D3发电有限公司
D3 Power Generation Ltd.

DOCUMENT TYPE	PROCEDURE
DOCUMENT REFERENCE	EMSP 05-01-EAI_2
DOCUMENT TITLE	Environmental Aspects & Impacts Evaluation
PROCESS OWNER	QHSE Manager

	Written By	Reviewed By	Approved By	Authorised By
Date				
Designation	QHSE Officer	QHSE Manager	CTO	CEO
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Signature				

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Document Control

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1. Purpose

The objective of the procedure is to define responsibilities and detailed rules used by D3PG to identify and evaluate direct and indirect environmental aspects.

The aim of the environmental aspects evaluation is to identify those aspects which have significant environmental impacts and hence to plan improvement programs to improve or to keep these aspects under control within the EMS.

The procedure is applicable to all D3PG activities within the EMS scope.

2. Responsibilities

QHSE Manager

- Proposes environmental aspects evaluation criteria

- Coordinates environmental data and information gathering, evaluation and updating

- approves the environmental aspects evaluation criteria and the environmental aspects evaluation

Process Owners

- identifies environmental aspects

- supports the EC in environmental data and information gathering, evaluation and updating

3. Terms & Definitions

EMS: Environmental Management System

EAIR: Environmental Aspects and Impacts Register

MRM- Management Review Meeting

Environment: context in which an organization works, including air, water, soil, natural resources, the flora, fauna, human beings and their relationships;

Environmental aspect: element of activities, products or services of an organization that can interact with the environment.

Environmental impact: environmental changes that occur, wholly or partly, as a consequence of an organisation's environmental aspects

4. Regulatory References & Other Documents:

Doc. Type	Ref. No	Description	Clauses
Standards	ISO 14001:2015	Environment Management System	6.1.2
Standards	ISO 45001:2018	Occupational Health and Safety Management Systems	6.1.2

5. Notes:

Procedures are reviewed periodically, at least once a year, in accordance to the Internal Audit Plan. Internal auditors audit the procedure and raise any inaccuracies with the process owners.

Other reviews are carried out as required.

6. The Environment

Ecosystems comprise communities of interdependent organisms and the physical environment that they inhabit. Although cyclical change is frequently observed in natural ecosystems, human interference threatens their sustainability in many parts of the world. Examples of ecosystem types include woodlands, lakes, rivers, moorland, coral reefs, estuaries, etc. Human interaction with the natural environment can be a hazard and pose risks that could ultimately impact the eco-system.

6.1. Environmental Aspects

Environmental Aspect is an element of an organization's activities, products or services that can interact with the environment. There are two types of environmental aspects taken into consideration:

(i) Direct Environmental Aspects are activities over which a company has influence and control. For example, emissions from processes.

(ii) Indirect Environmental Aspects are activities over which the organization can be expected to have an influence, but no control. For example, supply chain-controlled aspects, customer controlled aspects, aspects managed elsewhere within the same company.

As indicated, a single activity may have several aspects, which in turn may have several impacts. When assessing the environmental aspects associated with a particular activity, it is useful, therefore, to have a checklist of categories to consider. Below is the SHARLENE checklist:

- Solid waste.
- Hazardous material usage
- Air emissions
- Raw material usage
- Land usage
- Effluent discharges
- Nuisance
- Energy usage

6.2. Environmental Impacts

An environmental impact is the resulting change to the environment that is caused by one or more environmental aspects. Therefore, Environmental impacts are also often grouped in terms of the receptors affected.

As implied above, an environmental aspect may cause impacts under more than one heading, e.g. effluent discharge may cause changes to water quality (water) with secondary impacts on plant and animal communities (flora and fauna) and human health (human beings).

At the simplest level, environmental impacts fall into two broad categories:

- pollution;
- resource depletion.

Each may be defined as follows:

Pollution – the introduction by man of substances or energy into the environment that are liable to cause hazards to human health, harm to ecological systems, damage to structures or amenity, or interference with legitimate uses of the environment.

