TERMS OF REFERENCE TO CONDUCT AN ENVIRONMENTAL IMPACT ASSESSMENT AND COMPILE AN ENVIRONMENTAL MANAGEMENT PLAN FOR A COAL-FIRED POWER STATION AND ASSOCIATED INFRASTRUCTURE IN THE WATERBERG AREA

1. INTRODUCTION

1.1 Need for the Project

Eskom drives its vision of "Together building the powerbase for sustainable growth and development" through its core business focus on electricity generation, transportation, trading and retail. It entrenches the values of excellence, innovation, customer satisfaction and integrity across all business operations.

Achieving the vision requires in-depth planning and energetic implementation in a complex environment characterised by higher economic growth, greater demand for electricity and the heightened need for significant infrastructure expansion with attendant competition for scarce materials, funding, skills and supplier inputs. Challenges are compounded by the rising cost of primary energy and new components, regulatory pressure, restructuring of the electricity distribution industry, expectations of better environmental performance and the growing involvement of stakeholder groups.

The following four strategic objectives are key to achieving this vision:

» ***Sustaining quality and continuity of supply:***
This requires effective management of total system capacity and reliability planning, focusing on primary energy availability, maintenance, refurbishment and energy efficiency. Stretch targets need to be set while maintaining rigorous occupational health and safety standards.

» ***Capacity expansion:***
Successful delivery on the capacity expansion programme is central to Eskom's vision and entails thorough environmental impact assessments, site selection and optimisation, procurement efficiency, project management and commitment to health and safety in the construction environment while rigorously applying Eskom's climate change and air quality strategies. The challenge is to build new plant, on time and on budget, while running existing plant at optimal levels.

» ***Funding and resourcing:***
The build programme imposes significant funding and resourcing requirements. Appropriate skills and information management systems are also vital to ensure a sustainable business and delivery on the build programme. Other key factors include multi-year pricing determination, revenue management, efficiency initiatives and Eskom's skills acquisition and retention strategies.

» ***Leveraging business operations for developmental benefits:***
Sustainability shapes the way Eskom conducts business and provides the context for its developmental initiatives.

The magnitude of Eskom's current business procurement spend and the planned capacity expansion programme create opportunities for maximising the organisation's contribution to government's Accelerated and Shared Growth Initiative for South Africa (ASGI-SA). The mechanisms include the fostering of small and medium enterprises, black women-owned businesses and skills development, accelerated electrification and Eskom's corporate social investment spend. Local content will be a core requirement when major contracts are awarded.

Over the last decade, South Africa has experienced a steady growth in the demand for electricity on the back of healthy economic growth. The continued growth in the economy has exhausted Eskom's surplus electricity generation capacity and reduced our electricity reserves progressively. It is expected that the reserve margin will continue on a downward trend for the next seven years until new base-load power plant is built (2014). In spite of new capacity coming on line, which includes the bringing back to service of moth-balled power stations such as Camden, Grootvlei and Komati, and building Open Cycle Gas Turbines, the electricity demand within the country is still higher than available capacity. Eskom is stepping up the implementation of this capacity expansion programme and will invest about R150 billion over the next five years in the upgrading of South Africa's power supply infrastructure. The biggest percentage of the expenditure will go towards improving generation capacity through, among others, the construction of new power stations.

The decision to expand Eskom's electricity generation capacity is based on **national policy** and informed by on-going strategic planning undertaken by the national Department of Minerals and Energy (DME), the National Energy Regulator of South Africa (NERSA) and Eskom. Strategic decisions regarding the electricity generation options to meet energy requirements within the country are made through this strategic planning process. The acceptability of options investigated at a project-specific level from a technical, economic and environmental perspective.

The hierarchy of policy and planning documentation is illustrated in Figure 2.1.

