

PROJECT BRAVO

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

September 2007



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PROJECT DETAILS

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GLOSSARY OF TERMS

Bi-monthly	means every second month. This term is used throughout the Record of Decision, but is not defined. Similarly “ <i>two-monthly</i> ” is assumed to have the equivalent meaning to “ <i>bi-monthly</i> ”
Contractor	means the main contractor as engaged by Eskom for the construction of the subject infrastructure, including all Sub-contractors and service providers appointed by the main contractor of his own volition for the execution of parts of the Works. “ <i>Contractor</i> ” also includes any other contractor engaged by Eskom directly in connection with any part of the construction operations, which is not a nominated sub-contractor to the main contractor
Environment¹	means the surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> (i) the land, water and atmosphere of the earth; (ii) micro organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing
Environmental Control Officer	means a person who is responsible for the monitoring of the implementation of the requirements of an EMP
Environmental Officer	means a person who is responsible for the implementation of the requirements of an EMP
Environmental Impact Assessment (EIA)	means a study of the environmental consequences of a proposed course of action
Environmental Impact Report (EIR)	means a report assessing the potential significant impacts as identified during the Scoping phase
Environmental impact	means an environmental change caused by some human act

¹ As defined in terms of the National Environmental Management Act (No 107 of 1998).

Environmental Monitoring Committee	means a committee that monitors the implementation of an EMP and provides an advisory role to the authorities and project proponent
Method Statement	means setting out in detail how the management actions contained in an EMP will be implemented, in order to ensure that the environmental objectives are achieved
Public Participation Process	means a process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development
Scoping	means a procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail
Scoping Report	means a report describing the issues identified

ABBREVIATIONS

CEMP	Construction Phase Environmental Management Plan
DEAT	Department of Environmental Affairs and Tourism
DME	Department of Minerals and Energy
DWAF	Department of Water Affairs and Forestry
ECA	Environment Conservation Act (No. 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Plan
FBC	Fluidised bed combustion
FGD	Flue gas desulphurisation
GDACE	Gauteng Department of Agriculture, Conservation and Environment
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
km	Kilometre
kV	Kilovolt
kWH	Kilowatt Hour
m	Metre
m³	Cubic Metre
MDALA	Mpumalanga Department of Agriculture and Land Affairs
NEMA	National Environmental Management Act (No. 107 of 1998)
MPRDA	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
MW	Megawatt
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No 36 of 1998)

OEM	Original Equipment Manufacturer
PES	Project Environmental Specification
ppm	Parts per Million
pf	Pulverised fuel
PPP	Public Participation Process
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency
SES	Standard Environmental Specification
UCG	Underground Coal Gasification
ToR	Terms of Reference

PART A: INTRODUCTION

Part A provides a brief introduction and overview of the purpose and structure of this guideline document.

1 BACKGROUND

The Project Bravo power station is a response by Eskom towards meeting South Africa's growing electricity demand, and entails the construction of a coal-fired power station and associated infrastructure² in the Witbank geographical area. Regulation 1182 of the Environment Conservation Act (ECA) (No. 73 of 1989)³, lists "*the construction, erection or upgrading of facilities for commercial electricity generation with an output of at least 10 megawatts*" and "*the change of land use from agricultural or zoned undetermined use or an equivalent zoning to any other land use*" as activities with the potential to cause substantial detrimental effects to the environment. Accordingly, the proposed power station required authorisation from the competent environmental authority⁴ in terms of the Environmental Impact Assessment (EIA) process outlined in Regulations 1183.

Ninham Shand Consulting Services was appointed by Eskom to assist them in complying with the environmental requirements for the proposed project. The EIA process was initiated on Eskom's behalf in February 2006, and culminated with the submission of a Final Environmental Impact Report (EIR) in February 2007. After consideration of the environmental reporting, the competent environmental authority, *viz.* the Department of Environmental Affairs and Tourism (DEAT), issued a Record of Decision (RoD) authorising the proposed activity on 5 June 2007 (refer to Annexure A for a copy of this RoD). As a condition of the authorisation (Condition # 3.2.12.1), Eskom was required to submit a site specific Construction Phase Environmental Management Plan (CEMP) to the relevant authorities (*viz.* DEAT) for acceptance prior to the commencement of any construction activities associated with Project Bravo. The current document was compiled in response to this requirement.

² A separate EIA process will be undertaken for the transmission lines that will be required to feed electricity into the national electricity grid. With respect to fuel supply, an EIA is currently being undertaken for the coal mine proposed to supply the coal.

³ On 3 July 2006 new EIA Regulations were enacted in terms of the National Environmental Management Act, which superseded the ECA EIA Regulations. However, in terms of the transitional arrangements provided for in the NEMA EIA Regulations any application for authorisation submitted in terms of the ECA EIA Regulations, and which was pending when the new Regulations took effect, was to be completed in terms of the ECA.

⁴ Since Eskom is a state-owned enterprise, the competent authority was the national Department of Environmental Affairs and Tourism (DEAT).

2 PURPOSE OF THIS DOCUMENT

In response to the RoD requirement that “*compliance with the accepted [CEMP] must form part of all tender documentation ... and must be endorsed contractually*”⁵, the CEMP has been developed as a set of environmental specifications, to be integrated into the tender documentation. However, in order to ensure that these environmental specifications are appropriately contextualised and that clear guidance is provided in terms of their on-site implementation, it has been necessary to compile this guideline document. Accordingly, the CEMP for Project Bravo is primarily comprised of the following three components: (1) this guideline, (2) the environmental specifications (included as Annexure D) and (3) various monitoring and implementation tools (included in Annexures E and H to J)⁶. Specifically, the purpose of the guideline document is to:

- Sketch the background for the development of the CEMP;
- Introduce the structure of the CEMP, particularly in terms of the contractual application of the environmental specifications;
- Highlight the salient features of the CEMP;
- Detail the roles of the various parties with respect to the implementation and monitoring of the EMP;
- Clarify and streamline the implementation of the EMP;
- Define requirements and procedures for monitoring; and
- Outline procedures for proactive environmental management and environmental control, in the event of pollution or similar incidents.

It should be noted that since this CEMP represents an extension of the EIA process undertaken for Project Bravo, it is important that this guideline document and associated annexure be read in conjunction with the Final Scoping Report and Final EIR. This will contextualise the CEMP and enable a thorough understanding of its role and purpose in the integrated environmental process.

3 STRUCTURE OF THIS DOCUMENT

This guideline document has been divided into four parts, each addressing a different aspect of the CEMP:

- **Part A** provides a brief introduction and overview of the purpose and structure of this guideline document;

⁵ Condition # 3.2.12.3.

⁶ In addition to these three elements, the CEMP also includes the Terms of Reference for the Environmental Monitoring Committee (Annexure G) and a list of residual environmental issues that could not be addressed at the time of writing the CEMP (Annexure F), since these help in addressing its intended purpose.

- **Part B** sets the context for the CEMP by providing an overview of the project, summarising the objectives of the CEMP, highlighting the scope of the CEMP and briefly emphasising Eskom's environmental commitments;
- Since this CEMP has been developed as a set of environmental specifications, **Part C** provides an introduction to the specification, provides an overview of the structure and application of the specification and highlights the environmental considerations that should inform the tender adjudication process; and
- **Part D** provides guidance in terms of the on-site implementation of the CEMP, highlighting the organisation structure and various roles and responsibilities, emphasising the importance of awareness training, summarising the requisite approach to monitoring and auditing and addressing the requirement for review and amendment of the environmental specifications.

PART B: SETTING THE CONTEXT

The purpose of Part B is to set the context for the CEMP by providing an overview of the project, summarising the objectives of the CEMP, highlighting the scope of the CEMP and briefly emphasising Eskom's environmental commitments. In developing the environmental specifications and documentation related to the on-site implementation of the CEMP cognisance has been taken of these requirements.

4 OVERVIEW OF THE PROPOSED PROJECT

4.1 BACKGROUND

The project comprises the construction, commissioning and operation of a coal-fired power station and its associated infrastructure in the Witbank area. The power station itself would comprise six boiler/ turbine sets with a nominal electricity generation capacity of approximately 5 400 MW (900 MW per unit⁷). The project would include the following infrastructure:

- Power Station Precinct:
 - Power station buildings;
 - Administrative buildings (control buildings, medical, security etc.); and
 - High voltage yard.
- Associated Infrastructure:
 - Coal stock yard;
 - Coal and ash conveyors;
 - Water supply pipelines (temporary and permanent);
 - Electricity supply (temporary, during construction⁸);
 - Water and wastewater treatment facilities;
 - Ash disposal systems;
 - Access roads (including haul roads);
 - Dams for water storage; and
 - Railway siding and/or line for sorbent supply.

The flow diagrams below (**Figures B1 and B2**) illustrate the process by which electricity is produced in a coal-fired power station.

⁷ The station capacity rating is dependant on the selected technology based on various Original Equipment Manufacturer (OEM) proposals, which would be acquired during the technical and commercial evaluation process.

⁸ *i.e.* not for bulk supply.