Resource depletion – the consumption of natural resources that are either finite in their existence (non-renewable resources) or are managed in such a way as to permanently deplete potentially renewable biological or physical resources. Examples of non-renewable resources include fossil fuels and mineral ores. Examples of resources, which may be indefinitely renewed if managed/consumed appropriately include fish stocks and timber.

It should be noted that environmental impacts may be considered positive or negative and that while we often tend to focus on the negative impacts, actions may be taken which result in positive consequences in the human, biological or physical environment.

7. Environmental Aspects and Impacts evaluation

7.1. Introduction

The environmental analysis is carried out through the Environmental review, which starts through in the Environmental aspects register (EMSR 05-01-EAIR Environmental Aspects & Impacts Register) and is concluded through the Environmental Management Program.

The environmental review is the analysis of D3PG operational and administrative processes. The analysis is executed in terms of Environmental Aspects and Impacts and how these can be reduced, controlled and monitored.

7.2. Environmental Review

The Environmental review is executed through EMSR 05-01-EAIR Environmental Aspects & Impacts Register. This register contains all the relevant D3PG processes, aspects and impacts thereof. The Environmental Review considers only the environmental factors and assesses the environmental risk for each process. Different conditions are routinely considered for any activity to ensure that all actual and potential environmental aspects are identified:

- **Normal:** routine operations that occur continuously or frequently
- **Abnormal:** planned operations occurring infrequently, e.g. maintenance activities, which may give rise to very different environmental aspects to those occurring under normal operations.
- **Emergency:** unplanned occurrences, e.g. spillages which are 'potential aspects' that may be very important if inadequate precautions are in place or insignificant if the likelihood of occurrence is extremely low.

Consideration of these different operating conditions may give rise to some additional actual or potential aspects to include in the list generated by the input-output/SHARELENE approach.

Furthermore, this review considers controls, measurement and improvement for the significant risks identified. The output of the EMSR 05-01-EAIR Environmental Aspects & Impacts Register is the input to the EMSR 05-01-EAIR Environmental Aspects & Impacts Program, which is discussed, approved and reviewed for implementation during the MRM.

The EAIR includes:

- identified environmental aspect (with related impacts);
- business activity to which this is connected;
- information and explanatory elements that could be useful to clarify the context and evaluation decisions;
- whether the environmental aspect is linked to normal, anomalous or emergency conditions;
- the control method adopted (procedures, monitoring or other) and the instruments for the environmental aspect management;
- opportunities for improvement (this column is compiled only for the initial environmental analysis);
- evaluation of aspects through evaluation criteria;
- actions expected within the EMS, HSMS

The EAIR is modified according to significant variations such as with the introduction of new activities or processes. It is updated every time the environmental aspects evaluation changes, or each time new environmental aspects are introduced, or eliminated once they are no longer applicable. The EAIR is also reviewed once yearly against Legal Compliance, Internal Audits, and Organisational Context to ensure all the factors and risks are being considered appropriately.

7.3. Data and Information Collection

The Environmental review is carried out by the RAC and the relevant process owners. All process aspects are discussed for normal situations and possible abnormal situations, majorly through evaluation intended and unintended outcomes of possesses. Inputs to the Environmental Aspects and Impacts Evaluation include:

IMSF 02-02-OC Organisational Context Summary

QEHS POLICY

IMSR 04-02-CMR Change Management Register

IMSF 05-10-ATP Annual Training Plan

IMSR 08-01-LCR Legal Compliance Register

IMSF 10-02-PFMEA Process Failure Mode and Effects Analysis

EMSP 01-01-LCP Life Cycle Perspective

The above mentioned inputs are considered for the Environmental Review and evaluated through the common risk scoring system as established by IMSP 10-01-RM Risk Management procedure.

The only variation is the inclusion of the "*coefficient of influence*". This coefficient is mainly used to differ between direct and indirect aspects, and assign a value to the degree of influence the organisation has on the relevant aspect. The Co-efficient of influence is a value between 0 and 1, where 0 is negligible influence on an indirect aspect and 1 is maximum influence and a direct aspect. (Table 1)

The Severity, Occurrence, detection and the Coefficient of influence are than multiplied to obtain the final RPN. The processes with the highest significant risks, top 10, are then entered in the EMSR 05-01-EAIR Environmental Aspects & Impacts Program

Degree of Influence criteria	***Value of the coefficient of influence***	***Criteria to evaluate the degree of influence***
No influence	0	No opportunities to influence the impact
Low	0.3	Possibility to carry out information or awareness activities.
Medium	0.5	Possibility to address the impact through contracts, internal processes and supplier/contractors qualification and evaluation.
High	0.7	The impact can be influenced through on site controls and supplier visits.
Full	1	D3PG has direct influence on the aspect.