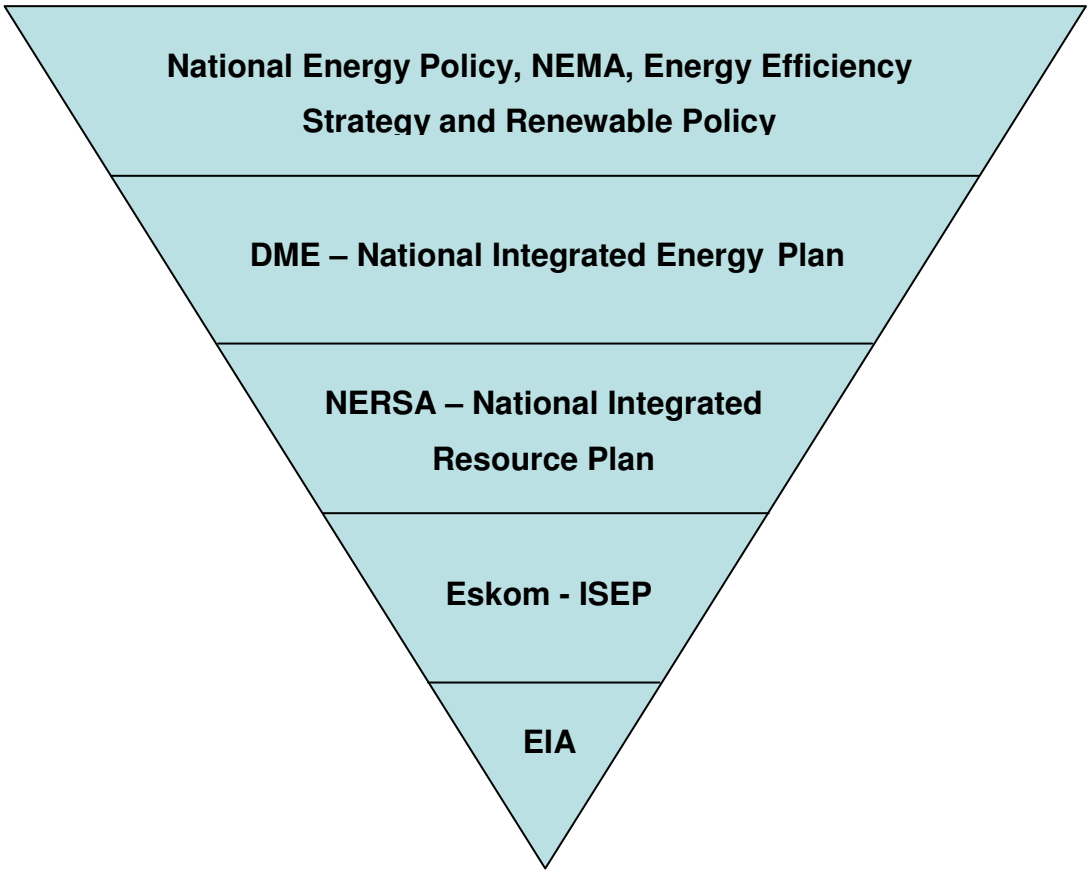

Figure 2.1: Hierarchy of electricity policy and planning documents

1.2 2.1. White Paper on the Energy Policy of the Republic of South Africa, 1998

Development within the energy sector in South Africa is governed by the White Paper on a National Energy Policy (the National Energy Policy), published by DME in 1998. This White Paper identifies five key objectives for energy supply within South Africa, that is:

- Increasing access to affordable energy services
- Improving energy sector governance
- Stimulating economic development
- Managing energy-related environmental impacts
- Securing supply through diversity.

Furthermore, the National Energy Policy identifies the need to undertake an Integrated Energy Planning (IEP) process and the adoption of a National Integrated Resource Planning (NIRP) approach. Through these processes, the most likely future electricity demand based on long-term southern African economic scenarios can be forecasted, and provide the framework for South Africa (and Eskom) to investigate a whole range of supply and demand side options.

2.2. Integrated Energy Plan (IEP) – 2003

In response to the requirements of the National Energy Policy, the DME commissioned the Integrated Energy Plan (IEP) to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance between the energy demand and resource availability to provide low-cost electricity for social and economic development, while taking into account health, safety and environmental parameters.