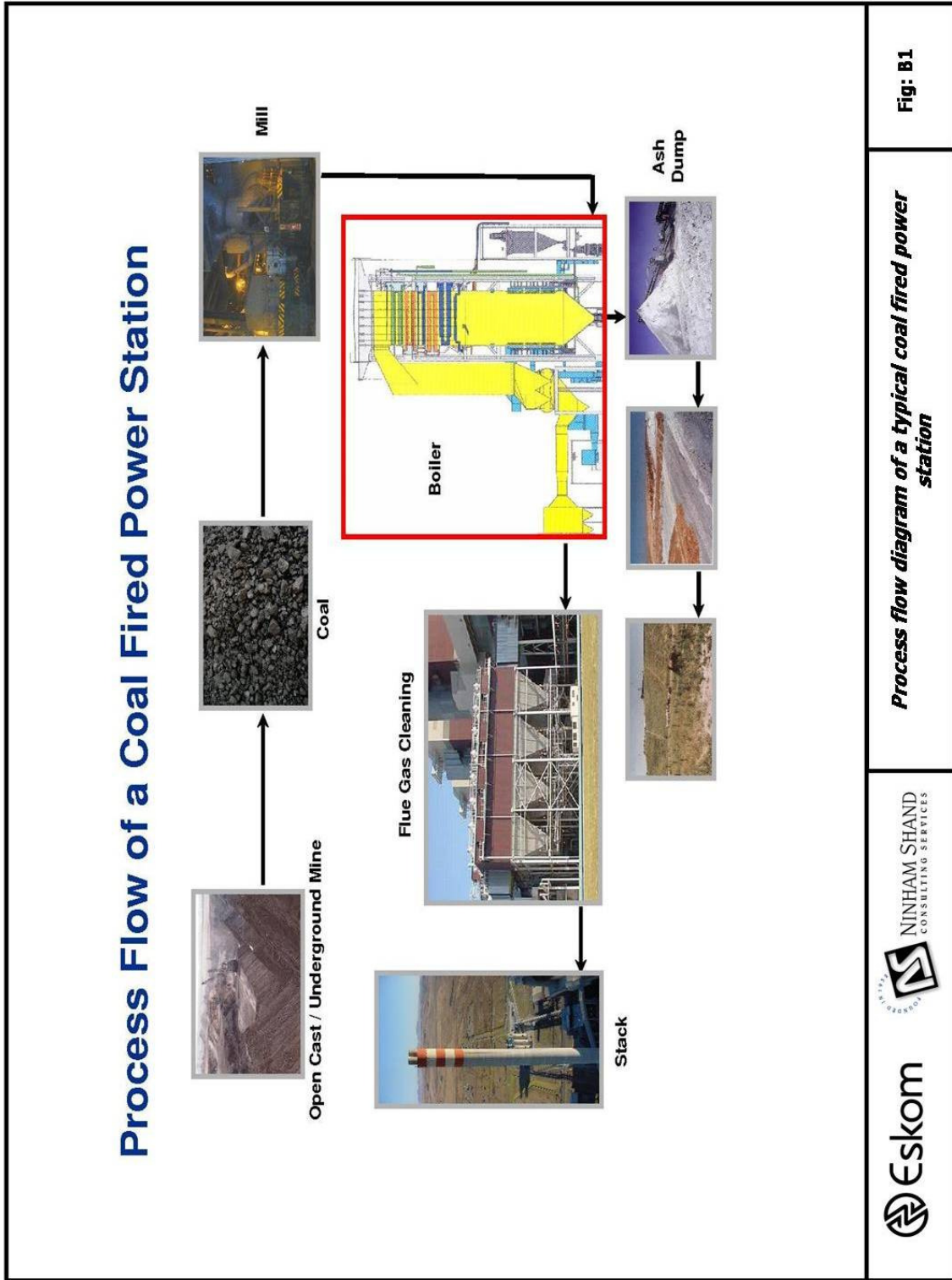


Fig: B1

Process flow diagram of a typical coal fired power station



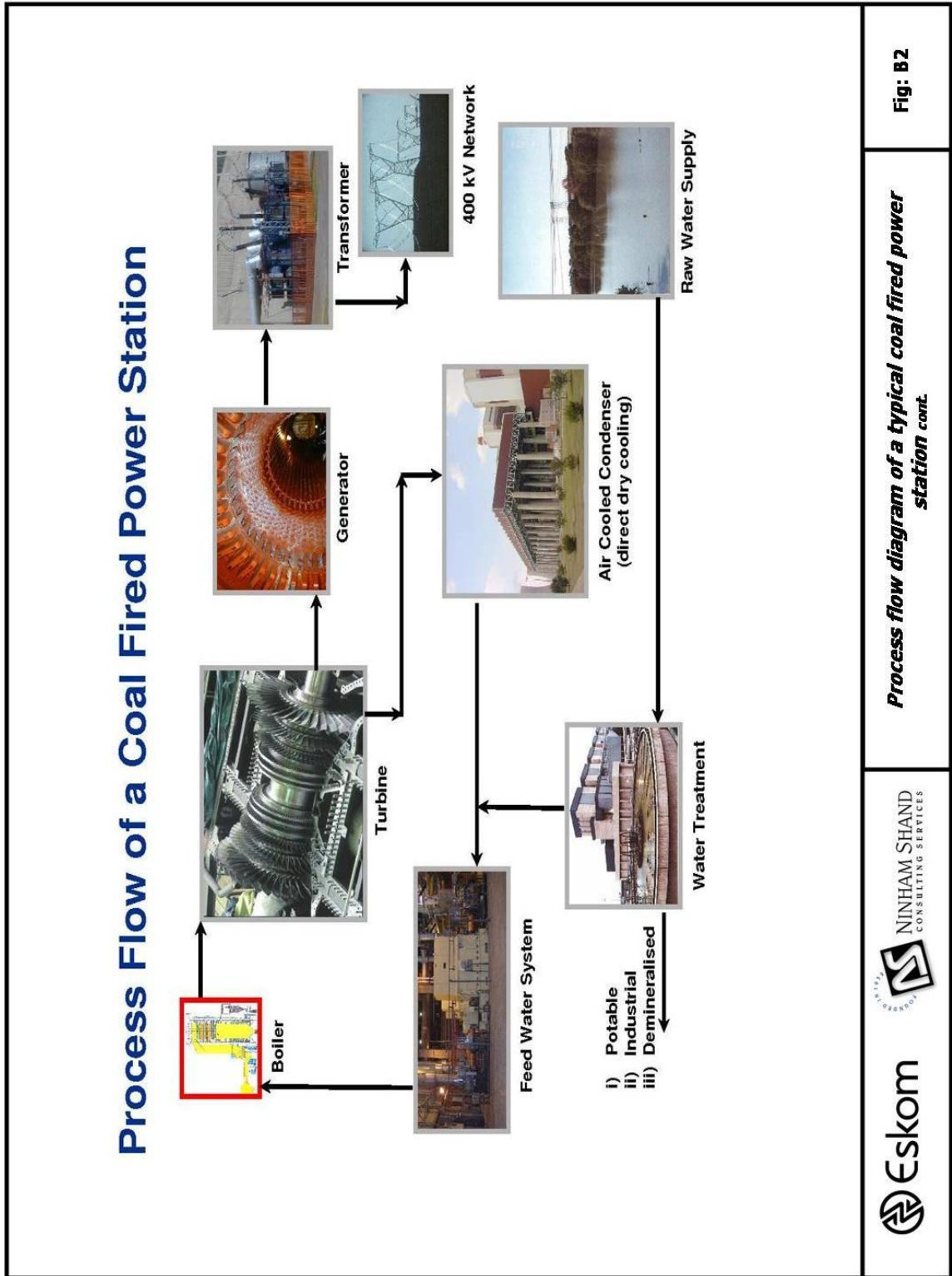


Fig: B2

Process flow diagram of a typical coal fired power station cont.



The power station would be fuelled by coal, supplied from a new colliery in the vicinity of the proposed power station. Coal is transported via conveyor belts from the colliery to the coal stockyard, where would be stockpiled. The stockpile is divided into strategic, seasonal and live stockpile areas. Coal from the stockpile is fed to the power station by means of a stacker/reclaimer and conveyor belts. The coal is pulverised in a milling plant to form 'pulverised fuel' and, with a combination of air, blown into the boiler where would be combusted.

Heat released from burning the pulverised fuel is used to heat water to produce steam within a network of boiler tubing. The final superheated steam exiting the boiler is used to drive turbines coupled to generators, which generate electricity via electromagnets that spin within large copper coils. The generated electricity is then transformed from 22 kV to 400 kV and fed via the high-voltage yard into the transmission network. Once the steam's energy has been exhausted, it is condensed and the water is returned to the boiler to start the process again. The cooling system can use either wet or dry cooling, the dry cooling option being either direct or indirect.

The ash produced through the combustion of the coal is removed from the bottom of the boiler (boiler bottom ash) and fly ash is removed from the top of the boiler together with the flue gas (via electrostatic precipitators or bag filters) and sent to an ash-dumping facility.

4.2 INTEGRATION OF ENVIRONMENTAL CONSIDERATIONS INTO PROJECT DESIGN

Various alternatives were considered during the EIA process for Project Bravo. This section contains a summary of the key recommendations emanating from the Final EIR, particularly as it relates to the final design of the power station. Eskom have taken cognisance of these recommendations and agreed to their incorporation within the project design.

4.2.1 Site

Two alternative sites were identified for the proposed site of Project Bravo, viz. sites X and Y. Although the environmental impacts associated with the two sites were regarded as very similar, Site X emerged as the marginally preferred environmental site for the following reasons:

- The geology on Site X is such that it is unlikely to allow the rapid distribution of pollutants through the groundwater, specifically related to the disposal of ash, while at Site Y the ash dump is more likely to pollute the groundwater rapidly;
- Site X supports a smaller area of high integrity wetlands and offers less wetland services than Site Y;
- There are fewer sensitive noise receptors that are likely to be affected by a direct dry cooled power station at Site X than at Site Y;
- There is less land that is cultivated on Site X than on Site Y, especially with respect to irrigated land; and
- The net income per hectare at Site X is in excess of 20% lower than the net income per hectare on Site Y.

While the differences are marginal, the establishment of a coal-fired power station on Site X is likely to have fewer negative impacts on the biophysical and socio-economic environments.

4.2.2 Site layouts

The specific location of the power station, coal stockyard and aboveground ash dump as initially identified on Site X have been refined, to avoid impacting on high integrity wetlands. **Figure B3** illustrates the recommended layout. Note that the proposed coal stockyard will receive coal directly from the mine workings, *i.e.* there will not be a separate coal stockyard within the mine precinct.

4.2.3 Cooling technology alternatives

Indirect dry cooling, which utilises cooling towers, greatly increases the disturbance footprint and visual prominence of the power station, making it a more imposing structure. However, direct dry cooling, utilising the bank of fans for each boiler unit, increases the ambient noise levels significantly, which only reduce to the requisite limits 6 km from the power station precinct. Given the potential mitigation measures for noise impacts, such as noise abatement technology, insulation, and increasing the buffer zone between the power station and adjacent farmers, direct dry cooling is recommended as the most environmentally acceptable option, despite the increased noise impact.

4.2.4 Air emission abatement technology

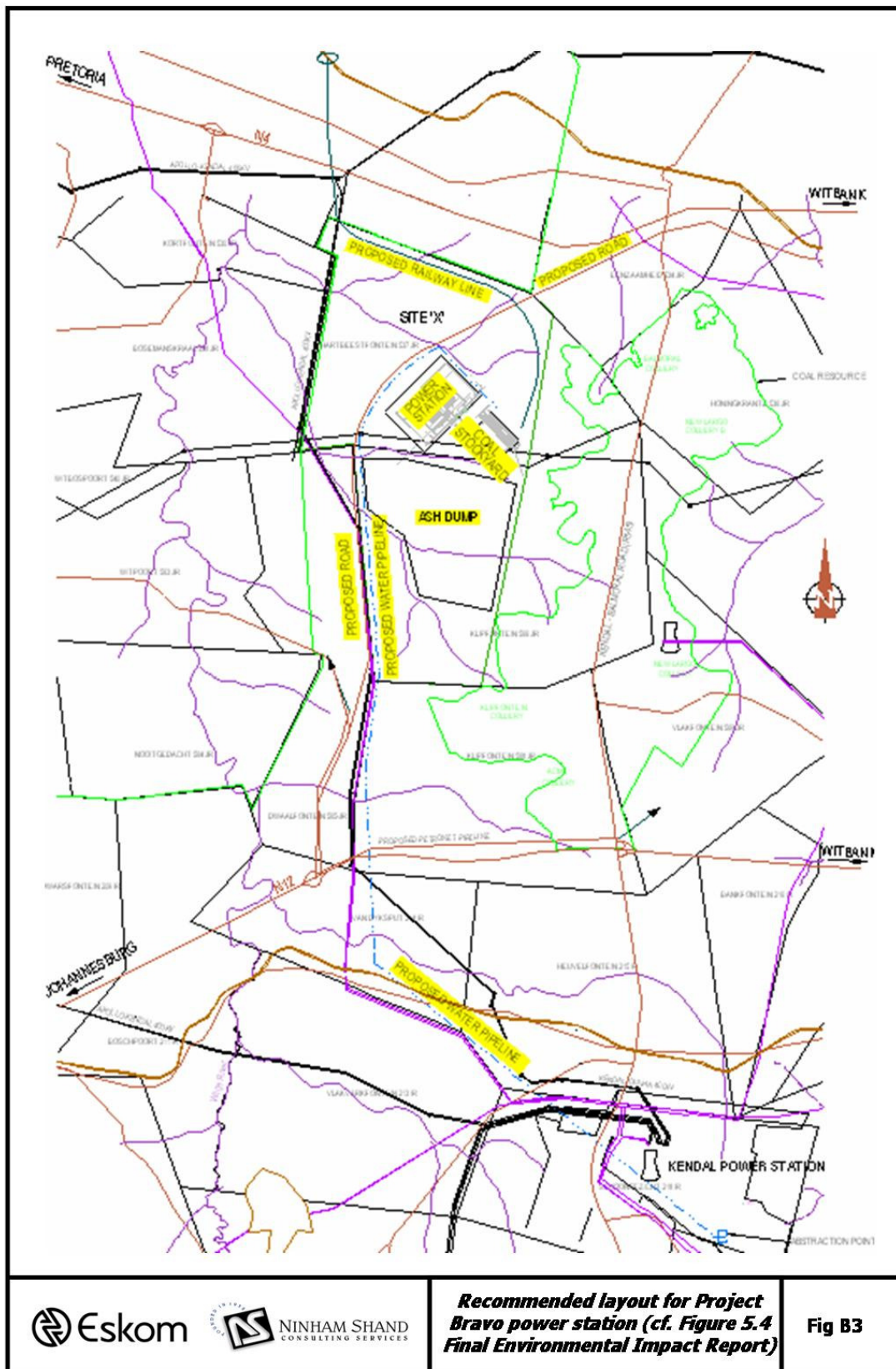
Eskom has made a firm commitment to the implementation of Flue Gas Desulphurisation (FGD) with at least 90% removal efficiency for the proposed new coal-fired power station in the Witbank area. Without FGD in place, exceedances of the SO₂ standards increase significantly and a large number of additional people are likely to be exposed to SO₂ levels that are detrimental to human health.

