchment of the Bedford-Chatsworth wetland
	139.7 Eskom shall fund research into local wetlands and wetland biota
	139.8 Eskom shall rehabilitate wetlands on INR to the extent that research and experience show to be necessary
	139.9 Eskom shall institute comprehensive erosion rehabilitation and soil conservation measures throughout the catchment of the wetlands
140	Eskom shall prepare environmental management plans (EMP) for the construction and operation phases of the project, submit these EMPs to DEA and the relevant provincial departments for approval, update these EMPs in the light of monitoring and auditing, and similarly seek approval for the updates from the national and provincial authorities
141	Eskom shall manage the INR, rehabilitate wetland and control gully and sheet erosion in close cooperation with the relevant provincial authorities
142	Eskom shall ensure that at the upper reservoir the virgin flow and the exact volumes and seasonal timing of base and flood flows are maintained. This aspect must be dealt with in detail in the construction and operational EMPs for the proposed scheme
143	Eskom shall announce and forward to DEA before construction commences the name of an Environmental Control Officer who shall ensure that the conditions of the EA are complied with
144	Eskom shall implement a monitoring and auditing program and quarterly communicate the results of the program to DEA.
145	Eskom shall prepare and submit for approval from DEA and relevant provincial authorities the construction EMP before construction starts
146	Eskom shall develop procedures for the solid waste disposal, water provision and water storage
147	Eskom shall ensure that removal of vegetation during construction, and post-construction rehabilitation, shall be in cooperation with the relevant provincial departments
148	Eskom shall, with the help of a suitably qualified ornithologist and landscape architect, investigate, design and construct suitable sites to establish artificial cliffs for the colony of Bald Ibis to roost and nest. The extent of the cliffs to be established, must replace the cliffs that will be lost due to flooding
149	Eskom shall ensure that there shall be no negative impact on the downstream wetland as a result of the construction and operation of the proposed upper

	reservoir (see paragraph 83)
	149.1 Eskom, in close cooperation with the Department of Water Affairs and Forestry, shall prescribe mitigation measures in the EMPs to ensure that the water flow regime remains similar to pre-construction conditions (see paragraph 83, Exhibit 5)
	149.2 Eskom shall maintain the hydrological system downstream of the upper reservoir by releasing water at a rates quantity and quality as closely as possible to the pre-construction flow
	149.3 Eskom shall ensure that the upper reservoir is designed to maintain the pre-construction flow regime with among other things the volume and seasonal timing of base and flood flows. Eskom shall do this in close cooperation with the Department of Water Affairs and Forestry
150	Eskom shall ensure that the upper reservoir is designed to preserve the quasi-equilibrium of the landscape geomorphics by ensuring that among other things
	150.1 Measures are put in place to ensure that the base to which erosion is working does not change
	150.2 Measures are put in place to avoid concentrated flow inputs into the wetland
	150.3 Design and construct a low weir below the upper reservoir to allow uniform dispersed release into the wetland (see paragraph 97)
151	Eskom shall ensure that the quarries for the rock-fill dam wall (upper reservoir) and aggregate for concrete must be below FSL to minimize the visual impacts once the dams have been completed, and land disturbed between FSL and MOL be made safe before impoundment (paragraph 15)
152	Eskom shall ensure that waste material from excavations is used as construction or rehabilitation fill material or disposed of below MOL of the two dams
153	Eskom shall obtain the services of a suitably qualified landscape architect to maintain the 'sense of place' of the upper reservoir specifically and the entire scheme generally
154	Eskom shall design the upper reservoir to prevent spill during the high rainfall season
155	Eskom shall develop mitigation measures to prevent, as far as possible, mixing of Tugela and Orange-Vaal biotas, and to maintain the water quality of upper and lower reservoirs as follows (see paragraphs 84, 85, 101, 102, 110)
	155.1 Eskom shall establish whether there are bass or other alien fish above the upper reservoir before impoundment, and if there are, then eradicate the alien fish, verify that the eradication is successful, and only then impound the upper reservoir
	155.2 Eskom shall establish whether there are alien fish in any of the rivers and dams upstream of the lower reservoir wall, and if there are, then eradicate the alien fish, verify that the eradication is successful, and only then impound the lower reservoir
	155.3 Eskom shall prohibit fishing in the upper and lower reservoirs and their catchments, and prevent import of any live fish into the catchments except with written permission from the CM
	155.4 Eskom shall seek the cooperation of the landowners of the Braamhoekspruit upper catchment in a joint fish conservation effort to achieve the above two conditions
	155.5 Eskom shall undertake fish conservation research as part of the obligation to fund research into local wetlands and wetland biota (see paragraph 144), and Eskom shall implement research recommendations in keeping with paragraph 144, and Eskom shall seek the collaboration of local landowners where relevant
156	Eskom shall develop and ensure implementation of mitigation to limit construction impact on the avifauna downstream of the upper reservoir, particularly in respect of noise (paragraphs 16-19, 52, 112), vibration (paragraphs 51, 52), dust (paragraphs 20-22, 52, 123), water quality (paragraphs 25, 31, 38, 40-43, 46, 47, 49, 69, 70, 83, 87, 88, 90-92, 94-96, 98, 103-107, 109, 116, 118, 119, 125-129), illumination (paragraphs 63, 65), vehicles and personnel (paragraphs 51, 52, 76-78, 80-82)