Table 1 Coefficient of influence

8. Check-list of Environmental Aspects and the Impacts Evaluation

This is a list of items and checks, which should be considered in support of the Environmental Evaluation and the Environmental Management Plan.

8.1. Resource Usage

- **Energy usage**
- Electricity depletion of coal reserves and generation of greenhouse gases
- Issues for consideration when developing improvement options

- heating efficiency and wastage
- lighting efficiency
- use of power-management feature on equipment
- unnecessary usage
- use of inefficient equipment
- reuse of waste heat where viable
- co-generation opportunities

- Gas depletion of gas reserves and generation of greenhouse gases
- Liquid fuel depletion of oil reserves and generation of greenhouse and other harmful gases
- Steam depletion of fuel reserves and generation of greenhouse gases

- **Water usage**
- Depletion of town water reserves, examples of ways in which water use can be reduced:

- maintain equipment to minimise leakage

- mulch and other measures to reduce need for watering gardens
- native plants to reduce need for water and fertilisers
- focus on equipment and practices which use the most water in a building or on a site

➢ **Chemical purchase and/or usage**

➢ Environmental contamination by chemicals and chemical residues, examples of ways in which this contamination can be reduced:

- purchase of smaller package sizes in line with need
- use existing stock (share chemicals) where possible rather than buying new chemicals
- reuse or recycling of waste
- minimise use of environmentally-toxic chemicals (find safer alternatives)

➢ **Paper use**

Paper manufacture and even recycling has various environmental impacts and leads to pollution, examples of ways of reducing paper use:

- examining all paper usage and eliminating usage where possible
- double-sided printing (and providing equipment capable of double-sided printing
- collection and reuse of paper printed on one side

➢ **Use or disposal of packaging**

- packaging is often seen as unavoidable, but it can be reduced by bringing pressure on suppliers to:
- minimise the amount of packaging used

- collect and reuse packaging
- use environmentally-friendly materials (paper rather than plastic)

➢ Equipment usage (including vehicles)

➢ Inefficient resource usage because of poor maintenance of equipment and because equipment is too old

➢ Wasted resources due to equipment running when not in use or under-utilised

➢ Excessive resource usage because of inefficient operation (eg. long flush/wash cycles)

➢ Opportunities to use more efficient or cleaner fuel source for equipment

➢ **Storage issues**

- minimising risk of spillage and pollution by using good storage practices:
- good basic housekeeping
- labelling and segregation of chemical classes
- bunding of liquids
- removal from site of excess raw materials and other stock that is unlikely to be used
- ready access to MSDS in the event of a leak or spill
- availability and adequacy of spill kits
- staff competent in mitigating the environmental effect of a leak or spill

➢ Minimising rework and scrap to minimise resource wastage

8.2. WASTE GENERATION

➢ Temperature effects (eg. creating of vapours potentially harmful to sewer workers)

➢ May lead to contamination of town water

- Segregation to maximise reuse and recycling opportunities
- Disposal to general garbage
- Pressure on land-fills due to large volume of general garbage
- Leakage of oil
- Leakage of PCBs from old electrical equipment (especially from old capacitors)
- Leakage of CFCs and HCFCs from closed-cycle cooling equipment
- Long-term contamination of land fills from nicad, mercury and lead-acid batteries
- Reuse, recycling and disposal of construction waste
- Production
- Minimising the amount of waste and scrapped product generated on-site

8.3. Reuse and Recycling

- Mulching and composting or organic waste
- Recycling (or reusing):

- glass, plastic and metals
- paper
- cardboard
- packaging
- chemicals
- old equipment and furniture