The implementation of FGD with at least 90% removal efficiency is recommended for the proposed project. Bag filters or electrostatic precipitators are recommended for the control of particulate matter. Low NO_x burners are recommended for the control of NO_x emissions.

Eskom has indicated that *wet* FGD technology will be applied, which will result in the concomitant benefits of a shorter transport distance, less transport energy consumption and fewer transport emissions, as well as a greater removal efficiency than semi-dry FGD technology.

4.2.5 Ash disposal methods

Aboveground ashing would, over the project lifespan, result in an extensive area of disturbance. The impacts with respect to particulate matter and groundwater contamination are however manageable, and it is therefore considered an acceptable means of ash disposal.



For comparative purposes, back-ashing and in-pit ashing were considered, and require the ash to be conveyed off-site and may result in groundwater contamination, which is possibly less manageable. Further investigation regarding sub-surface ash disposal are required should Eskom wish to pursue this option.

4.2.6 Access and transport routes

Access and transport corridors to provide for water supply, vehicles access, coal conveyance and sorbent supply were assessed by the relevant specialists and applicable recommendations were made. **Figure B3** provides an illustration of the recommended routes for such linear infrastructure, as follows:

- An access road that links the power station to both the N4 to the north-east and the N12 to the south-west, the former requiring a new section of road to the vicinity of the N4/R545 intersection and the latter requiring the upgrading of a section of the D960 to its intersection with the N12;
- A railway line from the north for the importing of sorbent that connects with the Crown Douglas siding on the Pretoria - Witbank main line, and that would require crossings over the N4 and under the Apollo – Kendal 400 kV transmission line;
- A water supply pipeline from the existing Kendal power station, running due north-west to a point in the vicinity of the N12/D969 intersection, turning north parallel to the Kendal – Duvha 400 kV transmission line and then proceeding along the western boundary of Site X before turning to the east towards the proposed power station. Several crossings of a railway line, roads and the proposed Petronet multi-products pipeline would be necessary; and
- A short section of coal conveyor from the coal stockyard to the proposed power station, immediately to the east of the envisaged site.

4.2.7 Summary of recommended alternatives

The key recommendations emanating from the Final EIR, and which will be acted upon by Eskom, both in terms of the RoD requirements and in the interests of promoting sustainable development (refer to Section 7), are summarised below:

Alternative	Recommendation	Reference in Final EIR
Site	Site X	Sections 1.2.5 & 6.2.1
Site layout	Refined as per Figure B3	Sections 2.2.2 & 6.2.2
Cooling technology	Direct dry cooling	Sections 2.2.1.b) & 6.2.3
Air emission abatement	<ul style="list-style-type: none"> • Wet FGD for SO_x • Bag filters or electrostatic precipitators for particulates • Low NO_x burners for NO_x 	Sections 2.2.1.c) & 6.2.4

Alternative	Recommendation	Reference in Final EIR
<i>Ash disposal</i>	<ul style="list-style-type: none"> Above ground (subsurface ashing to be investigated with the mining house in the future) 	Sections 2.2.1.d) & 6.2.5
<i>Access & transport routes</i>	Refined as per Figure B3	Sections 2.2.2 & 6.2.6

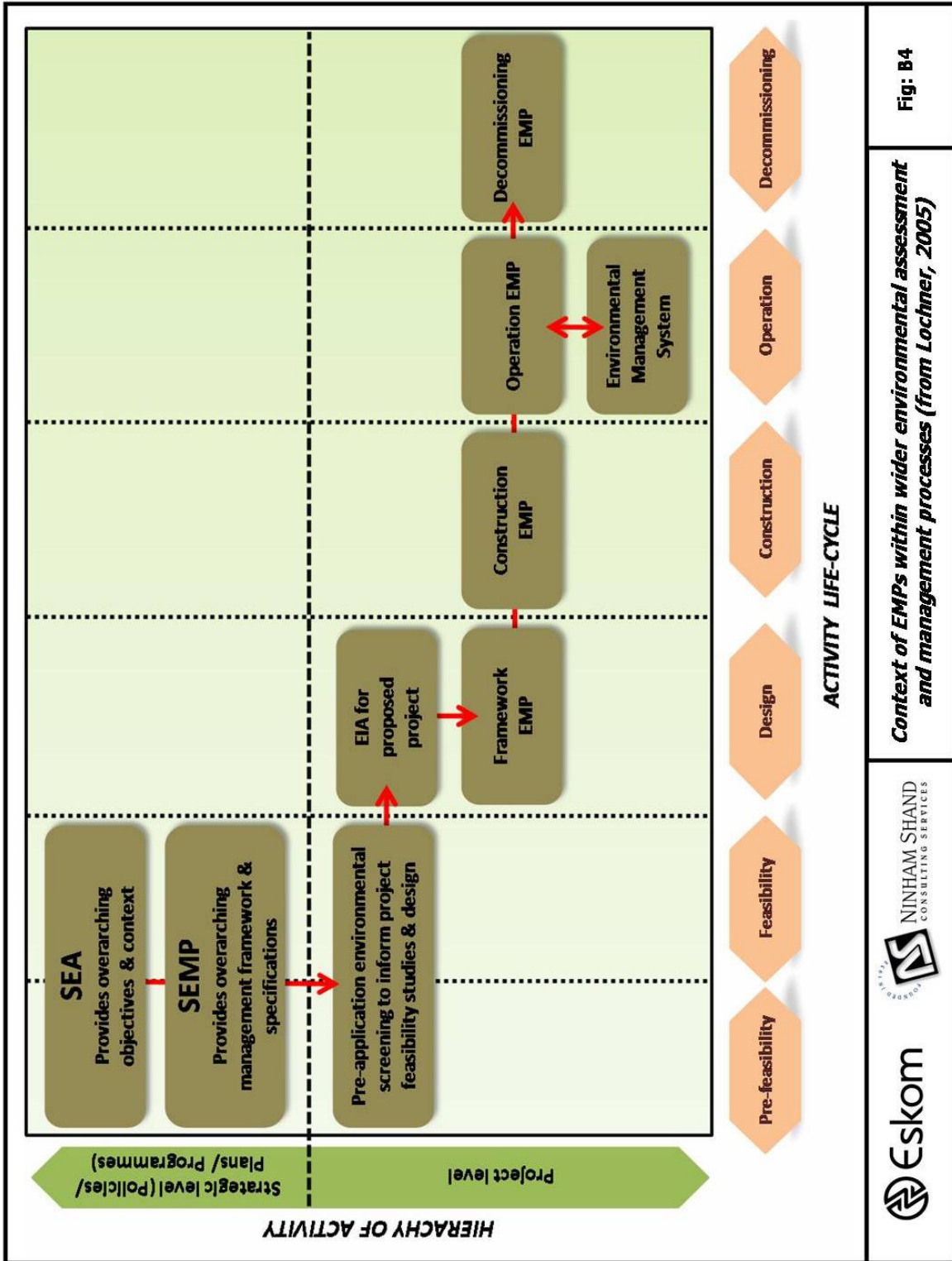
5 OBJECTIVES OF THE CEMP

Environmental management does not end with obtaining the requisite environmental authorisations. Rather there is a need to ensure that the remedial requirements identified during the environmental process are effectively realized during project implementation, and this is where EMPs have a key role to play. **Figure B4** contextualises EMPs within the broader environmental assessment and management processes.

An EMP is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented, and that the positive benefits of the projects are enhanced”⁹. As the name suggests, the CEMP provides specific environmental guidance for the construction phase of a project, and is intended to manage and mitigate construction activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing, erection of the construction camp) through those incurred during the construction activities themselves (erosion, pollution of watercourses, noise, dust) to those incurred during site remediation (soil stabilisation, revegetation). Specifically, the objectives of the CEMP can be articulated as follows:

- To give effect to the construction-related requirements articulated in the environmental authorisation and associated reporting;
- To give effect to the environmental commitments articulated in Eskom’s corporate policies and commitments;
- To ensure that these requirements/ commitments are expressed in a manner that is accessible to all parties and is binding upon those responsible for project implementation;
- To ensure that sufficient resources are allocated to the project budget in order to give effect to the environmental requirements/ commitments, and to ensure that the scale of EMP-related interventions is consistent with the significance of identified impacts;
- To provide a coherent and pragmatic framework for the implementation of the requirements, ranging from the formation and administration of the Environmental Monitoring Committee (EMC), through the roles and responsibilities of the key project participants to the auditing and reporting of compliance;

⁹ Lochner (2005) *Guideline for Environmental Management Plans*. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.



- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the EIA process; and
- To ensure that the construction phase of Project Bravo does not result in undue or reasonably avoidable adverse environmental impacts, and that any potential environmental benefits are enhanced.

6 SCOPE OF THE CEMP

The scope of the CEMP must ensure that the objectives outlined in Section 5 will be addressed, and is principally determined by the key documentation related to the EIA process, notably the EIR, the Framework EMP and the RoD. A brief overview of the key issues raised in each of these documents is provided below.

6.1 ENVIRONMENTAL IMPACT REPORT

In terms of the Final EIR (February 2007), various construction-related environmental impacts were identified, including:

- Disturbance of flora and fauna;
- Impacts on water resources (sedimentation and water quality);
- Increase in traffic volumes in the vicinity of the construction site;
- Noise pollution;
- Impact on existing infrastructure;
- Socio-economic impacts;
- Windblown dust;
- Litter/ waste pollution;
- Interruption of road services;
- Storage and utilisation of hazardous substances on site;
- Risk of fire;
- Disturbance to sense of place, visual aesthetics;
- Security risks;
- Health issues; and
- Light pollution.

None of the construction phase impacts were deemed to have a highly significant impact on the environment, given their relatively short duration and localised extent. Many of the construction phase impacts were, however, assessed as being of medium significance and requiring specific mitigation interventions in order to avoid and minimise impacts on the biophysical and especially the human environment. In this regard, the EIR emphasised that a comprehensive CEMP should be developed and implemented to protect sensitive onsite and offsite features through controlling construction activities that could have a detrimental effect on the environment, and avoiding or minimising potential impacts.

6.2 FRAMEWORK EMP

A Framework EMP (refer to Annexure B), which broadly outlined the type and range of mitigation measures that could be implemented during the pre-construction, construction, operational and decommissioning phases of the project, was included in the Final EIR. The intention was that this would form the outline for the subsequent development of detailed construction, operational and decommissioning EMP documentation once the project had been authorised. Key recommendations emanating from the Framework EMP of relevance to the CEMP include the following:

- Environmental input into tender drafting and adjudication:
 - Incorporate relevant environmental management specifications into the tender and contract documentation;
 - Incorporate relevant payment items into the schedule of quantities; and
 - Assess ability of tenderers to adequately manage the environmental issues;
- Environmental management of the construction phase:
 - Monitoring and enforcement of specified environmental management requirements:
 - Appoint an Environmental Control Officer is (either independent or in-house);
 - Develop and implement an environmental auditing system for the construction phase;
 - Audit the Contractors compliance with the requirements of the environmental specification contained within the relevant Contract Document; and
 - Produce regular (monthly) environmental audit reports for submission to DEAT and the EMC (if one is appointed);
 - Communication with Contractor and his staff:
 - Include environmental considerations as an item on the agenda of the monthly site meetings for each Contractor;
 - Include environmental considerations in the Contractors programme (where relevant);
 - Appoint a senior manager on the Contractors staff as the designated Environmental Officer, empowered to independently managed compliance with the environmental requirements on behalf of the Contractor;
 - Compile and implement the necessary Method Statements; and
 - Undertake environmental awareness training of all site staff during the commencement of each Contract, with regular refreshers for the duration of the Contract;
 - Communication with public:
 - Provide a contact number of someone responsible for the site on the site signage;