157	Eskom shall report on the status of the wetland downstream of the upper reservoir on a quarterly basis during construction
158	Eskom shall alert construction contractors to the possible occurrence of Red Data species, and if Red Data species are encountered the relevant provincial departments should be consulted regarding mitigation
159	Eskom shall ensure that graves in the construction path are identified and the appropriate mitigation applied (marking, fencing, legal reburials) to conform with the National Heritage Act, 1999 (Act 25 of 1999)
160	Eskom shall offer botanical gardens and similar institutions the opportunity to collect and relocate indigenous plants that occur on the sites to be affected, before construction begins
161	Eskom shall include in the EMPs mitigation measures to address the socio-economic impacts associated with the possibility of the development of the three major projects (de Beers Pass, Thukela Water Project and the Ingula Pumped Storage Scheme) occurring simultaneously
162	Eskom shall make a fresh EIA application should the present scheme be considered as part of a an interbasin water transfer project
163	Eskom shall ensure that the peat section that will be affected during construction be sampled for a study of the palaeo environment
164	Eskom shall set up a research program to investigate the possible unmitigated effects of the scheme on wetland, including functioning of the wetland and interaction with the biota and avifauna. The results of the research shall feed back into revised EMPs. The value of the research program shall not be less than R500 000 per year for 10 years.
165	Eskom shall indicate quarterly to DEAT and the relevant provincial environmental departments that the findings of the research program are incorporated in the EMP
166	Eskom shall report on a quarterly basis to DEAT and the relevant provincial departments on the success or failure of mitigation measures
167	Eskom shall not commence construction before DEAT receives and approves a final development framework development and detailed site development plan, and a comprehensive EIA for all access roads and power lines to connect the scheme to the national grid
168	Eskom shall close the diversion furrows leading water from the Braamhoekspruit to the property Zaaifontein by the end of the construction project
169	Eskom shall undertake alien invader plant control on all the Eskom-owned property associated with IPSS, and may collaborate with all landowners in the catchment of the Braamhoekspruit with the objective that they undertake similar control in a coordinated manner. The control shall involve complete treatment within 5 years of commencement of construction, and annual follow-up control on all areas for the duration of the operational life of the scheme
170	Eskom shall prepare, and submit for approval to DEAT and relevant environmental departments, an Operational EMP based on an operations environmental risk assessment undertaken by a suitably qualified environmental risk assessor
171	Eskom shall include in the operations EMP, among other things, operation of the scheme to ensure virgin base and flood flows into the wetland below the upper reservoir, operating procedures to meet the minimum releases required by