The IEP projected that the additional demand in electricity would necessitate an increase in electricity generation capacity in South Africa by 2007. Furthermore, the IEP recognises:

- That South Africa is likely to be reliant on coal for at least the next 20 years as the predominant source of energy.
- That new electricity generation will remain predominantly coal-based, but with the potential for hydro, natural gas, and nuclear capacity.
- The need to diversify energy supply through increased use of natural gas and new and renewable energies.
- Continuing investigations into nuclear options as a future new energy source.
- The promotion of the use of energy efficiency management and technologies.
- The need to ensure environmental considerations in energy supply, transformation and end use.
- The promotion of universal access to clean and affordable energy, with the emphasis on household energy supply being co-ordinated with provincial and local integrated development programmes.
- The promotion of the use of energy efficiency management and technologies.
- The need to maximise load factors on electricity generation plants to lower levelised lifecycle costs.
- The need to lessen reliance on imported liquid fuels by exploring and developing oil and gas deposits.
- The need to increase existing oil refineries capacity where appropriate rather than greenfields development.
- The continuation of existing synfuel plants and supplement with natural gas as feedstock.
- The need to introduce policy, legislation and regulation for the promotion of renewable energy and energy efficiency measures and mandatory provision of energy data.

» The need to undertake integrated energy planning on an on-going basis

2.3. National Integrated Resource Plan (NIRP), 2003/2004

In response to the National Energy Policy's objective relating to affordable energy services, NERSA commissioned a National Integrated Resource Plan (NIRP) in order to provide a long-term, cost-effective resource plan for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social and economic policies. The planning horizon for the study was from 2003 to 2022.

The objective of the NIRP is to determine the least-cost supply options for the country, provide information on the opportunities for investment into new power generating projects, and evaluate the security of supply. The NIRP also provides an assessment of the system reliability and serves as a benchmarking tool for market performance. It also examines specific public policies, including those on security of electricity supply and risks associated with the current system.

The national electricity demand forecast took a number of factors into account. These include:

» A 2,8% average annual economic growth.
» The development and expansion of a number of large energy-intensive industrial projects.
» Electrification needs.
» A reduction in electricity-intensive industries over the 20-year planning horizon.
» A reduction in the number of electricity consumers – NIRP anticipates people switching to the direct use of natural gas.
» The supply of electricity to large mining and industrial projects in Namibia and Mozambique.
» Typical demand profiles.

Various demand side management and supply-side options are considered in the NIRP process, prior to identifying the least cost supply options for South Africa. The outcome of the process confirmed that coal-fired options are still required over the next 20 years, and that additional base load plants will be required from 2010.

The first NIRP (NIRP1) was carried out during 2001. The second NIRP was carried out under the auspices of the NER in the period 2003-2004. NIRP2 has been drastically improved, compared to its predecessor, NIRP1. It provides moderate and high electricity and demand forecasts, a complete database of the cost and performance of the generation plant considered in the optimisation, detailed output results, methodology applied in the planning process and risk and sensitivity analyses. To a large extent the NIRP report content resembles IRPs recently developed by international utilities and planning panels.

Other important changes from NIRP1 is the inclusion of risk and sensitivity analyses and scenarios to address risk factors and uncertainties that are associated with the long-term demand forecast; performance of existing generation plants; sustainability and delivery of demand-side management (DSM) options, including Interruptible load supplies; and changes in the electricity demand load shape. Further, NIRP2 takes into account transmission integration costs and credits for regional location of new capacity that were not considered in the previous national resource plan.

2.4. Integrated Strategic Electricity Planning (ISEP) in Eskom

Eskom uses a modelling tool called Integrated Strategic Electricity Planning (ISEP) to plan its future capacity strategy. By analysing usage patterns and growth trends in the economy, and matching these with the performance features of various generation technologies and demand side management options, ISEP identifies the timing, quantity and type (base load or peaking) of new capacity options required in the long-term. These options include the Return-to-Service of the three mothballed coal-fired Simunye Power Stations (i.e. Camden, Komati and Grootvlei), conventional pulverised fuel power plants (i.e. coal-based power), pumped storage schemes, gas-fired power plants, nuclear plants, greenfield fluidised bed combustion technologies, renewable energy technologies (mainly wind and solar projects), and import options within the Southern African Power Pool. As the older Eskom power plants reach the end of their design life from approximately 2025 onwards, the use of all available technologies will need to be exploited to replace these in order to supply the country's growing electricity demand.