- Maintain a complaints register on site to allow public complaints to be recorded. Complaints should be noted and signed off at site meetings; and
- Hold meetings with EMC at agreed frequencies;
- Site establishment ~ *Access*:
 - Secure Site in an appropriate manner;
 - Where necessary to control access, fence and secure Contractor's camp; and
 - Provide alternative access/ detours for public/ landowners;
- Site establishment ~ *Site structures*:
 - Locate key site infrastructure in environmentally acceptable area and limit its extent;
 - Position site infrastructure so as to limit visual intrusion on neighbours or the greater environment;
 - Select materials for site infrastructure that limit reflection and blend in with the environment; and
 - Accommodate temporary services underground and within the same trench where possible;
- Site establishment ~ *Protection of topsoil and sensitive areas/ artefacts*:
 - Locate key site infrastructure in environmentally acceptable area and limit its extent;
 - Remove topsoil approximately 150 mm deep from establishment, working area and stockpile areas, and stockpile for later use;
 - Protect topsoil stockpiles against erosion and contamination;
 - Provide containment and settlement facilities for effluents from concrete mixing facilities;
 - Provide spill containment facilities for hazardous materials like fuel and oil;
 - Minimise the extent of areas cleared;
 - Identify sensitive areas or artefacts and demarcate these as no-go areas; and
 - Develop contingency plans to address heritage resource discoveries during construction;
- Site establishment ~ *Surface and groundwater*:
 - Establish contaminated water management system;
 - Provide suitable and sufficient ablution facilities that are serviced regularly;
 - Provide containment and settlement facilities for effluents from concrete mixing facilities; and
 - Provide spill containment facilities for hazardous materials like fuel and oil;
- Site establishment ~ *Solid waste*:
 - Demarcate, and enforce use of, a designated eating area;
 - Provide adequate waste bins;

- Set up system for regular waste removal to approved facility;
 - Minimise waste by sorting wastes into recyclable and non recyclable wastes; and
 - Prohibit burying or burning of waste on Site;
- Site establishment ~ *Fire*:
- Provide adequate cooking and heating facilities for staff ;
 - Prohibit open fires;
 - Develop emergency protocols for dealing with fires, which may include a Fire Management Plan in accordance with the National Veld and Forest Fire Act (No 101 of 1998); and
 - Ensure adequate fire-fighting equipment is available on site, particularly near “hot” works;
- Site management ~ *Materials*:
- Inform delivery drivers re requirements of the specifications;
 - Secure materials during transport;
 - Identify appropriate storage areas for stockpiling of materials, storage of hydrocarbons and storage of hazardous substances and ensure that these areas are appropriately prepared for their purpose;
 - Dispose of hazardous substances in terms of the relevant legal requirements;
 - Limit spillage of hazardous substances or substances with the potential to cause contamination of the environment;
 - Develop emergency protocols for dealing with spillages particularly where these pose a pollution risk or involve hazardous substances;
 - Compile and implement the necessary Method Statements ; and
 - Undertake environmental awareness training of all site staff;
- Site management ~ *Equipment maintenance and storage*:
- Ensure that all plant is in good working order;
 - Undertake maintenance within specified area (workshop); and
 - Use drip trays for all stationary or parked plant and when servicing equipment away from designated areas;
- Site management ~ *Surface water and/or existing stormwater systems*:
- Identify predetermined stockpile areas for topsoil, construction materials and excavated material;
 - Dispose of waste excavated material at appropriate waste disposal sites;
 - Rehabilitate site to prevent soil erosion, including temporary revegetation of areas that will remain exposed for extended periods;
 - Undertake concrete mixing away from sensitive areas and on impermeable surfaces;
 - Store fuels in storage area that is appropriately bunded and drains to a sump;

- Ensure that substances that pose a risk of water contamination are appropriately stored and disposed of; and
- Develop and implement water monitoring programme where work abuts aquatic systems;
- Site management ~ *Dust*:
 - Implement dust suppression measures e.g. regular watering;
 - Undertake concrete mixing away from sensitive areas; and
 - Develop and implement dust monitoring programme;
- Site management ~ *Noise*:
 - Limit working hours for noisy equipment to daylight hours;
 - Fit silencers appropriate to equipment; and
 - Develop and implement noise monitoring programme;
- Site management ~ *Public health and safety*:
 - Ensure adequate signage for landowners/ public about the work, particularly where work abuts major public thoroughfares or use areas;
 - Erect and maintain fencing and gated access to restricted areas;
 - Implement requisite traffic safety measures at abutting roads;
 - Implement requisite safety measures where there are abutting public use areas; and
 - Ensure adequate accessibility to landowners/ public where required for safe access;
- Closure ~ *Environmental integrity*:
 - Remove all temporary facilities and waste materials; and
 - Replace stockpiled topsoil.

6.3 RECORD OF DECISION

The DEAT RoD (refer to Annexure A) sets specific conditions that are relevant to the development and implementation of a CEMP, specifically:

- All unavoidable construction within wetland areas must be done so as to minimise disturbance of pedology;
- A revised layout must be submitted to indicate how the proposed corridors for the pipelines, roads, railways and coal conveyors have taken the wetland into consideration;
- The existing vegetation cover must be retained by selective clearing;
- Community forums and communication channels between the local communities, contractors and Eskom must be established and maintained;
- Assistance must be provided to the inhabitants on site through skills development and job opportunities. Information confirming compliance with this must be included in the Environmental Control Officers (ECO) compliance report;

- Eskom must establish an Environmental Monitoring Committee with clear terms of reference. These terms of reference must address logistic arrangements, administration and financial arrangements;
- The EMC shall include the following members, amongst others:
 - A chairperson;
 - An ecologist;
 - Representatives from the public;
 - The ECO;
 - A senior site manager from the Contractor; and
 - An air specialist;
- The EMC must appoint an independent chairperson with appropriate people and project management skills
- The EMC must meet on a bi-monthly¹⁰ basis from the inception of the project, although the EMC may revise this frequency should the need arise;
- The EMC must report to DEAT on a bi-monthly¹⁰ basis in terms of their core functions, viz.:
 - To monitor and audit compliance with the RoD, environmental legislation and environmental reporting (EIR and EMP); and
 - To make recommendation to DEAT in terms of monitoring and auditing of the project;
- All costs for the EMC must be borne by Eskom;
- Eskom must submit a site-specific CEMP for acceptance before commencement of any activities. The EMP must include the following:
 - Rehabilitation of all areas disturbed during construction, including areas where permanent structures are erected;
 - Siting and management of construction camps, sanitation, ablution and housing facilities as well as material storage areas used by the Contractor. All work areas must be supplied with proper sanitation facilities;
 - Management and rehabilitation of temporary access roads to construction areas. Any new roads constructed for any purpose not covered as part of this RoD, must comply with the relevant SANS codes and must first be authorised by DEAT;
 - Waste avoidance and minimisation and disposal of waste at an appropriate facility;
 - Protection of any heritage sites identified during the project design or implementation;
 - Provisions for harvesting of any medicinal plants that may occur on site, prior to site clearance;
 - Protection of indigenous vegetation where such is not affected by the physical footprint of the infrastructure or the construction activities;
 - Provision for search and rescue of protected or endangered plant species, prior to the commencement of any construction related activities;

¹⁰ Within this context bi-monthly is interpreted to mean every second month.

- Management of traffic during the construction phase of the development, where the site access roads and other transportation networks intersect;
 - Measurement, monitoring and management of noise and dust pollution levels during the construction phase;
 - A fire control management plan for implementation on site;
 - Implementation of site specific erosion, sediment and dust control measures during the construction phase; and
 - All recommendations and mitigation measures proposed in the Final EIR dated February 2007;
- Once accepted by DEAT, the revised CEMP will become a dynamic document. Any changes to the CEMP must be submitted to DEAT for acceptance prior to implementation. Such submission to DEAT must be accompanied by the recommendations of the EMC;
 - Compliance with the accepted CEMP must form part of all tender documentation for all Contractors working on the project and must be endorsed contractually;
 - Eskom must appoint a suitable qualified ECO to monitor compliance with the conditions of the RoD, requirements of the CEMP and environmental legislation on a daily basis on behalf of the EMC. The costs of the ECO must be borne by Eskom;
 - The ECO must be appointed at least a month before the onset of construction activities and DEAT must be notified to facilitate communication;
 - The ECO shall ensure that periodic environmental performance audits are undertaken on the project implementation;
 - The ECO shall submit a written environmental compliance report to DEAT, copied to MDALA, on a two-monthly¹¹ basis;
 - The ECO shall maintain the following on site:
 - A site diary;
 - A non-conformance register;
 - A public complaints register; and
 - A register of audits;
 - The ECO shall remain employed until all required rehabilitation measures are completed and the site is handed over to Eskom for operation;
 - The ECO shall report to and be accountable to the EMC;
 - Records relating to monitoring and auditing for the proposed development must be available for inspection by any relevant authority;
 - An effective monitoring system must be put in place during construction to ensure safety and to detect any leakage or spillage of coolants from all oil containing equipment during their transportation, handling and installation;
 - No exotic plant species may be used for rehabilitation purposes. Only indigenous plants may be used;

¹¹ Within this context two-monthly is assumed to be equivalent to “bi-monthly” and is interpreted to mean every second month, in keeping with the frequency for the EMC meetings.

- Measures aimed at controlling invasive plants species and weeds must be implemented and must form part of the relevant EMP;
- No disturbance of the land at any stream, rivers edge or wetland is allowed unless such disturbance compliance with the legislation and conforms to strict design criteria;
- Archaeological remains, artificial features and structures older than 60 years are protected by the National Heritage Resources Act (No 25 of 1999). Should any archaeological artefacts be exposed during excavation for the laying of foundations, construction near the find must be stopped. An archaeologist must be called to the site for inspection. Under no circumstances shall any artefacts be destroyed or removed from the site without SAHRA's approval. SAHRA's recommendations should be included in the CEMP and adhered to;
- All provisions of the Occupational Health and Safety Act (No 85 of 1993), and any other applicable legislation must be adhered to by the holder of this authorisation;
- A copy of the RoD shall be available on site during construction and all staff, Contractors and Sub-contractors shall be familiar with or be made aware of its contents;
- Compliance/ non-compliance records must be kept and shall be made available on request from the authorities, within five days of receipt of the request;
- Any complaint from the public during construction must be attended as soon as possible to the satisfaction of the parties concerned. A complaints register must be kept up to date and shall be produced upon request; and
- Department officials shall be given access to the properties earmarked for construction activities for the purposes of assessing and/ or monitoring compliance with the conditions contained in this document at all reasonable times.

7 ESKOM'S ENVIRONMENTAL MANAGEMENT POLICIES AND COMMITMENTS

Irrespective of the legal obligations attached to any environmental authorisation, the success of environmental management and mitigation measures is inextricably linked to the proponent's commitment to ensure that these are adequately developed and implemented. For large developments, like Project Bravo, it is expected that this commitment would be developed as a coherent environmental philosophy that is demonstrably integrated into the proponent's corporate culture¹². Accordingly, this section provides a brief overview of Eskom's corporate environmental management policies and commitments¹³.

7.1 VISION

"Together building the powerbase for sustainable growth and development."

Together: One Eskom, unified, working together in partnership with others

¹² The same expectation would hold true for the Contractor(s), hence the reason that the environmental specifications require each Contractor to provide their environmental policy and commitments.

¹³ The information presented in this section has either been taken of the Eskom website or obtained directly from Eskom.

Building: Planning for the future, building South Africa's economy

Powerbase: Providing the electricity foundation for positive sustainable development

Sustainable: Ensuring continued delivery on economic, environmental and social outcomes

Growth: Empowering South Africa, its people and the economy

Development: Securing a brighter future for all and integrating the first and second economy

The principles of social equity and environmental sustainability are clearly articulated within the Eskom Vision. This vision was developed to align Eskom with the capacity expansion era and was born of Eskom's recognition that, given the major role it plays in accelerating growth in the South African economy, it has a responsibility to ensure that sustainable development becomes a reality.

7.2 ENVIRONMENTAL MANAGEMENT SYSTEM

One of Eskom's environmental strategies is the development and implementation of an environmental management system (EMS). Linked to this is a requirement for the development and implementation of Environmental Management Programmes (EMProgs) for its projects. In terms of the EMProg guideline (copy included in Annexure C1), EMProg's must be developed and implemented, in terms of the relevant line division EMS, for (1) existing and future Eskom land (site, servitude); and (2) projects for which an EIA or screening was undertaken. Moreover, Eskom's environmental land policy requires that all Eskom land be continually managed, through the control of operations and activities that take place on it, to ensure the sustainable utilisation of the asset. It also requires that all Eskom land be managed, operated, and maintained in terms of an established EMProg.