	DWA's water use license, operating rules for the upper reservoir to ensure that fish do not enter the reservoir from downstream, management of INR and in particular defoliation management, alien invader plant control, soil erosion control, rehabilitation of gullies and sheet eroded areas, rehabilitation of wetlands, relocation of labour tenants, and conservation of the native biota including control of hunting and gathering of wild plants or plant materials
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<b>ACCESS ROAD MANAGEMENT</b>	
172	Eskom shall ensure that the access roads to IPSS (De Beers Pass to upper and lower sites) do not pollute or cause environmental damage (e.g. cause accelerated soil erosion) (National Environmental Management Act 107 of 1998, section 28) and are maintained in good order and safe to use (The Constitution of the Republic of South Africa section 24), as set out in the provisions below
173	Eskom shall avoid concentrating runoff by resorting to roadside drains (gutters) and frequent mitre drains to discharge runoff and dissipate its energy
	173.1 Eskom shall inspect the access roads regularly and identify where runoff or discharge from the roads is causing erosion
	173.2 Eskom shall stop such identified erosion by constructing frequent drains to limit concentration of runoff and by developing means, such as grassing and energy dissipation structures, to dissipate the energy of discharged runoff
	173.3 Eskom shall undertake preventive maintenance of road drains, roadside grassing and runoff dissipation structures
174	Eskom shall make wide drains alongside roads, install drop weirs on the grade line and establish to grass as per revegetation procedure of this EMP
	174.1 Eskom shall inspect roads after erosive storms & identify where runoff alongside roads is causing erosion
	174.2 Eskom shall limit this identified erosion alongside roads by ensuring roadside drains are wide, they are fitted with drop weirs (keyed into sides, lower at centre than at sides, built on the grade line) and grassed
	174.3 Eskom shall undertake preventive maintenance of roadside drains, drop weirs and grassing
175	Eskom shall ensure that mitre drains discharge only onto grass, or other erosion resistant structures, and dissipate energy of discharge
	175.1 Eskom shall inspect roads after erosive storms and identify where mitre drains are causing erosion or are not discharging onto grass or other erosion-resistant or poorly weatherable surface such as sandstone
	175.2 Eskom shall limit this identified erosion, or potential erosion, by such means as reducing runoff concentration by increasing the frequency of mitre drains, by grassing the floor of mitre drains or by installing energy dissipation structures in the mitre drains
	175.3 Eskom shall undertake preventive maintenance of mitre drains
176	Eskom shall not lower the base to which erosion is working at bridges, culverts and drains – remedies are to raise road over bridge, culvert or drain, and install drop weirs as non-erodible bases, and dissipate energy below drop weir
	176.1 Eskom shall inspect roads after erosive storms and identify where erosion is occurring at bridges, culverts and under-road drains, upstream of such structures, downstream or both
	176.2 Eskom shall limit this identified erosion by constructing drop weirs to raise the base to which erosion is working
	176.3 Eskom shall fit the drop weirs with energy dissipation structures in the form of a stilling pond or a hard surface to receive the water falling over the weir
	176.4 Eskom shall undertake preventive maintenance of bridges, culverts and under-road drains as well as associated drop weirs to limit erosion
177	Eskom shall not topsoil and not revegetate cut embankments that expose poorly weatherable rock such as sandstone
178	Eskom shall slope cut and fill embankments comprised of weatherable and erodible materials to lowest gradient feasible (preferably not steeper than 1 in 5), but where gradients are 1 in 5 or steeper then grass establishment & on-going management must maintain an average cover rating $\geq 4$ (see revegetation procedure of this CEMP)
179	Eskom shall grass all areas disturbed by road construction, as per revegetation