The ISEP process identifies the timing, quantity and type (e.g. base load or peaking) of new electricity generating capacity required over the next 20 years. The planning scenarios are based on an average 4% growth in demand for electricity over the 20 year period. This translates into a 6% growth in GDP. The most recently approved ISEP plan identified the need for increased *peaking* electricity generating by *2007* and additional *baseload* capacity by approximately *2010*. An increase in peaking supply has since been achieved through the commissioning of new plant, such as the OCGT facilities at Atlantis and Mossel Bay in the Western Cape. Figure 2.2 illustrates Eskom's "project funnel", which shows the range of supply options being considered by Eskom to meet the increasing demand for electricity in the country. There are many projects at various stages in the project funnel including research projects, transmission lines and generating options in South Africa and Southern Africa.

This Terms of Reference deals with the proposed new coal-fired power station located southwest of the existing Matimba and Medupi Power Stations in the Waterberg area.

1.3 Summary Description of preferred sites

1.3.1 Location

Eskom envisage constructing and operating a coal-fired "Greenfield" power station in the area approximately southwest of the existing Matimba and Medupi Power Stations in the Waterberg area.

Through the ISEP process, and as part of Eskom's Integrated Coal Programme, the need for an additional coal-fired power station has been identified. This new power station will be located on/close to a coalfield/area with sufficient coal resources, identified through Eskom's discussions with/coal information from relevant mining houses.

Please see the attached map for a high-level indication of where a new coal-fired power station could be located.

On the basis of the above information detailed site selection process, will have to be conducted. The results from these processes would then be fed into a proper EIA process.

1.4 Previous studies

No previous studies have been conducted on this project, and the successful EIA consultant will have to work hand-in-hand with Eskom in this regard. Similar stations that have been studied are Medupi (whose EIA has recently been completed) and Matimba.

2. AIMS OF THE STUDY

The aim of the EIA is to conduct a defendable and robust EIA process, and ultimately a final, high-quality Environmental Impact Report (EIR) that will be submitted to the relevant authority, with the view of obtaining an Environmental Authorisation from the relevant authority. The process to be undertaken should comply with the "Equator Principles" and the World Bank requirements, at minimum.

3. SCOPE OF WORK

The Tenderer needs to provide a comprehensive proposal for the scope of work required to complete an Environmental Impact Assessment process (commencing with a detailed site-selection, as a separate activity and report), as well as the compilation of an Environmental Management Plan (at close of the EIA process), for the proposed power station. The study is to be undertaken in three linked phases, to be executed sequentially or concurrently, as may be necessary:

Phase 1: Detailed site selection and site screening process

Phase 2: Environmental Impact Assessment process – Scoping and EIA phases, which can be overlapped for fast-tracking the process (for power plant, as well as associated infrastructure such as ash disposal facility, ash & coal conveyors, temporary and permanent access roads networks, sorbent off-loading and storage facilities, high-voltage yard, water supply pipeline for construction and operation, construction villages, etc)

Phase 3: Environmental Management Plan (EMP) for construction and operations (must provide for any amendments as required for DEAT post authorisation)

Post Authorisation work (may include dealing with any appeals, and notification for appeals, although Eskom reserves the right not to use the services of the consultant)

It is envisaged that a robust, defendable EIA process will be undertaken by the successful tenderer, such that an environmental authorisation may be obtained for this proposed coal-fired power station. It is also envisaged that the successful tenderer will make provision to fast-track this EIA process.

3.1 Project Description

The project comprises the design, construction, commissioning and operation of a coal-fired power station with its associated infrastructure in the Waterberg area. The power station itself would comprise, **at most**, six supercritical boiler/ turbine units (each with a nominal generating capacity of approximately 900 MW of electricity) fuelled by pulverised fuel (coal), and will have a total nominal electricity generation capacity of approximately 5 400 MW. The station capacity rating is dependant on the technology selected, which is based on a technical and commercial evaluation of various Original Equipment Manufacturers (OEM). Furthermore dry cooling would be considered for the proposed development.

Apart from the generating units themselves, there would be various ancillary infrastructure including:

- A high voltage (HV) yard within the power station precinct ;
- Water supply pipelines (for both construction and operation);
- Water and wastewater treatment facilities;
- Ash disposal facility;
- Sorbent off-loading, storage and conveyance systems;
- Air quality abatement technology processes and associated waste conveyance and disposal systems;
- Ash and coal conveying systems;
- Coal stockyard and coal handling facilities;
- General storage and handling facilities;

- Hazardous storage facilities;
- Electricity supply during the construction phase;
- Access roads (internal and external);
- Batching plants (concrete and tar);
- Dams for the storage of “clean” and “dirty” water; and
- A construction village

Air quality abatement technology, in view of the tightening of legislation in South Africa regarding gaseous emission levels, **may** be considered a requirement and therefore will be considered to form part of the technology to be applied to the new proposed coal fired power station for Proposed power station.