In terms of the requirements of the EMProg guideline, an EMProg would need to be developed for Project Bravo as a plan of action that sets out a required environmental end state and outlines how activities that could have a negative impact on the environment will be managed and monitored, and how impacted areas will be rehabilitated.

7.3 2006 ANNUAL REPORT

The Eskom Director's Annual Report for 2006 has, *inter alia*, the following to say about their Environmental Management System:

"The Eskom occupational hygiene, safety and environmental policy commits the business to the implementation of appropriate management systems to address environment, safety and occupational hygiene issues to minimise risk and ensure continual improvement. Certification to the ISO 14001 Standard continues to be implemented in Eskom, with the following divisions and subsidiaries now certified:

- *Corporate divisions;*
- *Corporate sustainability;*
- *Corporate technical audit;*

- *Transmission division;*
- *Rotek Engineering (Pty) Limited; and*
- *Roshcon (Pty) Limited.*

Where environmental risks have been identified in other parts of Eskom, selfevaluation audits and management reviews are undertaken to determine whether the environmental management system conforms to planned arrangements and has been implemented and maintained in terms of ISO 14001. As an example, the Generation division maintained compliance with the standard in 2005 through external audits.

Policy principles of Eskom's occupational hygiene, safety and environmental policy include:

- *This policy will apply wherever Eskom operations exist;*
- *Eskom will ensure that no operating condition, or urgency of service, can justify endangering the life of anyone or causing injury and will strive to prevent illness;*
- *Eskom will work with selected suppliers, customers and contractors to integrate safety, health and environment issues into their operations; and*
- *Contractors working under the supervision of Eskom or on Eskom premises will comply with this policy.*

Eskom, as a provider of energy and associated services, will:

- *Establish appropriate management systems to address environment, safety and occupational health issues to minimise risk and ensure continual improvement. This will include preventing pollution and environmental degradation, where economically viable and sustainable;*
- *Comply with all legislative and policy requirements and, in the absence of appropriate principles, set standards to meet the objectives of this policy;*
- *Promote open communication on safety, health and environment issues with employees and other stakeholders;*
- *Educate, train, motivate and develop employees on occupational health, safety and environment issues;*
- *Provide and maintain a healthy and safe work environment and protect individuals against risk to occupational health and safety arising out of Eskom's business; and*
- *Contribute to sustainable development through efficient resource use, and efficient production, distribution and use of energy."*

In support of these statements, a copy of Eskom's Safety, Health and Environment (SHE) Policy, signed by the CEO and Directors, has been included as Annexure C2.

7.4 UNITED NATIONS GLOBAL COMPACT

The United Nations (UN) Global Compact requests companies to embrace, support and enact nine universal principles in the areas of human rights, labour standards and the environment. Eskom, a signatory to the compact, continues to support the UN Global Compact through its sustainable practices. Eskom is committed to aligning itself with international sustainability reporting initiatives.

Practical examples of how Eskom has implemented these principles are detailed in the table over the page.

UN Global Compact Principles	Eskom's main activities in support of principles
Human rights	
<p><u>Principle 1</u> <i>Businesses should support and respect the protection of internationally proclaimed human rights within their sphere of influence.</i></p> <p><u>Principle 2</u> <i>Make sure that they are not complicit in human rights abuses.</i></p>	<ul style="list-style-type: none"> • Eskom is a member of the International Labour Organisation and has programmes including: <ul style="list-style-type: none"> ○ Employment equity, including gender and disability equity; ○ Electrification; ○ BEE; and ○ SMMEs development and training. • Eskom has incorporated issues surrounding human rights into decision-making, and engaged in extensive public consultation and community involvement through various projects and initiatives such as the electrification programme and assisting in ensuring affordability through energy efficient lighting programmes. • The procurement practices in Eskom support SMMEs and large black businesses for the supply of goods and services. • Eskom's policies and procedures are developed to ensure compliance with South African legislation, including the Constitution, which specifically provides for the protection of human rights.
Labour standards	
<p><u>Principle 3</u> <i>Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining.</i></p> <p><u>Principle 4</u> <i>The elimination of all forms of forced and compulsory labour.</i></p> <p><u>Principle 5</u> <i>The effective abolition of child labour.</i></p> <p><u>Principle 6</u> <i>Eliminate discrimination in respect of employment and occupation.</i></p>	<ul style="list-style-type: none"> • Eskom practises freedom of association and recognises the right to collective bargaining, as set out in the South African Labour Relations Act. • The impact of HIV/AIDS is managed through education and awareness programmes, voluntary counselling and testing, and care and support for infected and affected employees. Eskom has taken a corporate leadership and sponsorship role in the research for the development of a vaccine against HIV/AIDS. • Eskom continues to maintain transparency and worker consultation in decision-making through forums and agreements with employees and unions. • Eskom supports the involvement of labour at the highest levels of governance. • Employment equity policies have been implemented that are inclusive of race, gender and people with disabilities to ensure that Eskom builds an organisation that is representative of all the people of South Africa. • Eskom has continued to demonstrate commitment to development and transformation by investing in educating and training workers, both internal and external to Eskom. <p>• Eskom has an established home ownership and rental subsidy</p>

UN Global Compact Principles	Eskom's main activities in support of principles
	scheme for employees, to enable them to have access to accommodation.

UN Global Compact Principles	Eskom's main activities in support of principles
Environment	
<p><u>Principle 7</u> <i>Businesses should support a precautionary approach to environmental challenges.</i></p> <p><u>Principle 8</u> <i>Undertake initiatives to promote greater environmental responsibility.</i></p> <p><u>Principle 9</u> <i>Encourage the development and diffusion of environmentally friendly technologies.</i></p>	<ul style="list-style-type: none"> • The Board Sustainability Committee addresses economic, environmental and social issues and is responsible for the approval and the presentation of recommendations to the Board regarding policies, strategies and guidelines in particular for safety, health, environment and nuclear issues. • The Chief Executive is responsible for Eskom's overall sustainability and environmental performance. Environmental performance measures are integrated into the business units and relevant performance contracts. The overall assessment and measurement of environmental performance is managed through the operational sustainability index and the reporting on additional key environmental indicators and issues to the Sustainability Subcommittee of EXCO. • Environmental award presentations have been held on an annual basis to reward superior performance in the organisation. • Continual improvement in environmental performance is achieved through the development and implementation of environmental management systems based on ISO14001. Many parts of Eskom have received ISO 14001 certification, while the remainder of the organisation demonstrated compliance through third party audits. • Research, development and demonstration focuses on supporting sustainable development.

PART C: ENVIRONMENTAL SPECIFICATIONS

Part C provides an introduction to the environmental specifications, presents an overview of the structure and application of the specification and highlights the key environmental considerations that should inform the tender adjudication process.

8 INTEGRATION OF THE CEMP INTO THE CONTRACT

As alluded in Section 2, this CEMP has been written in a form and language that is consistent with the tender/ contract documentation used for engineering contracts i.e. the CEMP takes the form of a set of environmental specifications that can be integration in the civil, mechanical and electrical tender/ contract documentation. Beyond meeting the RoD requirement that “*compliance with the accepted [CEMP] must form part of all tender documentation ... and must be endorsed contractually*”, there are various advantages to this approach:

- The Contractor is made aware of the CEMP at the tender stage;
- The Contractor is able to cost for compliance with the CEMP;
- The CEMP is presented to the Contractor in the language and terminology with which he is familiar, and unnecessary duplication and contradiction is eliminated;
- Inclusion of the CEMP within the contract ensures that the CEMP becomes a legally binding document within a well-developed legal framework; and
- The standardised form and structure of the environmental specifications ensures that with time and each new contract, the Contractor becomes increasingly familiar with, and thus more accepting of, the CEMP and implements it with the same diligence as any other set of specifications contained within the contract.

Ultimately, by measuring compliance against an explicit set of environmental controls that are well located within a robust legal framework, the approach has been proven to enhance success in the implementation and enforcement of the CEMP significantly.

9 SPECIFICATION STRUCTURE AND APPLICATION

9.1 OVERVIEW

For the Project Bravo power station, the proposed construction activities would be distributed across a range of civil, mechanical and electrical contracts, and thus environmental specifications would need to be inserted into each individual contract package. However, at the time of compiling this CEMP, very little project detail was available to inform the environmental specifications, which negated the possibility of developing a tailored set of environmental specifications for each Contract. To addresses this, the following approach was adopted:

- The primary environmental controls have been provided for in the form of a generic suite of environmental specifications, referred to as the Standard Environmental Specification (SES). The SES is common to all Contracts, and would be inserted unmodified into each Contract Document (refer to Annexure D for a copy of the SES).
- A list of unresolved or “*residual*” environmental issues, as well as the actions required to address these issues, has been developed and included in this CEMP (refer to Section 10). Where the resolution of these outstanding issues will have implications for the manner in which the Contractors undertake their activities, the specific environmental controls would need to be incorporated into the relevant tender documents as a set of Project Environmental Specifications (PES’s). The PES’s, which are specific to a particular Contract, would add to and amend the SES (as required). Obviously, each set of the PES’s would only be developed as and when each of the residual environmental issues is resolved and the relevant Tender Document is being compiled. Accordingly, rather than burden DEAT with an iterative process of PES review, it is recommended that the EMC be tasked with reviewing and endorsing any PES’s developed for the Project Bravo, which would then be finalised for inclusion in the relevant Tender Document.

9.2 OTHER CONTRACT REQUIREMENTS WITH ENVIRONMENTAL OBLIGATIONS

The contract documentation for Project Bravo will be compiled in terms of the International Federation of Consulting Engineers Conditions of Contract for Construction (FIDIC CCC). The FIDIC CCC already specifies several requirements that have environmental bearing. To avoid repetition and the risk of contradiction, these requirements are not reiterated in the environmental specification. Accordingly, the environmental specification must be read in concert with the FIDIC CCC, and specifically the requirements of the following clauses:

- Subclause 3.2: Delegation by the Engineer (for the appointment of the Environmental Monitor);
- Subclause 4.14: Avoidance of Interference;
- Subclause 4.15: Access Route;
- Subclause 4.18: Protection of the Environment;
- Subclause 4.23: Contractor’s Operations on Site;
- Subclause 4.24: Fossils;
- Subclause 6.6: Facilities for Staff and Labour;
- Subclause 6.9: Contractor’s Personnel;
- Subclause 6.11: Disorderly Conduct;
- Subclause 8.8: Suspension of Work; and
- Subclause 11.11: Clearance of Site.

These requirements are highlighted in Subclause 1.3.1 of the SES to ensure that the Contractor is aware of these additional environmental obligations.

9.3 METHOD STATEMENTS

Environmental practitioners are not specialists with regard to construction techniques. Therefore, so as not to hinder construction activities by stipulating elaborate, costly and/ or ineffective mitigation measures, the environmental specification is underpinned by a series of Method Statements, within which the Contractor is required to outline how they propose to mitigate any identified environmental risk. For example if the specification states that “*cement contaminated water shall not be allowed to contaminate the soil or adjacent watercourse*”, the Method Statement compiled by the Contractor would be required to outline describes how he or she intends to achieve this requirement.

In terms of the environmental specifications for Project Bravo (specifically Subclause 3.5), the Contractors must submit various written Method Statements to the Engineer¹⁴, as requested in the Specification or as directed by the ER. For the purposes of the environmental specifications, a Method Statement is defined as “*a written submission by the Contractor to the Engineer in response to the Specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications*”. The Method Statement must cover applicable details with regard to:

- Construction procedures,
- Materials and equipment to be used,
- Getting the equipment to and from site,
- How the equipment/ material will be moved while on site,
- How and where material will be stored,
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- Timing and location of activities,
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Engineer.