- Reducing use of disposable cups, plates, cutlery etc.
- Use of recycled paper and other products to support the recycling industry (create a demand for such items)

- Converting paper printed on one side to notepads to facilitate reuse

- recyclability of manufactured products (LCA)
- reuse of waste materials generated on-site
- reuse of waste heat

8.4. Heritage Issues and Public Utility

- Interaction with heritage issues
- Preservation of heritage structures (eg. buildings)
- Preserving natural ecosystems and rare plants
- Preserving culturally significant sites
- Creation of conditions conducive for breeding of mosquitoes, mice, cats and other pests
- Spread of human, animal or plant disease within the site
- Interaction with local community issues
- Changes affecting visual appeal of buildings and property
- Shadows cast by buildings during the day
- Light pollution at night
- Changes affecting traffic density and associated hazards, and availability of local parking
- Changes affecting access to public land
- Vibration from equipment
- Littering local environment
- Activities affecting land conservation
- Disturbance of natural habitats or bio-systems

8.5. SYSTEMS

The following list is not a list of environmental aspects and impacts, but rather a checklist of system aspects.

- Environmental awareness education (including knowledge of environmental aspects) to:
- Staff whose duties may lead to intended and unintended environmental impacts
- General staff
- Students (for educational institutions)
- Contractors and collaborators
- Provision of information
- Knowledge of applicable legislation by those with responsibilities for compliance
- Provision of sources of expert advice as required
- Record-keeping
- Provision of information to create incentive for reducing waste and minimising environmental impacts
- Assignment of responsibilities and appropriate authorities
- Management responsibilities
- Operational responsibilities
- Emergency responsibilities
- Operational control
- Identification of environmental risks
- Identification of legal and other obligations
- Assessment of potential impacts and effectiveness of existing environmental controls
- Development of new procedures to minimise environmental impacts
- Training in (and resourcing of) these procedures

- Improvement programs
- Control of the work of contractors working on-site
- Written conditions of contract and adequate instruction
- Controls to ensure performance
- Safe storage of materials
- Means of reporting incidents and environmental hazards and taking action
- Monitoring
- Key waste quantities and waste costs
- Potential legal non-conformances and significant environmental impacts (intended and unintended)
- Competency in dealing with emergencies
- Identification of foreseeable loss-of-control incidents which may lead to significant environmental impacts this may include:
  - flood (contamination of flood water)
  - Fire
  - power failure
  - loss of control of a process

8.6. Positive Environmental Aspects

- Improving education and environmental awareness (staff, students, suppliers, customers)
- Use of "Green" products (to support reuse and recycling industries)
- Clean up of past environmental damage
- "Spread the word" to others (co-workers, local community, sports groups etc.) on environmental sustainability
- Environmental initiatives in view of creating an offset to the operating impacts and influencing stakeholders.

9. Environmental Program

The Environmental Program is the resulting output of the Environmental Aspects and Impacts analysis. While the Environmental Evaluation supports D3PG Policy and objectives to reduce risks and continually improve multiple aspects of its operations while safeguarding the environmental and its stakeholders, the Environmental Program is developed to ensure that the risks are controlled, monitored, mitigated and/or contained at source through set targets and goals.

Following the conclusion of the Environmental Aspects and Impacts review, scoring and identification of the significant top 10 risks, control and risk mitigation actions are developed. Process owners are requested to proposed and discuss actions intended to reduce or eliminate the identified environmental risks.

The targets and goals are all about reducing the significant risks and hence improving the environmental performance of the organisation. By setting goals to reduce the risks a specific process imposes, we are always improving and achieving D3PG organisational objectives.

The Environmental Program is documented as per EMSR 05-01-EAIR Environmental Aspects & Impacts Register.

10. Related Documents

IMSF 02-02-OC Organisational Context Summary

QEHS POLICY

IMSR 04-02-CMR Change Management Register

IMSF 05-10-ATP Annual Training Plan

IMSR 08-01-LCR Legal Compliance Register

IMSF 10-02-PFMEA Process Failure Mode and Effects Analysis

IMSR 14-01-NCR Non-Conformity Register

EMSP 01-01-LCP Life Cycle Perspective