The study will therefore cover all the above aspects relating to the construction and operation of the proposed power station.

In addition, the EMP must consider at least the following impacts associated with the following aspects under construction, operating and decommissioning scenarios:

- Site clearance and fencing
- Bulk earthworks and civils
- Erection of structures and steel work
- All mechanical & electrical work
- All wet services installation
- Domestic water supply infrastructure
- Solid and liquid waste disposal
- Air emissions
- Distillate fuel oil supply infrastructure, including fuel oil transfer and on-site storage
- Storm water and effluent control
- Presence of construction workforce and permanent workforce.

Other activities would include:

- Batching plants
- Onsite storage of hazardous substances
- Temporary contractors/construction villages

3.2 Legal Framework

Environmental Impact Assessment (EIA's) for the new proposed power station is governed by the EIA regulations as promulgated under the National Environmental Management Act (No. 107 of 1998). The EIA needs to contain a review of all legal requirements relevant to this project during its life cycle, and all specialists' studies should take cognisance of these legal requirements. Hence the final designs and management plans for this project should conform to the existing and proposed legal requirements, which may include *inter alia*, the need for permits, licences or authorisations.

Particular attention should also be paid to World Bank, the "Equator Principles" and European Union Guidelines for new coal-fired power plants and its impact on the project in terms of design, operation and management plans.

3.3 Phase 1: Detailed site selection and site screening

A detailed site selection and screening process, will be conducted by the successful EIA consultant. In addition to criteria jointly decided upon by Eskom and the EIA consultant, the following aspects will be considered ***inter alia*** during the site selection process:

- Coal availability, including distance to "mine mouth", the non-sterilisation of mineable coal reserves and the feasibility of distance between station and coal resource
- Water availability
- Sorbent availability
- Existing ambient air quality and the potential impact of additional emissions
- Distance to urban and rural communities (proximity to sensitive receptors)
- Transmission capacity/options for linking to grid
- Distance to existing infrastructure such as roads, etc.
- Current and surrounding land use and associated communities

This site selection process would serve as the appropriate "point-of-departure" for the Scoping phase and hence the EIA process.

The tenderer must provide a detailed and clear site selection process to be followed in selecting feasible sites to be studied. As the "point-of-departure" for the whole process, this aspect of the tender is of critical importance for defendability of the siting alternatives.

During the site selection process, all specialists must develop a clear sensitivity mapping against a shaded relief mapping.

3.4 Phase 2: EIA process

3.4.1 Scoping and EIA phases

Following the completion of the site selection process, the EIA process will commence, with siting being informed by the previous process. The EIA process shall include the Scoping phase and the Environmental Impact Assessment phase. Both phases must be undertaken in strict compliance to the EIA regulations, at the minimum.

The tenderer must clearly articulate how these phases will be executed in undertaking a robust process. Both of these phases will have representative public participation processes

At the end of the scoping and EIA phases, the process must produce a set of sensitivity mapping against a shaded relief map.

3.4.2 The public participation process

The public participation process is critical in ensuring public review and input into the EIA process. Some of the authorities to be engaged include: Department of Environmental Affairs & Tourism, Department of Water Affairs & Forestry, Department of Public Enterprises, Department of Trade & Industry, Limpopo provincial environmental authorities (including L DEDET), South African national Roads Agency (SANRAL) and provincial roads agencies, Department of Transport, other national/provincial departments where deemed necessary, Water User Associations, Community Based Organisations, Non-Governmental Organisations, Business Unions, Farmers' Unions, etc.

The tenderer must provide a **detailed Public Participation Plan**, which shall include, but not be limited to the following: A timetable for communication, detailing who will be consulted and why; as a minimum, one public meeting should be held during the Scoping phase and one public meeting during the impact assessment phase (although this number might be increased due to the width of the study area). The timing of these meetings would be decided upon in conjunction with Eskom's EIA Project Manager; ensure that the public participation process complies with the relevant EIA regulations; compile minutes of the meetings and send to all participants and organise appropriate feedback mechanisms for public comment.