The environmental specifications set very stringent requirements in terms of the provision of Method Statements and the commencement of the activities they cover:

- Any Method Statement required by the Engineer or the specification must be produced within the timeframes specified by the Engineer or the specification (typically two weeks);

¹⁴ The environmental specifications do not make reference to the ECO. This is to conform to the structure and terminology used for Contract Documents compiled in terms of the Federation of Consulting Engineers Conditions of Contract for Construction (FIDIC CCC). In all cases the responsibility for monitoring compliance with the various specifications is vested with the Engineer. However, in terms of FIDIC CCC Subclause 3.2, the Engineer may delegate his responsibilities in terms of the Contract. Typically these responsibilities are delegated to the Engineers Representative (ER), for technical considerations, and to the ECO, for environmental considerations.

- The Contractor may not commence the activity covered by the Method Statement until it has been approved, except in the case of emergency activities and then only with the consent of the Engineer;
- The Engineer may require changes to a Method Statement if the proposal does not comply with the specification or if the proposed methodology carries an unreasonable risk of excessive damage to the environment;
- Approved Method Statements must be readily available on the site and must be communicated to all relevant personnel;
- The Contractor is required to carry out the activities covered by the Method Statement in accordance with the proposed approach; and
- Approval of the Method Statement does not absolve the Contractor from their obligations or responsibilities in terms of the Contract.

Annexure E explains Method Statements and provides a pro forma Method Statement sheet as a guide for the compilation of the requisite Method Statements. Method Statements may be applied not only for environmental purposes but for health and safety purposes as well.

9.4 PROVISIONS FOR ADDRESSING NON-COMPLIANCE

Ultimately, the key to effective environmental management during the construction phase is ensuring that the requirements of the CEMP are adequately and appropriately implemented on site. Accordingly, monitoring performance and addressing non-compliance are key attributes of any construction phase environmental interventions. Part D addresses the actual process for identifying and addressing non-compliance, whilst this section provides an overview of the provision made for this in the environmental specification.

Broadly, the mechanisms for addressing non-compliance that are provided for in the environmental specifications and associated contract documentation can be divided into the following categories:

- Controlling performance via the certification of payments;
- Requiring the Contractor to “*make good*”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours; and
- Removing environmentally non-complaint staff/ plant from site, or suspending part or all of the activities on Site.

Provision is made for the imposition of these punitive measures, either through the environmental specification or the broader conditions of contract. Section 15.2 provides an overview of how these various measures should be used to address non-compliance, whilst this section simply provides an overview of the mechanism(s) enabling this course of action.

9.4.1 Certification of payment

As outlined previously, one of the main aims of translating the CEMP into a set of environmental specifications is to provide the Contractor with a reasonable opportunity to cost for compliance with the environmental obligations. Accordingly, the environmental specifications for Project Bravo include a series of Measurement and Payment clauses, and compliance with the environmental requirements is assessed as part of the certification of each Payment Certificate. Where the Contractor has failed to comply with specific obligations emanating from the environmental specifications, payment for the specific items to which their non-compliance relates would be withheld. Where the Contractor fails entirely to provide or fulfil for a period of time all or part of the services and obligations required of them in respect of the specification, the Engineer could decide to reduce the Contract Price, either by the full value of the relevant item or by an appropriate proportion of that value.

To provide an effective incentive for compliance, the Measurement and Payment clauses are divided into fixed and time-related costs. Payment for fixed costs is based on proof of compliance with the specified requirement. For time-related costs, the value for that item is divided by the duration of the Contract (in months), and payment is certified on a monthly basis, based on proof of compliance with that item. Time-related costs are only reimbursed once the relevant fixed cost has been certified. Time-related costs are forfeited on a *pro rata* basis for each month during which the Contractor fails to show compliance with the requirements of the relevant item.

To prevent the Contractor circumventing his liabilities by “zero-rating” the various items scheduled in terms of the environmental specifications, the SES includes the following subclause (Subclause 11.1); “*The Contractor shall tender a rate or sum against each scheduled item and shall not price any item as nil or “0-00” and shall not indicate that the cost of any of the items listed in this schedule as being included elsewhere. In the event that the Contractor fails to provide a rate or sum, prices an item as nil or “0-00”, or indicates an item as being included elsewhere, the Engineer shall assign what he believes to be reasonable price to each of these items and the Tendered Sum shall not be adjusted to accommodate any additional costs.*”

9.4.2 Making good on environmental damage

The requirement to make good any environmental damage stems from the following provisions:

- By entering into a Contract with Eskom, the Contractor has agreed to comply with the various obligations attached to that Contract, which include the environmental responsibilities detailed in the relevant SES and PES.
- In terms of Subclause 4.18 of the FIDIC CCC, entitled “*Protection of the Environments*”, “*The Contractor shall take all reasonable steps to protect the environment (both on and off Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.*”

In light of these considerations, the Contract is expected to meet their environmental commitments, failing which it is reasonable to expect them to make good on any environmental degradation, at their own cost. To give emphatic weight to this requirement, Subclause 10.2 of the SES notes; “*Where environmental damage occurs as a result of the failure of the Contractor*

to comply with the requirements of this Specification, the requisite remediation shall be effected to the satisfaction of the Project Manager and at the cost of the Contractor.”

9.4.3 Penalties

Subclause 10.3 of the SES provides a list of environmental transgressions for which the Engineer can impose penalties upon the Contractor, and the magnitude of these penalties. These essential represents a “stick” with which to force compliance and punish negligence by the Contractor.

Penalties are issued per incident at the discretion of the Engineer, and are issued in addition to any remedial costs incurred because of non-compliance with the environmental specifications. The Engineer would inform the Contractor of the contravention and the amount of the penalty, and would deduct the amount from the next Payment Certificate. For each subsequent similar offence, the penalty would be doubled in value, up to a specified maximum amount (*viz.* R 250 000, Subclause 10.3).

9.4.4 Removal from site and suspension of works

In terms of the provisions of the FIDIC CCC Subclause 6.11, the Engineer has the power to remove from site, any person who is guilty of misconduct, or is incompetent, negligent or constitutes an undesirable presence on Site. Failure to comply with the requirements of the environmental specifications could suffice in this regard. Similarly, Subclause 5.2 of the SES requires that all Plant is in good working order, and accordingly the Engineer could order any Plant that does not meet this requirement to be removed from Site.

In terms of the provisions of Subclause 8.8 of the FIDIC CCC, where the Engineer deems the Contractor to be in breach of any of the requirements of the Contract he may order the Contractor to suspend the progress of the Works or any part thereof. Failure to comply with the requirements of the environmental specifications would constitute such a breach.

10 RESIDUAL ENVIRONMENTAL ISSUES

Various environmental issues raised as part of the EIA process could not been addressed at the time of compiling this CEMP, specifically since inadequate technical information was available to enable these issues to be finalised and incorporated into the environmental specifications. These issues will need to be addressed by Eskom as the implementation of Project Bravo proceeds. Whilst some of the issues relate specifically to design or organisational considerations, others will have bearing on the manner in which the Contractor undertakes the Execution of the works, and accordingly will need to be incorporated into the relevant contracts as PES's.

Annexure F contains a table listing the various residual environmental issues and highlighting the actions required to resolve them. The summary table also indicates who is responsible for addressing the specific residual issue as well as the documentation and program implications.

11 ENVIRONMENTAL CONSIDERATIONS IN ADJUDICATION OF TENDER

In terms of the RoD, Eskom has an obligation to ensure compliance by various parties with a suite of environmental requirements related to the construction phase. The compilation of the CEMP, and its integration into the Tender Document as a suite of environmental specifications, forms part of meeting this obligation. However, to ensure that these obligations continue to be fulfilling during the actual construction process, it behoves Eskom to ensure that the appointed Contractors possess the requisite environmental management experience and expertise. Accordingly, it would be prudent for Eskom to ensure that environmental considerations form part of the tender adjudication process. Key considerations in this regard would be as follows:

- To request as part of the tender process that the Contractor provide his environmental policy and indicate how this will influence the way the construction process is approached and managed on Site. Subclause 1.2 of the SES requires the Contractor to prepare an “*Environmental Protection Policy*” (EPP) for the specific project. At the tender stage the Contractor would merely be asked to provide the overarching environmental policy for the Company or Joint Venture and not the project-specific EPP;
- To request as part of the tender process a list of the Contractor’s previous experience in terms of the on Site implementation and management of environmental requirements;
- To request as part of the tender process an indication of the proposed organisational structure for the Contract, and specifically for the Contractor to indicate which staff would be acting in the capacity of Environmental Officer (EO) and which senior staff member would have overall responsibility for ensuring compliance by the Contractor with the specified environmental requirements; and
- To confirm, upon receipt of the Tender, that the Contractor has made sufficient allowance in his Tender Price for meeting the various environmental requirements outlined in the relevant SES and PES.

During the tender adjudication process for each Contract, each Contractor should be scored in terms of the aforementioned considerations and allocated an environmental competency score. This score should form a key consideration in the final decision-making regarding the award of the various contracts.

PART D: ON-SITE IMPLEMENTATION

Part D provides guidance in terms of the on-site implementation of the CEMP, highlighting the organisation structure and various roles and responsibilities, emphasising the importance of environmental induction, summarising the requisite approach to monitoring and auditing and addressing the requirement for review and amendment of the environmental specifications.

12 ORGANISATIONAL STRUCTURE

The organisational structure identifies and defines the responsibilities and authority of the various role-players (individuals and organisations) involved in the project. All instructions and official communications regarding environmental matters shall follow the organisational structure shown in **Figure D1**.

The organisational structure reflected in **Figure D1** has been developed to ensure that:

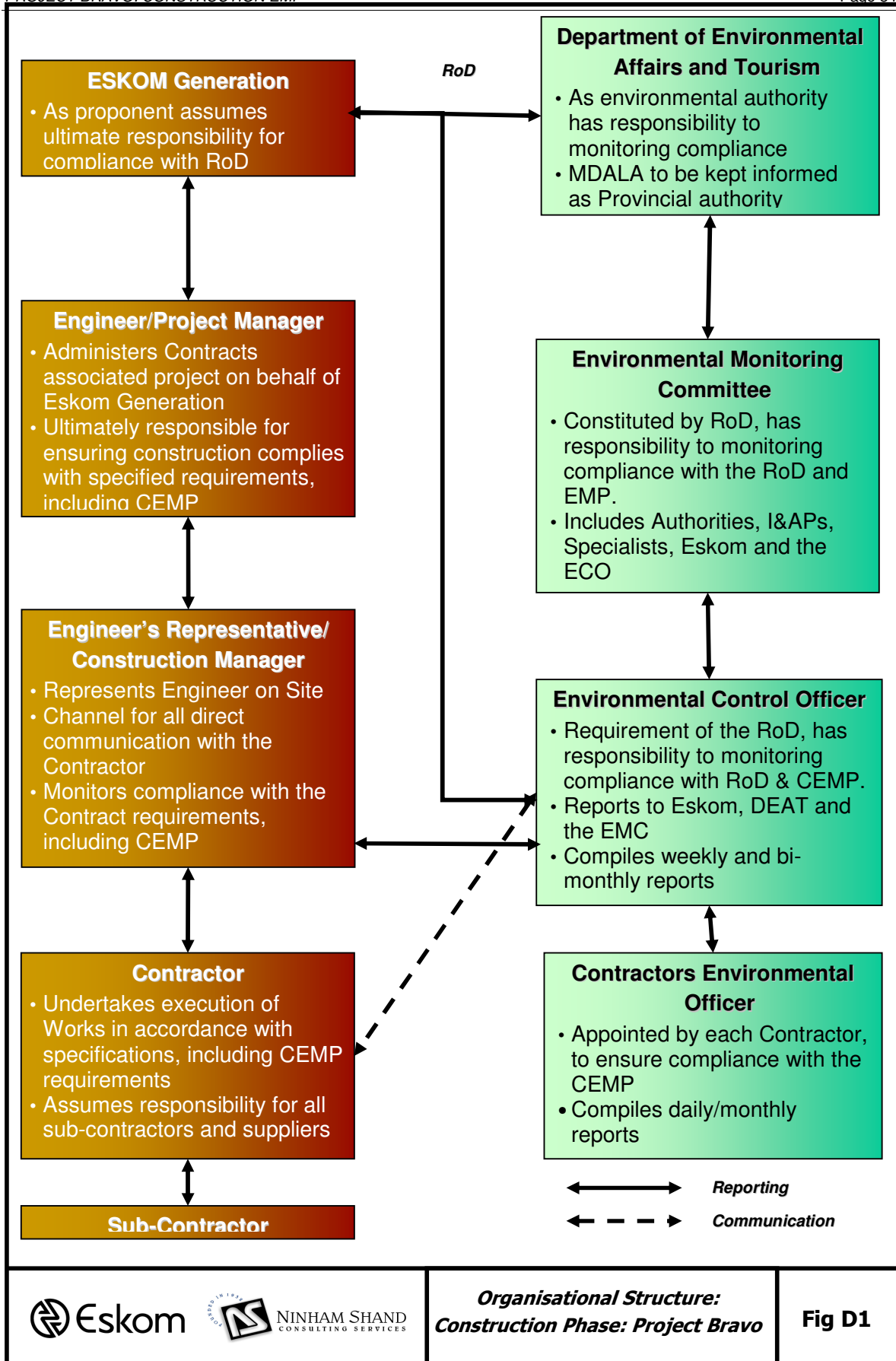
- There are clear channels of communication;
- There is an explicit organisational hierarchy for Project Bravo; and
- Potential conflicting or contradictory instructions are avoided.