	procedure of the EMP, and Eskom shall maintain an average cover rating of $\geq 3$ except for areas with slope of 1 in 5 or more where Eskom shall maintain an average grass cover rating of $\geq 4$ (see revegetation procedure of this EMP)
180	Eskom shall ensure that the road base does not interfere with water flow in a wetland where road alignment cannot avoid traversing wetland
	180.1 Eskom shall, monthly, inspect wetlands where they are crossed by access roads and identify where the road base is interfering with wetland function, e.g. flooding upslope of the road & preventing inundation downslope of the road
	180.2 Eskom shall, where interference of wetland function is identified, design & implement means (such as constructing under-road drainage) of reducing the interference, subject to the approval of Eskom & the Supervisor/Engineer
181	Eskom shall apply preventive maintenance to the road surface & drainage
182	Eskom shall check road surface, rehabilitation and drainage after every storm and restore and repair damage immediately
183	Eskom shall undertake alien invader plant control on all the Eskom-owned property associated with IPSS, including road reserves from De Beers Pass to site for both upper and lower sites

## PENALTIES

Contractors will incur financial penalty for each incidence of employees committing any of the following.

- Non-compliance with restrictions imposed by fire danger rating system (FDRS) – Exhibit 2.
- Fire fighting equipment not in place/not serviceable.
- Solid waste containment and disposal not compliant with CEMP
- Repeated and/or significant air quality levels not within the prescribed limits in CEMP
- Repeated and/or significant leakage and spillage of hazardous substances
- Repeated and/or significant leakage and spillage from wastewater system
- Exceeding DWA Special Standard (upper site), General Standard (lower site) or other DWA water license for wastewater discharge (see Exhibit 9)
- Vehicle-wildlife collision, injury, fatality
- Trespass (*i.e.* entry into no-go area), wildlife disturbance, hunting, trapping, snaring, netting, fishing, harvesting of indigenous plants

The penalties shall be as follows

First offence: R 5 000 per day plus cost of mitigation

Second Offence: R 10 000 per day plus cost of mitigation

Further Offence: Penalty increased by R10 000 (per day plus cost of mitigation) for each further offence

If consistent non-compliance occurs the Project Manager may stop the work of the relevant contractor at that contractor's expense.

**Exhibit 1      Acceptable noise levels (extracted from SANS 10103)**

Time of day	Noise level, free-field dB(A)		
	SANS 10103 acceptable rating level $L_{Req,d}$		
	Rural	Urban	Industrial
Day	45	55	70
Night	35	45	60

## Exhibit 2      Fire danger rating system (FDRS) obtainable from SA Weather Service

The principle is that restrictions become more severe with increasing FDRS index

Fire Alert Status	Blue	Green	Yellow	Orange	Red
Fire Danger Index	0-20	21-45`	46-60	61-75	76- ->
Measures					
Fire Breaks	May be prepared	May be prepared	Limited physical preparation	Prohibited	Prohibited
Outside fires	In Designated areas	In Designated areas	Prohibited	Prohibited	Prohibited
Inside fires	No Limitation	No Limitation	Under direct supervision	Prohibited	Prohibited
Naked flame / external welding	No Limitation	No Limitation	Under direct supervision	Prohibited	Prohibited
Smoking	In designated areas	In designated areas	In Internal designated areas	In Internal designated areas	In Internal designated areas
Access to site	Unlimited	Unlimited	Limited	Limited	Limited
Access to no-go areas	Only with CM permission	Only with CM permission	Only with CM permission	Only with CM permission	Prohibited