3.4.3 Specialist' studies to be conducted

The Consultant shall describe the receiving environment on and in the vicinity of the proposed coal-fired power station, using site observations and measurements, input from other studies, new research findings and updated data bases. The environmental specialist studies shall include, **but is not limited,** to the following:

- Land use;
- Geology, Soils & Agricultural Potential;
- Economic study;
- Geotechnical investigations (Geology, Soils);
- Surface water resources (including water quality and aquatic biota) and wetlands delineation;
- Impacts on Groundwater resources;
- Air quality;
- Noise;
- Visual impact;
- Terrestrial vegetation;
- Terrestrial fauna;
- Heritage impacts;
- Social Impact Assessment;
- Risk assessment;
- Transportation and traffic impact studies (including the transportation of sorbent for potential FGD implementation); and
- Tourism.

Although not a separate study, the use of GIS to make clear and easy-to-read presentations is required.

3.4.4 Interactive consultation with the design engineers to develop the final project layout and design

It will be expected that the Consultant will liaise closely with the engineering design team, while the various alternatives and possible mitigation measures are being considered. Possible fatal flaws must be reported to the Project Team as soon as they are identified.

3.4.5 Assessment of impacts

The impact assessment must cover the following main scenarios:

- Construction phase
- Normal and upset operating conditions
- Decommissioning and closure

The impacts should be evaluated in terms of their local, regional, national and international importance. The impacts should be assessed in terms of the magnitude, significance, frequency of occurrence, duration and probability. The confidence level in the prediction must be stated. A summary table showing the impacts and their ratings must be provided, together with general recommendations for mitigation.
The methodology for impact assessment must be clearly communicated in the proposal.

3.4.6 Compilation of a world-class Environmental Impact Report

The EIR must be a stand-alone document, which can be included in the overall bankable feasibility study report/business case for the project. All reports in the EIA process must be submitted to Eskom for review and comments before further processing (to public or authorities). The specialist studies must be included in a separate volume or volumes. All maps must be in GIS format.
The tenderer must provide a sample Table of Contents for the final Scoping report and EIR in the submission. A total of 2 hard copies and 5 CDs of the draft scoping report and EIR, and 5 hard copies of the final scoping report and EIR plus 5 CD's should be made available to the Client.

In addition to the above requirements, a statement on compliance to the following requirements must be included upfront in the draft and final EIR:

- Whether the EIA process and associated documentation comply with the World Bank Group's Environmental Assessment (EA) process
- Whether the EIA process and associated documentation comply with the "Equator Principles"
- Whether the EIA process and associated documentation comply with any other standards/guidelines/principles as may deem necessary by Eskom and/or export credit agencies (ECAs) acting on behalf of Eskom.

3.5 Phase 3: Environmental Management Plan/Programme (EMP)

This must be done in line with the relevant EIA regulations. A draft EMP must be submitted with the final Environmental Impact Assessment Report (EIR). The EMP must be drawn up for the control of residual impacts and emergency situations during construction, operation, decommissioning and closure. The EMP will be a stand-alone document. The EMP will be drawn up in close collaboration with the project design engineers, Eskom environmental specialists and other staff to ensure that all the measures required to achieve the agreed environmental management objectives are practicable and achievable. The EMP will be in a form that can be included in construction tender documents.

The EMP will also contain detailed plans relating to *inter alia*, 'clean' and contaminated topsoil and spoil management, 'clean' and polluted water management, removal of vegetation, erosion and slope stabilization, noise management, uncontaminated solid waste management, hazardous material and waste management, fuel off-loading and storage, air quality management, health and safety strategy, risk management and emergency response, public consultation and ongoing liaison.

The EMP will set out a detailed monitoring programme to ensure that all aspects of plant construction are complying with the agreed environmental management objectives. The monitoring programme will include soils, vegetation, ecological indicator species, surface and ground water quality, air quality, noise, marine environment and socio-economic indicators. The EMP will indicate who will be responsible, the location of monitoring points, what must be monitored and how frequently. The Graphical Information System tools must be used in the EMP, to delineate sensitivity mapping, approved corridors for transportation, no-go area's etc, that gives authorities and I&AP a clear visual understanding of the site from an environmental perspective.