In terms of the defined organisational structure reflected in **Figure D1**, all instructions that relate to environmental matters will be communicated to the Contractor via the Engineers Representative. The only exception to this rule would be in an emergency (defined as a situation requiring immediate action and where failure to intervene timeously would, in the reasonable opinion of the ECO, result in unacceptable environmental degradation), where instructions may be given directly to the Contractor¹⁵. The detailed roles and responsibilities of the various role-players identified in the organisational structure are outlined in Section 12.

13 ENVIRONMENTAL ROLES AND RESPONSIBILITIES

As is evident from **Figure D1**, the key-role-players for Project Bravo are DEAT, the EMC, Eskom and the Contractor. The detailed roles and responsibilities of each of these organisations are outlined below.

¹⁵ It should be noted that there is likely to be a considerable amount of informal communication between the ECO and the Contractors environmental representatives. However, where such communication (1) represents an instruction, (2) could lead to liability on the part of the Employer or Engineer or (3) could have financial implications, this must be address through the formal channels of communication defined in the organizational structure.



**Organisational Structure:
Construction Phase: Project Bravo**

Fig D1

13.1 DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM

As the competent environmental authority, DEAT has the responsibility to ensure that the proponent, *viz.* Eskom, complies with the conditions attached to the Project Bravo RoD as well as the requirements of the broader environmental legislation, specifically NEMA and the ECA. Compliance would be confirmed via the following mechanisms:

- Receipt and review of the environmental reporting required in terms of the RoD, *i.e.* the periodic environmental performance audits and bi-monthly environmental compliance reports compiled by the ECO;
- Attendance at the bi-monthly EMC meetings; and
- *Ad hoc* and planned site inspection by the DEAT Compliance and Enforcement Directorate.

DEAT would be assisted in this compliance monitoring function by MDALA.

13.2 ENVIRONMENTAL MONITORING COMMITTEE

The requirement for an EMC emanates as a specific Condition of Approval in the Project Bravo RoD. In terms of subclauses contained under Condition 3.2.11 of the RoD, Eskom must establish an EMC and this EMC must be comprised of the following representatives, as a minimum:

- An independent chairperson appointed by the EMC membership;
- An appropriately experienced ecologist;
- Representatives from the public (at least two people);
- The ECO;
- Contractors' EOs, when and where relevant;
- A senior representative from the main contractor¹⁶; and
- An air quality specialist.

In addition to this representation, it is anticipated that DEAT and Eskom would be represented on the EMC.

The EMC would meet on a bi-monthly basis¹⁷, and in terms of Subclause 3.2.11.6 of the RoD, its roles and responsibilities would be to:

- Monitor and audit compliance with the RoD, environmental legislation and environmental reporting (EIR and EMPs); and

¹⁶ Since the approach to the construction of Project bravo would mean that there are likely to be several main contractors, each with independent responsibilities for compliance with the environmental requirements attached to their specific appointments, it would probably be more appropriate for the Eskom Engineer or Engineers Representative to be present rather than the contractors.

¹⁷ Although the RoD specifies bi-monthly meetings, it also empowers the EMC to review the prescribed frequency.

- Make recommendation to DEAT in terms of monitoring and auditing of the project.

A requirement of Subclause 3.2.11.1, is that Eskom must provide the EMC with a clear Terms of Reference (ToR). Accordingly, a Draft ToR has been compiled and is included in Annexure G of this CEMP. It is intended that DEAT would approve the Draft ToR as part of the process of approving the CEMP. Once the EMC has been constituted, the Draft ToR would be distributed to the EMC members for review and ratification.

13.3 ESKOM

As the Proponent, Eskom must ensure that the implementation of Project Bravo complies with the requirements of the DEAT RoD, as well as any obligations emanating from other relevant environmental legislation. Although part of this obligation is being met by the development of the CEMP, and its integration into the contract documentation, the constitution of the EMC and the appointment of the ECO, Eskom cannot delegate out of this responsibility *in toto*. Accordingly, Eskom retains various key roles and responsibilities during the construction of the power station. These are outlined below.

Eskom, as an organisation must ensure that adequate funding is made available for the implementation and monitoring of the environmental controls emanating out of the EIR, RoD, CEMP and applicable environmental legislation. This would include the appointment of the ECO and the financial requirements for the running of the EMC, as these are explicit requirements of the RoD.

The Engineer (\approx Eskom's Project Manager) must:

- Be fully conversant with the EIA reporting for the project, the conditions of the RoD, the CEMP and all relevant environmental legislation.
- Ensure that all the specifications, legal constraints and Eskom standards and procedures pertaining to the project, specifically with regards to environment management, are highlighted to Eskom and its Contractor(s) so that they are aware of these; and
- Ensure that the environmental specifications are correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.

The Engineers Representative (\approx Eskom's Construction Manager) must:

- Be fully knowledgeable with the contents of the EIA Reporting;
- Be fully knowledgeable with the contents and conditions of the RoD;
- Be fully knowledgeable with the contents of the CEMP, specifically as articulated into the environmental specifications attached to each Contract;
- Be fully knowledgeable with the contents of all relevant environmental legislation and Eskom environmental policies and procedures, and ensure compliance with these;
- Have overall responsibility of the environmental specifications and their proper implementation;

- Ensure that regular audits are conducted to confirm compliance with the environmental specifications;
- Ensure there is communication with the Engineer or his delegate, the ECO and the relevant Site Engineers on matters concerning the environment;
- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.

13.4 ENVIRONMENTAL CONTROL OFFICER

In terms of the requirements of Condition 3.2.13 of the RoD Eskom must appoint a suitable qualified ECO to monitor compliance with the conditions of the RoD, requirements of the CEMP and the environmental legislation on a daily basis on behalf of the EMC. To fulfil these requirements, the ECO would need to have relevant on site experience and would need to be permanently based on site for the duration of the construction phase. It should be noted, since the RoD has no specific requirement for an independent ECO, the ECO could be an Eskom employee, as long as they had the requisite environmental training and experience.

The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specification. Accordingly, the ECO would be required to:

The Environmental Control Officer (ECO) must:

- Be fully knowledgeable with the contents of the EIA Reporting;
- Be fully knowledgeable with the contents and conditions of the RoD;
- Be fully knowledgeable with the contents of the CEMP, specifically as articulated into the environmental specifications attached to each Contract;
- Be fully knowledgeable with the contents of all relevant environmental legislation and Eskom environmental policies and procedures, and ensure compliance with these;
- Ensure that compliance with the conditions of the RoD and environmental specification are monitored and verified through regular and comprehensive inspections of the site and surrounding areas, and that the results of these inspections are reduced to writing;
- Ensure that if the environmental specifications are not followed then appropriate measures are undertaken to address this;
- Report to the EMC and DEAT every two months regarding compliance with the requirements of the RoD, CEMP and environmental legislation; and

In meeting the aforementioned obligations, the ECO's specific duties would include the following:

- Assisting the Engineer in ensuring necessary environmental authorizations and permits have been obtained;
- Confirming that activities on Site comply with legislation;
- Monitoring and verifying that the conditions of the RoD and environmental specifications are adhered to at all times and requiring the Contractor to take action if these are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;

- Reviewing and approving construction Method Statements together with the Engineer;
- Giving a report back on the environmental issues at the monthly site meetings and other meetings that may be called regarding environmental matters;
- Inspecting the Site and surrounding areas regularly with regard to compliance with the environmental specifications;
- Ensuring that a register of complaints is kept by the Contractor and that all complaints are appropriately recorded and addressed;
- Ensuring that the requisite environmental induction occurs for all new personnel coming onto site;
- Assisting the Engineer in certifying payment for items related to the environmental specification;
- Recommending the issuing of penalties for contraventions of the environmental specifications;
- Advising on the removal of person(s) and/or equipment, not complying with the specifications, from site;
- Completing the requisite environmental reporting, which should include a daily site diary entry, weekly audit checklists, a bi-monthly (*viz.* every second month) environmental compliance report for submission to the EMC and incident reports;
- Keeping a photographic record of progress on Site from an environmental perspective; and
- Attending the EMC meetings to report on environmental compliance, as stipulated in the EMC ToR (Annexure G).

As outlined previously, all instruction issued by the ECO would go through the Engineer's Representative, who will then convey these to the Contractor.

13.5 CONTRACTORS

By virtue of the environmental obligations delegate to the Contractor through the Contract Document, all contractors (including subcontractors and staff) and service providers appointed for Project Bravo would be responsible for:

- Ensuring adherence to the environmental specifications;
- Ensuring that Methods Statements are submitted to the ECO for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications ;
- Ensuring that any instructions issued by the Engineer, on the advice of the ECO, are adhered to;
- Ensuring that there must be communication tabled in the form of a report at each site meeting, which will document all incidents that have occurred during the period before the site meeting;
- Ensuring that a register is kept in the site office, which lists all the transgressions issued by the ECO;
- Ensuring that a register of all public complaints is maintained.

- Ensure that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute to wards the successful implementation of the environmental requirements of the Contract.

The most important actions by the Contractor to ensure compliance with the environmental requirements, relates to the establishment of an adequate and appropriate organisational structure for ensuring the implementation and monitoring of the requisite environmental controls. In terms of these requirements, the SES (Subclause 3.2) specifies, “A suitably qualified senior staff member employed full time on site by the Contractor shall be responsible for environmental monitoring and control. This position shall be designated as the Environmental Officer (EO). The EO shall be a person with adequate environmental knowledge to understand and implement these Specifications, as determined by the Engineer. As a minimum requirement the EO should poses a tertiary qualification in a relevant field and two years of experience in environmental monitoring and control”. It is vital that the EO is appointed prior to the commencement of a contract; a four week period should be allowed.

The EO's specific duties relate to the implementation of the environmental controls contained within the environmental specification, and which are audited by the ECO. Accordingly, the EO's duties include:

- Ensuring that activities on Site comply with legislation;
- Monitoring and verifying that the environmental specifications are adhered to at all times and taking action if the specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum and taking action to address any environmental degradation;
- Compiling the requisite Method Statements for review by the ECO and Engineer;
- Proactively developing environmentally responsible solutions to problems, in consultation with the EO where necessary;
- Giving a report back on the environmental issues at the monthly site meetings and other meetings that may be called regarding environmental matters;
- Keeping records of all activities / incidents concerning the environment on Site;
- Inspecting the Site and surrounding areas regularly with regard to compliance with the environmental specifications;
- Maintaining a register of complaints, ensuring that all complaints are appropriately recorded and addressed and notifying the ECO of each complaint and how it was resolved;
- Undertaking the requisite environmental induction for all new personnel coming onto site, as well as any refresher or *ad hoc* induction that might be required during the Contract;
- Completing the requisite environmental reporting, namely a daily compliance checklist, a record of staff induction and incidence reports, for submission to the ECO;
- Keeping a photographic record of progress on Site from an environmental perspective.