**Exhibit 3 DWA General and Special effluent standards**

SUBSTANCE/PARAMETER	GENERAL LIMIT	SPECIAL LIMIT
Faecal Coliforms (per 100 ml)	1 000	0
Chemical Oxygen Demand (mg/l)	75*	30*
pH	5,5-9,5	5,5-7,5
Ammonia (ionised and un-ionised) as Nitrogen (mg/l)	6	2
Nitrate/Nitrite as Nitrogen (mg/l)	15	1,5
Chlorine as Free Chlorine (mg/l)	0,25	0
Suspended Solids (mg/l)	25	10
Electrical Conductivity (mS/m)	70 mS/m above intake to a maximum of 150 mS/m	50 mS/m above background receiving water, to a maximum of 100 mS/m
Ortho-Phosphate as phosphorous (mg/l)	10	1 (median) and 2,5 (maximum)
Fluoride (mg/l)	1	1
Soap, oil or grease (mg/l)	2,5	0
Dissolved Arsenic (mg/l)	0,02	0,01
Dissolved Cadmium (mg/l)	0,005	0,001
Dissolved Chromium (VI) (mg/l)	0,05	0,02
Dissolved Copper (mg/l)	0,01	0,002
Dissolved Cyanide (mg/l)	0,02	0,01
Dissolved Iron (mg/l)	0,3	0,3
Dissolved Lead (mg/l)	0,01	0,006
Dissolved Manganese (mg/l)	0,1	0,1
Mercury and its compounds (mg/l)	0,005	0,001
Dissolved Selenium (mg/l)	0,02	0,02
Dissolved Zinc (mg/l)	0,1	0,04
Boron (mg/l)	1	0,5

\* After removal of algae

## **Exhibit 4      Rehabilitation procedures**

Land disturbed by construction must be rehabilitated and revegetated according to the following procedures.

### Control alien invader plants

- For eucalypt, wattle and other saplings and trees fell and apply basal stem treatment with systemic herbicide
- Truck out large timber
- Chip brush and spread (do not stack and burn)
- Germinated wattles can be hand-pulled or sprayed with herbicide if shorter than 1.5 m
- For other invader plants (*e.g.* American bramble) apply appropriate control method (see for example Vermeulen JB, Grobler H and van Zyl K 1998 *A Guide to the Use of Herbicides* National Department of Agriculture, Pretoria, 16<sup>th</sup> edition)

### Seedbed preparation

- Remove all foreign material (concrete, aggregate, gravel, nails, wire, plastic, *etc.*)
- Restore land to pre-construction contours and smooth (if tree stumps not removed then grassing and aftercare will have to be done manually)
- Slope steepness should not exceed 1 in 5, but if steeper then enhanced aftercare will be required (see later)
- Reverse compaction by ripping
- At least 2 months before planting apply dolomitic lime at 1 t.ha<sup>-1</sup>, plus kraal manure or chicken litter at 5 t.ha<sup>-1</sup> and incorporate into top 10 cm of soil by light discing or harrowing

### Grass establishment

- Optimal period is spring, otherwise not between mid-February and mid-October
- To protect bare areas from unseasonal rainstorms through the winter (mid-February to mid-October soil must be mulched with hay/straw (apply at 5 t.ha<sup>-1</sup> and disc in to 10-20 cm)
- Apply P at 80 kg.ha<sup>-1</sup> and K at 100 kg.ha<sup>-1</sup> and include Zn with fertilizer
- Incorporate to 10 cm with harrow, and roll using Cambridge roller
- Sow grass seed at 10 kg.ha<sup>-1</sup> in 1:1 mix of teff (*Eragrostis tef*) and Rhodes (*Chloris gayana*)
- Roll again using Cambridge roller
- When grass germinates apply LAN at 200 kg.ha<sup>-1</sup>
- When grass comes into flower mow or slash, remove cut grass and topdress with LAN at 200 kg.ha<sup>-1</sup>
- Repeat previous step whenever grass comes into flower but do not apply LAN between mid March and mid October

- After every rainstorm inspect and repair washaways and failed establishment by repeating the establishment procedure above
- Undertake follow-up alien invader plant control

### Aftercare

- In first winter after establishment sample soils and submit to soil laboratory for fertility analysis
- Remedy fertility shortfalls (minima are Mg 100 mg.kg<sup>-1</sup>, P 15 mg.kg<sup>-1</sup>, K 120 mg.kg<sup>-1</sup>, Zn 1.5 mg.kg<sup>-1</sup>, and acid saturation must not exceed 40%) in mid October by application of required fertilizer, and topdress with LAN at 200 kg.ha<sup>-1</sup>
- Undertake follow-up invader plant control
- When grass comes into flower mow or slash, remove cut grass and topdress with LAN at 200 kg.ha<sup>-1</sup>
- Do not topdress with LAN between mid-March and mid-October
- Repair rainstorm damage and re-establish grass on bare or sparse areas using establishment method above
- Towards end of second summer after establishment test to see if vegetation meets revegetation standard below. If so then apply defoliation management thereafter (*i.e.* mow, slash or graze in mid-summer and early winter or burn in winter), and continue to remedy storm damage. If vegetation does not meet revegetation standard then repeat the aftercare outlined above.