14 INDUCTION OF SITE STAFF

The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that

employees are adequately experienced and properly trained in order to execute the Works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- Ensuring that a copy of the environmental specifications is readily available on site, and that all site staff are aware of the location and have access to the document. It is particularly important that the EO have access to the environmental specifications in order for them to fulfil the roles and responsibilities outlined in Section 12.5.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The Environmental Awareness Training course would be conducted by the EO, who must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented. All new staff coming onto site after the commencement of construction activities must also attend the Environmental Awareness Training course, and refresher courses should be undertaken on a quarterly basis. A detailed record of all training sessions, including a list of attendees must be compiled by the Contractor and submitted to the Engineer on a regular basis. Although the responsibility for the compilation of an appropriate and adequate Environmental Awareness Training course rests with the Contractor, a generic example has been included in Annexure H to assist in this regard.
- Ensuring that all site staff are aware of the requirements of any approved Method Statements that have bearing on their activities, and, where necessary, that any specialised training required to ensure compliance with the approved Method Statements, has been provided.
- Ensuring that regular *ad hoc* training is provided, both as part of the daily toolbox talks as well as to address specific environmental concerns or areas of non-compliance.
- Ensuring that employee information posters, outlining the environmental “do’s” and “don’ts” (as per the environmental awareness training course) are erected at prominent locations throughout the Site (an example of a generic information poster is included in Annexure I).

It has become common practice for the environmental induction requirements to be addressed as part of the standard worker Health and Safety induction programme that accompanies the recruitment of new staff. Although this approach is supported, the Contractor must ensure that the environmental considerations are adequately covered during this induction process. If, in the reasonable opinion of the ECO, the Health and Safety induction training is not adequately addressing environmental aspects, he/ she may require the Contractor to develop a stand-alone environmental induction programme.

15 CONFIRMING COMPLIANCE

Ultimately, the key to effective environmental management during the construction phase is ensuring that the requirements of the CEMP, and specifically the environmental specifications, are adequately and appropriately implemented on site. Accordingly, monitoring performance and addressing non-compliance are key attributes of any construction phase environmental interventions. The following sections provide an overview of how this should be achieved for the current project.

15.1 MONITORING AND REPORTING

As alluded to in the preceding sections, four levels of compliance monitoring are provided for in terms of the Project Bravo construction phase, namely:

- DEAT;
- The EMC;
- The ECO; and
- The EO.

The key party in this monitoring hierarchy is the ECO, as his reporting will form the basis for satisfying DEAT and the EMC¹⁸ regarding Eskom's compliance with the requirements of the EIR, RoD and other relevant legislation. The EO's role will be to ensure that the Contractor meets the various environmental obligations attached to the environmental specifications, and to maintain a record that confirms such compliance.

The aim of the monitoring and auditing process would be to check the implementation of the environmental specifications routinely, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications;
- Ensure adequate and appropriate interventions to address non-compliance;
- Ensure adequate and appropriate interventions to address environmental degradation;
- Provide a mechanism for the lodging and resolution of public complaints;
- Ensure appropriate and adequate record keeping related to environmental compliance;
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site; and
- Aid communication and feedback to the EMC and authorities.

As per the requirements of the RoD (Subclause 3.2.13.1), monitoring would be undertaken daily (i.e. continuous monitoring) by both the EO and ECO, although the reporting frequency would vary. In addition to any incident reporting:

- The EO would be required to complete a daily audit checklist and monthly report, and submit these to the ECO;
- The ECO would be required to complete a weekly audit checklist, and compile a bi-monthly (viz. every second month) environmental compliance report for submission to the EMC. It would also be prudent for the ECO to maintain a daily Environmental Site Diary as an independent record of compliance/ incidents.

¹⁸ It is recognized that DEAT/ the EMC would augment this via their own sites visits.

The accurate capturing and reporting of monitoring results is critical to ensure that the degree of compliance, and nature of any non-compliances/ incidents, is unambiguously communicated to all role-players, from the Contractor through the Engineer to the EMC and DEAT. Accordingly, routine monitoring would be undertaken using audit checklists, which would be compiled by the EO (daily checklist) and ECO (weekly checklist) prior to the commencement of the construction activities. The course of all incidents, from occurrence through to resolution, would also need to be recorded in the form of an incident report. To assist the ECO and EO in the development of the requisite monitoring documentation, examples of daily and weekly checklists, as well as of an incident report, have been included in Annexure J. It is important that these only represent examples, and checklists tailored for the specific Project Bravo requirements would need to be developed by the EO/ ECO.

As outlined in Section 13.4, one of the key responsibilities of the ECO would be the compilation of a bi-monthly (*viz.* every second month) environmental compliance report for submission to the EMC and DEAT. Although this reporting would be informed by the daily, weekly and incident reporting, the bi-monthly environmental reporting would need to provide a more substantial assessment of compliance with the requirements of the RoD (Eskom) and the SES (various contractors). Annexure J4 provides an example of an auditing protocol that could be considered for this purpose¹⁹. This protocol provides a quantitative assessment of compliance with each of the key RoD and EMP requirements and enables a compliance rating to be determined for each Contractor. Not only does the proposed approach provide an accessible summary of the project environmental performance, and its management, but it also enables the level of compliance by a Contractor to be tracked on a bi-monthly basis, and for any deterioration in the degree of compliance to be readily identified and addressed. As for the daily, weekly and incident reporting examples, this protocol would need to be tailored by the ECO for the specific Project Bravo requirements.

15.2 ADDRESSING NON-COMPLIANCE

15.2.1 Mechanisms

As outlined in Section 9.3, four avenues exist for addressing non-compliance by the Contractor, and are provided for either in the environmental specifications or in the broader contract requirements, *viz.*:

- Controlling performance via the certification of payments;
- Requiring the Contract to “*make good*”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours; and
- Removing environmentally non-complaint staff/ plant from site, or suspending part or all of the activities on Site.

¹⁹ The auditing methodology presented here was used for auditing compliance for the Phase 1B expansion to the Saldanha Bay Iron Ore Terminal, and accordingly would need to be extensively revised to make it relevant to Project Bravo.

The type and extent of the corrective measures required to address non-compliance would depend on the nature of the transgression and the Contractor's history in terms of compliance with their environmental obligations. When deciding on the nature of any punitive actions, however, it is important to recognise that the effective implementation of the environmental specification is highly dependant on the quality of the working relationships that develop between the key role-players, specifically between the Engineer, the Contractor and the ECO. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause significant environmental degradation in the long term due to its effect in eroding the Contractor commitment to meeting their environmental responsibilities. Moreover, other mechanisms, like an expanded environmental induction programme, may prove more effective than purely punitive measures in controlling non-compliance in the long-term. This is an important consideration that must be borne in mind by the ECO, EMC and authorities when responding to non-compliance.

The certification of payment and the expectation for the Contractor to "make good" any environmental degradation represent the most elementary mechanisms for forcing compliance. Ultimately, the Contractor should want to comply so that he can be paid for meeting his/ her environmental obligations, and thus environmental inputs into the certification of payments becomes a fundamental part of the enforcement process. This said, the nature of the activities associated with Project Bravo is such that, even with the best of intentions, environmental degradation can and invariably will occur. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures.

Penalties represent the next tier in castigatory measures, followed by removal from site, with suspension of work representing the apex of potential remedies. As alluded to previously, the implementation of these measures requires careful considered:

- Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations;
- Removal from site would typically be warranted where a particularly staff member or piece of equipment is the cause of persistent environmental damage.
- Suspension of the Work would only be warranted under rare circumstances, and then only with the Employers approval, where the Contractors actions have caused or are likely to cause significant environmental degradation.

15.2.2 Procedure

Should there be any incident on site affecting the environment, irrespective of whether it is the result of non-compliance or not, the following lines of communication should be implemented:

- All incidents must to be reported to the Engineer and ECO immediately;
- Depending on the severity of the incident, the Engineer and/or ECO are to notify Eskom, the relevant authorities, the EMC and emergency services (if required), regarding the incident. Although all incidents must be recorded in the site reporting, the decision regarding the need

- to notify other parties (*i.e.* Eskom, relevant authorities, the EMC and emergency services) will be at the discretion of the Engineer and ECO;
- All issues of non-compliance must be reflected in the environmental reporting (including the daily and weekly checklists), and an incident report must be completed for all environmental incidents (*i.e.* any environmental degradation resulting from the construction activities, irrespective of whether it is the result of non-compliance or not). Environmental Incident reports must address the following aspects²⁰:
 - Description of the incident;
 - Remedial action required, including the deadline for such action;
 - Relevant/ supporting documentation: *i.e.* providing evidence of the incident and the cause of the incident;
 - Relevant diagrams to support the description of the incident and/ or the remedial action to be taken;
 - Provision for dates and signatures of both the ECO and Engineer at issuing of the report, as well as completion and verification of the remedial action, as specified in the report.

16 SPECIFICATION REVIEW AND AMENDMENT

Owing to the lack of information available at this stage and the changing nature of projects of this scale, it is no plausible to develop an infallible specification at this stage. Amendment is likely to be necessary as more information becomes available and as lessons are learned during the construction process. Recognising this, Subclause 3.2.1.2 of the RoD specifically notes that the approved CEMP must be regarded as a dynamic document. Accordingly, as outlined previously, one of the key roles of monitoring compliance will be to determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes. Where revision is warrant, the ECO would be required to draft such amendments and submit it to the EMC for comment prior to submission to DEAT for approval.

17 COMPLIANCE WITH OTHER LEGISLATION

Apart from the requirements of the EIR and RoD, Eskom and its Contractors will be required to comply with the full suite of South African Legislation concerning the natural environment, pollution and the built environment. This legislation includes but is not limited to:

- National Environmental Management Air Quality Act (No 39 of 2004);
- Minerals and Petroleum Resources Development Act (No 28 of 2002);
- National Heritage Resources Act (No 25 of 1999);
- National Water Act (No 36 of 1998);

²⁰ Annexure H contains an example of an incident report.

- Environment Conservation Act (No. 73 of 1989), including the noise regulations and litter controls promulgated thereunder;
- National Environmental Management Act (No 107 of 1998);
- National Veld and Forest Fire Act (No 101 of 1998);
- National Forest Act (No 84 of 1998);
- National Road Traffic Act (No 93 of 1996)
- Occupational Health and Safety Act (No 85 of 1993), including the Major Hazard Installation Regulations promulgated thereunder;
- Conservation of Agricultural Resources Act (No 43 of 1983) and the regulations dealing with declared weeds and invader plants as amended from time to time;
- National Building Regulations and Building Standards Act (No 103 of 1977);
- Health Act (No 63 of 1977); and
- Hazardous Substances Act (No 15 of 1973).

ANNEXURE A: RECORD OF DECISION

ANNEXURE B: FRAMEWORK EMP

ANNEXURE C: ESKOM CORPORATE DOCUMENTATION

C1: Safety, Health and Environment

C2: Environmental Management Programme Guidelines

ANNEXURE D: STANDARD ENVIRONMENTAL SPECIFICATION

ANNEXURE E: METHOD STATEMENT PRO FORMA

ANNEXURE F: RESIDUAL ENVIRONMENTAL ISSUES

ANNEXURE G: TERMS OF REFERENCE FOR ENVIRONMENTAL MONITORING COMMITTEE

ANNEXURE H: GENERIC ENVIRONMENTAL AWARENESS TRAINING COURSE

ANNEXURE I: GENERIC EMPLOYEES INFORMATION POSTER

ANNEXURE J: DOCUMENTATION AND REPORTING EXAMPLES

J1: Daily Environmental Report Example

J2: Weekly Environmental Report Example

J3: Incident Report Pro Forma

J4: Example for Approach to Bi-monthly Environmental Compliance Reporting

REPORT DISTRIBUTION CONTROL-SHEET

JOB NAME: Project Bravo
PROJECT NUMBER: 401281 /WW/R150
REPORT TITLE: Project Bravo: Construction Environmental Management Plan
REPORT NUMBER: 4446/401821
DATE: 20 September 2007

Copy Number	Person	Organisation	Sender's signature
1 of 5	Peter Ngoasheng	DEAT	
2 of 5	Tobile Bokwe	Eskom Gx	
1 of 5	Brett Lawson	NS George	
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