### Verification

Contractors must verify their rehabilitation undertaken, as follows

- Document the work with dates, sites, actions, and before-and-after photographs
- Require materials, fertilizers, grass seeds and herbicides brought to site to be in sealed labeled containers
- Retain tax invoices for materials: lime, manure/litter, fertilizer, grass seed, topdressing, herbicide
- Have ECO and Supervisor inspect and approve
- The Contractor can be signed off IF (a) the vegetation meets the revegetation standard at the end of the second summer after establishment OR (b) after grass establishment as inspected and approved by Supervisor and ECO and subject to retention by Eskom of R 5 000 per ha of rehab to cover the costs of aftercare

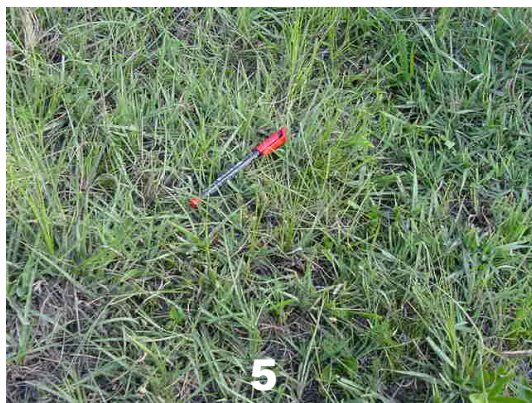
### Revegetation standard

- No Category 1, 2 or 3 invader plants
- Where gradient less steep than 1 in 5, perennial grass cover must average  $\geq 3$  (determined as average from 30 random points on area assessed) on scale of 5 = lawn, 4 = near lawn, 3 = more grass than bare ground, 2 = more bare ground than grass, 1 = sparse or bare (see photos under grass cover ratings)

- Where gradient steeper than 1 in 5, perennial grass cover must average  $\geq 4$  (determined as average from 30 random points on area assessed) on scale of 5 = lawn, 4 = near lawn, 3 = more grass than bare ground, 2 = more bare ground than grass, 1 = sparse or bare (see photos under grass cover ratings). To achieve this it is necessary to defoliate frequently (every 2 weeks during summer, topdress after defoliation with LAN at 50 kg.ha<sup>-1</sup>, annually check that soil P  $\geq 15$  mg.kg<sup>-1</sup>, soil K 120 mg.kg<sup>-1</sup>, Mg 100 mg.kg<sup>-1</sup>, Zn 1.5 mg.kg<sup>-1</sup>, and acid saturation does not exceed 40%), and remedy any fertility shortfalls

#### Grass cover ratings

Walk across area. Every 2<sup>nd</sup> time right foot comes down assess area in front of foot. Make 30 assessments and calculate average





**Exhibit 5      DWA's minimum flow releases**

In terms of DWA licence 27/2/2/V112/1/1 of 15 June 2007 the following minimum releases from the upper and lower reservoirs will be met during construction.

Upper reservoir

During first filling releases at the upper dam (Bedford) shall be in accordance with the table below, until the dam reaches storage volume of 5 million cubic metres, thereafter all inflows shall be released until operations commence.

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Release (litres/sec)	23	28	33	43	58	52	45	35	28	25	22	22

Lower reservoir

During first filling all releases at the lower dam shall be in accordance with the table below until the system operating volume has been met.

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Release (litres/sec)	65	80	95	125	170	150	130	100	80	70	60	60

## Exhibit 6 Environmental Organisational Structure

### Ingula Pumped Storage Scheme: Environmental Organisational Structure

